ਜਗਤ ਗੁਰੂ ਨਾਨਕ ਦੇਵ
ਪੰਜਾਬ ਸਟੇਟ ਓਪਨ ਯੂਨੀਵਰਸਿਟੀ
ਪਟਿਆਲਾ

**The Motto of Our University (SEWA)**

**S**KILL ENHANCEMENT
**E**MPLOYABILITY
**W**ISDOM
**A**CCESSIBILITY

## JAGAT GURU NANAK DEV
## PUNJAB STATE OPEN UNIVERSITY, PATIALA
### (Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

# B.COM (Hons.)
# Accounting and Taxation

## SEMESTER – II

## AE2B31201T

# INTRODUCTION TO ENVIRONMENTAL STUDIES

**Head Quarter: C/28, The Lower Mall, Patiala-147001**
**Website: www.psou.ac.in**

The Study Material has been prepared exclusively under the guidance of Jagat Guru Nanak Dev Punjab State Open University, Patiala, as per the syllabi prepared by Committee of Experts and approved by the Academic Council.

**COURSE COORDINATOR AND EDITOR:**

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**ASSISTANT PROFESSOR IN HISTORY**
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**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY,PATIALA**

**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

# PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open Universityof the State, entrusted with the responsibility of making higher education accessible to all, especially to those sections of society who do not have the means, time or opportunity to pursue regular education.

In keeping with the nature of an Open University, this University provides a flexible education system to suit every need. The time given to complete a programme is double theduration of a regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skill-based and employability-enhancing education. The study material provided in this booklet is self- instructional, with self-assessment exercises, and recommendations for further readings. Thesyllabus has been divided in sections, and provided as units for simplification.

The University has a network of 99 Learner Support Centres /Study Centres, to enable students to make use of reading facilities, and for curriculum-based counseling and practical's. We, at the University, welcome you to be a part of this institution of knowledge.

Prof. G.S. Batra
Dean Academic Affairs

# B.Com (Hons.)
## Accounting and Taxation
### SEMESTER-II
### (AE2B31201T): INTRODUCTION TO ENVIRONMENTAL STUDIES

**MAX.MARKS:100**
**EXTERNAL:70**
**INTERNAL:30**
**PASS:40%**

**Objective:**                                                                                    **Credits:4**

The objective of this paper is to create awareness about environmental problems among learners. The paper imparts basic knowledge about environment and its problems, and attempts to motivate learners to participate improvement.

**INSTRUCTIONS FOR THE CANDIDATES:**

Candidates are required to attempt any two questions each from the sections A, and B of the question paper, and any ten short answer questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

### SECTION-A

The multidisciplinary nature of environmental studies. Definition, scope and importance. Concept of Biosphere – Lithosphere, Hydrosphere, Atmosphere.

**Ecosystem & Biodiversity Conservation**
Ecosystem and its components, Types of Ecosystems
Biodiversity - Definition and Value, Threats to biodiversity and its conservation
Level of biological diversity: genetic, species and ecosystem diversity; bio-geographic zonesof India; biodiversity patterns and global biodiversity hot spots.
India as Mega-biodiversity nation; Endangered and endemic species of India.
Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

**Natural Resources–Renewable And Non Renewable Resources:** Land resources and land use change; land degradation, soil erosion and desertification. Deforestation: causes and impacts due to mining, dam building on environment, Forests, Biodiversity and tribal populations.
Water: Use and over-exploitation of surface and ground water, Floods, droughts, conflictsover water (international & inter-state)
Energy resources: renewable and nonrenewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Environmental Pollution:** Types, causes, effects and controls; Air, Water, Soil and noise pollution. Nuclear hazards and human health risks Solid waste management, Source Segregations : Control measures of urban and Industrial waste. Pollution case studies.

## SECTION-B

**Environmental Protection Laws In In dia:** Environmental protection act for; Air (Prevention and control of pollution), Water (Prevention and Control of pollution), Wild life, Forest Conservation, Issues involved in the enforcement of environmental legislation.Role of an individual in prevention of pollution.

Environmental policies & Practices; Climate change, global warming, ozone layer depletion, acid rain and imapcts on human communities and agriculture.

### Human Communities and the Environment
Human population growth: Impacts on environment, human health and welfare, Sanitation & Hygiene. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environment movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation for a Clean-green pollution free state. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi)

**Road Safety Awareness:** Concept and significance of Road safety, Traffic signs, Traffic rules, Traffic Offences and penalties, How to obtain license, Role of first aid in Road Safety.

**Stubble Burning:** Meaning of Stubble burning. Impact on health & environment. Management and alternative uses of crop stubble. Environmental Legislations and Policies for Restriction of Agriculture Residue Burning in Punjab.

### Suggested Readings:
1. Carson, R.2002. Silent Spring, Houghton Mifflin Harcourt.
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11. Rao, M.N. & Datta, A.K.1987. Waste Water Treatment. Oxford and IBH PublishingCo. Pvt.Ltd.
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13. Rosencranz, A., Divan, S., & Nobie, M.L. 2001. Environmental law and policy inIndia. Tripathi 1992
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development.OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science andConservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S. Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
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19. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World commission on Environment and Development. 1987. Our Common Future.Oxford University Press.

# B.Com (Hons.)
# Accounting and Taxation

## Semester-II

### AE2B31201T: ENVIRONMENTAL STUDIES COURSE

### COORDINATOR AND EDITOR: MRS.PARAMPREET KAUR

### SECTION A

| UNIT NO. | UNIT NAME |
|---|---|
| UNIT 1 | INTRODUCTION TO THE ENVIRONMENTAL STUDIES |
| UNIT 2 | ECOSYSTEM & BIODIVERSITY CONSERVATION |
| UNIT 3 | NATURAL RESOURCES – RENEWABLE AND NON - RENEWABLE RESOURCES |
| UNIT 4 | ENVIRONMENTAL POLLUTION |

### SECTION B

| UNIT No. | UNIT NAME |
|---|---|
| UNIT 5 | ENVIRONMENTAL PROTECTION LAWS IN INDIA |
| UNIT 6 | HUMAN COMMUNITIES AND THE ENVIRONMENT |
| UNIT 7 | ROAD SAFETY AWARENESS |
| UNIT 8 | STUBBLE BURNING |

# B.Com (Hons.)
# Accounting and Taxation
## SEMESTER: II
## COURSE:  ENVIRONMENTAL STUDIES

### UNIT – 1: INTRODUCTION TO ENVIRONMENTAL STUDIES

**STRUCTURE**

**1.0 Learning Outcomes**

**1.1 Introduction**

**1.2 Meaning of Environment**

**1.3 Multidisciplinary Nature of Environment Studies**

**1.4 Definition, Scope and Importance of Environment Studies**

**1.5 Concept of Biosphere, Lithosphere, Hydrosphere, Atmosphere**

**1.6 Summary**

**1.7 Questions for Practice**

**1.8 Suggested Readings**

## 1.0 LEARNING OUTCOMES:

After the study of this unit, the learners will be able to:

- Know the concept of environment and understand it from the perspective of the elements that constitute the environment

- Understand the multidisciplinary approach towards the subject of Environmental Studies

- Learn about the scope and importance of the discipline of Environmental Studies

- Acquire a greater understanding of the components of the environment and know more about the thermal stratification of the environment

## 1.1 INTRODUCTION

The subject of Environment  Studies aims at providing a comprehensive  understanding  of a wide range of environmental concerns through an interdisciplinary approach that combines scientific knowledge with an understanding  of  the  socioeconomic  impact  of  these problems. It focuses on environmental issues such as climate change and global warming, as well as contamination  and  pollution. It contributes significantly in equipping the students with an analytical skill and critical approach towards the understanding of the important issues

pertaining to the environment and inculcates in them a contextual understanding of major global and regional environmental challenges. The resources available with the Mother earth are dwindling day by day and the human beings have been causing intemperate damage to the environment in an urge to grow and progress in all spheres of their lives. The human beings cannot survive without the environment either but the destruction caused to the quality of environment because of the incessant use of natural resources has almost begun to render survival and sustenance impossible on the Earth. The rise in the global temperature, depletion of the ozone layer, climate changes, increasing incidence of environmental pollution, rising proportion of human population and calamities and disasters are all, the consequences of human interference with the ecological balance.

The subject of environmental studies can help in understanding the problems and concerns relating to the environment from the perspective of physical, biological, chemical and social perspectives. It gives the learners an opportunity to delve deeper into the interface between human beings and nature and understand how human beings and other living organisms depend upon each other. An insight into this discipline will help to develop an awareness of the significance of the renewable sources of energy and the need to cut down on the use of non-renewable sources. The knowledge of the subject can provide the skills that are essential to find out effective solutions to the problems and encourage the use and development of scientific and conscientious principles to address the issues that have invited a great deal of national and global attention.

## 1.2 MEANING OF ENVIRONMENT

The word environment finds its origin from the French word _environner' which means _to encircle' or _to surround'. The term _environment' was used for the first time by a biologist Jacob Van Uerkal for the subject of ecology in which the interaction between the living organisms and their environment is studied. Thus the term indicates the external conditions or surroundings that support the growth of flora and fauna or even the human beings and their characteristics and also protect all these species from the ill effects of pollution. Douglass and Holland (1947) defined environment as ‒*a word which describes, in the aggregate, all of the extrinsic (external) forces, influences and conditions which affect the life, nature, behaviour and the growth, development and maturity of living organisms.*‖The Environment Protection Act 1986 defines an environment as the sum total of land, air, water, the interrelationship amongst these components and also their interface with the human beings and other living organisms on the earth. Environment can thus be defined as the aggregate of a complex set of

physical, geographical, biological, social, cultural or political conditions or forces which can potentially affect the individuals or organisms on the earth and can also shape their appearance and determine the conditions of their survival. Of all the planets in the solar system, it is the Earth alone that
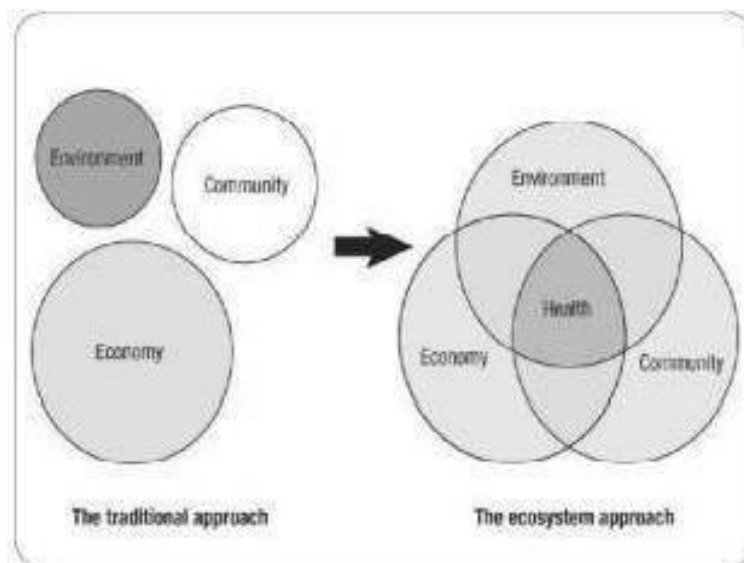


supports life and provides for all the necessary conditions that are conducive for the survival of various species.

Since an environment constitutes of the interaction of the physical, biological and cultural elements, *inter alia*, the components that broadly define an environment may be categorized as:

a. Physical elements –The physical elements include the climatic and the physical conditions such as the air, water, sky, vegetation, the elements below the surface of the earth and the organisms that are a part of life on earth. The physical efficiency, appearance, colour of the skin, all depend upon the physical environment. For ex. In cold regions, the human beings usually have a short and a sturdy built-up so that heat is trapped inside their body whereas in the hot areas, people have thin and long limbed structures which allow heat to be released from the body, more quickly.

b. Social and cultural environment –The moral values, cultural ethics and emotional strengths of the individuals contribute towards their social and cultural environment. The social environment is an outcome of the interaction of the political, economic or social conditions in which an individual operates. Such an environment manifests itself in the form of all rituals and customs, legal and behavioural approaches reflected by the society. It comprises of the groups, communities, committees or all such institutions which are established by the individuals to build up human relationships.

c. Psychological environment – All individuals in a society may have a common physical and social environment but each individual is faced by a different psychological environment. The psychological environment is important for the

purpose of understanding the personality and approach of an individual. Such factors influence the nature of an individual and also cast their impact on the way an individual lives his life. For ex. if a person is unable to attain a goal that he sets for himself, he will either become frustrated or will be forced to switch his goal according to his psychological environment.

## 1.3 <u>MULTIDISCIPLINARY NATURE OF ENVIRONMENT STUDIES</u>

It is a well-known fact that an environment is a complex structure wherein all living organisms interact with their surroundings in a quest to live. In this process, the human beings come either in conflict or in direct correlation with the nature by using the limited and finite resources bestowed by the nature. Environment studies, thus by its multidisciplinary nature, aims and endeavours at finding out and unravelling ways and means so that life can be sustained without drastically affecting the environment. The discipline of environment studies is believed to be multidisciplinary in nature because it is one such subject which has interrelation with several other subjects like physical science, medical science, chemistry, agriculture, economics, statistics, law, public health, biological sciences, geology, sociology, anthropology, political science, engineering, management, technology and even religion. Amongst all these subjects, physics, geography, chemistry and geology are the main streams which help us to understand the environment in its structural and physical form. Apart from these, the subject of statistics and computer applications can be used for data simulation and designing a suitable environmental model. The idea of devising technical solutions or a scientific technique to tackle the problems like pollution, waste management, use of green energy, can be effectively contributed by the fields of engineering and chemical sciences. The subjects like economics and law which are prescriptive in nature, can go a long way in identifying the extent to which damage has been caused to the environment and can thus be used to suggest and recommend legal remedies or policy solutions which can effectively be used to compensate for the harm caused by the human beings to the environment, in their unquenching urge to grow and develop. Similarly, insights on subjects like political science and international relations can help in understanding the relevance of the issue of sustainability attached to the environment; the principles of sustainable development are more associated and intertwined with the elements of international cooperation which are accorded significance while dealing with the global environmental issues such as climate

change, ozone layer depletion, loss of biodiversity, transmission of pollution across the boundaries of the countries etc.
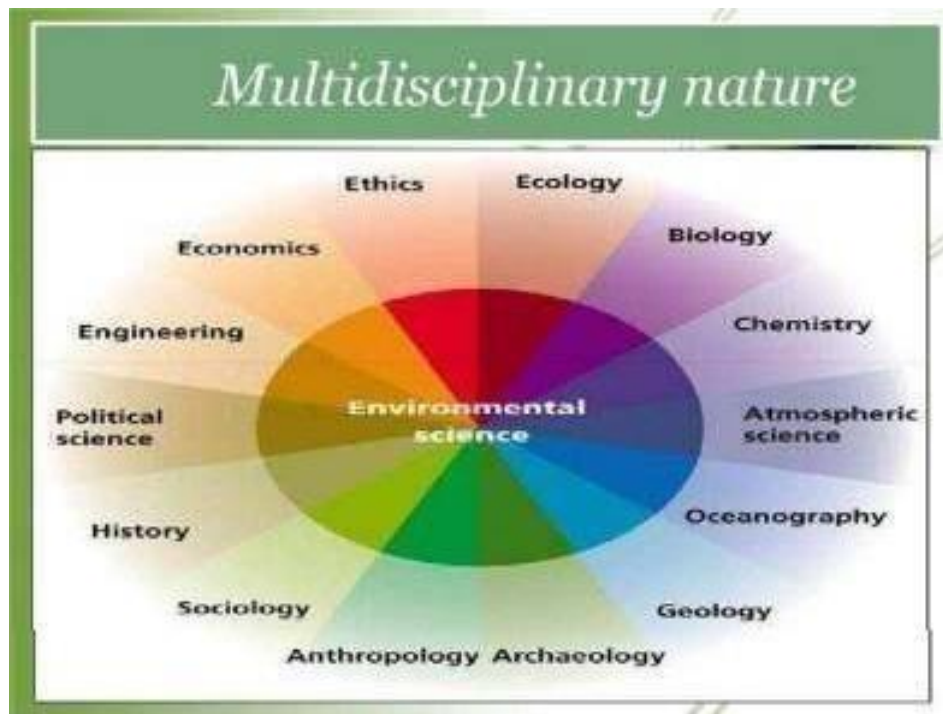


The food that provides energy, water which is crucial for the sustenance of life and air without which life on earth would not have been possible - all form an integral part of the environment and to maintain and sustain these components of environment, the subject of environmental studies has to be approached in a holistic way. Therefore it can be conclusively said that only the use of a multidisciplinary approach towards environmental studies can help in understanding and appreciating the inter linkage between the nature and the human beings. This subject in its practical sense seeks to analyse the problems and concerns related to the environment and eventually find out practical solutions so as to render life on earth more sustainable, keeping in view the limited extent to which environmental resources are available for life.

## 1.4 SCOPE AND IMPORTANCE OF ENVIRONMENT STUDIES

### 1.4.1 Scope of Environment Studies

Human development has paced up during the last two and a half centuries and this period has been important from the point of view of environment as well. In an urge to control and use nature for the sake of development, human beings have exploited the resources to an extent of their depletion. The approach of acquiring development at the cost of the natural resources

has not only set into motion complex changes which have not only altered the very basics of nature but has also caused irreparable damages to the environment, a kind of which has never been witnessed before. The scope of the subject of environmental studies is now not only confined to the study of the concepts and components of nature but has also transgressed into social, political and economic dimensions so as to find solutions to the problem related to environmental protection. This calls for greater participation of the individuals at all levels and also an approach which can be used to effectively design solutions and strategies for the problems being faced on the environmental aspect. It is time that human beings accept their responsibility in causing the damage to the environment and start taking immediate steps to reverse the loss. The resources available with the mother earth are finite and enough for meeting the development needs of the human beings but not enough for their greed. So, in this backdrop, it is extremely important that the individuals rise up and realise the need to use environmental resources more rationally and prudently and start leading environmentally responsible and sustainable lifestyles.

### 1.4.2 Importance of Environment Studies

Environment studies, is a subject that imparts knowledge to the mankind about the need and importance of protecting and conserving the resources available in nature and also provides an idea of the indiscriminate extent of pollution released into the environment. Since recent the problems related to the environment have been growing in size as well as their complexity day by day. This has not only threatened the survival of mankind on earth, but has also raised global concerns for the need to look into environmental protection. Today the human beings have reached that stage where they can reverse some extent of environmental degradation only if they organise and empower the educated communities and seek expert guidance in issues related to sustainable development. Environment studies, has been gaining significance for the following reasons:

1. **International importance attached to environment issues:** It is now being realised that environmental issues like ozone depletions, acid rain, marine pollution, global warming and loss of biodiversity have no more remained issues of national concern but have become global issues which require international efforts and cooperation to tackle them.

2. **Issues concerning development process:** The process of development across nations gave birth to the phenomenon of urbanisation, growth of agriculture, growth of

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industrial sectors, development of means of transportation etc. However the countries of the north, i.e. the developed world started cleansing out their own environment by shifting their _dirty' factories to the southern nations thus distributing the impact of their development on environment to the other parts of the world.

3. **Discovering sustainable ways of life:** Adopting a sustainable approach to life would mean that the human beings make sure that they not only use the resources for their present needs but also preserve some, for their future generations. If the current rate of exhaustion of the resources continues, the natural resources will be depleted at a rate fast enough and making them unavailable for the future generations. An environmentally sustainable approach advocates for the need to create awareness amongst people about rational consumption of resources and minimise its unnecessary wastage. Thus, environmental education can help in understanding the repercussions that may be caused because of over exploitation of resources and underlines the need to act accordingly.

4. **Knowledge of the contemporary concepts for conservation of biodiversity:** The study of environment studies helps in understanding how the human beings and other organisms get along with the environment and how the two are interdependent. The study of Environment Studies brings with it new concepts like biodiversity; organic food; sustainability; the R's of environment i.e. reduce, reuse and recycle; use of eco-friendly products, etc. With the increase in the concerns pertaining to the environment, new concepts and policy solutions have evolved which have expanded the scope and dimensions of this discipline.

5. **Efficient use of natural resources:** The study of environmental science guides towards utilisation of natural resources lake water, forests, minerals and fossil fuels in an efficient manner. It explains the methods and measures in the form of conservation and recycling strategies so that the environment and its resources can be put use in such a manner that there is maximum utility and minimal wastage.

6. **Creating awareness about the environmental problems at local, national and the international levels:** It has been observed that most problems related to the environment occur because of the lack of awareness and this applies not only to the local or national levels but also to the international regime. Environmental studies as a subject can help to educate and equip the learners with the necessary skills and ability so that the knowledge acquired can be passed on to create awareness amongst the members of the community.

## 1.5 COMPONENTS OF THE ENVIRONMENT

The environment is divided as a whole into physical and biological components which include man and other living organisms along with the natural and physical factors that surround the various species of living beings. The factors such as soil, air, water, light, temperature, etc. are all called abiotic factors. Apart from these abiotic factors, the environment constitutes of biotic factors as well which include various forms of life like plants, animals, human beings, microorganisms etc. Thus, man is an integral part of the environment and that is why the environment is significantly affected by the activities carried out by the human beings. The environment can thus be divided into four major components namely the Lithosphere, Hydrosphere, Atmosphere and Biosphere.

1. **Biosphere** –It is that part of the global ecosystem which includes living organisms and the non-living factors which work as the source of energy and nutrients to the living organisms. The Biosphere encompasses all the zones of the earth in which life is present, that is the entire bio-resources on the earth. The biosphere evolved almost 4billion years ago through an evolutionary process. Life exists in diverse forms in the top layer of the lithosphere, throughout the hydrosphere and in the lower layers of the atmosphere. Thus, all the biological resources and their surroundings together constitute the biosphere and amongst all the components of the biosphere, human beings are the most evolved species. The layer of the biosphere extends almost over the entire surface of the earth and includes the upper layers of the Earth's crust and the thick layer of the soil which primarily support



life. Since life has been observed to exist on the ground, in the air, below the water, so

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the biosphere is known to overlap all these spheres. The biosphere extends to about 20 kilometers from top to bottom and almost all living organisms exist end survive between these limits; i.e. about 500 meters below the sea level and about 6 kilometers above the sea level.

About 3 to 30 million species of organisms constitute the biosphere which include plants, animals, fungi, the oldest and the earliest form of life called prokaryotes which included single celled organisms like bacteria that survived without oxygen and single celled eukaryotes which included organisms like protozoa. Of all these species, only about 1.4 million species have been named by the systematists and less than 1% species have been examined for the relationship that they witness with the ecology and the role that they play in the ecosystem. The Biosphere is thus believed to be a large ecosystem – that is a complex community of various living and non-living components which function together as a single unit. However, more often, the biosphere is described to have many ecosystems included in itself.

2. **Lithosphere** – The lithosphere is thought to have evolved around 4.6 billion years ago. It reaches a depth of around 60 miles (100 km).The solid, stony crust that covers the entire surface of the Earth is referred to as the lithosphere. It consists of all hard and solid land masses on the earth's surface, as well as semi-solid rocks (molten minerals) beneath the earth's crust and liquid rocks in the earth's inner core. The lithosphere's outer shell is not one continuous piece, but is fragmented into around a dozen main independent hard blocks, or plates, like a slightly cracked eggshell. The lateral movements of the plates are thought to be caused by slow convection currents deep under the mantle, which are caused by radioactive heating of the interior. The lithosphere's surface is uneven, as it is marked by diverse landform features. The liquid, semi-solid, and solid land components in this layer comprise of chemically and physically distinct layers. This is why the lithosphere is separated into sub-spheres such as the crust, mantle, outer core, and inner core.

The top layer of the Crust, known as the outer crust is made up of rocks and loose soil; it is expected to be around 30 to 40 kms thick and mostly contains Silicon and Aluminium whereas the inner crust which is merely 5 to 10 kms thick comprises of Silicon and Magnesium. The middle layer, i.e. the mantle is composed of dense rock containing nickel and iron in the form of silicate rocks and its lower layer comprises of semi-solid rocks. Liquid (pure molten) rock components make up the outer core of

the Lithosphere. The inner core of the planet is formed entirely of extremely hot and liquid iron and nickel. Almost 10% of this layer is believed to be composed of sulphur and oxygen since these elements are abundantly available in the cosmos and dissolve easily into the molten iron.

Earthquakes, volcanic eruptions, mountain formation, and continental drift all occur in the Lithosphere. It includes continents, oceans, seas, lakes, mountains, plateaus, plains, deltas, beaches, cliffs, and dunes, among other topographical characteristics. It is made up of rocks (igneous, sedimentary, and metamorphic rocks) that contain all minerals(dolomite, magnetite, hematite, etc.) and elements(iron, nickel, nitrogen, hydrogen, oxygen, sulphur, phosphorus, etc.) which are essential for the survival and prosperity of the human beings.

3. **Hydrosphere** –The word Hydrosphere refers to the most important resource, i.e. water and it includes all important forms of water in the form of solid, liquid and gas on the surface of the Earth. The hydrosphere extends to thousands of miles from the Earth's surface into the lithosphere and high above the crust into the atmosphere. The majority of the water in the atmosphere is in a gaseous state, and as it reaches higher in the atmosphere, it condenses into clouds, which fall back to earth as precipitation. Like the gases in the atmosphere, all of the water in the hydrosphere is always in motion. Rivers, streams, lakes, seas, oceans, and water vapour are examples of natural earth characteristics that portray the hydrosphere. Glaciers, which are slow-moving masses of ice, are also a part of the Hydrosphere.

Since water is a necessity for life, all plants and animals depend upon the Hydrosphere for their survival. The Hydrosphere is the home to various plants and animals and it is estimated that the Hydrosphere stretches across to almost 70% of the surface of the Earth. Moreover, almost 97% of the water available on the earth is saline; oceans carry most of the salty water with themselves whereas the lakes and the rivers carry fresh water. The temperature on the surface of the Earth is also significantly affected by the Hydrosphere. Icebergs, glaciers, and icecaps are associated to extremely cold temperatures; low to moderate temperatures are related to the basic forms of precipitation i.e. the snow, rain, drizzle, sleet, or hail; and high temperatures are generally correlated to dry, hot conditions and evaporation.

| Water source | Water volume, in cubic miles | Water volume, in cubic kilometres | Percentage of freshwater | Percentage of total water |
|---|---|---|---|---|
| Oceans, Seas, & Bays | 321,000,000 | 1,338,000,000 | -- | 96.54 |
| Ice caps, Glaciers, & Permanent Snow | 5,773,000 | 24,064,000 | 68.7 | 1.74 |
| Groundwater | 5,614,000 | 23,400,000 | -- | 1.69 |
| Fresh | 2,526,000 | 10,530,000 | 30.1 | 0.76 |
| Saline | 3,088,000 | 12,870,000 | -- | 0.93 |
| Soil Moisture | 3,959 | 16,500 | 0.05 | 0.001 |
| Ground Ice & Permafrost | 71,970 | 300,000 | 0.86 | 0.022 |
| Lakes | 42,320 | 176,400 | -- | 0.013 |
| Fresh | 21,830 | 91,000 | 0.26 | 0.007 |
| Saline | 20,490 | 85,400 | -- | 0.006 |
| Atmosphere | 3,095 | 12,900 | 0.04 | 0.001 |
| Swamp Water | 2,752 | 11,470 | 0.03 | 0.0008 |
| Rivers | 509 | 2,120 | 0.006 | 0.0002 |
| Biological Water | 269 | 1,120 | 0.003 | 0.0001 |

*Source*: Adapted from Igor Shiklomanov's chapter "**World Fresh Water Resources**" in Peter H. Gleick (ed.), Water in Crisis: A Guide to the World's Fresh Water Resources, copyright 1993, Oxford University Press, New York

*Table made available by the United States Geological Survey*

4. **Atmosphere** –The layer of air around the Earth makes the atmosphere which comprises of nitrogen (78%), oxygen (21%), other gases (1%) which includes carbon dioxide (0.039%), argon (0.93%) and remaining trace gases (like krypton, neon, helium and xenon). The atmosphere gets thinner as it rises in altitude, and this characteristic eventually approaches towards space. The atmosphere stretches from the earth's crust to more than 10,000 kilometres above the surface of the planet and into space. The atmosphere is a protective layer of gases that surrounds the Earth and

aids in the survival of life. It shields humans from the harsh conditions of space by absorbing the majority of cosmic rays and damaging UV radiation. It transmits visible light, near-infrared light (300 to 2,500 nm), UV light (primarily UV A), and radio waves.

Based on temperature, the atmosphere is separated into five layers. The troposphere is the layer closest to the Earth's surface, measuring between seven and fifteen kilometres. At the equator, the troposphere is thickest, but at the North and South Poles, it is much thinner. The troposphere contains the majority of the mass of the entire atmosphere—between 75 and 80%. The troposphere contains the majority of the water vapour in the atmosphere, as well as dust and ash particles, which explains why the troposphere is home to the majority of Earth's clouds. Temperatures in the troposphere drop as the altitude increases.

The stratosphere is the next layer above the surface of the Earth. It extends from the tropopause, i.e. the top of the troposphere, to a height of about 50 kilometres. The stratosphere's temperature rises with height. The stratosphere's ozone layer is made up of a high concentration of ozone, a molecule made up of three oxygen atoms. This ozone absorbs some of the incoming solar energy, protecting life on Earth from potentially damaging ultraviolet (UV) light, and is responsible for the rise in altitude temperature.

The stratopause is the top layer of the stratosphere. The mesosphere is above that, reaching up to 85 kilometres above the Earth's surface. With an increase in the altitude in themesosphere, the temperature drops. The coldest temperatures in the atmosphere are found towards the top of the mesosphere, where temperatures are around -90°C. The atmosphere is thin here, but thick enough for meteors to fall
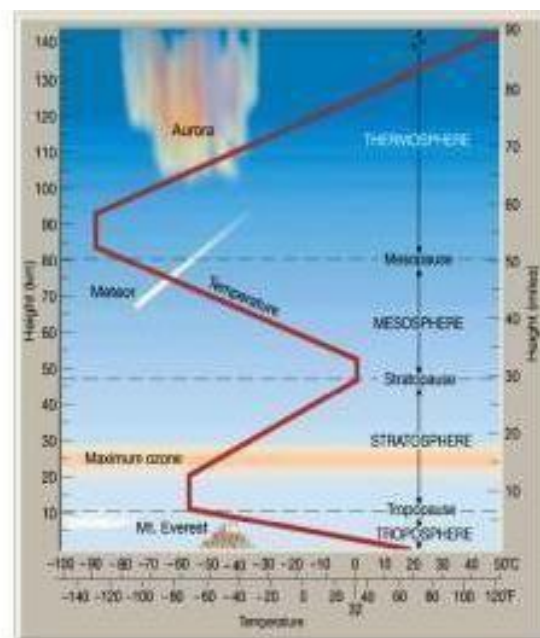
through. The upper layer of the mesosphere is called the mesopause.

Above the mesopause is the thermosphere, which extends for about 600 kilometers. The thermosphere is one such zone of the atmosphere, about which not much is known, except the fact that temperatures rise with height in this layer. Solar radiation heats the thermosphere's top portions, which can raise the temperatures as high as up to 2,000°C.The exosphere is the topmost layer, which merges with what is called outer space. The gravitational attraction of the Earth is so weak here that gas molecules escape into the outer space.

## CHECK YOUR PROGRESS

Ques.1 Answer the following Short Answer Type Questions:

i.  The solid components of the earth consisting of soil, rocks and mountains is called:

a.  Hydrosphere
b.  Lithosphere
c.  Biosphere
d.  Atmosphere

ii.  The major principle of environmental sustainability entails the concept of R's which mean…………………., ………………… and ……………………

iii.  The reversal of environmental degradation caused by the human beings calls for the need to ...................... the educated communities and seek an expertise in issues related to ……………………………………

iv.  Match the component of Environment (in Column A) with its thickness (Column B)

| Column A | Column B |
| --- | --- |
| Lithosphere | 10,000 km |
| Biosphere | All over the earth's surface |
| Atmosphere | 20 km |
| Hydrosphere | 60 km |

v.  The layer of the atmosphere that absorbs the ultra violet and other harmful radiations from the Sun and prevents them from reaching the Earth is called

a.  Troposphere
b.  Exosphere
c.  Mesosphere
d.  Stratosphere

**1.6 SUMMARY**

In this unit, effort was made to understand the meaning, scope and importance of Environment Studies as a discipline and to develop a more cognizant approach towards the issues related to the environment. The learners would have been able to learn that:

- The external conditions or surroundings that support the life of human beings and all others living organisms together constitute the environment

- The environment constitutes of the physical (air, water, sky, etc.) social and cultural (moral, ethical and emotional factors) and psychological (nature or personality of the human beings) elements

- Environment studies, is multidisciplinary in nature and approach because environment as a concept and a problem, can be perceived from the perspective of science as well as the non-science subjects. The interrelationship between environment and other disciplines can help in finding out better policy solutions to the problems pertaining to the environment.

- The study of the environment has now extended its dimensions to the social, political and economic aspects as well because of the urgent need to look into the solutions to the problems related to environmental protection.

- New concepts related to the field of environment, like biodiversity, sustainable development, the three R's of environment, i.e. reduce, reuse and recycle, green energy etc. have evolved in the recent year and there is need to look into the concerns arising from the environment from a contemporary perspective.

- It is becoming extremely important day by day to look into and examine various issues that occur because of the irrational behaviour of human beings while using the natural resources for their growth and development.

- The environment is actually divided into four broad components, i.e. the Lithosphere, Hydrosphere, Atmosphere and Biosphere.

- The Biosphere includes all the zones of the Earth in which life exists and it extends across almost the entire surface of the earth and even the upper layers of the Earth's crust.

- The rocky layer on the surface of the Earth is called the Lithosphere which is further fragmented into three subzones - the crust, the mantle and the core.

- All the sources of water on the surface of the Earth, whether they are in the form of solid, liquid or gaseous state, constitute the Hydrosphere and it is this hydrosphere which is the main source of supporting life on the Earth.
- The layer of air around the Earth is called the atmosphere which consists of various gases that exist in different proportions and it is this protective layer of gases that helps in the survival of life on the Earth.

## 1.7 QUESTIONS FOR PRACTICE

Ques. 1 How do you think Environment Studies is a subject with a multidisciplinary approach?

Ques. 2 Discuss how has the scope of Environment Studies changed with the change in the intensity of the issues related to the environment?

Ques. 3 ―Earth provides enough to satisfy every man's needs but not every man's greed.‖ In the light of this statement, explain why is it important to use resources for need and not for greed?

Ques. 4 Differentiate between Lithosphere and Biosphere. Which of the two has conditions more suitable for supporting life on the earth and why?

Ques. 5 Make a thermal stratification of the atmosphere and explain the features of each layer of the atmosphere in detail.

## 1.8 SUGGESTED READINGS

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
- Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2021
- B.S. Chauhan, Environmental Studies, 2008
- P.S. Jaswal, Environmental Law, 2021
- S.R. Myneni, Environmental Law, Asia Law House, Hyderabad

# B.Com (Hons.)
# Accounting and Taxation

## SEMESTER: II

## COURSE: ENVIRONMENTAL STUDIES

### UNIT 2: ECOSYSTEM AND BIODIVERSITY CONSERVATION

**STRUCTURE**

2.0     **Learning Outcomes**

2.1     **Introduction**

2.2     **Ecosystem**

2.3     **Types of Ecosystem**

2.4     **Biodiversity : Meaning and Definition**

2.5     **Threats to biodiversity and its Conservation**

2.6     **Level of Biological Diversity: Genetic, Species and Ecosystem Diversity**

2.7     **Biogeographic Zones of India**

2.8     **Biodiversity Patterns and Global Biodiversity Hot Spots**

2.9     **India as Mega Bio-diversity Nation**

2.10     **Endangered and Endemic Species of India**

2.11     **Ecosystem and Biodiversity Services: Ecological, Economic, Social, Ethical, Aesthetic and Informational Value**

2.12     **Summary**

2.13     **Questions for Practice**

2.14     **Suggested Readings**

## 2.0 LEARNING OUTCOMES

After reading the material, learner shall be able to understand

- Meaning of ecosystem and biological diversity

- Importance of Biological diversity and need for protection of biodiversity

- Methods of protecting biodiversity

- Value of biodiversity

- Biodiversity in India

## 2.1 INTRODUCTION

Environment has received greater attention in the later part of the twentieth century and in twenty first century. Increased exploitation of natural and physical resources without caring for the surrounding environment and increased environmental pollution impacting all living organisms on the planet has received the attention of the masses and policy makers. Environmental studies, therefore, has assumed greater emphasis than ever. However, environmental studies is not restricted to study of what constitutes environment and environmental pollution but also the legal provisions, human actions and other factors which influence the environment. The subject indeed requires a multidisciplinary approach involving study of environmental science, legal provisions and human approach.

Term Environment has been derived from French word _Environia' which implies to surround. Term environment includes both living (biotic) and non-living/physical environment. Therefore, it includes all surrounding in which organisms live. Immediate environment i.e. area near the surface of the earth can be divided into atmosphere, hydrosphere, lithosphere and biosphere. Atmosphere is composed of various gases surrounding the earth. Atmosphere is in a state of continual change. Atmosphere can be divided into troposphere (lower layer of the atmosphere close to earth), stratosphere (upper layer of the atmosphere where large layer of ozone is there), mesosphere (where water vapors free and create clouds) and thermosphere (the top layer of the atmosphere where satellites circle the earth).
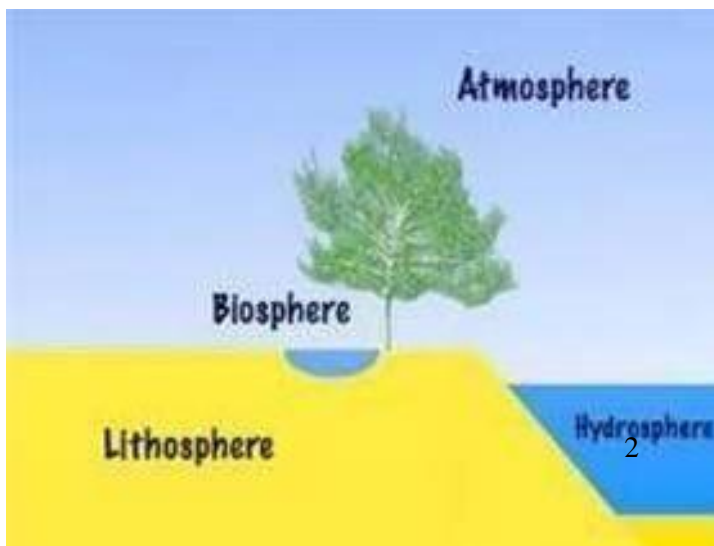
Lithosphere implies rocks and minerals. Lithosphere is believed to have come into existence billions of years ago and it refers to solid rocky crust that covers the entire planet. It includes mountains, valleys, soil, minerals and rocks.

Hydrosphere refers to all forms of water in earth's environment. It includes lakes, rivers, oceans, glaciers, ground water etc. About 70% of the earth's surface is composed of Hydrosphere.

Biosphere refers to all forms of living organisms existing on the planet. Various forms of life exist in the biosphere including plants, animals and other living organisms.

## 2.2 ECOSYSTEM

Term _eco' implies part of the world. It means set of coordinating units. In an environment, various living organisms and their surroundings function together as a unit. These units of ecology are referred to as _ecosystem'. Ecosystem, therefore, implies sum total of living organisms and the surrounding environment i.e. biotic and abiotic environment. It includes living organisms including plants, animals and other living things. This is described as biocoenosis. Nature is a biotope that encompasses the visible environment of life. The term ecosystem first appeared in a book published by British naturalist Arthur Tansley, in 1935. The biological system can have verydifferent sizes. It could be a whole forest, with a small dam. Various natural habitats are often separated by local barriers, such as deserts, mountains or seas, or by other means, such as lakes orrivers. Since these boundaries are never solid, nature often meets.

Ecosystem species are connected with each other, directly or indirectly. There is a diverse relationship between various species in an ecosystem. This relationship is unique as well as delicate. Changes in ecosystem can adversely affect this relationship causing damage to various species thereby affecting the entire ecosystem. For example, if there is increase in temperature in a particular ecosystem, plants and other living organisms will have to adapt to such change and those which are unable adapt would face extinction or migration.

### 2.2.1 Components of Ecosystem

Ecosystem is composed to two different components i.e. abiotic and biotic components. Biotic components of the ecosystem are living things. As stated earlier, in an ecosystem various species are connected with each other in diverse ways and they influence each other in myriad ways.

Plants, animals, bacteria and fungi all affect each other. Based on their energy requirement source, biotic components are categorized as producers, consumers, and decomposers.

Abiotic components are physical and non-living components. These include rocks, minerals, water, air and other non-living things. These include organic and inorganic compounds. Organic compounds include proteins, carbohydrates, amino acids and lipids. Inorganic compounds, on the other hand, include calcium, nitrogen, phosphate, caron dioxide. These factors influence living organisms.

## 2.3 <u>TYPES OF ECOSYSTEMS</u>

Depending upon various climates, habitats and life forms, ecosystems can be broadly classified as Aquatic and Terrestrial Ecosystem.

### 2.3.1 Aquatic Ecosystem

Aquatic ecosystems refer to all such ecosystems that are primarily located on or inside water bodies. The nature and characteristics of all living and non-living organisms in the aquatic system are determined based on the environment surrounding their ecosystem. Organisms in these ecosystems interact with other organisms in aquatic and terrestrial ecosystems. The aquatic ecosystem is mainly sub-divided into the following types:

### 2.3.1.1 Freshwater Ecosystem

The freshwater ecosystem is one of the essential ecosystems for humans and other organisms living on land. This is because this ecosystem is a source of drinking water. Additionally, it also helps in providing the necessary energy and water for transportation, recreation, etc. Freshwater ecosystems mainly include lentic, lotic, and wetlands.

**Lentic:** Water bodies that are moving slowly or are still in some places come under lentic. For example, ponds, lakes, pools, etc. Lakes are known as large water bodies and are surrounded by land.

**Lotic:** Water bodies that are moving at a fast pace fall under a lotic. For example, streams and rivers.

**Wetlands:** Environments characterized by soils saturated with water for a long time fall under wetlands.

The freshwater ecosystem is the smallest type of ecosystem among the major types of ecosystems.

There is usually no salt content in the freshwater ecosystem. Besides, it consists of many insects, small fish, amphibians, and various plant species. Plants help provide oxygen through photosynthesis and also provide food for the organisms living in this ecosystem.

### 2.3.1.2 Marine Ecosystem

Marine ecosystems are usually characterized by the presence of salt content. These ecosystems have a higher salt content than the freshwater ecosystem. Moreover, they are known as the largest type of ecosystem on Earth. It usually includes all the oceans and their parts. Besides, marine ecosystems have distinctive flora and fauna, which support greater biodiversity than freshwater ecosystems. This type of ecosystem is essential for both marine and terrestrial environments.

In particular, this ecosystem includes salt marshes, lagoons, coral reefs, estuaries, intertidal zones, mangroves, seafloor, and deep seas. Salt marshes, mangrove forests, and sea-grass meadows are said to be among the most productive ecosystems. Coral reefs are known to provide adequate quantities of food and shelter to most marine inhabitants worldwide.

### 2.3.2 Terrestrial Ecosystem

Terrestrial ecosystem refers to all such ecosystems which are mainly located on land. Although the presence of water in these ecosystems is measured, they are entirely land-based and exist on land. More specifically, a low and sufficiently needed amount of water is located in terrestrial ecosystems. The low amount of water separates these ecosystems from aquatic ecosystems. Besides, terrestrial ecosystems typically have temperature fluctuations in both seasonal and diurnal climates. It is also a specific factor that makes these ecosystems different from aquatic ecosystems in similar environments.

Furthermore, the availability of light is somewhat higher in terrestrial ecosystems than in aquatic ecosystems. The reason for this is that the climate in the land is relatively more transparent than

water. Due to entirely different light availability and temperature in terrestrial ecosystems, they have diverse flora and fauna. Terrestrial ecosystems include various ecosystems distributed around different geological zones. Terrestrial ecosystems are mainly classified into the following types:

### 2.3.2.1  Forest Ecosystems

A forest ecosystem is an ecosystem where many organisms live together with the environment's abiotic components. There are much different flora and fauna in this ecosystem. This usually means that the forest ecosystem has a high density of living organisms that live with non-living abiotic elements. The forest ecosystem usually includes various plants, microorganisms, animals, and other species.

Forests are significant carbon sinks and participate in controlling and balancing the overall temperature of the Erath. Changes in the forest ecosystem affect the entire ecological balance, and severe changes or destruction of forests can also kill the whole ecosystem. Forests are generally classified into tropical deciduous forests, tropical evergreen forests, temperate deciduous forests, temperate forests, and Taig.

### 2.3.2.1  Grassland Ecosystems

Grassland ecosystems are referred to as those ecosystems where the number of trees is low. These ecosystems mainly consist of grasses, shrubs, and herbs. That means grasses are the primary vegetation in these ecosystems, along with legumes that typically belong to the composite family.

Grassland ecosystems are commonly situated in both the tropical and temperate regions globally; however, they have distinct variations. Examples of these ecosystems include the savanna grasslands and temperate grasslands. They are home to various grazing animals, insectivores, and herbivores.

### 2.3.2.2  Mountain Ecosystems

As the name suggests, the mountain ecosystem is characterized by mountainous regions where the climate is usually cold, and rainfall is low. Due to these climate changes, these ecosystems have a wide variety of habitats where various animal and plant species are found.

The high altitude areas of mountainous regions have a cold and harsh climate. This is the reason why only treeless alpine vegetation is found in these ecosystems. Animals found in these ecosystems usually have tick fur coats to protect them from cold climates.

Besides, mainly coniferous trees exist on the lower slopes of the mountains. Examples of mountain ecosystems include mountain tops in Arctic regions. They are covered with snow for most of the year.

### 2.3.2.3 Desert Ecosystems

Desert ecosystems exist worldwide and cover about 17 per cent of desert areas. These are areas where annual rainfall is usually measured less than 25 mm. Due to fewer trees and land of sand, sunlight intensifies in these ecosystems. This is why these ecosystems have incredibly high temperatures and low availability of water. However, the nights are quite cold.

The Desert ecosystem has unique flora and fauna. Plants grow with small amounts of water and conserve water's possible amount in their leaves and stems. For example, the spiny-leafed cactus is a type of desert plant that has the characteristic of storing water using a stem. Similarly, animals are also adapted to the condition of desert ecosystems. Some common animals are camels, reptiles, a diverse range of insects and birds.

## 2.4 BIODIVERSITY : MEANING AND DEFINITION

Biodiversity refers to all the species of living things on Earth or to a particular ecosystem. Biodiversity is the variety of the species of plants, animals, fungi and living things including the diverse ecosystems in which they live.

Natural resources from biodiversity and ecosystems are important at the global, regional and local levels. The world now acknowledges that the loss of biodiversity is contributing to global climate change. Forests are a major means of converting carbon dioxide into oxygen. Loss of forest cover, coupled with increased release of carbon dioxide and other gases through industrial use contributes to the ‗thermal effect‘ causing global warming. Global warming is melting glaciers, leading to

rising sea levels which will slowly drown the low lying coastal areas. It causes dramatic changes in the atmosphere, resulting in rising temperatures, severe droughts in some areas, and unexpected floods in others areas. Value of biodiversity can be measured in terms of direct value like use of plants, herbs for medicinal, human consumption or other productive uses. Apart from economic value, biodiversityhelps in sustenance of the environment and thus is essential for our sustenance and survival.

## 2.5 THREATS TO BIODIVERSITY AND ITS CONSERVATION

### 2.5.1 Threats to Biodiversity

There are various threats to biodiversity primarily owing to human activities. The underlying causes of biodiversity loss are growing human population and overconsumption. These factors are often complex and stem from many interrelated factors. Some of these threats are discussed hereinafter:

#### 2.5.1.1 Human Population

Population explosion is one of the biggest challenges to biodiversity protection. Population explosion has led to severe strain on natural resources leading to over exploitation of natural resources. From 1 billion people in 1800, population has increased to around 6.8 billion in around 200 years. Increasing demand for food, clothes, necessities and luxuries of life leading to deforestation and large exploitation of natural resources pose a serious threat to biodiversity.

#### 2.5.1.2 Pollution

Environmental pollution is a big threat to survival of many species. Various facets of environment be it air, water, soil or noise have been immensely polluted due to irresponsible behavior of mankind. Rapid industrialization, increased construction activities, mass scale deforestation to meet human needs, vehicular emissions, household emissions, discharge of industrial affluents into water bodies, stubble burning, massive waste generation and its unscientific disposal pose serious threat to the environment and sustenance of various organisms. All these factors individually and jointly have a serious adverse impact on biodiversity.

Bioaccumulation is another facet which requires special mention. Bioaccumulation refers to the process wherein chemicals released by humans get concentrated in animal tissues and they enter

the food chain. These chemicals invade into the nervous systems of the predators and cause serious ailments thereby endangering the entire population of the predating specie.

### 2.5.1.3 Habitat Loss

One of the major threats to biodiversity is habitat loss often caused due to anthropogenic reasons. Increasing population, increasing demand for food supplies and forest produce led to large scale deforestation therebycausing serious habitat loss endangering flora and fona found at such places.

### 2.5.1.4 Invasive Species

Movement of species and living organisms from one place to another place can affect resident species of that place sometimes endangering the original inhabitants. Such invasive species can predate original resident species, disrupt their habitat or be the cause of some diseases. All these factors taken together can lead to loss of biodiversity of the area.

### 2.5.1.5 Overharvesting

Overfishing includes targeted hunting, gathering, or fishing for a particular type of harvest and harvesting associated with the decline of marine fisheries. An example of the extinction of megafauna in the past was the example of over-harvesting causing environmental loss.

Marine fisheries are at high risk of over harvest especially during the second post-war period due to technological advances such as refrigerator, sonar, processing board etc. a few decades of great harvest using this new technology in the late twentieth century led to the collapse of the human race. The population is declining by more than 90%, and species fishing was banned in Canada and the United States. The loss of high-quality animal such as cod, as well as the decline of other predators such as haddock and flounder, has led to the explosion of large numbers of fish such as herring, capelin, shrimp. Cod people have not yet been found, although fishing pressures have stopped, and these observations have led researchers to speculate that the ecosystem may now be in a stable state that will prevent cod recovery

### 2.5.1.6 Climate Change and Biodiversity Loss

Climate change affects the environment in manyways, including changes in temperature. These

mutations make it difficult or impossible for many species to survive. As the climate changes more and more, biodiversity will face ever-increasing threats. Likewise, efforts to conserve biodiversity will face challenges. Conservationists may be faced with the challenge of deciding which species

should be protected.

**2.5.2** Conservation of Biodiversity

Conservation of biodiversity is of crucial importance for survival of various life forms including humans. The primary aim of conservation of biodiversity is to ensure sustainable utilization of species and ecosystem thereby maintaining essential ecological processes. There are two methods of two methods of biodiversity i.e. in-situ conservation and ex-situ conservation.

Endangered species may be protected by protecting its habitat. This method is known as in-situ conservation and is one of the commonly adopted measures to protect the endangered specie in its own habitat. Various countries have adopted this method and created National Parks, Wildlife Sanctuaries, protected areas etc.

Sometimes, it may not be feasible to protect endangered species by protecting their habitat alone. For example, the specie may be close to extinction. Therefore, alternative measures may be required to protect the specie from becoming extinct. In such cases, ex-situ conservation may be adopted, i.e. conserving the specie outside its natural habitat in an artificially created habitat wherein humankind can control the circumstances and can help the specie multiply using human intelligence.

2.5.2.1   Strategies for Biodiversity Conservation

There are various ways in which biodiversity can be preserved including :
- Development of national parks, wildlife sanctuaries etc
- Identification and conservation of economically important organisms
- Preservation of unique ecosystems.
- Efficient and effective utilization of resources
- Enforcing an effective ban on poaching and hunting of wild animals
- Strict enforcement of environment legislation
- Control over environmental pollution
- Identification and conservation of endangered species both in situ and ex situ
- Creation of public awareness

## 2.6 LEVEL OF BIOLOGICAL DIVERSITY: GENETIC, SPECIES ANDECOSYSTEM DIVERSITY

Biodiversity is categorized as Genetic Diversity, species diversity and ecological diversity.

### 2.6.1 Genetic Diversity

All species on Earth have genetic connections with other species. Through the process of evolution, species have evolved into their present-day shape and form. And when one species is related to another, they will share additional genetic information. These types will also look very similar. The closest physical contact is with members of its genus. Members of a particular gene share genes. Genetics are fragments of information about chemicals that partially determine how the body looks, behaves, and lives. Almost all species have the same and closely related species in the neighborhood. In addition, all species have other closely related species. These two types share common features.

### 2.6.2 Species Diversity

Biodiversity refers to the diversity of species that exist in an area. It determines the level of biodiversity. Species are a common form of biodiversity because they are the basic units of biodiversity. It is estimated that there are some 10 million species in the world, with only 1.75 million species being able to name them.

Some regions are more diverse. Tropical North and South America, for example, have about 85,000 flowering plants. Tropical and Tropical Asia has at least 50,000 while tropical and tropical Africa has 35,000.

Europe has about 11,300 artificial plants. Some areas, such as the polluted stream, have a surprisingly low percentage of species.

### 2.6.3 Ecological Biodiversity

Ecological Biodiversity refers to ecosystem diversity in the area. It includes a complex network of diverse species that exist in living environments and strong connections between them. An ecosystem is made up of materials from a variety of species that live together in an environment and their interactions through the flow of nutrients, energy, and matter.

An ecosystem can cover a small area, such as a lake, or a large area, such as the entire forest. The main source of energy for almost all of nature is the sun's radiant energy being converted into chemical energy by plants.

Animals eat plants, allowing energy to flow through systems. Animals are eaten by other animals. Fungi decomposes organic matter to gain energy and in the process of regeneration the nutrients return to the soil.

Thus, an ecosystem is a collection of living things and inanimate objects connected by energy flow. It is difficult to measure biological diversity because every living thing on earth is connected to the surrounding environment.

## 2.7 <u>BIO-GEOGRAPHIC ZONES OF INDIA</u>

Biogeography is the study of the distribution of species and nature in geographic space and geological period. India has a rich heritage of biodiversity. India ranks fourth in Asia and tenth in the world among the 17 most diverse countries in the world. India accounts for about 11% of the world's flower species including more than 17500 flowering plants, 6200 endemic species, 7500 medicinal plants and only 246 threatened species worldwide in only 2.4% of the world's soil.

India also has some of the most diverse landscapes - the Andaman & Nicobar Islands, the Eastern Himalayas, the Indo-Burma region, and the Western Ghats.

Attempts have been made to divide India zoogeographically since 1988. India's Forest Survey published an atlas of forest species in 2011. However, there is no official plan approved by the Government of India, as issued by the European Environment Agency to conserve biodiversity.

### 2.7.1  Biogeographic Zones

As stated earlier, attempt have been made to divide India zoogeographically while planning a network of protected areas of India. The system has divided India into 10 biogeographic segments, and each area is further subdivided into biogeographic provinces, numbering 27 in total.

2.7.1.1.  Ten Biogeographic Segments

- Trans Himalayan zone.

- Himalayan zone
- Desert zone.
- Semiarid zone.
- Western ghat zone.
- Deccan plateau zone.
- Gangetic plain zone.
- Northeast zone.
- Coastal zone.
- Islands

## 2.8 BIODIVERSITY PATTERNS AND GLOBAL BIODIVERSITY HOT SPOTS

As stated earlier biodiversity is the richness of species and degree of variation of life and other living organisms including genetic diversity, species diversity, or biodiversity within the area, biome, or planet. Diversity is the work of two things: the number of species (Species Richness) and the number of specimen of these species (Evenness). Multiple indices for measuring diversity have been suggested, which give more or less weight to the two.



Introduction of species in new areas have led to new distribution patterns. For example, Macropus eugenii was thought to be extinct in Australia for 100 years but was rediscovered on an island in New Zealand (2000 species) where it was introduced in 1862. Migration creates a special kind of diversity pattern.

If we examine biodiversity patterns, we find that Tropical areas have the highest diversity of species due to various reasons including High productivity and food availability; high biomass; past patterns of evolution etc. The patterns of a variety of species in a place or at any one time are set by a combination of three elements i.e. Chance, History and Necessity.

### 2.8.1 Biodiversity Hotspots

The term biodiversity hotspot was coined by Norman Myers. It refers to regions known for their high diversity richness and endemism. According to Conservation International, in order to qualify as a biodiversity hotspot, the region must meet the following two criteria:

- ✓ The region should have at least 1500 species of vascular plants i.e., should have a high rate of endemism.
- ✓ Region Must contain 30% (or less) of its original species, i.e. species must be threatened.

In India, following major biodiversity hotspots have been identified:

- ✓ The Himalayas
- ✓ Indo-Burma Region
- ✓ Western Ghats
- ✓ Sundaland

2.8.1.1  The Himalayas

Himalayas is located in northeastern India, Bhutan, central and eastern parts of Nepal. The region (NE-Himalayan) has a record of 163 endangered species including Wild Asian Water Buffalo, 1-horned rhino; and some 10,000 species of plants, 3160 of which are extinct.

2.8.1.2  Indo - Burmese region

The Indo-Burma region extends over 2,373,000 km². Over the past 12 years, six species of mammals have been identified in the region.

The tropics are also known for the tortoise species of freshwater, many of which are at risk of extinction, due to over harvest and large-scale losses. There are also 1,300 different species of birds, including the threatened White-eared Night-heron, the gray-headed Crocias, and the Orange-neck Partridge.

2.8.1.3  Western Ghats

The Western Ghats are located on the western edge of the Indian subcontinent and include most of the refreshing forests and rain forests. According to UNESCO, it is home to at least 325

endangered species that are endangered, animals, birds, amphibians, reptiles and fish. Initially, vegetation in the region was distributed over 190,000 km2 but has now been reduced to 43,000 km2. The region is also known for the world's endangered species of plants and animals represented by 229 species of animals, 31 species of mammals, 15 species of birds, 43 species of amphibians, 5 species of reptiles and 1 species of fish. According to UNESCO, –of the 325 species threatened in the Western Ghats, 129 are considered endangered, 145 are endangered and 51 are at risk of Extinction.‖

2.8.1.4  Sundaland

Nicobar Island form part of the Sundaland. It is a biological diversity hotspot. It extends to the tectonic plates under Indian ocean. Various species like Orangutans, Javan and Sumitran Rhinos, pig-tailed langurs etc are found in this hotspot. It is home to world‘s largest fowers measuring upto one meter.

2.8.1.5  Terrai-Duar Savannah

The region falls within a narrow stretch at the base of Himalayas in Indo-Gangetic plains in India,, Nepal and Bhutan. These are the world‘s tallest grasslands. These are rare elephant grasslands grown by silt deposited by monsoon floods. These are home to one-horned rhinoceros, sloth bears and Asian elephants.

2.8.1.6  Sunderbans

Sunderbans is the largest mangrove forest in the world consisting of set of 104 island formed by Ganga-Brahmaputra Delta. Sunderbans are home to Royal Bengal Tiger, Gangetic Dophins and estuarine crocodiles. Sunderbans have immense biological diversity but are endangered by rising sea level caused by global warming.

## 2.9 INDIA AS MEGA-BIODIVERSITY NATION

India is one of the 12 mega biodiversity countries of the world. Various factors have contributed in making India as a mega biodiversity nation including physical and geographical factors and climatic conditions. Biogeographically, India is located at a tri-junction of three realms - the Afro-

tropical, Indo-Malayan and Paleo-Arctic regions. Consequently, India has certain features of all these regions. This is one of the important factors for rich biodiversity in India. India is home to 167 important crops of millets, cereals, condiments, fruits, vegetables, pulses, fiber plants and oilseeds, and 114 species of domestic animals. About 4,900 species of flowering plants are found in the country. Western Ghats and North East India are home to rich biodiversity. It is claimed that India is home to around 62% of the amphibians.

Conservation of biological diversity and respect for environmental sustainability was deep rooted in Indian tradition and culture. Many tribes in India worship facets of environment and work towards sustenance of biological diversity. Owing to rich biodiversity and traditional knowledge of the medicinal therapeutic use of herbs, many alternative systems of medicines viz., Ayurveda, Unani and Homeopathy are practiced in India making use of biodiversity.

## 2.10 ENDANGERED AND ENDEMIC SPECIES OF INDIA

Endangered species are those species whose sustenance is endangered i.e. whose population is declining owing to various natural and anthropogenic reasons. These species may become extinct, if efforts are not made to protect them. In India, around 450 plant species, 100 mammals and around 150 types of birds are considered as endangered.

Endemic species, on the other hand, are those plants or animals which exist in a particular area only and nowhere else e.g. Bengal Tiger.

**Critically Endangered animals**

1. Jenkin's Shrew
2. Malabar Large Spotted Civet
3. Namdapha Flying Squirrel
4. Pygmy Hog
5. Salim Ali's Fruit Bat
6. Sumatran Rhinoceros
7. Wroughton's Free-Tailed Bat

**Endangered animals**

1. Asiatic Lion
2. Asiatic Black Bear
3. Desert Cat
4. Great Indian Rhinoceros
5. Indian Elephant or Asian Elephant
6. Blue Whale
7. Capped Leaf Monkey
8. Fin Whale
9. Ganges River Dolphin
10. Hispid Hare
11. Indus River Dolphin
12. Red Panda

**Vulnerable Species**

1. Asiatic Wild Dogs
2. Banteng
3. Brown Bear
4. Clouded Leopard
5. Ganges River Dolphin
6. Himalayan Musk Dear
7. Jackal
8. Asiatic Golden Cat
9. Barasingha
10. Blackbuck
11. Fishing Cat
12. Royal Bengal Tiger
13. Sloth Bear
14. Wild Goat
15. Wild Yak

**Threatened Species**

1. Indian Wild Ass
2. Leopard
3. Red Fox

**Endemic animals**

Endemic species are animals or plants that exist only in some particular areas and nowhere else in the world. In India, endemic species are mostly in the Himalayas and the Western Ghats. The endemic animals in India are :

1. Lion-tailed Macaque
2. Nilgiri Langur
3. Brown Palm Civet
4. Nilgiri Tahr

## 2.11 ECOSYSTEM AND BIODIVERSITY SERVICES: ECOLOGICAL, ECONOMIC,SOCIAL, ETHICAL, AESTHETIC AND INFORMATIONAL VALUE

Biodiversity has great social, economic, information, ethical and aesthetic value. Though it is not possible to exactly quantify the value of biodiversity yet an attempt is made to explain the value of biodiversity in economic, social, ethical, moral and information terms.

### 2.11.1 Social Value

Social value of biodiversity is reflected in cultural, medicinal, aesthetic, recreational and spiritual value to the society at large. Biodiversity is part of cultural heritage and the lifestyles. Governments of welfare state are keen on protecting the biodiversity and are spending on green vegetation and on Coral Reef Island for tourism and for preserving their identity associated with biodiversity.

### 2.11.2 Ethical and Moral Values

Every society has its own ethical and moral values. Every specie has a right to life and to preserve the life. Various communities attach great significance to biodiversity and they worship components of ecosystem, worship rivers, trees, plants and animals as part of their culture and heritage. There are various cultural and ethical considerations associated with conservation of

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biodiversity. We have a number of sacred places, sanctuaries of rivers which have been preserved by tribal people. These places are infact genetic banks for wild plants. Tribals view biodiversity as part of their culture and their ethical and social norms.

### 2.11.3 Economic Value

Biological diversity and its sustenance help us in sustainable use of biological resources which can be used for making various products. These products be it agricultural products, extracts from plants, animals or their use in various ways have immense economic value. Various plants have medicinal value; extracts from animals are used for cure of various diseases; biodiversity provide raw material to various industries. Thus, biodiversity has vast economic value.

### 2.11.4 Aesthetic Value

Aesthetic value of biodiversity is known to all of us. All of us seek beauty in mountains, rivers, water bodies, snow covered peaks, animals, flowers etc. World without these is unimaginable and would be devoid of aesthetic value. Thus, biodiversity has great aesthetic value.

### 2.11.5 Ecological Value

Every species plays a unique role in nature and helps in maintaining natural balance ensuring that the environment is not disturbed. Therefore, even if we do not use a plant or animal yet it has an important place in food chain and in preserving the ecology. One creature becomes food for another creature and nothing goes waste. Forests are sinks of carbon dioxide and are lungs of this planet earth providing oxygen to humans which is essential for our survival. Forests and oceans absorb global warming and therefore protect us from the evils of global warming. Thus, various components of biological organisms contribute in maintaining ecological balance.

### 2.11.6 Educational Value and/or Scientific Value

Biodiversity has immense scientific value. Plants and animals are subject matter of research and help us in understanding our ecosystem. They are the source of scientific and medical information and are useful for educational, scientific and medical purposes. Even our day to day use products are made or influenced by biological organisms. For example, Velcro design is obtained from cockle-burrs that quickly attach to clothing as we walk through the woods.

### 2.11.7 Cultural and Spiritual Value

Many societies worship plants and animals. For example, Hindus worship owls as the vehicle of Goddess Lakshmi, elephant, monkeys, snakes etc. Many religions identify themselves with pants and animals and as such, those plants and animals have cultural and religious importance.

### 2.11.8 Option Value

Option value refers to the undiscovered potential of plants or animals or other living organisms. With advancements in technology and research, plants and animals have been found to be useful in treatment of various diseases. Snake venom is used in medical treatment. Option value refers to untapped potential of biodiversity which is unknown today but there is a possibility of discovery in future. But if the biodiversity is destroyed, the untapped potential would be lost.

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**CHECK YOUR PROGRESS**

Which of the following is correct?

1) Preservation of specie in its own habitat is known as
   a. In-situ preservation
   b. Ex-situ preservation
   c. Bio preservation
   d. All of these
2) The top most layer of atmosphere is knows as
   a. Lithosphere
   b. Biosphere
   c. Mesosphere
   d. Thermosphere
3) Which of the following is a major threat to biodiversity
   a. Increasing population and over exploitation of resources
   b. Invasive species
   c. Natural calamities
   d. All of the above
4) Which of the following is a Biodiversity hotspot in India
   a. Himalayas

b. Western Ghats

c. Indo Burmese Region

d. All of these

5) Which of the following is a critically endangered specie in India

a. Asiatic Lion

b. Sumatran Rhinoceros

c. Desert Cat

d. Jackal

## 2.12 SUMMARY

**2.12.1** Term Environment has been derived from French word _Environia' which implies to surround. Term environment includes both living (biotic) and non-living/physical environment.

**2.12.2** Ecosystem is the sum total of living organisms and the surrounding environment i.e. biotic and abiotic environment. It includes living organisms including plants, animals and other living things.

**2.12.3** Ecosystem includes Aquatic ecosystems and terrestrial ecosystem. Aquatic ecosystem refers to all such ecosystems that are primarily located on or inside water bodies and include Marine ecosystem, freshwater ecosystem. Terrestrial ecosystem refers to all such ecosystems which are mainly located on land and includes Forest ecosystem, desert ecosystem, mountain ecosystem and grassland ecosystem.

**2.12.4** Biodiversity refers to all the species of living things on Earth or to a particular ecosystem. Biodiversity is the variety of the species of plants, animals, fungi and living things including the diverse ecosystems in which they live.

**2.12.5** Preservation of ecosystem and biodiversity is important for survival and wellbeing of human race.

**2.12.6** Ecosystem and biodiversity are threatened by non-sustainable exploitation of natural resources, increased population, rapid industrialization, deforestation, environmental pollution, global warming and the like.

**2.12.7** India is a mega biodiversity nation and it can be divided into 10 biogeographical zones.

**2.12.8** Biodiversity hotspot is a region which has rich biological diversity and some or other species are endangered

**2.12.9** India is home to 167 important crops of millets, cereals, condiments, fruits, vegetables,

pulses, fiber plants and oilseeds, and 114 species of domestic animals. About 4,900 species of flowering plants are found in the country. Western Ghats and North East India are home to rich biodiversity. It is claimed that India is home to around 62% of the amphibians.

**2.12.10** Despite mega biodiversity, India also has biodiversity hotspots and many animals, plants are declared as endangered or critically endangered species.

**2.12.11** Biodiversity is not only essential for wellbeing of all living organism on this planet earth but it also has economic, medicinal, scientific, educational, social and cultural value

## 2.13 QUESTIONS FOR PRACTICE

1) Discuss whether India has rich biological diversity? What are the biodiversity hotspots in India?

2) What is biodiversity conservation? What measures can be taken for biodiversity conservation?

3) What is ecosystem? What are the components of ecosystem?

4) Discuss major threats to biological diversity.

5) Write a note on the value of biological diversity to mankind.

## 2.14 SUGGESTED READINGS

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
- Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2021
- B.S. Chauhan, Environmental Studies, 2008
- P.S. Jaswal, Environmental Law, 2021
- S.R. Myneni, Environmental Law, Asia Law House, Hyderabad

# B.Com (Hons.)
## Accounting and Taxation

### SEMESTER-II

### COURSE: ENVIRONMENTAL STUDIES

### UNIT – 3: NATURAL RESOURCES – RENEWABLE AND NON-RENEWABLE

**STRUCTURE**

**3.0 Learning Outcomes**

**3.1 Introduction**

**3.2 Meaning of Renewable and Non Renewable Resources**

**3.3 Land Resource and Land Use Change**

**3.4 Land Degradation, Soil Erosion and Desertification**

**3.5 Deforestation: Causes and Impact due to Mining, Dam Building**

**3.6 Water Resources: Use and Over-exploitation of Surface and Ground Water, Floods and Droughts**

**3.7 Conflicts over Water (Inter-state and International)**

**3.8 Energy Resources: Renewable and Non- Renewable Energy Sources**

**3.9 Use of Alternate Energy Sources, Growing Needs**

**3.10 Case Studies**

**3.11 Summary**

**3.12 Questions for Practice**

**3.13 Suggested Readings**

### 3.0 LEARNING OUTCOMES

After the study of this unit, the learners will be able to:

- Understand the concept of Renewable and Non Renewable Resources

- Know about the issues and challenges associated to the use of Land Resource

- Develop an insight into the issues pertaining to Deforestation and its impact on the environment and the lives of the communities dependent upon the forests

- Learn about the use and exploitation of water resources and know more about some Water Resource conflicts
- Acquire a knowledge about the Renewable and Non-Renewable Sources of Energy and also gauge the significance and need for alternate sources of energy in the light of growing energy needs.

## 3.1 INTRODUCTION

The biosphere of the Earth is home to a wide range of ecosystems that give a bounty of products and services to humanity. A natural resource is any component of the natural environment that can be used by man to enhance his well-being. A substance, an energy unit, or a natural process or phenomena can all be considered natural resources. These are resources that are found in the environment and developed without human involvement. Air, sunlight, water, soil, stone, plants, animals, and fossil fuels are all examples of natural resources. Some of the resources (such as soil and water) are critical elements of the life-sustaining system. Natural resources provide recreational opportunities, solace, and even inspiration to people, apart from providing food, fodder, and shelter. Humans have been exploiting natural resources since the dawn of civilization, if not earlier. However, because the resources were ample in comparison to the human population at that time, no severe depletion occurred. Natural resources are naturally occurring items that are beneficial to man or could be useful in possible technological, economic, or social circumstances, as well as supplies derived from the ground, such as food, building and clothing materials, fertilisers, metals, water, and geothermal energy. Natural resources were once the purview of the natural sciences.

The human population has grown dramatically during the previous millennium, causing significant damage to the destruction of natural resources. The location, quantum, and quality of natural resources vary widely. For example, a specific forest type may only be found in a few nations. In addition, the geographical area covered by forest and the nature of the wood available, may vary greatly between countries. After being utilised once, some resources can be reused. The exhaustibility and renewability of resources provide a useful classification system, i.e. Renewable and Non - Renewable Resources

## 3.2   RENEWABLE AND NON RENEWABLE RESOURCES

### 3.2.1 Renewable Resources

Renewable resources are those that are always available, no matter how they are used. After use, they can be fairly restored or replaced. However, if the rate of consumption of these resources continues to outpace their rate of replenishment, not only will their quality suffer, but they may also become completely depleted. Some of the important renewable resources include:

(1) Forests, which produce timber and other plant products, (2) Rangelands, which support grazing animals for milk, meat, and wool production, (3) Wildlife, which maintains the food chain, (4) Agricultural systems, which produce food and fibre, and (5) Marine and fresh water systems, which produce a variety of foods from plants and animals Other renewable resources include soil and water. Animals are also renewable resources since they may be reared and bred to generate offspring to replace older animals.

Even though these resources are renewable, replacing them could take tens to hundreds of years. Organic renewable resources are those that come from living things such as animals and plants, whereas inorganic renewable resources are those that come from non-living things such as the sun, water, and wind.

### 3.2.2 Non - Renewable Resources

Non-renewable resources are those that can't be easily replaced or recovered once they've been used or destroyed. Biological species that have evolved over millions of years in nature are termed non-renewable. Man cannot recreate a biological species that have become extinct on the planet. Minerals and  fossil fuels are examples of such natural resources. Minerals are classified as non-renewable because, while they form naturally through the geological cycle, they require thousands of years to create. Because they are on the point of extinction, some  animals, especially endangered species, are classified as non-renewable. It highlights the several reasons why endangered species must be safeguarded at all costs.

Organic non-renewable resources are non-renewable materials that arise from living creatures, such as fossil fuels while those that come from non-living substances like rocks and dirt are

called inorganic non-renewable resources. The natural resources can be of four types - Land Resources; Water Resources; Forest Resources and Energy Resources

## 3.3  LAND RESOURCE

### 3.3.1 Land as a Resource

Hills, valleys, plains, river basins, and wetlands are examples of landforms that comprise of multiple resource-generating areas on which the people living therein, depend. Many traditional farming communities had appropriate mechanisms to protect the regions  that possessed the resources that they used. For example, in the Western Ghats, ‗sacred groves,' requests to the spirit of the Grove for permission to cut a tree or extract a resource were accompanied by simple rituals.

Land can be considered a renewable resource if it is used efficiently. The soil is bound by the roots of trees and grasses. When forests are depleted or grasslands are overgrazed, the land becomes unproductive, resulting in the formation of wasteland. Irrigation that is too intensive results in water logging and salinization, preventing crops from growing. When highly hazardous industrial and nuclear wastes are placed on land, it becomes  a non-renewable resource.  Land, like all of our other natural resources, is limited. While humanity has learned to adapt its lifestyle to many ecosystems around the world, he will not be able to live comfortably on polar ice caps, under the sea, or in space in the near future.

Land is required by man for the construction of homes, the cultivation of food, the maintenance of pastures for domestic animals, the development of industries to provide goods, and the support of the industry through the creation of towns and cities. To safeguard our very rich biodiversity, man must also protect wilderness areas in forests, grasslands, marshes, mountains, and coasts, among other places. As a result, rational land use necessitates meticulous planning. Most of these distinct forms of land uses can be developed virtually everywhere. However, Protected Areas (National Parks and Wildlife Sanctuaries) can only be established when some natural ecosystems remain undisturbed. These Protected Areas are critical components of effective land  use planning.

### 3.3.2 Land Use Change

The speed with which forests have disappeared in recent years, both in India and around the world, demonstrates the most devastating change in landuse. Forests offer a variety of services to mankind. These processes include things like regulating oxygen levels in the atmosphere, removing carbon dioxide, controlling water regimes, and reducing erosion, as well as producing things like food, fuel, timber, fodder, medicinal plants, and so on. The loss of these is significantly greater in the long run than the short-term profits from converting forest lands to other uses.

## 3.4 LAND DEGRADATION, SOIL EROSION AND DESERTIFICATION

### 3.4.1 Land Degradation

Land degradation is the loss of soil fertility or the deterioration of soil. Due to increasing intensification of use, farmland is under danger. The demand for arable land to produce food, fibre, and fuel wood is increasing as the world's population grows. As a result, there is increasing pressure on scarce land resources, which are degrading as a result of over-exploitation. The degradation of land resources affects around 56 percent of the country's overall geographical area. Every year, 5 to 7 million hectares of land are added to the world's already damaged agricultural area. Wind and rain erode soil more quickly when it is used more extensively for farming. Salinization is caused by over-irrigating fields, as evaporation of water pushes salts to the top of the soil, where crops cannot grow. Excessive irrigation also causes topsoil water logging, which affects agricultural roots and causes the crop to degrade. As more chemical fertilizers are used, the soil becomes poisoned, and the land becomes unproductive. Agricultural land and woods are shrinking as urban centers and industrial growth expand. This is a significant loss with long-term consequences for human civilization. Water logging and salinity affect 3.4 million hectares of canal irrigated land, out of a total area of 17 million hectares.

### 3.4.2 Soil Erosion

The nature of soil determines the characteristics of natural ecosystems such as forests and grasslands. Various types of soil support a wide range of crops. The process by which the superficial layer of soil is lost or removed due to the impact of wind, water, and human influences is called soil erosion. The abuse of an ecosystem results in the loss of essential soil due to monsoon rains and, to a lesser extent, wind erosion. The soil is held by the roots of the

trees in the forest. As a result, deforestation causes considerable soil erosion. In other terms, it can be characterized as the transfer of soil components from one place to another, particularly surface litter and top soil. More than 5000 million tonnes of topsoil are predicted to be eroded each year, with 30% of the total eroded mass ending up in the sea.Soil is washed into streams, carried downstream by rivers, and eventually washed into the sea. The process is more visible in places like the Himalayas and the Western Ghats, where deforestation has resulted in erosion on steep hill slopes. These places are known as ESAs (ecologically sensitive areas). To avoid the annual loss of millions of tons of the essential soil, it is critical to conserve what remains. It is indeed crucial to reforest the deforested areas. The physical soil binding function of forests is not the only link between their existence and the presence of soil. The leaf litter of the forest enriches the soil. Soil microorganisms, fungi, worms, and insects break down this waste, which helps to recycle nutrients in the system. Further depletion of our soil wealth will drain the resource base of our country and impair the ability to produce enough food in the future.

### 3.4.3 Desertification

The term Desertification refers to an irreversible change in a land resource. Desertification is the loss of ten percent or more of the productive potential of arid or semiarid regions. Desertification is marked by deforestation, groundwater depletion, salinization, and significant soil erosion. If it would take more than a decade to recover from damage, it is deemed to be irreversible. There are various types of desertification that can be observed.

- Loss of economic capacity to manufacture goods and services involving direct human utility

- Loss of ecological functions required to maintain ecosystem processes

- Loss of biodiversity at the ecological or genetic level

- To detect new and difficult-to-reverse forms of deterioration, persistent national land monitoring systems are required.

- The current socio-economic systems and management technologies should be the subject of research.

- Policy approaches must account for local heterogeneity and complexity.

- In the absence of global or regional solutions to the majority of savanna and dry land degradation issues, progress must be made.

- Because of the failure and large expense of traditional initiatives, it is evident that focusing on enabling incentives that foster spontaneous response across the entire community will result in more progress. Land tenure, taxation, and marketing are the three key policy issues.

- Many successful techniques will have a high geographical dimension and include cross-national and ecological boundary movement.

Monitoring and evaluation are critical for the formulation of an action plan to halt the desertification process. This necessitates the use of a consistent mapping methodology.

## 3.5  DEFORESTATION: CAUSES AND IMPACT

Forests comprise over a third of the earth's land surface and provide numerous environmental benefits, including a critical role in the hydrologic cycle, soil conservation, climate change mitigation, and biodiversity protection. Deforestation is the process of converting forestland to a non-forested land use such as agriculture, grazing, or urban development. Deforestation is primarily a challenge for tropical developing countries since it leads to depletion of the tropical forest areas, resulting in biodiversity loss and increasing the greenhouse impact. Forests cover 30% of the earth's geographical surface, or around 3.9 billion hectares. It was estimated that the ancient forest covered an area of 1,500 acres.

The loss of various plant, animal, and microbial species in the recent years has been an outcome of deforestation. This phenomenon also poses a threat to indigenous people, whose culture and physical well-being is dependent on the forests. Regional and global climate changes are also caused by deforestation. Droughts become more likely in deforested areas because of the decline in rainfall. Deforestation contributes to global warming by releasing stored carbon as carbon dioxide, a greenhouse gas, into the atmosphere.

### 3.5.1 Causes of Deforestation

The fight to save the world's rainforests and other forests continues, and global consciousness about the issue is growing day by day. To save forests, we must understand the causes behind

their destruction. In order to understand the major factors of deforestation, it is critical to distinguish between the agents of deforestation and the causes of deforestation.

1. Shifting Cultivation or Jhum Cultivation - Shifting cultivation means that the people in the tribal areas clear the forest lands to grow subsistence crops. It has been observed that the major cause of deforestation in regions like Africa, Asia and tropical America has been estimated to be around 70, 50 and 35% respectively. Shifting cultivation is a process of slash and burn agriculture in which it is estimated that more than 5 lakh hectares of land is cleared annually. In countries like India, shifting cultivation is more popular in the north eastern States and to some extent in states like Bihar, Madhya Pradesh and Andhra Pradesh where the phenomenon contributes significantly to the process of deforestation.

2. Commercial logging - Commercial logging is also an important agent of deforestation stop although it might not be the primary cause of forest clearing but is certainly a secondary cause of deforestation because new logging definitely permits shifting cultivation and the fuelwood gathers access to the new logged areas.

3. Need for fuelwood – With an increase in the population, the demand for fuel would also increase which persistently becomes an impelling factor for deforestation especially in the dry forest areas.

4. Overgrazing - The dry regions of the tropical areas are more prone to overgrazing where soil pastures are degraded because of overgrazing which further becomes a cause for soil erosion. Also, the felling of trees is a common feature in the dry areas where the cleared land is used for providing fodder for the grazing animals. When animals that are brought for grazing, remove the vegetation from the land, the remaining task is finished up by the winds which blow away the top layer of the soil, thus transforming the grasslands into a desert. It has been primarily overgrazing, which was a major cause of converting the grasslands in the north of Beijing and Inner Mongolia into desert lands.

5. Expansion of the farming land - With the addition of cash crops and the increased earnings from such crops, the demand for cultivation of plants like oil palm, rubber, fruits and other ornamental plants has considerably increased. This has also exerted pressure on the need to expand the area for the cultivation of agri-business products and this is what leads to an increase in deforestation.

6. Urbanization - Developing cities and towns necessitate land to build the infrastructure required to support a growing population, which is accomplished through clearing forests. Tropical forests are a significant target for infrastructure development for oil extraction, logging concessions, and hydropower dam construction, which ultimately leads to the growth of the road network and the construction of roads in otherwise virgin areas. Roads, railways, bridges, and airports offer additional territory for development, bringing a growing number of people to the forest frontier. These immigrants have colonized the forests by exploiting logging routes or new roads to enter the forest for subsistence land, whether or not they were supported by government programming.

7. Fires - Fires are a common method of clearing forest for shifting and permanent agriculture, as well as the development of pastures. When used responsibly, fire can be a helpful tool in agricultural and forest management, but when used inappropriately, it can result in severe deforestation. Forest fires were reported to affect an average of 19.8 million hectares or 1% of all forests per year, according to statistics from 118 countries covering 65% of the global forest area. In Brazil, deforestation due to road paving has resulted in an increase in forest fires.

8. Tourism - Undoubtedly, national parks and sanctuaries safeguard trees, but the unregulated and irresponsible opening of such regions to the public for tourism is detrimental. Unfortunately, national governments in tropical and sub-tropical nations use tourism as a quick source of revenue, abandoning strict management techniques in the process. Furthermore, many organizations and resorts that represent themselves as eco-tourist destinations are actually profiting off the trees.

9. Exploitation by industrialized nations - Wealthy countries or former colonial powers who lack their own natural resources rely heavily on the resources of financially impoverished countries that are often wealthy in natural resources. Only 20% of the world's population consumes 80% of the world's resources. Unfortunately, the governments of these poor resource-rich countries had adopted the same growth-syndrome as their western neighbours, focusing on maximizing exports, income, and exploiting their vast natural resources for short-term profits. The problem is further exacerbated by the low price of most Third World exports realized in the international market.

10. Overpopulation and Poverty - The influence of population density on deforestation has long been a source of debate. According to international organizations such as the FAO and intergovernmental bodies, poverty and overpopulation are the primary drivers of forest loss. These organizations often assume that fostering development and attempting to minimize population increase will address the problem. Rapid population expansion, on the other hand, appears to be a key indirect and overarching source of deforestation. More people necessitate more food and space, which necessitates more agricultural and habitation land. As a result, additional woods have to be cleared.

### 3.5.2 Impact of Deforestation

Deforestation has a number of negative repercussions; it directly and adversely affects the environment. It affects the lives of human beings and hampers the ecological balance to quite an extent; so much so that hundreds of thousands of species are killed each year as their habitats are destroyed by forest fires and tree cutting. Moreover, deforestation also exacerbates the pace of global warming, thus making life unsustainable for all species on the Earth. The major implications of the problem of deforestation are:

1. Impact on Productivity - Soil, water, and wind erosion are among the catastrophic effects of deforestation in India, with an annual cost of approximately 16,400 crores. Deforestation has a two-fold effect on farmland productivity: it increases soil erosion by a considerable proportion; deforestation forces people to utilize cow-dung and crop wastes as fuel, primarily for cooking, because the soil has been swept away, resulting in an exacerbated cycle of floods and drought.

2. Land Erosion and Landslides - Land erosion and landslides have been caused by deforestation. In the situation of lack of trees, data shows that around 6,000 million tonnes of topsoil is lost annually due to water erosion. In 1973, topsoil erosion loss resulted into a worth of almost Rs 700 crores. In 1976, 1977, and 1978, the values were Rs. 889 crore, Rs. 1,200 crore, and Rs. 1,091 crore, respectively.

3. Reduction in Agricultural Production - Forest trees help to ensure long-term agricultural output by providing environmental protection. They improve the fertility and texture of forest soils, as well as production, by protecting agricultural land from deterioration. The presence of trees on farmlands in portions of the sudano-sahelian region lowers the drying effect of the prevailing wind on the soil, preserving the soil moisture essential for healthy agricultural growth and development. Wind speed and sand movement over planted crops are reduced by trees. Already planted seeds may be lost if there are no wind breaks. In terms of seed and labour expenses, supplying or replanting seedlings is a financial loss. In extreme circumstances, late planting can result in crop failure.

4. Loss of Income Generation - Forest resources bring prosperity to the people of the communities, where they are used. The forests are vital to the livelihood of rural people. Rural people process and trade forest products to supplement their household income and, in certain cases, to set aside money for future needs. To create additional cash, the forest sells wild life, fruit, medicinal herbs, and fuel wood. Furthermore, many rural and urban residents profit from forestry. However, it is an irony that today, as a result of deforestation, the amount of cash generated from the forest has been substantially reduced.

5. Loss of Biodiversity and Habitats - Deforestation, fragmentation, and degradation of forests, particularly those in the tropical areas, harm biodiversity as a whole and habitat for migratory species, including endangered species, some of which have yet to be identified. Tropical forests are home to almost two-thirds of all known species and 65 percent of the world's 10,000 threatened species. The biodiversity of forested regions should be preserved as a type of capital until further research is carried out to determine the relative significance of diverse plant and animal species.

### 3.5.3 Impact of Deforestation due to Mining

Mining affects the forests and lives of tribal people in number of ways:

- Surface mining is used to mine shallow deposits, while subsurface mining is used to mine deep deposits. It causes land deterioration and the loss of top soil. In India, mining activities are believed to be putting around 80,000 hectares of land under danger.

- Mining and other related activities remove flora as well as the underlying soil mantle, resulting in topography and landscape degradation in mountainous areas. Due to indiscriminate mining, large-scale deforestation has been recorded in the Mussoorie and Dehradun valleys.

- In hilly areas, mining causes perennial water sources such as springs and streams to dry up.

- The extent of forested land has decreased by 33% on average, and the rise in non-forest land owing to mining activities has resulted in relatively unstable zones that have resulted in landslides.

- Since 1961, unregulated mining in Goa's forests has devastated more than 50000 acres of forest area. Coal mining in the Jharia, Raniganj, and Singrauli areas has resulted in considerable deforestation in Jharkhand, while magnetite and soapstone mining in the mountainous slopes of Khirakot, Kosi valley, and Almora has destroyed 14 hectares of forest.

- The lush forests of the Western Ghats are also under threat from mining projects for copper, chromites, bauxite, and magnetite in Kerala, Tamil Nadu, and Karnataka.

- Mining is both intensive and a devastating activity. Because the land area involved is so little, it is not considered a major cause of primary deforestation. Mining is a lucrative industry that promotes development booms, which can lead to population increase and deforestation.

- Furthermore, roads built to assist the mining operations will allow agriculturists, permanent farmers, ranchers, land speculators, and infrastructure developers to access the area. For example, infrastructure development projects like as highways allowing access to frontier regions, mining areas, and big hydropower reservoirs were at the heart of Brazil's Amazon development strategy.

- Roads, railways, bridges, and airports open up the land for development, bringing an increasing number of people to the forest frontier. If wood is utilized as a fuel in mining operations and comes from plantations set up for that purpose, it might result in significant deforestation in the region.

### 3.5.4 Impact of Dam Building on Environment

Dam and valley projects were called as "Temples of Modern India" by Pandit Jawaharlal Nehru.

These large dams and river valley projects serve a variety of purposes. These dams, on one hand, are responsible for the degradation of forests and on the other hand, they are to be blamed for the degradation of catchment areas, the extinction of flora and wildlife, the spread of water-borne diseases, the disruption of forest ecosystems, and the rehabilitation and resettlement of tribal people. Ironically, woodlands are found in locations with abundant mineral resources. Forests also cover the steep river valley embankments, which are perfect for developing hydropower and irrigation projects. As a result, there is a perpetual conflict of interest between environmental scientists' conservation concerns and the Mining and Irrigation Departments'.

Dams provide a year-round supply of water for domestic purposes, as well as additional water for agriculture, industry, and hydropower generation, but they also have a number of major environmental concerns. They disrupt river flows, alter natural flood control mechanisms like wetlands and flood plains, and destroy local people's lifestyles as well as wild plant and animal habitats. The lives, livelihoods, customs, and spiritual existence of indigenous and tribal people have all been negatively impacted by large dams. Dams have unduly harmed them, and they are usually left deprived of the advantages. In India, tribal people accounted for 40 to 50 percent of the 16 to 18 million people displaced by dams, despite being only 8% of the country's population of one billion.

### 3.6 WATER RESOURCES: USE AND OVER-EXPLOITATION, FLOODS AND DROUGHTS

#### 3.6.1 Use of Water Resources

Water is utilised for agricultural, industrial, household, recreational, and other purposes, in addition to environmental initiatives. The majority of the operations necessitate the usage of fresh water. However, salt water makes up around 97 percent of all water on the planet, with fresh water accounting for barely 3%. Glaciers and polar ice caps hold a bit more than two-thirds of the accessible fresh water. The remaining freshwater is mostly found as groundwater, with only a small amount present on the ground or in the air. Water is a critical element in all aspects of the ecosystem. Water resources are distinct from other natural resources. It is the world's most abundant and extensively distributed element. It covers almost three-quarters of the earth's

surface (70 percent). It can be found in every part of the environment, including the oceans as a massive saltwater reservoir, on land as surface water in lakes and rivers, underground as groundwater, in the atmosphere as water vapour, and in the polar icecaps as solid ice. This equates to 1400 million cubic kilometres, or enough to cover the world with a 3000 metre thick layer. This apparent abundance, however, is deceptive, as it conceals an ironic reality that a massive 97.5 percent of the amount contained in the world's oceans and seas is saline and so unfit for human consumption. We, like many other organisms, require fresh water to thrive, but only around 2.5 percent of the entire amount is available as fresh water. Approximately 68.9% of the water resources are inaccessible due to ice fields and glaciers, while the remaining 29.9% is present as groundwater. In fact, just one-hundredth of one percent (0.03%) of the world's total supply of 14 billion cubic metres is deemed readily available for human consumption on a regular basis.

The following is a quick rundown of how water is used in various industries.

i. Agricultural Use: In agricultural economies like India, agriculture accounts for 69 percent of total water usage. As a result, agriculture is the world's largest consumer of accessible freshwater.
Agriculture's global water demand is expected to rise by 19 percent by 2050 due to irrigational needs. Increased irrigation demand is projected to place undue strain on water reserves. It's also unclear whether further irrigation development, as well as increased water withdrawals from rivers and groundwater, will be sustainable or not.

ii. Industrial Use: Water is used in industry since it is the lifeblood of the industry. It is utilised as a coolant for raw materials, a solvent, a transport agent, and an energy source. Manufacturing accounts for a significant proportion of total industrial water usage. Chemicals and key metals, in addition to paper and related goods, are major industrial uses of water.
The industry accounts for 19% of overall consumption worldwide. Industry, on the other hand, consumes more than half of the water available for human use in developed countries.

iii. Domestic Use: It encompasses drinking, cleaning, personal hygiene, gardening, cooking, clothing, dishwashing, and vehicle maintenance, among other things. People have been moving out of the countryside and into ever-expanding cities since the end of World War II. This trend has major 15 consequences for our water resources.

To distribute water to expanding populations and industry, the government and towns have had to start developing major water-supply systems. Domestic water use accounts for around 12% of global water consumption.

iv. Use for Hydropower generation: Hydropower is electricity generated by water. Hydropower is the world's most widely used renewable energy source. It generates around 16 percent of the world's total electricity. There are several hydropower development prospects all throughout the world. China, the United States, Brazil, Canada, India, and Russia are the world's top hydropower producers now.

v. Use for Navigation and Recreation: Watercourses that have been or may be used for interstate or international commerce are known as navigable waterways. In many parts of the world, agricultural and commercial items are transported by water on a vast scale. Recreational activities such as boating, swimming and sporting activities are all done on the water. These activities degrade the water's quality and pollute it. While allowing such operations in reservoirs, lakes, and rivers, the highest priority should be given to public health and drinking water quality.

### 3.6.2 Over-Exploitation of Water Resources

Water scarcity has become a worldwide concern. In recent decades, the United Nations has convened several water conventions. Continuous overuse of surface and ground water has resulted in today's world experiencing virtual water scarcity.

Water scarcity has arisen as a result of dwindling resources due to high human population growth over the centuries, as well as rising man-made water pollution around the world. As a result of the massive rise in the world population, existing water supplies have been continuously overused. In many places of the world, groundwater is the primary source of water. However, due to overexploitation by an ever-increasing human population and the rapid rise in global temperatures, this resource has been steadily depleted.

In recent times, there has been a lot of industrialization and urbanization. By 2025, India is predicted to be under severe water stress. At the global level, 31 nations are now experiencing water shortages, and by 2025, 48 countries will be experiencing severe water shortages. Water shortages are expected to affect 4 billion people by 2050, according to the United Nations. This will result in a slew of water-related conflicts between countries. Around 20 of India's main cities are experiencing chronic or intermittent water shortages. The waters of 13 main rivers and

lakes are shared by 100 countries. Upstream countries may starve downstream countries, resulting in political instability around the world.

## 3.6.2.1 Surface Water

Rain and snow cover are the prime sources of surface water. Natural lakes and ponds, rivers and streams, and constructed reservoirs are all examples of surface sources. The country's economy is determined by the availability of surface water. Surface water availability affects production on one hand, while water sources can also produce floods and drought on the other. Water may cause national (interstate) or international issues as a result of unequal distribution. Due to these issues, the sharing of surface water is harming the productivity of several agro eco-zones and causing challenges for the government.

## 3.6.2.2 Ground Water

In many places of the world, groundwater is the primary source of water. However, due to overexploitation by a growing human population and the rapid development in industrialization and urbanisation in contemporary times, this resource has been continuously depleted. Groundwater accounts for around 9.86 percent of total fresh water resources, and it is 35-50 times larger than surface water supplies. So far, about 32% of the groundwater resources have been exploited.

Groundwater extraction is increasing day by day in order to cater to the growing agricultural demands, particularly for the production of water-intensive crops like sugarcane. 90% of the groundwater that is extracted is used for irrigation. In most states, over 8.5 million electric and diesel pumps are used to remove groundwater, resulting in declining water tables. Only the northern and coastal plains have abundant groundwater supplies. In some areas, the supply is insufficient. The volume of groundwater is around 210 million cubic metres. Infiltration, seepage, and evaporation all contribute to this amount. The country's total replenishable ground water resources have been assessed to be 45.23 million hectares metres per year. 6.93 million hectares metres are used for drinking, industrial, and other purposes, leaving 38.34 million hectares metres available for irrigation. Even now, our country is unable to offer safe drinking water to all of its villages and cities. The dissolved minerals in ground water come from the soil layers through which it flows. As water seeps through the layers of the earth, it is drained of most of the microorganisms originally present in the surface water. Though the salt concentration can

be overwhelming at times, it is generally superior as a source of domestic water. The organic materials and mineral nutrients in surface water support algae and huge bacteria populations.
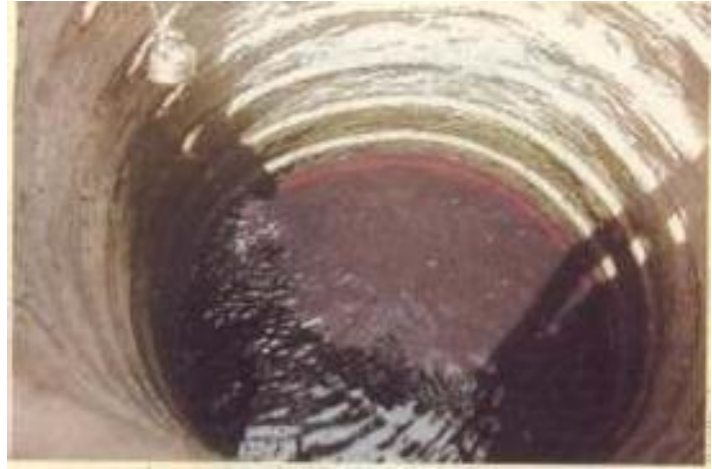
### 3.6.2.3 Overutilization

With the increase in human population, bigger volumes of water are required to meet a range of fundamental demands. This standard is currently unattainable in many regions. Water overuse occurs on a variety of levels. Most people consume far more water than they require. Most of us waste water while bathing, showering, or washing our clothes. Many farmers use more water than is required to cultivate crops. Farmers may use less water without compromising yields in a variety of methods, including the use of drip irrigation technology.

The world's freshwater resources have been stressed by years of fast population increase and rising water usage. Water demand has already surpassed natural availability in some locations, and an increasing number of countries are anticipated to experience water shortages in the near future. At 6.1 billion people, the world's population is increasing by roughly 80 million people per year. This figure translates to a 64 billion cubic metre increase in annual freshwater demand. When annual water supplies fall below 1,700 cubic metres per person, a country is said to be experiencing water stress. A country is said to be facing water scarcity if water availability is less than 1,000 cubic metres per person. When a country faces water scarcity, it should expect persistent freshwater shortages that jeopardise food production, stifle economic growth and development, and harm the environment.

In 1995, 31 countries with a population of 458 million people faced water scarcity or stress. According to Population Action International's forecasts, more than 2.8 billion people in 48 countries would face water stress or scarcity by 2025. By 2050, there will be 54 countries without enough water, affecting 4 billion people, or 40% of the estimated global population. The Middle East, North Africa, and Sub-Saharan Africa have been impacted the hardest. More than 200 million people in Sub-Saharan Africa already live in water scarce countries.

The can be depicted through the following table.

**Table 3.1 World's Water Demand Per Year**

| Year | Demand for Water per Year (in cubic kilometers) |
|------|--------------------------------------------------|
| 1940 | 1000 |
| 1990 | 4130 |
| 2000 | 5000 |
| 2002 | 6650 |

Water scarcity is becoming the single greatest threat to food production, since groundwater levels are dropping and rivers are receding, leaving less water available for cultivation.

According to the United Nations Environment Programme, India will be water-stressed by 2025, with average annual water availability ranging from 1000 to 1700 cubic metres per person.

Agriculture sector is shown to be the largest user of water. Water usage for irrigation increased from roughly 40% two decades ago to 73 percent by the year 2000 A.D. The usage of irrigation is inefficient. As a result, 25-30% efficiency and watering methods will be dramatically altered. The data on water consumption displayed in the table below shows that irrigation, including livestock and electricity use, accounts for 79.6% and 13.7 percent of total water use, respectively.

**Table 3.2 Water Use (India) 2000 A.D.**

| Use | Taken | Consumed | Returned |
|-----|-------|----------|----------|
| Irrigation | 869 | 783 | 86 |
| Livestock | 150 | 5 | 145 |
| Industry | 35 | 10 | 25 |
| Domestic | 38 | 8 | 30 |
| **Total** | 1092 | 806 | 286 |

**3.6.3** Floods

For ages, floods have been a severe environmental concern. However, as people have deforested catchments and increased their usage of river flood plains that originally served as safety valves, the destruction wreaked by rivers overflowing their banks has become increasingly devastating. Wetlands in flood plains are natural flood control systems into which overflowing rivers can spill and act as a temporary buffer, soaking up the water and keeping it from destroying the

surrounding land. Water levels in rivers, seas, and oceans rise as a result of heavy rains. Flooding occurs when water accumulates along the coastline. Floods wreak havoc on crops, domestic animals, property, and people's lives. Many animals are carried away by the power of the water during floods and die as a result.

Floods in the Ganges and its tributaries, as well as the Bramhaputra, are caused by deforestation in the Himalayas, which kill people, damage the crops, and destroy homes year after year. During floods, rivers alter the direction of their flow, and tonnes of rich soil is lost to the sea. Rainwater no longer seeps into the subsurface when forests decline, but instead flows down the mountainside, carrying vast volumes of topsoil. This momentarily blocks rivers, but as pressure builds, it gives way, allowing massive amounts of water to wash down into the plains below. Rivers surge, burst their banks, and flood waters engulf people's crops and homes there.

### 3.6.4 Droughts

Drought has been a serious issue in our country, particularly in the dry areas. Droughts occur when an area goes without rain for an extended length of time. In the meantime, evaporation and transpiration will continue to drain groundwater from the soil. The land gets incredibly dry since this water is not returned to the earth in the form of rain; the water level in ponds and rivers drops and in rare cases, water bodies totally dry up. Droughts occur when groundwater becomes scarce. It is extremely difficult to obtain food and fodder in drought circumstances. Life becomes difficult, and many animals perish as a result. It is a climatic situation that develops as a result of the failure of one or more monsoons. It occurs at different times in different places of our country. While it is impossible to prevent the monsoon from failing, careful environmental management can mitigate its negative consequences. During drought years, water shortage has an impact on houses, agriculture, and business. It also causes food shortages and malnutrition, which has a particularly negative impact on children.

Rainfall in most parched places of the world is unpredictable. This results in periods of severe water scarcity for drinking, farming, and providing for urban and industrial use. Drought-prone areas are consequently subjected to periodic hunger. Agriculturists have no income in these terrible years, and because they don't have a consistent source of income, they are constantly concerned about droughts. Drought-prone areas in India have 'Drought Prone Areas Development Programs,' which are intended to mitigate the consequences of droughts. People

are paid in bad years to build roads, minor irrigation projects, and plantation initiatives under these programs. There are several steps that can be taken to reduce the severity of a drought's effects. However, this must be done as a precautionary measure so that the impact on local people's life is minimized if the monsoons fail. When the monsoon is nice, we use up the plentiful quantity of water without attempting to save it or use it wisely. In the drought area, there is no water even for drinking during a year when the rains are scarce.

Deforestation is one element that exacerbates the effects of drought. Rainwater rushes down rivers and is lost once hill slopes are cleared of forest cover. Water is kept in the area by the forest cover, which allows it to seep into the earth. This increases the amount of water stored underground in natural aquifers. If the stocks have been replenished during a good monsoon, this can be utilized in dry years. Overuse of subsurface storage water causes the water table to drop and vegetation to suffer. Drought-resilient soil and water management, as well as afforestation, are long-term solutions.

## 3.7  CONFLICTS OVER WATER

Water conflict  is a term that describes a dispute over water resources between countries, states, or groups.

### 3.7.1 Inter-state Water Conflict

Agriculture is India's primary source of income. For the effective supply of water for agricultural uses, multi-purpose projects and irrigation projects have been built across rivers. As a result, the equitable distribution of river water resources is critical to people's well-being. Inter-state water disputes arose as a result of states sharing river water. Since India's independence, there have been numerous river water disputes. When a water dispute emerges between two or more State governments, the Central Government receives a request under Section 3 of the Inter-State River Water Disputes Act, 1956 (ISRWD Act, 1956) from any of the basis States regarding the existence of a water dispute.

### Kaveri River Dispute

The origins of this war may be traced back to two agreements made between the ancient Madras Presidency and the Princely State of Mysore in 1892 and 1924. Karnataka claims that the river does not provide it with its fair share of water. It contends that the accords were severely skewed

in favour of the Madras Presidency, and it has asked a renegotiated deal based on equitable water sharing. On the other hand, Tamil Nadu claims that it has already developed about 3,000,000 acres of land and has come to rely substantially on the current pattern of use. Any change will have a negative impact on the livelihoods of millions of families in the states.

On February 5, 2007, the Indian government issued a final decision allocating 419 billion cubic feet of water to Tamil Nadu and 270 billion cubic feet to Karnataka, as well as 30 billion cubic feet of Kaveri river water to Kerala and 7 billion cubic feet to Puducherry. All four states have decided to file review petitions in order to obtain clarifications and maybe renegotiate the ruling. The Indian Government notified the final award of the Cauvery Water Disputes Tribunal on February 20, 2013, in accordance with Supreme Court orders (CWDT). On May 10, 2013, the Supreme Court of India issued an interim order directing the Government of India to establish a temporary Supervisory Committee to administer the Cauvery Tribunal order.

### 3.7.2 International Water Conflict

**Tsangpo-Brahmaputra (Indo – China conflict)**

The two lower riparian countries, India and Bangladesh, are concerned about China's huge intentions to harness the Brahmaputra River's waters. Dam development in China, as well as the anticipated diversion of the Brahmaputra's waters, is likely to have an impact on water flow, agriculture, environment, and downstream lives and livelihoods. Hydropower projects along the Brahmaputra have been approved by the Chinese government. It claims that all of these projects are run-of-the-river, with no storage or diversion, and that they will have no impact on the river's downstream flow into northeast India. Nonetheless, its ambitions have caused concern in India's northeast and Bangladesh, where the Brahmaputra is a lifeline. The anticipated northward rerouting of the Brahmaputra's waters is more concerning than China's construction of hydropower dams on the river. The river's water level would drop significantly as it entered India as a result of the diversion. The increased salinity of the water will have a significant impact on agriculture and fisheries in downstream locations. The issue's lack of communication is fueling distrust and tension. This emphasizes the importance of a multi-country discourse involving all riparian countries. China must share information about its dam development and other plans with the rest of the world.

## 3.8 ENERGY RESOURCES

Energy is a critical component of economic growth, and the availability of energy is closely linked to a country's future prosperity. The production of electricity and the consumption of energy are both critical to economic progress. Energy is consumed in India in a variety of ways, including through the use of fuel wood, animal dung, and agricultural wastes. Commercial fuels, such as coal, petroleum products, natural gas, and electricity, are gradually replacing these noncommercial fuels. Commercial fuels contribute for 60% of total energy, whereas non-commercial fuels account for 40%.

In our lives, the sun is our primary source of energy. We use it directly for warmth, as well as indirectly through natural processes that offer us with food, water, fuel, and shelter. The sun's rays fuel the growth of plants, which provide us with food, produce oxygen, which we breathe in, and absorb carbon dioxide that we exhale. The sun's energy evaporates water from seas, rivers, and lakes, forming clouds that eventually transform into rain. Fossil fuels were originally forests that grew in prehistoric times owing to the sun's light. The exploitation of most energy sources will be required to meet the future energy needs of a rapidly growing human population. Energy resources can be classified as either non-renewable or renewable.

### 3.8.1 Renewable Sources

Natural processes rejuvenate renewable energy resources, allowing them to be used continuously. In comparison to fossil fuels or nuclear energy, renewable energy has a far lower negative environmental impact. Renewable energy generation is often more expensive than energy produced by fossil fuels or nuclear energy at this time in technology; but, as technology progresses, renewable energy costs are predicted to fall. Solar energy is the most important of the renewable energy sources. Hydropower, wind, geothermal energy, ocean waves, and tidal energy are some of the other sustainable energy sources.

Plants (crops and forests) and animals that are periodically replaced because they have the ability to reproduce and maintain life cycles are examples of renewable resources. Wood and wood products, pulp products, natural rubber, fibres (e.g. cotton, jute, animal wool, silk and synthetic fibres), and leather are examples of renewable resources that do not have a life cycle but can be recycled.

Water and soil, in addition to these resources, are considered as renewable resources. Solar energy, despite having a finite life, is seen as a renewable resource in the sense that solar stores are limitless on a human scale.

### 3.8.2 Non – Renewable Sources

Nonrenewable sources are resources that cannot be replaced by natural processes. There are only a limited number of such resources available, and they cannot be raised. Fossil fuels (petrol, coal, etc.) and nuclear energy sources are among these resources (e.g. uranium, thorium, etc). Moreover, minerals, salts, and metals (iron, copper, gold, silver, lead, zinc, and so on) (carbonates, phosphates, nitrates etc.) are also all forms of non-renewable energy resources. Once a non-renewable resource is depleted, it is no longer available. Then we must either locate a replacement or do without it. Non-renewable resources can further be divided into two categories, viz. Recyclable and non-recyclable.

(1) Recyclable resources: These are non-renewable materials that can be gathered and repurposed after they have been utilised. These are primarily non-energy mineral resources found in the earth's crust (e.g. aluminium, copper, mercury, etc.) and fertiliser nutrient reserves (e.g. phosphate sock and potassium, as well as minerals used in their natural state) (asbestos, clay, mica etc.)

(2) Non – Recyclable resources: These are nonrenewable resources that are incapable of being recycled in any way. Fossil fuels and nuclear energy sources (e.g. uranium, etc.) are examples of these, which provide 90% of our energy needs.

### 3.9  USE OF ALTERNATE ENERGY SOURCES

There is a need to develop renewable energy sources that are already accessible and can be used (such as solar or wind), as well as sources that can be generated and  used (bio-mass). Solar, wind, hydel, waste, and bio-mass are India's primary renewable energy sources. Bio-mass refers to agricultural resources such as wood, bagasse, cow manure, seeds, and so on.

### 3.9.1 Solar Energy

Solar energy can be used for human welfare in both direct and indirect ways. The radiant energy of the sun is direct solar energy, whereas indirect solar energy is acquired from things that have previously absorbed the sun's radiant energy. Direct heating using solar energy is possible, or the

heat can be transformed into power (thermal electric generation). Direct solar energy is converted into electricity using photovoltaic cells. When solar power is unavailable at night or on overcast days, a backup system is required to store and create electricity.

India, as a tropical country, has the potential to commercialize solar energy. As per the findings of various studies, one sq. kms of land might create 35 MW of power. With such potential, solar energy has a bright future as a source of energy for the country's development. The most significant constraint is the initial investment, which has resulted in a poor utilization of its potential. Solar energy will require a lot of research, low-cost technologies, and minimal expenditure to become one of the front runners

### 3.9.2 Biomass Energy

Biomass energy is the most important of the different energy resources where solar energy is used indirectly. Live plant material and dried residues, fresh water and marine algae, agricultural and forest residues (e.g. straw, husks, maize cobs, bark, sawdust, roots, animal wastes), and other materials whose origin can be attributed to photosynthesis provide biomass energy. Biomass also includes biodegradable organic waste from sugar mills, breweries, and other businesses. Biomass is the primary source of energy for at least half of the world's population. In India's rural areas, fuel wood is still an important source of energy for domestic use. To release its energy, biomass fuel, which can be solid, liquid, or gas, is burned. Wood, charcoal, animal dung and peat are examples of solid biomass. Biomass can be turned to liquid fuels, particularly methanol and ethanol, for use in internal combustion engines. Microbial decomposition can also be used to convert biomass, notably animal waste, into biogas in biogas digesters. Biogas is a clean fuel that emits fewer pollutants than other combustible energy sources when burned. It is made up of a mixture of gases that can be conveniently stored and transferred.

Biomass energy production necessitates a sufficient amount of land and water.

### 3.9.3 Biogas Energy

Organic waste, such as dead plant and animal material, animal dung, and kitchen garbage, can be transformed into a gaseous fuel called biogas by anaerobic digestion or fermentation. Biogas is composed primarily of methane ($CH_4$) and carbon dioxide ($CO_2$), with minor amounts of hydrogen sulphide ($H_2S$), moisture, and siloxanes. It is a biomass-based renewable energy source. Biogas is a fuel that can be utilized in any country for any type of heating, including

cooking. It can also be found in anaerobic digesters, where it is used in a gas engine to convert gas energy into electricity and heat. Biogas, like natural gas, may be compressed and utilized to power vehicles.

Denmark produces a considerable amount of biogas from wastes and 15 farmer cooperatives produce 15,000 megawatts of electricity. A factory in London produces 30 megawatts of electricity per year from 420,000 tonnes of municipal refuse, enough to power 50,000 households. In Germany, biogas is used to generate electricity in 25% of waste landfills. Japan recycles 85 percent of its waste whereas, France recycles 50 percent. In India's rural sector, biogas plants are becoming increasingly popular. Cowdung is utilised in biogas plants, which is transformed into a gas that is used as a fuel. It can also be utilised to power dual-fuel engines. Using biogas to minimise cooking smoke has helped thousands of people breathe easier.

### 3.9.4 Hydropower

To create electric energy, water is made to fall from a height which further turns turbines at the dam's bottom. Hydropower generates around a quarter of the world's electricity and is typically less expensive than electricity generated by thermal power facilities. Building a dam to keep the water, on the other hand, causes a slew of environmental issues, including the submergence of plant and animal habitats and the relocation of people. Hydropower generation globally grew sevenfold between 1950 and 1970. Some of its advantages include the long life of hydropower plants, the renewable nature of the energy source, very cheap operating and maintenance costs, and the absence of inflationary pressures as with fossil fuels.

Although hydroelectric power has aided global economic development, it has also exacerbated significant environmental issues. Large amounts of forest and agricultural land are submerged to generate hydroelectric electricity. Local tribal people and farmers have long relied on these areas for their livelihood. Land use conflicts are unavoidable. Reservoir silting (particularly as a result of deforestation) shortens the life of hydroelectric power plants. Aside from electricity generation, water is necessary for a variety of other functions. Domestic needs, agricultural crop production, and industrial needs are among them. As a result, conflicts arise.

When rivers are dammed for electricity generation, they become difficult to be utilised for navigation and fishing. The problem of displaced persons' resettlement is one for which there is no simple solution. As most dam projects have failed to rehabilitate those who have been displaced, yet many large hydroelectric initiatives are still being opposed.

### 3.9.5 Growing Energy Needs

Energy has always been inextricably related to man's economic progress and advancement. Energy usage has been regarded as an indicator of economic progress in current development models that have concentrated on measuring the extent of economic expansion. This measure, on the other hand, ignores the long-term negative repercussions of high energy consumption on society. The world's energy demands quadrupled between 1950 and 1990. Over the previous 22 years, the global demand for power has doubled. In the year 2000, the global primary energy consumption was 9096 million tonnes of oil. This equates to 1.5 tonnes of oil per capita on a worldwide scale. Electricity is currently the world's fastest increasing kind of end-use energy. By 2005, Asia-Pacific is predicted to overtake North America in terms of energy consumption, and by 2020, it will consume 40% more energy than North America.

Coal was the major source of energy for the industrial revolution in the nineteenth century for about 200 years. Oil accounted for 39% of global commercial energy use at the end of the twentieth century, followed by coal (24%) and natural gas (24%), with nuclear (7%) and hydro/renewable sources (6%) accounting for the remainder. Coal is the most common commercial energy source in India, accounting for 55 percent of total energy consumption in 2001, followed by oil (31%), natural gas (8%), hydro (5%), and nuclear energy (1%). Biomass (mostly wood and dung) provides for over 40% of India's primary source of energy. While coal remains the most common fuel for electricity generation, nuclear power has grown in popularity during the 1970s and 1980s, and the demand for natural gas has surged in the 1980s and 1990s.

## 3.10 **CASE STUDIES**

The importance of energy resources in today's economy and as a foundation for our future may be seen in recent clashes between some of the world's most powerful nations, which have mostly been attributed to the goal of securing their energy supply. The two Gulf Wars are significant examples of this. Energy security has been acknowledged by defence experts as the driving force for Iraq's invasion over Kuwait, as well as the rationale for the second Gulf war. The globe has recently witnessed a conflict in the South China Sea between India, Vietnam, and China over the subject of prospecting for natural gas and petroleum beneath the seabed and these days, it is the tussle between Russia, China and the U.S. making claims over the Arctic region, which highlights their expanding demand and urgent need to augment their sources of energy.

**3.10.1 India and Pakistan : The Indus Water Treaty**

**About the Indus River Basin:** The Indus River originates in China (Tibet) and Afghanistan and runs 3,100 kilometres to the Arabian Sea through India and Pakistan. Three western rivers (the Indus, Jhelum, and Chenab) and three eastern rivers (the Sutlej, the Beas, and the Ravi) make up the Indus River system. In terms of agriculture, the Indus is one of the world's most developed rivers, having huge irrigation facilities in both Pakistan and India. The partition of India and Pakistan in 1947 separated the Indus basin's water resources, resulting in disputes over water allocation between the two countries.

**Conflict:** The Indus River has long been a source of contention between India and Pakistan, two countries with a history of mistrust and antagonism in their relationship. During the 1940s, large irrigation projects were undertaken in a section of the basin (Punjab) that was to be partitioned between the two countries. On five of the six rivers in the Indus basin, the 1947 split established India as the upstream riparian and Pakistan as the downstream riparian. Water allocation disputes emerged almost immediately. In December 1947, a brief standstill agreement was reached, which kept the status quo in place until March 1948. In the spring of 1948, when the agreement expired, numerous water supplies from India to Pakistan were cut off. Attempts to resolve the dispute failed in producing a long-term solution.

**Resolution:** David E. Lilienthal, an external expert, suggested a cooperative approach to water management in the 1950s, with the goal of boosting available water supply through infrastructure development and controlling the Indus basin as a single entity. He recommended a technical and collaborative approach to issue solving and management, as well as the establishment of the Indus Engineering Corporation with World Bank funding and support. Following his evaluation of the report, World Bank President Jim Yong Kim called Pakistan and India's prime ministers to gauge their interest in engaging in a new dispute settlement procedure mediated by the bank's "good offices." The prime ministers agreed, and the mediation process began.

- A mediation process design was agreed upon, comprising fundamental concepts and a representation technique to steer the negotiations. Both governments agreed to take a cooperative approach to water management, to negotiate on a functional rather than political basis, and to appoint engineers from their respective countries to participate in the talks. The construction of a shared information base on water resources and infrastructure development choices was agreed upon, with a commitment to share data.

- Both India and Pakistan submitted a series of suggestions and counterproposals for water use and allocation plans at the request of the World Bank. While the respective models shared supply assumptions, they differed considerably in terms of water allocation. The two parties were unable to reach an agreement on a collaborative approach to developing the Indus basin's waters, leaving only a quantitative split of the waters as a viable alternative. The World Bank proposed allocating the vast majority of the water supplies from eastern tributaries to India and from western tributaries to Pakistan once the idea of joint development was abandoned.

- The World Bank's proposal was approved by India as the basis for an agreement. Given the inadequate storage facilities, Pakistan regarded the flow of western rivers insufficient to replace their existing supplies from eastern rivers. As a result, Pakistan only offered a conditional consent. The World Bank replied by recommending that India should construct larger storage facilities, which India declined due to financial constraints. The concerns of how much India would contribute to the development of extra storage and where the finances for the remaining construction would come from, were essential to resolve this deadlock.

- Separate talks with India and Pakistan were held by the Bank president, who also sought financing from the world community. India agreed to give $174 million, with the rest of the world chipping in another $900 million. Both Pakistan and India consented to the package, which was formally drafted as the Indus Treaty in January 1961 and ratified by both the nations.

**3.10.2 South China Sea Conflict**

**About the South China Sea:** The South China Sea is a huge tropical ocean expanse that spans over 3 million square kilometres and is located between Asia's mainland coast and the island groupings of the Philippines, Borneo, and Indonesia. Because it connects the Indian and Pacific Oceans, it is critical to the flow of world maritime trade. Approximately 90% of the world's commercial goods are transported by water. Many of the countries in this region lack natural resources but have robust, industrialised economies that rely on importing raw materials and shipping manufactured goods across the sea.

Ships operating through the South China Sea are expected to transport more than $5 trillion in annual trade. This includes around a quarter of all oil transported by sea (about 15 million barrels per day) and more than half of all global liquefied natural gas trade (LNG). The South China Sea

is also an internationally important biodiversity hotspot. It has coral reef environments that sustain at least 3,365 recognised marine fish species. The South China Sea, despite being a small area of the oceans, produces an incredible amount of fish, accounting for 12 percent of global fishing catch and valued about US$21 billion per year. These live assets are more valuable than money. They employ at least 3.7 million people and are critical to the region's food security for hundreds of millions of people.

**Conflict:** The South China Sea disputes mainly revolve around the islands. The area's coastal geography is complicated, with several small islands, rocks, and coral reef features, the vast majority of which are subject to opposing sovereignty claims. Two archipelagos — the Paracel Islands in the northwest and the Spratly Islands in the south — as well as the isolated Pratas Island and Scarborough Reef (or Shoal) in the northeast and east of the South China Sea are among the territories of conflict. Over 120 small islands, islets, rocks, and reefs dot the 240,000 square km of maritime space that make up the Spratly Islands. The 12 largest Spratly Islands have a total land area of less than 2 square kilometres, with the largest, Itu Aba, measuring only 1.4 kilometres long and 370 metres wide. Despite their apparent insignificance, China, Taiwan, the Philippines, Malaysia, Brunei, and Vietnam all claim these islands small whole or in part. With the exception of Brunei, all claimants have occupied and stationed garrisons on at least one of the disputed islands, demonstrating the significance of the conflicts.

**Competing Claims:** Another facet of these issues is that the South China Sea is becoming a more competitive, and potentially conflict-prone, battleground for China, its neighbours, and the United States. China has attempted to stretch its defensive perimeter offshore in recent decades. The People's Liberation Army Navy (PLAN) of China has been developing and modernising its navy, adding powerful submarines, frigates, destroyers, and long-range maritime patrol aircraft. Despite the fact that China is now Asia's most powerful naval power, it still falls behind in comparison to the US Navy in terms of size and capacity. The United States has increased its naval presence in the South China Sea in response to China's growing aggressiveness, as part of a so-called "pivot to Asia."

To make matters even more complicated, all of the South China Sea states claim coastal zones offshore that include important marine resources. These countries' maritime claims tend to converge as they border the South China Sea. They also make claims from contested islands, which will invariably clash. As a result, a complex, web-like network of claim lines emerges. In

the South China Sea, China also claims a so-called "nine-dash line." If these disconnected lines were connected, they would encircle around 80% of the South China Sea. Although China has never explained this 'nine-dash line' concept, yet it is presumed to be a historical claim to the islands and waterways in question.

**Further Complications:** This South China Sea dynamic of contending geographies is frightening. It sets the stage for future war as China strives to exercise its "historic rights" and other coastal states want to exploit resources such as oil and seafood found within "their" waters. This has serious consequences for the region's valuable marine biodiversity and fisheries management. It also jeopardises regional security and freedom of travel along globally significant rivers. China is expected to assert its sovereignty not only over the disputed South China Sea islands, but also over marine areas inside the nine-dash line as well and the issue is likely to continue further.

## CHECK YOUR PROGRESS

Ques. 1 Answer the following Short Answer Type Questions:

i. What does recycling mean?

    a) To use a natural resource to make something new.

    b) To use less of a natural resource than is possible.

    c) To reuse natural resources or old products to make new things

    d) To put old products in the trash.

ii. Total earth's surface covered by water is

    a) 75%

    b) 60%

    c) 85%

    d) 50%

iii. The primary cause of Deforestation is ……………….. and it leads to a fall in …………………

iv. The main activity largely responsible for the damage of Indian forests is …………………………..

v. What happens when rain falls on soil without vegetation cover?

    a) Rain water percolates in soil efficiently

    b) Rain water causes loss of surface soil

c) Rain water leads to fertility of the soil

d) Rain water does not cause any change in soil

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## 3.11 SUMMARY

The effects of natural calamities and disasters, population explosion, deforestation, increased transportation, and eviction of fumes and poisonous gases from industries have all contributed to the depletion of natural resources and environmental degradation, across all parts of the world. The present chapter was an endeavour to understand the following points:

- Natural resources which may be further classified as Renewable and Non-Renewable are subject to over-utilization because of the increasing demand by the human population, worldwide. However, there is a greater need to minimize the use of Non-Renewable Resources and increase the use of Renewable Resources.

- Although land is a renewable resource, it ought to be used efficiently and efforts need to be made to prevent activities which bring about a change in the pattern of use of land as a resource.

- Consistent efforts need to be made to prevent degradation of land, soil erosion and desertification of land.

- Forests constitute a significant resource which can help in maintaining the ecological balance but the unregulated felling of trees and increasing deforestation tendencies by the human beings so as to augment their incomes and acquire more development, affect adversely the lives of various species and even the tribal communities who are dependent upon these resources for their livelihood.

- Water, in recent years has acquired a critical significance, owing to its depleting levels especially in terms of groundwater. If the scantily available water resources are not conserved and water is not used cautiously and judiciously, most nations of the world will soon become water scarce countries. This will not only affect the lives of the people in the developed world but also the prospects of development in the less developed nations.

- Realizing the significance of the inadequacy of water resources, the states inside a country and even countries at the international level land up into disputes over water resources, which not only generates tension between two nations but also limits the movement by other countries across the disputed waters.

- In the contemporary times, energy has also assumed critical importance in terms of the development and prosperity of the nations. That is why it is becoming increasingly important to strike a balance between the renewable and non renewable sources of energy. Since the non renewable sources are available only to a limited extent, the need to develop alternate renewable energy sources has increased overtime.
- The increasing demand for energy resources across the world has culminated into disputes and conflicts between various nations over water resources, oil resources and land resources which possess the potential of catering to the supplementary energy resource needs of the progressing countries.

## 3.12 QUESTIONS FOR PRACTICE

Ques. 1 Differentiate between the Renewable and Non-Renewable Sources of Energy. Explain the various alternative sources of Renewable Energy that can be used effectively in the low income countries of the world.

Ques. 2 Explain in detail the case of any one dispute at the international level which indicates the increasing hunger of the nations to acquire an additional source of natural resources.

Ques. 3 Explain the various avenues of use of water resources by the human beings across the globe. How can the over-exploitation of water resources be minimized?

Ques. 4 What is meant by Deforestation? Explain the prime causes of deforestation. How does Mining impact the lives of the tribal people dependent upon the use of forest resources?

Ques. 5 Make an account of the ill-effects caused by the change in the land use pattern and land degradation on the environment.

## 3.13 SUGGESTED READINGS

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# B.Com (Hons.)
# Accounting and Taxation

## SEMESTER: II

## COURSE: ENVIRONMENTAL STUDIES

## UNIT 4: ENVIRONMENTAL POLLUTION

## 4.0 LEARNING OUTCOMES

The learner will be able to understand

- Meaning and causes of environmental pollution

- The impact of environmental pollution on human health and environment

- Types of environmental pollution and measures undertaken to control pollution

- Health hazards of radioactive wastes

- Policy and measures for management of waste

- Role of individual and society in environmental protection

## 4.1 INTRODUCTION

Protection and preservation of environment is essential for survival of various living organisms including mankind. Environment pollution is referred to the adverse alteration or contamination of physical or biological components of the environment. It may be in the form of alteration of properties/quality of air, water, soil or the climate due to anthropogenic reasons like emissions or

natural reasons like volcano eruptions, forest fires etc. Environmental pollution is primarily the adverse impact of human activities on our surroundings viz., land, air, water etc.

World is witnessing unprecedented deterioration of the environment owing to unregulated activities of humans including deterioration of air quality, pollution of water bodies, contamination of soil, water bodies, depletion of forest cover, loss of biodiversity, depletion of ozone layer, hostile climatic conditions etc. These adverse impacts on environment are primarily due to anthropogenic reasons. However, the problem of environment degradation is neither new or unique to India. This problem has confronted the mankind for decades and centuries altogether to varying degrees. The entire globe is afflicted by environmental pollution and India is no exception to this.

## 4.2 ENVIRONMENTAL POLLUTION :TYPES, CAUSES, EFFECTS ANDCONTROL MEASURES

Environmental pollution can be described as adverse impact of human activities on our surrounding depleting the quality of air, water, soil or other surroundings. Typically environmental pollution can be categorized as Air Pollution, Water Pollution, Soil Pollution, Noise Pollution etc.

### 4.2.1 Air Pollution

Air, and in particular good quality air, is essential for the survival of mankind and other living organism on this planet earth. Air is a gift to all living organism by the mother-nature and is the mixture of gases forming earth's atmosphere. Natural air in the earth's atmosphere contains molecules of different gases i.e. around 78% Nitrogen, 21% Oxygen and around 1% molecules of other gases like Carbon dioxide, argon and other components. It also includes water vapours. If this composition is disturbed by additional presence of carbon dioxide or ozone molecules or other gases, the air is said to be polluted. The entry of additional hazardous gases in disproportionate numbers in air or disturbance of the natural composition of air can have disastrous consequences.

Air pollution may occur due to entry of air pollutants in air disturbing the natural composition of the air. Various factors contributing to air pollution have been identified by environmentalists, scientists and experts including but not limited to, rapid industrialization, power plants, burning of fossil fuels, dust and fumes emitted by vehicles, deforestation, mining, agricultural activities, stubble burning, burning of municipal solid waste, construction activities, emission from stone crushers and hot-mix plants, smoke, fire and other human and natural

activities.

4.2.1.1. Causes of Air Pollution

4.2.1.1.1Industrial Emission
Rapid and unregulated industrialization has seriously impacted the environment and in particular air, water and soil. Untreated industrial emissions and discharge of toxic gases in air is a big source of air pollution. Industries, industrial products and industrial wastes emit various gases including carbon dioxide, carbon monoxide and other toxic gases.

- Burning of Fossil Fuels

Increasing number of automobiles and use of non-renewable forms of energy has immensely deteriorated the quality of air. Ever increasing burning of fossil fuels and vehicular emissions is a major source of greenhouse gases.

- Mining and Agricultural Activities

Rampant use of fertilizers, insecticides, pesticides etc in agriculture have not only adverse impact on the quality of soil but these chemicals also percolate in food chain. This apart, part of these chemicals become air borne either at the time of spray or in the form of vapors and therefore, degrade the quality of air.

Similarly, unregulated mining activities lead to dust and fumes being released in air polluting the air and surroundings and have adverse impact on the health of workers.

- Stubble Burning

Burning of crop residue after harvesting has become a big challenge in India and other developing countries. After the crop is harvested, farmers resort to stubble burning being cost effective, easy and fast method to clear the fields and to prepare them quickly for the next crop. Mass scale stubble burning pollutes the air and in some areas, air quality becomes toxic and dangerous.

- Burning of Municipal Solid Waste

Unscientific waste management is another reason for worsening quality of air. Sometimes, municipal solid waste is burnt in open. Scenes of rubber tyres being burnt are common. Burning of such waste releases toxic gases in air polluting the environment.

- Other Factors

There are various other factors causing air pollution like construction activities, unscientific management of household waste, emissions from hot mix plants, stone crushing units, dumping of toxic waste etc.

### 4.2.1.2. Effects of Air Pollution

Air pollution has reached alarming proportions around the globe and India has also been severely afflicted by air pollution.

- Adverse Health Impacts

Greenpeace India, in its report published in 2020 has reported that around 120000 people died in six metropolitan cities in India on account of air pollution related diseases. As per the report, cost of air pollution costs was around 120000 crores in six metropolitans. It is estimated in 2017 report of Greenpeace India that the cost of air pollution is around 3% of India's Gross Domestic Product. Assessment by Greenpeace of India's 168 cities across 24 states shows that none of the cities in India can claim to have clean air by WHO standards.

- Global Warming and Climate Change

One of the most serious issues caused by environmental degradation is climate change which has a very serious effect on human beings, ecosystems and other living organisms. Climate Change implies changes in the usual weather found at a particular place over a period of time i.e. the rainfall spells, rainfall quantum, duration, timing, dry spells, changes in temperature, changes in winter season etc. It implies changes in earth's climate in totality. Climate change was considered to be a rhetoric by majority of the people around the world but now it has been scientifically established that earth's climate is actually changing.

It has been reported that annual average surface air temperature of the earth has increased by 1.8 degree Fahrenheit during the last 115 years i.e. from 1901-2016. Climate change manifests in various forms including in the form of global temperature rise and the resultant effects of the same i.e. shrinking of ice sheets at the poles; melting of glaciers and glacier retreat around the globe i.e. in Himalayas, Alaska, Alps etc.; rise in sea level and the threat to survival of coastal cities/nations etc.

- Ocean Acidification

Ocean acidification is another cause of concern in international environmental governance.

Oceans are sinks of carbon dioxide and have been absorbing excess heat caused by GHG emissions. More than quarter of the $CO_2$ emitted in the atmosphere is absorbed by the oceans leading to warming of ocean waters at almost all levels and acidification of the oceans which is detrimental to marine ecosystems. Since the onset of industrial revolution, acidity of surface waters have increased by 30% (NASA) which is attributable to $CO_2$ emissions which are being absorbed by the oceans. The absorption of $CO_2$ by oceans is increasing every year making them more acidic. Absorption of $CO_2$ by oceans is increasing by 2 billion tons per annum.

4.2.1.3. Control of Air Pollution

To prevent and control Air Pollution, India enacted *Air (Prevention and Control of Pollution) Act*, 1981. The Act was enacted to make legal provisions for prevention, control and abatement of air pollution and to preserve quality of air. The Act provided for establishment of regulatory mechanism in the form of Central and State Pollution Control Boards for carrying out the objectives of the Act. The Act came into force on 16th May 1981 and it applies to whole of India. Act has empowered the Boards to lay down standards for quality control and to regulate release of gases in air. The industrial establishments are required to comply with the norms laid down by the Pollution Control Boards. Board can also ban use of particular type of fuels to prevent air pollution. However, enactment of law alone can not serve the purpose. Therefore, various other measures at individual, institutional and societal level are required to be undertaken to check the menace of air pollution. These include:

- Shifting from fossil fuels to renewable resources of energy
- Using clean energy sources
- Reducing vehicular emissions
- Energy conservation
- Proper and scientific waste management
- Prevention and prohibition on stubble burning and burning of municipal solid waste
- Avoiding traffic jams

**4.3.2  Water Pollution**

Water pollution is another issue which is facing the humankind at global level. Discharge of untreated sewage, industrial affluent and other discharges into water bodies has polluted major rivers across the globe and this is more so in developing countries. As per the report of UNEP,

Water pollution has worsened since 1990s in the majority of rivers in Latin America, Africa and Asia (UNEP, Snapshot of World's Water Quality, 2016). UNEP reports that around 1/3$^{rd}$ of all river stretches in Latin America, Asia and Africa are severely affected by pathogen pollution and it presents a serious health hazard posed not only by drinking contaminated water but also by using the same for bathing or other human purposes. The increase in pathogen and organic pollution is more than 50% in these regions and Asia is most severely hit by it. More than 323 million people living on these continents run the risk of water borne diseases. However, the menace is not confined to these continents alone or to developing countries alone even the developed countries are facing the same. For instance, water pollution causing severe water borne diseases has been reported in countries like Canada (John Vidal, Cleaning the World's Water). Contamination of water not only presents health hazards but also affects food production and economies of the nations.

4.3.2.1. Causes of Water Pollution

There are multiple causes of water pollution including discharge of untreated industrial affluents in water bodies; discharge of untreated sewage; discharge of religious material in water bodies; dumping of industrial and other wastes in water bodies; contamination of water by pesticides, insecticides and fertilizers and; contamination of ground water table by seepage of chemicals in water table.

4.3.2.2.  Effects of Water Pollution

Water pollution can have deleterious effect on the health of humans and various other living organisms. The effect of contamination of water depends upon the type of pollutants and their concentration in water. Polluted water can have deleterious effect on human effect and the concentration of chemicals in animals can enter the food chain and affect health severely. Not only it can have direct effect on humans and food chain, it can also affect aquatic life adversely affecting the metabolism, behavior, reproduction etc.

The effect of water pollution can have a huge impact on the food chain. It disrupts the food chain. Cadmium and lead are some toxic substances, these pollutants upon entering the food chain through animals (fish when consumed by animals, humans) can continue to disrupt at higher levels. Increasing incidence of water borne diseases like diarrhea, hepatitis etc. are the direct impact of water pollution.

4.3.2.3.  Control Measures for Prevention and Abatement of Water Pollution

To control and prevent water pollution, *Water (Prevention and Control of Pollution) Act*, 1974 was enacted in pursuance of resolutions passed by State legislatures under Article 252 of the Constitution of India. The Act was first in the series of laws dealing with pollution in India. The principal aim of the Act was to lay down legal regime for prevention, control and abatement of water pollution and to provide regulatory mechanism for the purpose. The Act is applicable throughout the territory of India. Act has laid provided for sleuth of measures for preventing water pollution by industrial affluents. Industries are required to take prior permission before commencing operations and are required to treat the industrial affluents before they are discharged. Violation of rules laid down under the Act has been penalized and offender can be prosecuted and punished.

However, enacting laws alone can not serve the purpose and efforts are required to be undertakenat individual, institutional and societal level. Some of the control measures are:

- Treatment of affluents and sewage before discharge in water bodies
-  Reuse of water after treatment
- Use of organic methods for detoxification of water like use of Water Hyacinth
- Scientific disposal of affluents and sewage.

**4.3.3  Soil Pollution**

Soil degradation is yet another serious environmental challenge being faced by the modern world. Soil pollution means the presence of chemicals in excess of natural compositions on the soil which degrade the soil. Soil pollution and soil degradation is the result of various human activities like use of excessive fertilizers, pesticides, herbicides, insecticides, agricultural practices, antibiotics contained in animal manure, sewage, waste dumping and industrial and mining activities leading to seepage of chemicals into the soil. As per Food and Agriculture Organization of the United Nations, around $1/3^{rd}$ of the world's soils are degraded and billions of tonnes of soil are lost to farming each year. It has seriously affected farmlands. The problem has affected various nations of the world. For example, the joint study conducted by Yale Environment and China dialogue reported in 2014 that 16.1% of the China's soil are polluted and the figure for farmlands was higher. The main contaminants are cadmium, lead, nickel and arsenic. As per the report of Food and Agricultural Organization (FAO) of UN, 40% of the African continent's soils are degraded (FAO, Status of the World's Soil Resources, 2015). So far as India is concerned, it has also been

facing this problem at a large scale. State of India' Environment, 2017 has reported that around 40% to 70% of land in India has undergone desertification. Further, India is one of the four major countries affected by soil salination.

4.3.3.1. Causes of Soil Pollution

There are various sources and causes of soil pollution. Some of them are:

- Discharge of untreated industrial affluents in water bodies
- Discharge of untreated sewage in water bodies
- Dumping of wastes in rivers and oceans
- Industrial accidents
- Oil spills
- Ocean acidification caused by excessive release of $CO_2$
- Seepage of chemicals in ground water table
- Seepage of fertilizers, chemicals, pesticides and insecticides in water bodies

4.3.3.2 Effects of Soil Pollution

Soil pollution has various adverse impacts on humans, ecosystem and biodiversity. Soil pollution initiates a chain reaction. It can adversely affect soil biodiversity and the capacity of the soil to act as a filter thereby leading to contamination of ground water table. The study of water table near the dumping sites at New Delhi has revealed that ground water table is dangerously contaminated. Contaminated water can accumulate in plant tissues, animal tissues and can thus enter the food chain of humans and animals. Such chain reaction can lead to multiple diseases and increase morbidity in humans apart from adversely affecting the health. Soil pollution has high economic costs. It reduces fertility of the soil thereby leading to lesser productivity.

4.3.3. 3 Control Measures

To control pollution including soil pollution, India enacted Environment (Protection) Act, 1986. The Act empowered the appropriate governments to take measures for prevention, control and abatement of environmental pollution including formulation of rules for scientific management of wastes. Consequently, Government of India has notified various rules for prevention of pollution. Some of the rules are as under:

- Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987

- The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
- The Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms/Genetically Engineered Organisms or Cells Rules, 1989
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- Ozone Depleting Substances (Regulation and Control) Rules, 2000
- Batteries (Management and Handling) Rules, 2001
- Atomic Energy (Radiation Protection) Rules, 2004
- Atomic Energy (Radiation Processing of Food and Allied Products) Rules, 2012
- Bio-Medical Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- E-Waste (Management) Rules, 2016
- Plastic Waste Management Rules, 2016
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
- Construction and Demolition Waste Management Rules, 2016

### 4.3.4 Noise Pollution

Word noise is derived from Latin word _Nausea' which means sickness leading to vomiting sensation. Noise pollution is also presenting as a significant environmental concern in the recent years.

4.3.4.1. Causes of Noise Pollution

There are various causes of noise pollution including the following:

- Vehicular noise
- Industrial noise
- Household/domestic noise
- Neighborhood noise
- Noise caused by natural resources like streams, falls etc.
- Construction and demolition activities
- Playing loud music in open in functions and elsewhere
- Use of loud fire-crackers, bugels etc.

4.3.4.2. Effects of Noise Pollution

Noise pollution has significant impact on human health and recently data has shown the proportionate hearing loss attributable to noise pollution (Alex Grey, 2017). As per the recent study in 2017, where noise pollution levels in 50 cities across the globe was measured, it was found that the Guangzhou in China is worst affected city followed by New Delhi, India. Mumbai ranks 4th worst city in noise pollution. The studies have found that excessive noise pollution is not only causing discomfort and other related diseases but is also responsible for hearing loss. As per WHO more than 360 million people are afflicted by hearing loss and of these, around 32 million are children. The average city dweller is found to be having hearing loss equivalent to 10-20 years older than his actual age. Unfortunately, in the hearing loss rank, New Delhi tops the global list followed by Mumbai wherein maximum hearing loss of 20 years than the actual age is reported (World Hearing Loss City Ranking, 2017).

Apart from hearing loss, excessive noise can lead to hypertension, sleeping disorders and cardiovascular issues.

### 4.3.4.3 Control Measures

With a view to prevent noise pollution, Noise Pollution (Regulation and Control) Rules 2000 have been notified by the Union Government under Environment (Protection) Act, 1986. Under these rules, restrictions on use of loud speakers, public address systems, DJ music systems beyond permitted hours can be placed. For example, use of DJ music systems after 10 pm has been restricted under Noise Pollution Rules. Areas can be classified as residential and silence zones and prohibitions can accordingly be placed.

However, enactment of laws can never be successful unless they are accepted and endorsed by the public at large. Therefore, it is of utmost importance that individuals and society at large take measures like

- Avoiding unnecessary honking at public places
- Avoiding loud music systems in residential areas
- Use of sound proof systems in commercial areas, silent zones like hospitals and schools
- Regulation of industrial noise.

## 4.4    NUCLEAR HAZARDS AND HUMAN HEALTH RISKS

Nuclear hazards are threats posed by invisible and odorless pollutants in the form of radioactive substances such as radio-nuclides in the air, water, or soil. These radio-nuclides emit high-energy particles (alpha and beta rays) and electromagnetic radiation (gamma rays). The automatic release of particles and radiation by an unstable nucleus is called Radioactivity and the pollution from these radiations is called Nuclear pollution. Therefore, radiation or Nuclear pollution can be defined as the release of radioactive material or particles of high energy into atmospheric water, or to the earth primarily as a result of human activity, either by accident or construction. Sources of nuclear pollution include natural and  man-made natural resources. The human environment has been emitting radiation and making up 85% of man's annual radiation output. Radiation from human activities usually accounts for up to 15% of public exposure each year.

### 4.4.1  Causes of Nuclear Pollution

Radiation substances when released into the environment are dispersed or concentrated in living organisms through a food chain. In addition to naturally occurring radioisotopes, large numbers are produced by human activities, including the operation of nuclear power plants, the development of nuclear weapons, and the testing of atomic bombs. Explosions at Three Mile Island 1979 and Chernobyl 1986 nuclear power plant are glaring examples of radioactive contamination. This apart, even the radioactive medical waste can have health effects on workers.

4.4.1.1.  Nuclear Waste management and Disposal

It can produce low to medium radiation over a long period of time. Radioactivity can pollute and disperse air, water, and soil. Therefore, their effects may not be easily distinguished and difficult to predict. The biggest problem with radioactive waste is the fact that it cannot be degraded or chemically or biologically treated. Therefore, the only option is to contain waste by storing it in tightly sealed containers protected by radioactive material, Debris can also be stored in remote areas with little or no life.

4.4.1.2.  Radiation isotope used for medical, industrial and research applications

The greatest exposure to humans stems from the use of X-ray diagnosis, radioactive isotopes used as a follow-up and treatment of cancer and other diseases.

4.4.1.3.  Nuclear explosion and nuclear weapons

The highest rate of man-made radioactive fallout has been made around the middle of the 20th century through various nuclear deterrent methods, which ended World War II. Use of radioactive material in the production of Defense weapons can also emit radiation from radioactive material.

4.4.1.4. Mining and Processing of Radioactive Ores

Crushing and processing of radioactive ores and the production of radioactive products can also produce radioactive waste, similar to the extraction of phosphate ores, contaminating the environment.

**4.4.2  Human Health Risks**

Nuclear pollution can have adverse effect on human health. The health risks of exposure to radioactivity may be DNA mutation, psychological effects, damage to vital organs and tissues, damage to the immune system, cancer cell production or biomagnification. These include Somatic effects and Genetic Effects.

4.4.2.1. Somatic Effects

Somatic affects the function of cells and organs of the exposed person. It causes damage to cell membranes, mitochondria and cell nuclei leading to abnormal cell function, cell division, growth and death. Radiation causes severe damage to cells throughout the body. Radiation damage can cause headaches, nausea, vomiting, diarrhea, and even death, depending on the amount of radiation you receive. While the remaining effects can last for days or years and can lead to death. All creatures are susceptible to radiation pollution, and the effects can range from mild to severe depending on a variety of factors such as volume, duration, and type of radiation.

4.4.2.2. Genetic Effects

Radiation exposure can lead to genetic mutations, i.e. changes in the genetic makeup of cells affecting future generations. These effects are mainly due to damage to DNA molecules. People suffer from leukemia and cancer of the bone when exposed to high doses radiation.

**4 . 4 . 3 Control Measures**

Union of India has enacted Atomic Energy Act, 1962 and thereunder Atomic Energy (Radiation Protection) Rules, 2004 have been formulated. This part, Atomic Energy (Safe Disposal of Radioactive Waste) Rules, 1987; The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989; The Manufacture, Use, Import, Export and Storage of Hazardous Micro-

Organisms/Genetically Engineered Organisms or Cells Rules, 1989; The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 have been formulated.

## 4.5  SOLID WASTE MANAGEMENT

Solid Waste Management is a major administrative and environmental hazard in all major cities of India. In-fact Solid Waste Management or Municipal Solid Waste Management is a serious problem everywhere especially in all developing countries. Rapid population growth, increasing industrialization and large scale migration from rural areas to cities has led to tremendous increase in waste generation and its disposal in cities and towns. Generation of large scale waste in cities has put tremendous strain on the already limited resources of modern cities. To add to this, unscientific disposal of the waste poses serious environmental and health hazard. The problem is further accentuated by the fact that urban solid waste contains not only household waste but it also contains hazardous waste, construction and demolition waste, plastic waste and electronic waste etc.

Waste can be categorized into Municipal Solid Waste, Construction and Demolition Waste, Plastic Waste, E-Waste, Hazardous Waste, Bio Medical Waste etc. In order to ensure proper and scientific management of waste generated in India, Union government has notified following rules under Environment (Protection) Act 1986

- Bio-Medical Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- E-Waste (Management) Rules, 2016
- Plastic Waste Management Rules, 2016
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016
- Construction and Demolition Waste Management Rules, 2016

Separate detailed rules have been put in place for management of various categories of waste including for Lead Acid Batteries (Management and Handling). Responsibilities of individuals, Municipalities, institutions and industry have been fixed under these rules.

## 4.6    SOURCE SEGREGATIONS: CONTROL MEASURES OF URBAN AND INDUSTRIAL WASTE

The above rules have laid down detailed framework for bifurcation of various categories of waste. Institutions, producers have a responsibility under E-Waste Management Rules to bifurcate electronic waste and dispose off the same to an authorized recycler or refurbisher only and maintain adequate records. Provisions for extended Producer responsibility for collection of electronic waste have been made.

Municipal Solid Waste is required to be segregated at the stage where the waste is generated. Rules provide for segregation and storage of waste in three separate bins

- o Bio-degradable waste– any organic material which can be degraded by micro-organisms into simpler stable compounds
- o Non bio-degradable waste– to contain dry waste including recyclable and non-recyclable waste, combustible waste, sanitary napkins and diapers etc.
- o Domestic Hazardous waste – CFL bulbs, expired medicines, broken mercury thermometers, pesticide cans, discarded paint drums, used needles and syringes, contaminated gauge, used batteries etc

- Segregated waste is required to be handed over to authorized waste collectors/waste pickers
- Used sanitary pads, diapers etc. to be packed/wrapped safely either in the pouches provided by manufacturers or in other prescribed suitable material
- Construction and demolition waste to be separately stored and disposed off as per Construction and Demolition Waste Management Rules, 2016
- Horticulture and garden waste to be separately stored in the premises
- No littering of solid waste on streets, public spaces roads etc
- Solid Waste not to be burnt/buried in streets or open public spaces
- Solid Waste not to be thrown in drains or water bodies

**4.6.1 Disposal of Industrial and Urban Waste**

The segregated waste, thus, collected can be disposed off in various ways i.e. Sanitary Landfills, incineration, recycling, recovery, pyrolysis, composting and use in energy generation and road making.

4.6.1.1 Sanitary Landfill

This is the most popular waste disposal method used today. Garbage is spread out in small layers, pressed and covered with soil or plastic foam. Modern garbage dumps are constructed in such a

way that the concrete floor is covered with an impenetrable line, often made of several layers of plastic and thick sand. This liner protects groundwater from contamination due to leakage or decay. When the landfill is full, it is covered with layers of sand, clay, topsoil and dust to prevent water accumulation. Arrangements are being made to rediscover recycling facilities.

### 4.6.1.2 Incineration

This process involves the burning of solid waste at high temperatures until the waste is reduced to ashes. Heats are made in such a way that they do not emit excess heat when solid debris burns. The things that recycle heat by kitchens and boilers are called waste plants. These waste energy systems are more expensive to set up and operate compared to empty heaters because they require special equipment and controls, skilled technical personnel, and auxiliary fuel systems.This method of solid waste management can be done by individuals, municipalities and even institutions.

### 4.6.1.3. Recovery

Resource recovery is one of the hallmarks in waste management. Many important metals go waste and create pollution unless they are recovered in a scientific manner. For example, precious metals used in electronic items can be recovered and reused which will not only lead to resource recovery and savings but will also avoid pollution.

### 4.6.1.4. Recycling

Certain waste like plastic bags, paper, tins, glass and containers can be recycled and reused. This reduces waste and thus reduces the burden on landfill sites and also leads to resource recovery. Process of recycling is aimed at reducing energy loss, reducing wastes and thereby reducing burden on landfills. Thus it avoids soil pollution.

### 4.6.1.5. Pyrolysis

Pyrolysis refers to decomposition of the solid waste using heat generated by chemicals without use of oxygen. The process is undertaken at high temperatures.

### 4.6.1.6. Composting

Biodegradable waste including wastes from trees, gardens etc. is segregated and used to make compost. Rules enacted by Union government require that the compost so generated shall be used as manure at the site of generation. New residential colonies have been mandated to make

provisions for compost making thereby reducing burden on landfill sites. Only bio-degradable waste is used in composting. It is a biological process which converts the waste into organic fertilizer which is high in carbon and nitrogen.

## 4.7 POLLUTION CASE STUDY

### 4.7.1 Delhi Pollution Case Study

Around the first week of November, almost every year, the capital city of India i.e. New Delhi gets clogged with dense layer of smoke. The smoke set down on the lower sky of the city and chokes the entire National Capital Region. Children, elderly people and persons afflicted with chest diseases find it difficult to breathe. Many people complain of chest congestion and breathlessness. Reports suggest that about 54000 people die of diseases related to air pollution every year in New Delhi. Cost of combating air pollution related ailments comes around 58000 crores in New Delhi.

It is claimed by government of Delhi that the primary cause of choking of New Delhi is stubble burning in the neighboring states of Punjab and Haryana.

### Conflict: Claims and Counter Claims

Government of National Capital Territory of Delhi claim that the cause of smoke engulfing Delhi is stubble burning in the States of Haryana and Punjab. Whereas States of Punjab and Haryana claim that it is the increased vehicular pollution in Delhi coupled with industrial pollution and pollution caused by fire-crackers are the root cause of air pollution in New Delhi. Both the States deny stubble burning as the root cause of choking of Delhi in NCR region near Diwali. Both the states claim that there is very little stubble burning in their states. It is claimed that since the wind is not blowing that is why Delhi has turned into gas chamber.

### Resolution

The solution to the problem of NCR lies in adopting a multipronged strategy. Stubble burning does contribute in choking of Delhi but other factors like pollution caused by fire-crackers burnt near Diwali significantly increase the smoke cover. Further, very low pressure of winds aggravates the problem and the smoke is not diluted and carried further. This apart, vehicular emissions, construction activities and industrial discharges into air also contribute significantly in deterioration of air quality of Delhi. The solution, therefore, lies in

- Encouraging and adopting the use public transport system and decreasing the use of

vehicles to reduce vehicular emissions by adopting odd-even formula.

- Strictly enforcing prohibition on burning of fire-crackers around that part of the year.

- Enforcing prohibition on stubble burning and by providing alternate and effective means of stubble disposal

- Temporary ban on construction and demolition activities when the air pressure is extremely low.

- Temporary ban on industrial activities when the air pressure is low and smoke starts engulfing the region.

- Use of scientific methods like air purifiers, sprays etc to improve the air quality

- Continuous monitoring of air quality levels.

## CHECK YOUR PROGRESS

Answer the following:

1) _____ and _____ natural sinks of carbon dioxide

2) _____ waste is used for composting

3) According to Food and Agricultural Organization (FAO) of UN, how much percentage of soil of African continent's soils are degraded?

 a) 20%
 b) 30%
 c) 40%
 d) 50%

4) Which of the following is unscientific and unacceptable method of waste disposal

 a) burning of rubber tyres in open

 b) Dumping at landfill sites

 c) Recycle and recovery

 d) All of these

5) CFL and LED lights, Thermometer etc are

a) Bio-degradable waste

b) Hazardous waste

c) Bio-degradable but hazardous waste

None of these

## 4.8 SUMMARY

- Environmental pollution is contamination of physical and biological components of environment.

- Environmental pollution is caused by various anthropogenic factors like discharge of industrial gases in air, smoke, vehicular emissions, stubble burning, burning of waste, dumping of wastes in open, contamination of soil, noise etc.

- Environmental pollution can be broadly classified as air pollution, soil pollution, noise pollution, water pollution

- Environmental pollution whether air pollution, water pollution, soil pollution or noise pollution has various adverse impacts on health, biodiversity, genetic mutations, habitat etc

- Government has enacted various laws and rules for prevention, control and abatement of air pollution yet the pollution is continuing unabated.

- Apart from pollution caused by emissions from vehicles and industries, handling and use of radioactive materials also expose humans and other living organisms to radiations which have harmful effect on humans and other living organisms.

- Municipalities, institutions, individuals and society have a responsibility to ensure that environment is protected and preserved and the waste generated by us is disposed off in an environmentally sound manner.

## 4.9 QUESTIONS FOR PRACTICE

1) Write detailed note on solid municipal waste and its disposal methods.
2) Explain pollution caused by radioactive material and the health hazards involved while dealing with radioactive waste.
3) What are the causes of water pollution? How it can be prevented?
4) Discuss the causes and effects of air pollution.

5) Discuss control measures for prevention of environmental pollution.

## 4.10 SUGGESTED READINGS

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
- Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses, 2021
- B.S. Chauhan, Environmental Studies, 2008
- P.S. Jaswal, Environmental Law, 2021
- S.R. Myneni, Environmental Law, Asia Law House, Hyderabad

**COURSE: ENVIRONMENTAL STUDIES**

**UNIT 5: ENVIRONMENT PROTECTION LAW IN INDIA**

## STRUCTURE

5.0  Learning Outcomes

5.1  Introduction

5.2  Environmental Laws in India

     a.   Indian Constitution and Environment

     b.   The Wild Life (Protection) Act, 1972

     c.   Water (Prevention and Control of Pollution) Act, 1974

     d.   Air (Prevention and Control of Pollution) Act, 1981

     e.   Environment Protection Act, 1986

5.3  Acid Rain and its impact on Humans and Agriculture

5.4  Climate Change and Global Warming

5.5  Ozone Layer Depletion

5.6  Role of Individual and Society in preservation and protection of environment

5.7  Major Issues in Environmental Law Enforcement in India

5.8  Summary

5.9  Questions for Practice

5.10  Suggested Readings

## 5.0 LEARNING OUTCOMES

Learning outcomes of this chapter are as follows:

- To apprise the learner about important environmental laws enacted in India
- To make learner understand the importance of environmental laws
- To apprise the learner about environmental offences
- To inform the learner about major environmental issues

- To make learner understand the individual role in preservation and protection of environment

## 5.1 INTRODUCTION

Traditional Indian society always respected and worshipped various constituents of environment and environment ethics formed part of Indian religious philosophy. Traditional inhabitants of this sacred land worshipped nature – Sun, Moon, Earth, Air and water. They perhaps knew that eco-system is delicate and has a very fine balance which is required to be preserved and any tangible changes in eco-system can have disastrous consequences. The reverence of nature in reflected in the teachings of Jagat Guru Nanak Dev Ji - ‗Pawan Guru, Pani Pita Mata Dhart Mahat, Divis Raat Doi Daia, Khele Sagal Jagat' (Air is like God, Water is father and Earth is the mother. It is through the harmonious interaction of all these three vital ingredients that the whole universe is being sustained). However, with the passage of time, human race started ignoring the environmental ethos and values and increasing human greed led to increasing exploitation of natural resources without caring for the need to preserve and protect the environment. Rapid industrialization, urbanization, societal degradation and increased greed to exploit resources led to environmental pollution and environmental degradation necessitating enactment of laws to preserve and protect the environment.

## 5.1 ENVIRONMENT PROTECTION LAWS IN INDIA

UN Conference on Human Environment (June 1972) is catalyst in development of environmental law across the globe. India also participated in the conference wherein it was decided to take appropriate measures for protection of natural resources and to prevent air pollution. Accordingly, India amended the constitution to include some provisions pertaining to environment. The constitutional amendment paved the way for development of environment protection laws in India.

### a. Indian Constitution and Environment Protection

There was no express provision in the Constitution of India relating to Environment protection. Constitution (Forty-Second Amendment) Act, 1976 inserted Article 48A in Part IV of the Indian Constitution (i.e. Directive Principles of State Policy). Article 48A read as under:

*The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.*

Though Part IV of the Constitution is not justiciable i.e. it can-not be enforced in a court of law, yet it is fundamental in the governance of the country. Insertion of express provision in the Constitution of India, coupled with other national and international developments, lead to development of environmental protection law in India. As stated earlier directive principles are fundamental in the governance of the country. This apart, Part IVA i.e. Fundamental duties was also inserted in the Constitution of India. Article 51A(g), contained in Part IVA, casts a duty on every citizen of India:

*To protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures*

Constitution of India did not provide express provisions for enforcement of fundamental duties. However, High Court of Rajasthan in L.K. Koolwal v. State of Rajasthan(AIR 1982 Raj. 2)stated that rights and duties co-exist and there can-not be any right without any duty and there can-not be duty without any right. Hence, the duty of one is the right of another. With passage of time, Right to clean environment has been recognized, by the Supreme Court of India, as a fundamental right explicit in Right to Life and Personal Liberty (Article 21 of the Constitution of India). Constitution (Forty-second Amendment) Act, 1976 also inserted entries 17A and 17B relating to Forests and Protection of Wild Animals and birds respectivelyin the Concurrent List. This apart, there are provisions in Article 252 and 253 of the Constitution of India. Article 252 enables the Parliament of India to enact laws, when so required by two or more states, on a subject on which Parliament has no power to make laws. Article 253 enables the Parliament to make laws to give effect to international treaties and agreements which include treaties and agreements relating to environment protection.

Therefore, it is clear that there are provisions in the constitution for enactment of laws relating to protection of environment. In accordance with constitutional mandate, India has enacted various laws for protection of the environment.

- The Wild Life (Protection) Act, 1972

- Water (Prevention and Control of Pollution) Act, 1974

- Forest Conservation Act, 1980

- Air (Prevention and Control of Pollution) Act, 1981

- Environment (Protection) Act, 1986

- Public Liability Insurance Act, 1991

- The Biological Diversity Act, 2002

- National Green Tribunal Act, 2010

### b.  Wild Life (Protection) Act, 1972

Elites of Indian subcontinent were fond of hunting wild animals since times immemorial and therefore, concern for wild life protection was raised far back in 3rd Century BC and accordingly, laws were enacted for

Indian legislature has made various laws for protection and preservation of wild life and forests viz.,

- Elephants Preservation Act, 1879
- The Wild Birds Protection Act, 1887
- The Wild Birds and Animal Protection Act, 1912
- The Indian Forest Act, 1927
- The Prevention of Cruelty to Animals Act, 1960
- The Wild Life (Protection) Act, 1972

### Objectives of The Wild Life (Protection) Act, 1972

As is apparent from the tile itself, The Wildlife (Protection) Act, 1972 was enacted to protect, preserve and improve wild life in India. The Act has been  enacted with the following objectives:

- To ensure protection of wild animals, birds and plants
- To ensure ecological and environmental security of the country

### Overview of the Wild Life (Protection) Act, 1972

- The Act facilitated the preparation of list of endangered species of wild life and it prohibited hunting of endangered species
- Act banned trading in Endangered species except as provided in the law.
- Wild Life Act has six schedules. Depending upon the threat to survival of species, species have been classified into various schedules. Animals, birds, reptiles etc mentioned in Schedule I, can-not be hunted except by an order in writing when such specie has become dangerous to humans etc.
- Law enabled setting up of Protected Areas i.e. Sanctuaries, National Parks etc.
- It regulated trade in prescribed species of wild life.
- Act provided for constitution of National Board for Wild life which is the highest authority. The Board lays down the policy and reviews the matters related to wild life preservation, national parks, sanctuaries etc.
- Central Zoo Authority has been established under the Act to supervise zoos in India.
- National Tiger Conservation Authority has been established to protect Tigers and to increase the population of Tigers.
- Tiger and other Endangered Species Crime Control Bureau has been established to curb poaching and trade in Tiger and other Endangered Species.

After Enactment of Wild Life (Protection) Act, 1972 India signed UN multilateral treaty aimed at protecting endangered animals and plants i.e. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which entered into force on 01st July 1975.

### c. Water (Prevention and Control of Pollution) Act, 1974

We all know that clean drinking water is essential for survival of human race and other species. That is why Supreme Court of India has recognized right to clean water as part of fundamental right to life (Narmada Bachao Andolan v Union of India, AIR 2000 SC 3751). Water Pollution amounts to violation of Right to Life enshrined in Article 21 of the Indian Constitution (State of M.P. v. Kedia Leather and Liquor Ltd, AIR 2003 SC 3236).

**Objectives of Water Act**

Water (Prevention and Control of Pollution) Act, 1974 has been enacted with the following objectives:

- To provide legal rules for prevention and control of water pollution
- To provide legal mechanism for implementation of the provisions of the Water Act
- To provide legal mechanism for maintaining wholesomeness of water of reservoirs etc.

**Overview of the Act**

- Water Act mandates setting up of Central Pollution Control Board and State Pollution Control Boards for carrying out various functions under the Water Act and for taking appropriate measures for prevention and control of water pollution.
- Water Act contains detailed provisions for prevention and control of Water Pollution. Water Act prohibits establishment of any industry etc which would discharge sewage or trade effluent into a stream without the permission of Pollution Control Board. Board is required to examine the application with regard to pollution control measures and is competent to impose requisite conditions for ensuring compliance with legal norms. Permission of the Board is required to be renewed periodically. If the industry does not comply with the conditions imposed by the Board, it may withdraw the permission and industry can-not continue its operations. Board has the power to inspect the premises of any industry and take appropriate measures.
- To regulate use of water, Board has the power to seek information regarding abstraction of water from a stream or well. Similarly, Board has the power to seek information regarding discharge of sewage or effluents into water bodies and issue appropriate directions. Non compliance with the directions can attract imprisonment upto 3 months or fine which can extend upto 10000 (Ten thousand) Rupee. In case of continuing defaults, fine upto Rs. 5000 per day during can be imposed.
- Water Act also bars discharge of any poisonous, obnoxious or polluting matter into a stream or water resource.
- Water Act prohibits obstruction in the free flow of a water body which is likely to increase pollution. It must, however, be remembered that Act does not bar construction of

dams, bridges, building, dock, drain or sewer which any person has right to construct. Similarly, the natural deposits, sand or gravel which have flown from the stream can be put back into the stream.

- Board is authorized to collect water samples from streams, wells and sample of sewage etc. being discharged into stream or well to ensure that untreated effluents are not discharged into water bodies. The officer is required so serve immediate notice upon the occupier or his agent stating the intention to take sample and to get it analysed.

- Pollution Control Board has the power to take appropriate measures in case of any accident or to meet emergencies and it can appropriate orders restraining discharge of pollutants into water streams or well. Non compliance with such orders is punishable with minimum mandatory imprisonment of one and half year extendable upto six years with fine.

### d. Air (Prevention and Control of Pollution) Act, 1981

Clean air is required for the survival of not only the humans but also for survival of various other living organisms. Air pollution has been defined to mean presence of any solid, gaseous or other substance in air, including noise, beyond defined limits which is likely to adversely affects humans and other living organisms. Natural air in the earth's atmosphere contains around 78% Nitrogen, 21% Oxygen and around 1% molecules of other gases like Carbon dioxide, argon and other components including water vapours. However, if the composition of the natural air is altered owing to natural or man-made reasons, it would adversely affect various living organisms.

**Objectives of the Air Act**

Air Act has been enacted with the following objectives:

- To lay down rules for the prevention, control and abatement of air pollution;

- To preserve the quality of the air and take appropriate measures to maintain the same;

- To establish mechanism for implementation of the provisions of the Act by establishing Central and State Pollution Boards;

- To confer powers upon Central and State Boards for carrying out the functions assigned by the Act.

**Overview of the Air Act**

- Air Act mandated the establishment of Central Pollution Control Board and State Pollution Control Boards for discharging the functions assigned under Air Act. To avoid duplicacy and to integrate Water Act and Air Act, it has been laid down that the Pollution Control Boards established under Water Act shall also perform the functions under the Act.

- Air Act contains provisions and measures for prevention control and abatement of air pollution. Act contains preventive as well as remedial measures.

- State Government has been empowered to declare certain areas to be air pollution control areas. Act empowers states to prohibit use of any fuel causing air pollution in such areas by notification.

- Burning of any material causing pollution like stubble burning can be prohibited in pollution control areas. Act also empowers for approval of appliances for controlling and regulating air pollution.

- Act enables issuance of emission standards for vehicles for curbing air pollution. Accordingly, pollution emission standards can be fixed which Vehicle Registration Authority is bound to follow. Similarly, section 110 of Motor Vehicles Act also empowers the Central government to issue directions regarding emission of smoke, visible vapour, sparks, ashes, reduction of noise caused by vehicles and standards of emission of air pollutants.

- All industrial plants are required to obtain permission of the Pollution Control Board before commencing operation. Similarly existing units are also required to obtain permission. All industrial plants in air pollution control area are required to comply with emission norms fixed by the Board from time to time.

- Before granting permission, Board may require installation of specified air pollution control equipments so as to prevent and control air pollution. Such equipments are required to be kept in good working condition.

- Board may also require chimney of approved specifications to be erected in industrial plants

- Act also requires remedial actions to be taken when there is apprehension of emission of air pollutants in excess of prescribed limits due to accidents and other unforeseen circumstances.

- It can also apply for injunction from court to restrain emission of air pollutants in excess of prescribed standards.

- To ensure compliance with the provisions of the Act, State Board can seek information from the person occupying industrial plant pertaining to emission of pollutants. To verify the information, Board officers can enter upon the premises and inspect the premises and take samples.

- State Board can issue directions for ensuring prevention and control of air pollution. To enforce provisions of the Air Act, State Board can also order closure, prohibition or regulation of any industry, operation/process or stoppage or regulation of electricity/water supply or other service.

-  Act has provided stringent penalties for non compliance with legal provisions pertaining to prevention and control of air pollution. Act provides for mandatory imprisonment for one and half years extendable upto six years and fine, if any person commences or operates any industrial plant without the consent of the State Board or emits air pollutants in excess of the standards laid down by the Board.

- In case of offences committed by Companies, punishment can be imposed not only on the company but also on the officers in charge of the company or responsible for the conduct of the business of the company. Similar provisions have been made in case of offences committed by Government departments.


### e. Environment (Protection) Act, 1986

Environment (Protection) Act is an umbrella legislation enacted by Parliament of India to protect the environment. Water Act and Air Act dealt with Water pollution and air pollution, however, provisions relating to soil pollution, noise pollution, waste management, electronic waste, solid waste, bio waste, Ozone Depleting Substances, Lead Batteries etc were missing. Therefore, an umbrella legislation was enacted which empowered Union to enact rules for protecting and

preserving the environment. Enactment of Environment (Protection) Act, 1986 has enabled the Union to frame various rules to prevent pollution and to protect the environment including the following:

This apart, India has enacted various rules and regulatory mechanism for dealing with waste disposal in an environmentally sound manner. These include :

- The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
- The Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organisms/Genetically Engineered Organisms or Cells Rules, 1989
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- Ozone Depleting Substances (Regulation and Control) Rules, 2000
- Batteries (Management and Handling) Rules, 2001
- Coastal Regulation Zone Notification, 2011 etc.
- Bio-Medical Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- E-Waste (Management) Rules, 2016
- Plastic Waste Management Rules, 2016
- Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016
- Construction and Demolition Waste Management Rules, 2016

## 5.3 ACID RAIN AND ITS IMPACT ON HUMANS AND AGRICULTURE

Acid rain, as is apparent from the name, implies precipitation of acid in the form of rain. Acid rain contains acidic droplets and can adversely affect plants, trees and agriculture. When Sulphur and Nitrogen particles get mixed with wet components of rain, it causes acid rain. Increased industrial pollution coupled with vehicular emissions can lead to acid rain wherein atmospheric pollutants like oxides of Nitrogen and Sulphur react with rainwater and come down with rain droplets. Acid rain can also result from natural causes like lightning strike which releases Nitrogen ions and release of Sulphur from volcano.

Various studies have shown that acid rain on its own may not have much adverse impact on humans directly. The pH of acid rain does not have enough acid to burn human skin. However, it

can have indirect impact on human health. It does pollute the air and water. Sulphur dioxide in the air can cause lung diseases in humans and animals. Similarly, acidic precipitation at high altitude areas can cause thick acidic fog which can lead to irritation in eyes and nose.

Acid rain, however, has serious impact on plants, trees and agriculture, it changes the composition of soil and depletes minerals and essential elements from the soil thereby affecting productivity and quality of the agricultural produce. Acid rain has also serious adverse impact on marine ecosystem. It can cause death of various marine living organisms disturbing marine ecology.

As stated earlier, various laws have been enacted to curb air pollution and to decrease carbon emissions.

## 5.4 CLIMATE CHANGE AND GLOBAL WARMING

Climate change implies changes in normal weather of a particular place over longer period of time. As per Intergovernmental Panel on Climate Change (IPCC), Climate Change refers to change in the state of climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change means tangible change in earth's climate e.g. change in earth's usual temperature.

Climate change has led to global warming. As per the data available, during the last 115 years global average surface air temperature has increased by 1 degree Celsius. Global warming has been attributed to increased carbon emissions. Increased industrialization has led to increase in carbon emissions leading to further rise in average global surface temperature.

Global warming has serious impacts on human race and ecosystem. It leads to ocean acidification adversely affecting marine ecosystem. It causes melting of glaciers, shrinking of ice sheets and rise in sea level. It has already lead to flooding of coastal areas which may ultimately sink in the ocean permanently. Global warming and increasing sea level can lead to intrusion o salt water in fresh water lakes causing shortages in drinking water supply. Extreme weather changes caused by global warming can adversely affect food production. Further, demographic

change caused by Climate change may lead to overheating and related health issues leading to increase in heat related deaths. Overheating is likely to affect human productivity as well.

Efforts have been made at the national and international level to decrease carbon emissions. India has also made a policy to combat climate change i.e. National Action Plan on Climate Change (NAPCC). NAPCC consists of eight national missions i.e. national solar mission, mission for enhanced energy efficiency, sustainable habitat, water mission, mission for sustainable agriculture, mission for sustaining Himalayan Ecosystem, national mission for green India and mission on strategic knowledge on climate change.

## 5.5 OZONE LAYER DEPLETION

Ozone layer or Ozone shield is concentration of Ozone in earth's stratosphere which protects us from harmful effects of solar radiation. It absorbs ultraviolet rays which are harmful to humans and other living organisms. In 1985, it was found that human activities have led to depletion of ozone layer and low concentration of ozone referred to as ozone hole was detected near South Pole. Driven by discovery of hole in ozone layer, Montreal Protocol on Substances that Deplete the Ozone Layer was adopted in 1985 as a supplementary agreement to Vienna Convention 1985. Montreal Protocol, 1987 has been ratified by all countries of the world including India. It was recognized that Chlorofluorocarbons (CFCs) are responsible for depletion of ozone layer. With increased scientific knowledge, various substances causing damage to ozone layer were identified and Montreal Protocol provided for phasing out such controlled substances in a time bound manner. Various substances identified for causing depletion of ozone layer are CFCs (Chlorofluorocarbons), Halons, Fully Halogenated CFCs, Carbon Tetrachloride, Methyl Chloroform, Hydrochlorofluorocarbons (HCFC), Hydrobromofluorocarbons (HBFC), Methyle Bromide and Bromocholoromethane and HFCs.

In compliance of its international obligations under the Montreal Protocol, India has enacted Ozone Depleting Substances (Regulation and Control) Rules, 2000. India has already phased out production and consumption of CFCs , CTC and Halons except for medical purposes. India has also phased out production and consumption of Methyl Chloroform and Methyl Bromide. The Rules of 2000 lay down rules for production, consumption, import and export of Ozone Depleting substances. Rules also provide for monitoring mechanism.

## 5.6 ROLE OF INDIVIDUAL IN ENVIRONMENTAL PROTECTION

Individuals have a very important role to play in protection and preservation of environment and in preventing and controlling pollution. As stated earlier, right to clean environment has been declared to be a fundamental right in India. Indian constitution casts a duty on every citizen to protect and improve the natural environment. However, fundamental duties remain on paper and we hardly bother for our fundamental duties.

Be it stubble burning, excessive and unjustified use of motor vehicles, high quantum of waste generation (electronic waste, municipal solid waste, plastic waste etc), improper and unscientific management of wastes in homes and in offices, excessive and disproportionate use of water, noise pollution or the like, individual role has not been upto the mark in India.

Therefore, if an individual understand his fundamental duties properly and does its bit in protection of environment like keeping vehicular emissions to the minimum, avoiding fossils fuels, decreasing carbon footprint, avoiding wastage of water and contamination of water bodies, segregating waste and adopting scientific waste management techniques in homes and offices, avoiding or decreasing activities causing air pollution, use of energy efficient equipments, saving energy etc. he can significantly contribute in protection and preservation of environment.

## 5.7 MAJOR ISSUES IN ENVIRONMENTAL LAW ENFORCEMENT IN INDIA

From the foregoing discussion, it is clear that India has plethora of laws to protect and preserve the environment and for preventing and controlling the pollution. However, despite enactment of several laws and pro-active approach of Indian judiciary in developing environmental jurisprudence, the environmental degradation in India continues unabated.

Untreated trade effluents are being discharged into water bodies polluting water resources and adversely affecting aquatic ecosystem. This apart, due to release of chemicals in soil, heaps of electronic waste and hazardous waste contaminate the soil and chemicals percolate deep down in the water table thereby polluting ground water table.

Air pollution caused by vehicular emissions, industrial emissions and stubble burning have worsened the air quality beyond measurable limits. Each year, near Diwali season, northern India is choked with smog caused by vehicular emissions and stubble burning despite there being ban on stubble burning. Air pollution is causing deep impact on human health. This apart, there are various environmental challenges like waste management, depleting ground water table, desertification, issues caused by climate change, loss of wild life habitat, more species being endangered, loss of Himalayan Ecosystem and other environmental issues.

The question, therefore, arises is why despite enacting various laws, the problem of environmental pollution is still haunting our country. There are various reasons for the same including

- Tardy Implementation of Laws
- Lack of initiative among Individuals and civil society regarding environmental protection
- Judicial system being afflicted by slow motion syndrome
- Non availability of technology and technical know-how at affordable prices to industry and individuals
- Lesser Human resources for implementation of Environmental Laws
- Governmental apathy in implementation of environment protection laws
- Increase in population and increased demand for customer and luxury goods
- Declining social and moral values
- Unemployment and poverty
- Developed countries dumping hazardous waste in developing countries like India

It must also not be lost sight of that India has achieved some success in environment management. We have been able to phase out Ozone Depleting Substances as per the norms applicable under Montreal Protocol. Similarly, we have been able to increase forest cover, provide better norms for waste management, developed environmental jurisprudence on sound judicial principles and the like.

**CHECK YOUR PROGRESS**

1) Right to Clean environment has been guaranteed in which article of the Indian Constitution
   a. Article 19      b. Article 20      c. Article 21      d. Article 22
2) Fundamental duty of every citizen to protect and improve the natural environment is provided in Article
   a. 51A(d)      b. 51A(f)      c. 51A(g)      d. 51A(h)
3) 78% of the Air is composed of which of the following elements
   a. Nitrogen      b. Oxygen      c. Carbon dioxide      d. Carbon Monoxide

4) Which of the following is cause of air pollution
   a. Burning of Fossil fuels      b. Agriculture residue burning
   c. Construction activities      d. All of these
5) Which of the following is protected area under Wild Life (Protection) Act
   a. Sanctuaries      b. Conservation Reserves
   c. National Parks      d. All of these

Answers:

1. C
2. C
3. A
4. D
5. D

## 5.8 SUMMARY

From the perusal of the foregoing discussion, it is apparent that India has enacted various laws for protection and preservation of environment and for controlling and preventing environmental pollution. Legal provisions have been introduced in the Constitution of India and various laws have been enacted viz. The Wild Life (Protection) Act, 1972; Water (Prevention and Control of Pollution) Act, 1974; Forest Conservation Act, 1980; Air (Prevention and Control of Pollution) Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; The Biological Diversity Act, 2002; National Green Tribunal Act, 2010. This apart various rules have been enacted under these statutes for protection of environment.

Indian judiciary have also contributed by developing sound environmental jurisprudence and have declared right to clean environment as a fundamental right being included in right to life and personal liberty guaranteed under Article 21 of the Constitution of India.

However, due to various factors including rapidly increasing population, increased demand for consumer and luxury goods, unavailability of sustainable technology at affordable prices etc, environmental pollution is a major issue confronting our nation. Mere enactment of laws can-not achieve the desired result. The effective implementation of laws is required to be ensured in letter and spirit. This apart, citizenry need to join hands to protect the environment. We must remember that it is not the job of government and its instrumentalities alone but citizens also need to partner the objective of preserving and protecting the environment.

## 5.9 Questions for Practice

### A. Descriptive questions

1) Discuss constitutional provisions for protection and preservation of environment.

2) Explain the legal framework for prevention and control of air pollution.

3) Discuss salient features of Water (Prevention and Control of Pollution) Act, 1974

4) Write a short note on National Action Plan on Climate Change.

5) Elaborate role of individual in protection of environment.

## 5.10 Suggested Readings

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4. Gardiner, S.M. et al (eds.) (2010) : Climate Ethics : Essential Readings, Oxford University Press, New York

5. Humphrey, S. (ed.) (2010) : Human Rights and Climate Change, Cambridge University Press, New York

6. Pandve, Harshal T. (2009) : India's National Action Plan on Climate Change, Indian Journal of Occupational and Environmental Medicine, Volume 13(1), April

7. Guus J.M. Velders et al (2007) : Importance of Montreal Protocol in Protecting Climate, Proceedings of the National Academy of Sciences of the United States of America, Vol. 104(12), March

8. Forest Survey of India (2015) : India State of Forests Report, 2015 available at http://fsi.nic.in/isfr-2015/isfr-2015-tree-cover.pdf

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# B.Com (Hons.)
# Accounting and Taxation

### COURSE: ENVIRONMENTAL STUDIES

### UNIT – 6: HUMAN COMMUNITIES AND THE ENVIRONMENT

**STRUCTURE**

**6.0 Learning Outcomes**

**6.1 Introduction**

**6.2 Human Population Growth: Impact on Environment, Human Health and Welfare**

**6.3 Sanitation and Hygiene**

**6.4 Resettlement and Rehabilitation of project affected persons; Case Studies**

**6.5 Disaster Management: Floods, earthquakes, Cyclones and Landslides**

**6.6 Environment Movements: Chipko, Silent Valley, Bishnois of Rajasthan**

**6.7 Environmental Ethics: Role of Indian and other Religions and cultures in Environmental Conservation for a Clean-Green Pollution free state.**

**6.8 Environmental Communication and Public Awareness; Case Studies (e.g. CNGVehicles in Delhi)**

**6.9 Summary**

**6.10 Questions for Practice**

**6.11 Suggested Readings**

### 6.0 LEARNING OBJECTIVES

After the study of this unit, the learners will be able to:

- Understand the concept of Human population growth and evaluate the impact causedby it on the environment and human welfare

- Delve deeper into the need and concerns pertaining to Sanitation and Hygiene

- Gauge the extent of resettlement and rehabilitation that has been possible for theproject affected people

- Acquire an understanding of the concept of Disaster Management with reference tothe problems created by Floods, Earthquakes and Cyclones

- Know about the various important movements attached to the issue of Environment
- Develop an understanding of the concept of Environmental Ethics and know about therole played by various religions and cultures in conservation of the environment
- Learn about the issues of Environmental Communication and Public Awareness

## 6.1 INTRODUCTION

Human population increase can be modelled using animal population dynamics concepts. Humans aren't the only ones who can change their surroundings. Beaver dams, for example, affect the stream ecology where they are constructed. Humans, on the other hand, have the potential to change their environment in order to enhance carrying capacity, often at the expense of other species. The human population and their usage of resources on Earth are fast increasing, to the point where some people are concerned about the planet's ability to support its human population. Long-term exponential expansion involves the possibility of famine, disease, and mass death, as well as social implications such as overcrowding and increased incidence of crime. Human technology, particularly human use of the energy contained in fossil fuels, has wreaked havoc on the Earth's environment, altering ecosystems to the point where some may be in jeopardy. Human activities are to blame for global changes such as ozone layer depletion, desertification and topsoil loss, and global climate change.

The total number of people living in a specific region at a given moment is referred to as the human population. The rapid growth of the human population over the previous few decades has resulted in a population explosion. The exponential growth of the human population is depleting natural resources and degrading the environment. Land, water, fossil fuels, minerals, and other resources are finite, and owing to overexploitation, these resources are depleting. Forests, grasslands, and other renewable resources are under severe stress. Industrial and economic development improves our standard of living but also introducing harmful contaminants into the air, water, and soil. As a result, environmental life-support systems are threatened.

## 6.2 HUMAN POPULATION GROWTH

The growth in the number of people in a population is known as population growth.

Global population increase is about 83 million people every year, or 1.1 percent per year. The lower death rate owing to advances in public health and sanitation has been the primary reason of human growth acceleration in the last 200 years. In industrialised countries, access to safe drinking water and appropriate sewage disposal has significantly benefited health. In addition, medical advances such as the use of antibiotics and vaccinations have reduced infectious disease's potential to limit human population increase.

Given present practises, population growth is far exceeding our planet's ability to support it. Overpopulation is linked to a variety of severe environmental and economic consequences, including over-farming, deforestation, and water pollution, as well as eutrophication and global warming.Anthropogenic activities such as urbanisation, industrialisation, deforestation, overpopulation, and the usage of fossil fuels all have an impact on our ecosystem. Natural calamities such as earthquakes, volcanoes, cyclones, landslides, and floods can also cause environmental damage. Some of the key environmental challenges India confronts today include air pollution, inadequate waste management, increasing water shortages, decreasing groundwater tables, water pollution, forest preservation and quality, biodiversity loss, and land/soil degradation. It has an impact on the natural environment as well.

**6.2.1 Impacts on environment**

Population explosion leads to various environmental problems because of overburdening on natural resources:

1. Worldwide warming: The combustion of fossil fuels has resulted in a rise in carbon dioxide gas emissions on a global scale. Increases in its atmospheric levels, as a GHG (greenhouse gas), have led to a rise in temperature by trapping heat radiation, resulting in the greenhouse effect, resulting in global warming and climate change. Melting polar ice caps contribute to rising sea levels, flooding, and coastal submergence as a result of global warming.

2. Deforestation: Forests must be removed to make more area accessible for agricultural operations and to meet the expanding population's other requirements. It causes soil erosion, destroys ecological equilibrium, and causes

irregular rain and drought-like conditions.

3. Biodiversity loss: Deforestation results in the loss of wild life habitat and biodiversity, disrupting the ecological equilibrium. It leads to the devastation of food chains and food webs, as well as the collapse of ecosystems, which can jeopardise human life on the planet.

4. Pollution: As a result of population pressure, there is a lot of pollution in the water,air, soil, and noise. Overconsumption and indiscriminate exploitation of natural resources are to blame. Pollution poisoning of these natural resources endangers human life by causing diseases such as lung and skin cancer, as well as respiratory and water-borne illnesses.

5. Natural resource stress: As the world's population grows, so does overexploitation and indiscriminate use of non-renewable natural resources such as fossil fuels.

6. Water scarcity: As the world's population grows, so does the need for clean, drinkable water. Water shortage might trigger a third world war.

7. Productivity: Degradation of the environment not only damages human health but also lowers economic productivity. In developing nations like India, dirty water, poor sanitation, air pollution, and soil degradation cause severe illnesses on a massive scale.

8. Urbanization: Rapid population expansion has resulted in urbanisation, which has hada negative impact on the environment. Natural resources in cities are being degradedat an alarming rate as a result of population pressure.

**6.2.2 Human Health and Welfare**

Economic hardship, environmental degradation, and overexploitation of natural resources are all consequences of population expansion, and the Indian government has launched a number of family welfare programmes to address the problem.India is a welfare state, as evidenced by the Directive Principles of State Policy, which are incorporated in Part IV of the Indian Constitution. The Ministry of Women and Child Development, a department of the Indian government, is responsible for women's and children's welfare as well as the coordination of operations of other ministries and organisations in this area; supports the development and stabilisation of Self Help

Groups (SHGs) as well as awareness campaigns among rural and urban women.

The National Family Welfare Programme (NFWP) was established in 1951 with the goal of stabilising and reducing population increase. The NFWP committee advocated for marriage at a young age, a limited family size, healthy motherhood, and a longer period between childbirths. Several birth control methods have been developed by modern science, including mechanical barriers, surgical procedures, chemical tablets, and physical obstacles to implantation. Methods of family planning are significant because they have resulted in lower birth rates, lower infant death rates, and higher life expectancy rates.

Women's and Children's Welfare: In 1985, the Indian government established the Department of Women and Child Development, which prepares and implements policies, programmes, and assists in the enactment and amendment of legislation for the welfare of women and children. Children and women are particularly vulnerable to exploitation, as they are members of a high-risk category. Many governmental and non-governmental organisations, such as the National Commission for Women (NCW), the National Commission for Children, the National Institute of Public Cooperation and Child Development (NIPCCD), the Rashtriya Mahila Kosh (RMK), UNICEF, and others, work to promote the development, welfare, and protection of women and children.

The Indian government has introduced a slew of social programmes aimed towards the country's overall growth. Antyodaya Anna Yojna, National Gramin Awaas Mission (previously Indira AwasYojna), Bharat Nirman, and other organisations are examples. All of these programmes have been created in order to alleviate poverty and create jobs so that the economy may grow quickly in this competitive world.

Women Welfare Programmes in India:

1. The Swarnajayanti Gram Swarojgar Yojana (SGSY)

2. The Jawahar Gram Samridhi Yojana (JGSY)

3. The Indira Awas Yojana (IAY):

4. The National Social Assistance Programme (NSAP)

5. Under the Accelerated Rural Water Supply Programme (ARWSP)

6. Rashtriya Mahila Kosh (RMK)

7. Development of women and children in Rural Areas (DWCRA):

8. Child Development Services Scheme (CDS)

9. Welfare of Street Children

## 6.3 SANITATION AND HYGIENE

### 6.3.1 Swachh Bharat Mission

It is common knowledge that a clean country is a healthy one. Due to the country's huge geographical covering of 3.2 million square kilometres, India's story of cleanliness and sanitation has been one of steady improvement. While regulatory measures can help to provide universal cleanliness, nothing compares to the influence of a cultural shift among the country's population. The Prime Minister of India, Shri Narendra Modi, inaugurated the Swachh Bharat Mission (SBM) on October 2, 2014, with the objective of making India an open defecation-free (ODF) country by October 2, 2019 as a befitting tribute to Mahatma Gandhi on his 150th birth anniversary.

The Department of Drinking Water and Sanitation is in charge of the Swachh Bharat Mission Grameen (SBM-G) rural component of the mission, as well as the broader SBM. India's rural sanitation coverage has improved from 39% in 2014 to over 95% as of June 2019, and the Mission is on target to meet its goal of an ODF India by 2019. The Swachh Bharat Mission was started with the goal of establishing a clean India by 2019 (encompassing over 4,000 cities and towns) through ensuring sanitation and cleanliness (solid and liquid waste management and making Gram panchayats open defecation-free). SBM (Gramin) is one of the two sub-missions of the overall mission.

### 6.3.2 Impact of Swachh Bharat Misison

- The Indian government has taken immediate steps to expand sanitation coverage across the country. Since its inception, the Swachh Bharat Mission - Grameen has built 81.55 million toilets across India, resulting in a rural sanitation coverage of roughly 90.33 percent, up from 38.7 percent on October 2, 2014.

- In addition, 4,19,391 communities have been proclaimed open defecation-free since the campaign began.

- Around 4.32 million household toilets and 392,817 community toilets have been built as part of the Swachh Bharat (Urban) Mission. Furthermore, 100% door-to-door collection was achieved in 67,085 wards (Solid Waste Management Rules).

- According to the WHO, if the government achieves 100 percent cleanliness implementation by 2019, the country might avoid 300,000 deaths from diarrhoeal illness and protein-energy malnutrition (PEM)

## 6.4 <u>RESETTLEMENT AND REHABILITATIONOF PROJECT AFFECTED PERSONS</u>

Various development initiatives sometimes result in the eviction of poor and often uneducated local or tribal people. The rehabilitation of these individuals is a serious socioeconomic concern. The purpose of development initiatives is to improve society.

However, over-exploitation of natural resources and environmental damage are common during the development process. The project site's indigenous people are directly impacted. They are the poorest of the poor, the most disadvantaged tribal people. As the local community's socioeconomic and ecological foundation is disrupted, many sorts of projects result in the displacement of native people, who suffer great economic and psychological hardship.

**6.4.1 Dam-Related Displacement Issues**: Large-scale displacement of local people from their ancestral homes and loss of their customary profession or occupation is one of the most significant socio-economic consequences of the huge river valley projects. India is one of the world's leaders in large dam development, with more than 20 million people believed to have been affected directly or indirectly by these dams over the previous 50 years. More than 20,000 people have been displaced as a result of the Hirakund Dam, who live in 250 communities. The Bhakra Nangal Dam was built in the 1950s, and only half of the displaced people have been rehabilitated to this day.The same may be said about the Tehri Dam on the Bhagirathi River, whose construction was approved following a three- decade struggle headed by

renowned activist and Chipko Movement propagator Sunderlal Bahuguna. The Tehri Dam's immediate impact would be on the 10,000 people of Tehritown.

### 6.4.1.1 Case Study

The Sardar Sarovar Project, which aims to construct 30 major, 135 medium, and 3000 minor dams on the Narmada River and its tributaries, is expected to engulf nearly as much land as it is intended to irrigate. Due to the flooding, a total of 573 villages with a population of over three lakh people would be impacted. The tribals' communal rights have been violated as a result of the large dams. It is a painful experience to be torn from one's native land, where one's family has lived for centuries, and relocate to a new location as an outsider.The family is frequently disbanded. The tribals are paying a high price for a large dam project that is meant to bring happiness and wealth to the country. The tribals must be adequately compensated in the form of land, jobs, financial compensation, and other forms of recompense in exchange for their great sacrifice, and attention should be taken to improve their quality of life.

**6.4.2 Displacement as a result of Mining**: Mining is another development activity that causes local people to be displaced. Thousands of hectares of land have been covered by mining operations, and indigenous people have been displaced. Local people are sometimes displaced as a result of accidents that occur in mined regions, such as land subsidence, which frequently results in population shifts.

### 6.4.2.1 Case Study

Due to subterranean fires, the Jharia coal fields in Jharkhand have become a major source of concern for nearby inhabitants, who have been ordered to leave. The proposed large- scale evacuation of roughly 0.3 million people from Jharia highlights the issue of their relocation and rehabilitation, which would require careful planning. Since 1976, 115 crores of rupees have been spent to put out the flames, yet the problem still exists. The residents of Jharia are being ordered to leave, but no replacement land or rehabilitation plan has been devised as of yet.As a result, the residents of Jharia coalfield have created a "Jharia coalfield Bachao Samiti." According to the latest estimates, the cost of relocating the Jharia people

would be approximately Rs. 18,000 crore, while the cost of putting out the fire will be around Rs. 8,000 crore.

**6.4.3** **Displacement as a result of the creation of National Parks**: When a portion of a forest is designated as a National Park, it is a positive step toward the protection of natural resources. It does, however, have a social element to it that is frequently overlooked. A large section of the forest has been designated as a core-area, making it illegal for locals or tribals to enter. When these people lose their ancestral rights or access to the forests, they typically react by engaging in harmful behaviour. It is necessary to investigate their difficulties and offer them with work.

**6.4.3.1 Case Study**

Tribals from the Tharu community in 142 villages in Bihar's Valmiki Tiger Reserve region in the West Champaran district believe they have been denied their legal traditional rights to harvest firewood and fodder from the forest. Their jobs have also been lost as a result of the "Project Tiger" programme. The villagers who have lost their jobs are revealed to be destroying the forest and its wealth in collusion with foreign agents who supply them with guns and ammunition for illegal logging and poaching. To prevent local tribals from becoming criminals, planners should prioritise compensating them for their losses by providing them with work opportunities.

The Wayanad Wildlife Sanctuary in Kerala has forced 53,472 tribal households to relocate. It was determined at the time of its inception to give land to these indigenous families in order to settle them. However, only 843 households were able to obtain the land until 2003. As a result, the tribals felt deceived, and in January 2003, they encroached into the forest in large numbers, cutting down trees, erecting houses, and digging wells, resulting in a violent confrontation with forest officials, resulting in injuries and fatalities among the people.

## 6.5 DISASTER MANAGEMENT

The word "disaster" comes from the French word "disastre," which means "a wicked or evil star." A disaster is an unexpected and unforeseeable tragedy that brings sorrow and

misery to humanity. Human lives, the economy, and the environment have all been severely impactedby the calamities. Natural catastrophes are always unexpected and devastating. A disaster is an unforeseen occurrence that strikes a town with little or no notice, wreaking havoc on people's lives and economies in the area.

Two types of disasters have been identified:

1. Earthquakes, landslides, volcanic eruptions, tsunamis, and cyclones are examples of natural disasters;

2. Man-made disasters include the Bhopal gas tragedy, the Chernobyl accident, dam leakage or collapse, and so on.

India is also vulnerable to natural disasters such as floods, earthquakes, cyclones, and landslides.

**Meaning:** The effective organisation, guidance, and exploitation of available counter-disaster resources is known as disaster management. For individuals who are unprepared, the events of a tragedy can be highly distressing. Disaster management concepts apply in both normal and emergency scenarios. Disaster mitigation and disaster rebuilding are examples of routine management tasks that take place during non-crisis situations. The term "crisis management" refers to the planning and execution of emergency operations, and it encompasses both the pre-disaster and post-disaster phases.

Post -Disaster management was the focus till now which involved taking care of the situation after its occurrence.

Post- Disaster management involves:
- Evacuation,
- Communication
- Search
- Rescue
- Fire fighting
- Medical
- Food

- Shelter assistance etc.

The need of the hour is to emphasize on Pre-disaster management measures to minimize or prevent the loss. Pre-disaster management strategies involve:

- Disaster-prone regions are identified, and
- Gathering of information about historical dangers, population, and current infrastructure
- Information on the local ecology
- Risk assessment to evaluate the frequency of disasters and the length of time it takes to recover from disasters and return to normality.

Mitigation entails using modern and improved technologies to anticipate, warn, and distribute information fast. GIS (Geographical Information System), GPS (Global Positioning System), and satellite communication are examples of computer and space technologies used in management.

Various national and state-level efforts have been launched with the goal of preventing and mitigating natural catastrophes, as follows:

1. The government has established the National Decades for Disaster Reduction (NDDR). Every year, the Indian government has designated the 29th of October as ‒National Day for Disaster Reduction.‖ Its main goal is to raise public awareness about natural catastrophes and to help people prepare for them.

2. Under the chairmanship of Shri J.C. Pant, the High-Power Committee on Disaster Management was established in 1999 at the suggestion of Prime Minister (PM) to create comprehensive model plans for disaster management at the national, state, and district levels.

3. The government established the National Committee for Disaster Management. It proposes the institutional and legal changes that will be required to develop a successful and long-term plan for dealing with severe natural disasters in the near future.

4. Hazard Mapping and Building Vulnerability Assessment- The Ministry of Urban Development created the Vulnerability Atlas of India, which includes maps of earthquake, cyclone, and flood-prone areas.

5. Monitoring and Impact Assessment of Natural Disasters- The Department of Space offered help and support for flood, cyclone, and drought impact monitoring and assessment.

6. The use of contemporary technology, such as remote sensing, the global positioning system (GPS), and database generation through computer modelling, has been popular in recent years. The disaster management control rooms are being actively modernised to make them more effective and community friendly.

**6.5.1 Floods**

The major environmental mental danger is flooding. The reason for this is due to the vast geographic distribution of river valleys and low-lying coastlines, as well as their long- standing appeal to human habitation. Floods affect every country, and in many cases, the hazard is restricted to floodplains and estuary areas.In Bihar, West Bengal, Uttar Pradesh, Assam, and Orissa, it is a common occurrence. Uttar Pradesh is often regarded as one of India's worst-affected flood-prone states. It covers almost 20% of the country's total 40 million hectares of flood-prone land. Floods are common in rivers such as the Ganga, Yamuna, Brahmaputra, Mahanadi, and Godavari. Human life, livestock, buildings, power supply, agriculture, roads, and water supply are all severely impacted by floods. In such circumstances, an outbreak of a water-borne epidemic illness can develop.

Deforestation plays a significant role in the occurrence of floods. Given that the country's land surface has lost forest cover (including 77 percent of the Himalayan territory), the extraordinary rise in the frequency and intensity of floods, despite no discernible change in rainfall patterns over the previous century, is easy to comprehend. Man's fast urbanisation and building activities have significantly reduced infiltration and increased surface run-off, resulting in local floods in major cities such as Mumbai and Kolkata. Flooding is three times more likely in a city with 40% impervious surface than when urbanisation had not yet taken hold.

Floods are caused by a number of factors, including:

a. Natural (heavy and prolonged rainfall, river passage obstruction, high tides, tsunami, landslide, and volcanic eruption beneath the sea bed) and b. man-made (tsunami, landslide, and volcanic eruption under the sea bed)

b. Created by humans (sudden water release from dam, breakdown of dam or reservoir).

Floods are most commonly caused by excessive rainfall. These can range from semi-predictable seasonal rains across large geographic areas, which cause yearly monsoon floodsin tropical places, to seemingly random conventional storms that cause flash floods in local basins.

Ice jam flooding adds to the severity of spring floods. This happens when huge ice chunks float downstream, temporarily damming waterways. This floating ice solidifies when it comes into contact with a constriction in a waterway, causing flooding. Rapid flooding occurs initially upstream, and when the ice melts, it creates havoc downstream as a result ofits severe impact.

Flood mitigation measures include wetlands preservation, afforestation, flood forecasting, and flood plan management. Construction of reservoirs to regulate monsoon flow and their regulated release after peak flow are structural steps. Flood control techniques include the construction of embankments and flood barriers, as well as anti-erosion measures and better drainage. Flood plains, or low-lying areas that are inundated during floods, aid in flood reduction. Flood control facilities such as flood barriers and river channel deepening have merely shifted the problem downstream.Building barriers keeps flood water from spilling over flood plains, but also increases the velocity of the water, causing it to have a greater impact on communities downstream. Rather of erecting structures on floodplains, it is proposed that floodplains be used for wildlife habitat, parks, recreational spaces, and other uses that are not vulnerable to flooding. To deal with the flood problem, river-networking across the country is also being considered.

**Case studies:**

     a. Kedarnath Disaster in 2013,

b. Jammu floods in 2014,

c. Chennai floods in 2015.

**6.5.2 Earthquake**

An earthquake is a sudden ground disturbance caused by the abrupt displacement of rock masses, generally in the top 15-50 km of the earth's crust. Earthquakes are vibrations in the earth's crust that shake up a portion of the crust, as well as all structures and everything on it.They are extremely short motions that seldom last more than a minute and are highly varied in strength and duration. Earthquakes are defined as brief tremors in the earth's crust.

The majority of earthquakes are caused by the passage of one rock mass past another due to tectonic pressures. Rocks are pliable and can build strain up to a point when surrounding sections of rocks are subjected to pressures pushing or dragging them. When the tension on a rock surpasses its strength, it fractures along a pre-existing fracture plane called a fault.

The severity of an earthquake is generally measured by its magnitude on Richter Scale, as shown below:

| Richter Scale | Severity of earthquake |
| --- | --- |
| Less than 4 | Insignificant |
| 4 - 4.9 | Minor |
| 5 - 5.9 | Damaging |
| 6 - 6.9 | Destructive |
| 7 - 7.9 | Major |
| More than 8 | Great |

Due to the collapse of high-rise buildings, dams, bridges, and highways, earthquakes have the most devastating consequences in highly populated metropolitan areas. Landslides are caused by earthquakes in mountainous areas, and tsunamis are caused by earthquakes under the sea, such as the Great Tsunami of 2004.

The catastrophic earthquake that struck Bhuj Town in Gujarat caused tremendous devastation, killing 20,000-30,000 people and injuring a large number of others.

Tsunamis, which are caused by earthquakes, may cause significant damage to coastal regions. These massive sea surges may reach speeds of up to 1000 km/hr or even more. They might reach 15 m or even 65 m in height as they approach the seashore, causing tremendous destruction in coastal communities.

Anthropogenic activities can also cause or increase earthquake frequency. Three such operations have been identified:

• Impoundment of massive amounts of water in a lake behind a large dam.
• Nuclear testing underground.
• Liquid waste disposal in deep wells.

Detailed information regarding epicentres and tectonic maps, as well as seismic hazards, are all part of the mitigation procedures taken before an earthquake. Earthquake sensors are being installed to keep track on seismic activity, which can help to prevent loss of life and property.

### 6.5.2.1 Construction of Earthquake-Resistant Constructions and Buildings

Post-earthquake management entails evacuating people to safe locations as quickly as possible, providing medical care to injured individuals, maintaining law and order, and restoring communication, transportation, and water and food supply lines. Following a disaster, the rebuilding phase entails a survey of the damage, resettlement and rehabilitation of impacted individuals, and the reconstruction of buildings and infrastructure. In earthquake- prone locations such as Japan, wooden homes are recommended.

### 6.5.2.2 Earthquakes in India

Over 80 earthquakes have struck India's northern, north-western, and north eastern regions in the last two centuries. The worst were those in Assam (1897), Kangra (1905), and Bihar (1907). (1934). The Assam earthquake of 1897 caused catastrophic damage over a 2,800,000- square-kilometer region. Shillong was the hardest hit area. Standing structures were destroyed, the ground was ruptured, the drainage system was dislocated, groundwater erupted, and major landslides were triggered as a result of the earthquake.

On the 15th of August 1950, Assam was struck by another earthquake of comparable magnitude, wreaking havoc. The Kangra earthquake of April 1905, on the other hand, would be known for a long time. It had an 8.9 magnitude and was felt all the way

to Tapti. More than 200,000 people were killed as a result of it. The earthquake in Bihar in January 1934 killed about 12,000 people. It had a magnitude of 8.4 and came from a depth of 20-30 kilometres. It wreaked havoc on nearly all of north Bihar, particularly the Mungher area, and Nepal.

### 6.5.3 Cyclones

Cyclones are spirally moving storms that form in the Bay of Bengal and Arabian Sea in the tropical belts. Wind vortices the size of spinning tops developed over the sea, spanning horizontally up to 1000 kilometres and vertically up to 12 to 14 kilometres from the surface. They can be found in tropical coastal areas. In other regions of the world, cyclones are knownas hurricanes, typhoons, and willy-Willys. Depending on the pace, cyclones can be mild, severe, or extremely severe. Cyclones are very powerful winds that cause widespread destruction by bringing torrential rainfall and storms that flood coastal regions.

During the months of October, November, and December, the eastern coastal belts of Bangladesh, Bengal, Orissa, Andhra Pradesh, and Tamil Nadu are particularly vulnerable tothe hazards of surging sea waves and heavy downpours that accompany spirally moving fierce winds. The cyclones are endemic in the Andhra Coast, one hitting every second year.

Three to four severe cyclonic storms form on average in the Bay of Bengal, mostly during the pre-monsoon months of April to June and the post-monsoon months of September to December.

Cyclones create a rapid drop in air pressure, as much as 60 to 100 millibars, over the coastal belt, generating storm surges. Floods, which may rise as high as 14 metres and inundate huge areas reaching deep inside the ground through river ways, exacerbate the effects of strong winds and heavy rainfall. Storm surges inflict more than 90% of the damage to coastal towns by flooding the terrain, sweeping away buildings, destroying crops and fields, and causing widespread salinity in the soil and water supplies.

Tsunamis, which are caused by earthquakes in deep sea trenches, are another devastating force alongside cyclones. More than 80% of the world's total seismic energy is concentratedin the pacific belts, which see around 200 earthquakes each year.

Both cyclones and tsunamis leave behind huge storm surges and a significant rise in sea level. They can rise to a height of 5-6 metres above normal sea level, wreaking havoc.

### 6.5.3.1 Cyclones' Effects

1. Pollution of surface water bodies by salty sea water.

2. Agricultural soils become saline and non-productive.

3. Beach sands overrun coastal belt crops, rendering agricultural lands unusable.

4. Bridges, roads, buildings, and telephone lines are all destroyed in large numbers.

5. Deaths as a result of drowning.

6. As a result of the deluge of huge swaths of land, diseases emerge, resulting in additional deaths.

The storm that hit India's coastal region in November 1970 killed over 2 million people and killed over 800,000 animals, damaging over 200,000 homes, 80 percent of the standing paddy crop, and 65 percent of the fishing capacity in 9000 villages.

### 6.5.3.2 Strategies for reducing the risk:

• Early warning and cyclone monitoring systems aid in the evacuation of individuals in susceptible regions. Wind tides are forecasted by the Indian Meteorological Department (IMD) and include the location, timing, predicted wind speed, and magnitude.

• The Indian coastal belt has been designated as a cyclone threat zone, preventing the construction of significant residential and industrial structures. It spans from Tamil Nadu to West Bengal via Orissa.

• It's critical to keep communication lines open during rescue efforts. Pocket radios, satellite connections, and Morse Code are all useful tools.

• Mangrove trees planted along coastal belts function as wind and tide blockers.

### 6.5.4 Landslides

Temporary instability of surface rock formations, whether consolidated or unconsolidated, has long been a serious concern in many parts of the world. These

superficial masses move vertically down after suddenly or gradually leaving their initial location. Such movements are referred to as "Landslides" when they occur on slopes.

The word landslide refers to the _rapid downslope movement' of soil or rocks in general. Gravity continuously pushes the material down, resulting in a process known as "mass waste." Although the movement is gradual and delicate, some slope processes, such as rock slides and avalanches, may be deadly and quick. Landslides are common in mountainous areas. Landslides are common in India's Himalayan and Western Ghats areas. Landslides cause economic damage by blocking roads, disrupting commerce and obstructing people's movement, as well as biodiversity loss.

Landslides can occur as a result of local features, climatic rock degradation, and natural earthquakes. In steep areas, man-made activities such as deforestation, land use change, androad building cause landslides.

Landslides are caused by a variety of activities.

1) Construction of roads in steep regions
2) Mineral and coal extraction (mining operations)
3) Forest removal on hill slopes
4) Cultivation techniques on slopes in agriculture
5) Constructing a home on a slope that is unstable
6) Explosions in the earth for rock blasting,

etc. Mitigation of disasters entails:

• Landslide predictions based on soil properties, rainfall, seismic activity, and man-made structures; • an effective warning system is essential.

• Overuse of natural resources should be avoided in development projects, and changes in the balance burden on the mountains should be avoided.

• People should be rehabilitated and relocated to safer locations.

• Landslides can be avoided through proper drainage during rainstorms and the adoption ofsoil erosion management measures such as grass plantation, masonry wall building, and afforestation.

## 6.6 ENVIRONMENT MOVEMENTS

Environmental and ecological movements are key instances of several social groupings acting collectively. These movements are concerned with the protection and

recognition of constitutional and democratic rights, which are not defined by law but are an important part of the subaltern masses' day-to-day lives, such as control over their resources, indigenous people's right to preserve their culture, environmental protection, and ecological balance.Within the wider framework of the development debate, the environmental movement is a broad word that is used to define and explain various forms of local struggles and conflicts involving livelihood concerns and ecological security. In reality, these battles questioned and criticised the Indian state's and officials' pursuit of development and conservation ecological from colonial times.

**6.6.1 Chipko Movement**

The Chipko movement in the central Himalayan area in the early 1970s is credited with establishing contemporary environmentalism and environmental movements in India. The Chipko movement, which was started to safeguard Himalayan forests from destruction before independence, has its origins in the pre-independence era. During the early decades of the twentieth century, several protests against colonial forest policies were organised. People's major demand during these rallies was that the forest's advantages, particularly the right to fodder, be distributed to locals. These conflicts have persisted in the post-independence era, as independent India's forest laws remain identical to those of colonial India.

During the year 1973, ‗Chipko' [chipak jayenge - to hug] was born. The forest department declined to give ash trees to the Dashauli Gram Swarajya Sangha (DGSS), a local cooperative centred in Chamoli regions, for the purpose of producing agricultural tools in early 1973. The forest department, on the other hand, assigned ash trees to Symonds Co., a private enterprise. The DGSS was prompted by this occurrence to protest the injustice by lying down in front of lumber trucks and burning resin and timber warehouses, as was done during the Quit India campaign.When these measures were ineffective, one of the leaders, Chandi Prasad Bhat, proposed embracing the trees, and so ‗Chipko' was created (for further information, see Bahuguna, 1990 and Guha, 1989). This type of protest was crucial in convincing the private firm not to cut down the ash trees. As a result of its success, the movement expanded to other nearby places, and the movement became known as the Chipko movement globally. From the outset, the Chipko movement focused on environmental concerns such as forest

depletion and soil erosion.

The Chipko movement's success was due to three important factors. First, the tight ties between the livelihoods of the local people and the character of the movement. Chipko is seen by the locals as a battle for fundamental survival, which has been denied to them by the state's institutions and policies. In addition, peculiarity of the location where Chipko movement took place; engagement of women in the contribution to households' subsistence and the overwhelming support to anti-alcohol campaign have contributed to the overwhelming support of women which is unique to the Chipko movement.The kind of agitation is the second point to consider. Chipko, unlike other environmental groups, has closely adhered to Gandhi's nonviolent liberation fight tradition. Third, the simplicity and sincerity of leaders such as Sunderlal Bahuguna, as well as their connections to national leaders such as Mrs. Indira Gandhi, other politicians, and bureaucrats, contributed significantly to the movement's success.

The Chipko movement's demands were as follows:

i)  A full halt to tree cutting for commercial interests;

ii) Traditional rights should be recognised in accordance with people's basic requirements;

iii) Bringing the dry forest back to life by encouraging people to plant trees;

iv) The establishment of local committees to oversee forest management;

v)  The development of forest-related home-based enterprises and the provision of rawmaterials, funds, and technology; and

vi) Putting afforestation first, taking into account local circumstances, needs, and varieties.


**6.6.2 Silent Valley Movement**

Palghat is a district in Kerala, India, that is 3000 feet above sea level. The district's geographical area is 8950 hectares. Because of the high altitude and abundant rainfall, this area has developed into an equatorial thick forest zone. This is a distant location that is currently devoid of human activity. The building of a hydropower plant sparked this movement. This project was launched due to irrigation and power. When the real building work began, various NGOs stepped out to voice their opposition to the proposal. Because of the thick forest, this area is rich in wildlife. There are several uncommon flora and animals, as well as birds.

The struggle over the now-famous Silent Valley lasted for more than ten years,

involving thousands of individuals who did not even reside in the region that was to be demolished. Despite the lack of unified organisation, the campaign was extremely successful. Citizens placed persistent pressure on the government, using all available measures at the time – letters to newspaper editors, seminars, extensive awareness programmes, and finally petitions and appeals in court and other high offices – which ultimately proved effective. Silent Valley was designated as a National Park in 1986, a powerful testament to the power of people's activism.

### 6.6.3 Bishnois of Rajasthan

A similar but less fortunate deed of Bishnois in the early 18th century inspired the first ever recorded environmental revolt, the Chipko movement of 1973. When the royal authorities instructed by the then Maharaja of Jodhpur went to her native hamlet Khejarli to cut down the lush Khejarli trees for the gathering of lumber, an outstanding Bishnoi woman named Amrita Devi took the initiative. To keep the trees from being cut, she and the other 84 villagers clutched them to their bosoms.

Unfortunately, the authorities mistook it for a bluff and chopped several peasants who were hugging the trees in their haste, and the slaughter continued until the King himself arrived to put an end to it. 363 Bishnois had died in that tragic struggle to defend their holy trees and beliefs. However, it was precisely this movement that brought Bishnois to the attention of the state, which then issued a royal edict restricting hunting and wood-cutting operations in Bishnoi-populated regions.

## 6.7 ENVIRONMENTAL ETHICS: ROLE OF INDIAN AND OTHER RELIGIONS AND CULTURES IN ENVIRONMENTAL CONSERVATION FOR A CLEAN- GREEN POLLUTION FREE STATE

In ancient Indian tradition, people have always valued mountain, river, forest, trees and several animals. As a result, much of the natural world has been preserved. Both in Hindu religion and tribal culture, forests have been associated with the names of forest gods and goddesses. The goddesses of the trees have been linked to certain plants. Tulsi is a plant that may be found in almost every home. The elephant is linked with Bhangwan Ganesha in Indian mythology. Tulsi is associated with Lakshmi and Krushna. Amalaki, mango, and Tulsi shrub are among the trees connected with

Goddess Laxmi. Our traditional culture and religion provide us with environmental education.

The environmental ethics are listed below.

1. Relationship and contact with the environment

2. The variety of the environment

3. Human health and spirit are created by the quality and beauty of nature.

4. Does not wreak havoc on the environment

5. We believe in long-term growth.

### 6.7.1 Human Ethics

The following are examples of human ethics: environmental protection.

1. The pattern of resource usage and the requirement for equitable utilisation

2. Inequity - the divide between northern and southern countries

3. Issues of urban-rural equality

4. The need of gender equality 5. Animal rights

6. Environmental education and awareness must be based on ethical principles.

7. India's traditional value system and conservation ethics.

### 6.7.2 Role of Religions and Cultures in Environment Protection and Conservation

All religions and cultures have something to offer in terms of environmental protection and conservation. Several injunctions or exhortations from each faith can be combined to build a guideline  for environmentally sustainable development. This is abundantly and comprehensively illustrated in the various religions' codes.

### 6.7.2.1 Environment and Hinduism

Hinduism is deeply rooted in the sanctity of all life on this earth and elsewhere. All creatures, including humans, are under the Supreme God's total authority. All lives have the  same  right to exist, according to Hindu texts.  Humans  have no  authority over other living things. They are discouraged from exploiting nature and are advised instead to seek peace and live in harmony with it. To maintain and protect the harmonious harmony of God and nature, the Hindu faith demands devotion, respect, and obedience. The doctrine of Ahimsa (nonviolence) is founded on Hindu philosophy, which implies the doctrines of karma and reincarnation. The Hindu belief in the cycle of life and

reincarnation, in which a person may reincarnate as an animal or a bird, means that Hindus appreciate and revere other animals. This offers a firm foundation for the Hindu idea of ahimsa, or non- violence (or non-injury) against both animals and humans, which Hindus hold dear. Becausethe soul may return in other living forms, there is a strong resistance to the institutionalised slaughter of animals, birds, and fish for human food. Hinduism is a religion that originated in India. Nature is referred to in Hinduism as "God's body." Different Gods and Goddesses are associated with different birds and animals, and they are worshipped or their protection and preservation is emphasised. Finally, Hinduism offers a moral framework for environmental protection and conservation. Nature abuse and exploitation are seen as unjust and sacrilegious.

Man, Nature, and The God all have an inherent equilibrium, according to Vedic literature (about 1500 BC). Natural forces were seen to be venerable realities and representations of the Lord Himself. The Vedas envision a lovely natural ecosystem on Earth and forbid man from polluting it. The wise are commanded by Veda to keep the environment free of all pollutants, which can be accomplished through Yagnas or sacrificial fire. Yagnas are thought to be the link between humans and the Devatas. These Devatas are the natural forces that must be pampered. Yagnas are performed to honour the deity as well as to purify the air and maintaina healthy environment.

### 6.7.2.2 Environment and Buddhism

Buddhism is a religion based on love, understanding, and compassion, as well as nonviolent beliefs. Buddhism's essential teachings are simplicity and ahimsa. Man should not overexploit natural resources, according to the idea of simplicity based on sustainability. The ahimsa (nonviolence) philosophy of not killing animals demonstrates a love for biodiversity. The doctrine of Karma and the philosophy of cause and consequence have been central to Buddhist teachings. They show how a willful disregard for these principles of ethical living can result in anarchy and, as a result, environmental disaster. Rivers, forests, and mountains are revered and regarded as bliss providers in Buddhism and the buddhist followers had great respect for the Sun, Moon and other planets.

In Sutta-Nipata, Buddha also established regulations prohibiting contamination of

rivers, ponds, and wells. "Recognize the grasses and trees... Then know the worms and the various types of ants... Know also the four-footed animals, both tiny and large... the serpents... the fish that swim in the water... the birds that fly through the air on their wings."

The Dalai Lama put it succinctly in the following way: "As a Buddhist, I believe in the interdependence of all things, in the interrelationships throughout the entire spectrum of plant and animal life, including natural components such as mountains, valleys, rivers, sky, and sunshine."

### 6.7.2.3 Environment and Jainism

The notion of refraining from preventable activities that are damaging to oneself or others is highly valued in Jainism. The essential pillar of the Jain way of life is ahimsa (nonviolence), a concept that is clearly associated with realism, common sense, personal value, and responsibility. Environmental harmony through spirituality should be pursued by all,according to the Jains. This can be accomplished by following three principles: correct belief, correct knowledge, and correct behaviour. Everyone should be kind to all living things, compassionate to the weak, tolerant of the insolent, and happy for the good. This is how theJain approach to environmental harmony works.

### 6.7.2.4 Environment and Sikhism

Nature was given divine traits by Guru Nanak, the founder of the Sikh religion. People should respect God's creations and understand the ultimate truth about their place in the cosmos, according to Sikhism. The human race is an inseparable part of nature, bound by inextricable ties to the rest of creation. God's glory is revealed in nature and the environment, according to the Guru Granth Sahib. Sikhs believe that the Almighty God created the universe. For the universe to continue, there must be a balance between all of nature's constituents. Any disturbance in the balance results in distress and calamity.

Many stories about the gurus' love and particular interaction with the natural environment, including animals, birds, flora, the land, rivers, mountains, and the sky, can be found in their history. As a result, Sikhism teaches that the natural environment and the survival of all living things are inextricably intertwined in nature's rhythm.

Many stories about the gurus' love and particular interaction with the natural environment - with animals, birds, flora, earth, rivers, mountains, and the sky - can be found in their history.

### 6.7.2.5 Environment and Christianity

According to Christianity, there is a harmonious triadic relationship between the divine and mankind, as well as between humans and nature, and failing to maintain this harmony may cause humanity to be alienated from its creator as well as from nature. "I am the Alpha and the Omega, the first and the last, the beginning and the end," the Lord declared. As a result, He has a divine hand in every aspect of creation, and no human creature has the absolute authority to destroy it. "All human endeavour in the world must consequently lead to mutual enrichment of man and creatures," remarked Rev. Father Lanfranco Serrihi (Minister General, Order Friars Minor Conventual, Rome).

In his message to the United Nations Conference on Human Environment in Stockholm in 1972, Pope John Paul VI stated that the environment and resources belong to everyone: they are inalienable property of everyone, and there is no discretionary sovereignty over this universal prosperity exempting from responsibility towards humanity today and tomorrow. 12 This message from Pope John Paul VI makes it abundantly obvious that Christianity and the environment are inextricably linked, and the emphasis is on sustainable development. As a result, the fundamental spirit of Christianity, which is to keep the environment in ideal shape, is heavily emphasised.

### 6.7.3 Environment and Indian Culture

India's cultural heritage has a strong commitment to environmental protection and preservation. The earth was regarded as 'Mother' in Indian culture. Lokamata describes rivers. India is a country steeped with rites and traditions. For the survival of life on Earth, Indians have defined the necessity to protect and enhance natural ecological balances through sacred incarnations and systematised rituals. Because almost all of the world's main religions are represented on Indian land, and their religions, in turn, recognised mankind's proximity to nature, they regulated mankind's behaviour in a way that was environmentally friendly.

Indian culture demonstrates an ecological shift toward peace. All aspects of nature

and humans are at peace, and there is harmony between them. The culture lessons were applied on two levels by the Indians. The first is at the level of society's relationship with nature, and the second is at the level of people inside society. Ecocultural socialisation was practised in Indian society. The second lesson was about sustainability and renewable energy. It is founded on the understanding that food comes from the forest, not from man-made towns; food comes from the fields, not from factories. As a result, _environmentalism' is an integral component of Indian culture.

## 6.8 ENVIRONMENTAL COMMUNICATION AND PUBLIC AWARENESS

The mass media is a medium that is frequently used to provide information to the general audience. It's also viewed as a technique for influencing public opinion on topics or organisations. The capacity to grasp the surrounding world, including all environmental changes, cause-and-effect linkages between environmental quality and human behaviour, and a sense of responsibility for maintaining them, is referred to as public awareness of the environment. Environmental education plays an important role in raising healthy consciousness and establishing a conducive atmosphere for the growth and preservation of human brains. Environmental education encompasses both formal and informal education and training that improves people's capacity to engage in environmental management and the resolution of environmental crises and issues. This might be accomplished through raising awareness and altering people's attitudes about the environment. We require awareness in our actions, as well as ethical principles, in order to maintain and conserve the environment and improve human life quality.

Citizens influencing political decision-making via action are known as public involvement. Demonstrations, protest gatherings, letters to the editor of publications and to politicians, as well as the distribution of information through flyers, newsletters, and the media, might be used to carry out this activity. Participating in consultation sessions with local governments and working groups formulating laws are examples. Finally, individuals might demonstrate actual instances of alternative behaviour and practises, such as recycling and low-impact agriculture approaches.In the

context of the environment, these activities are intended to influence public policy on issues such as water and air pollution, endangered species protection, and the negative consequences of natural resource extraction. These efforts may push politicians to consider public opinion, politicising environmental issues and eventually leading to the passage of laws and policies that reduce the negative environmental effects of growth. It can also compel firms and industries to adopt more environmentally friendly practises, such as reducing car emissions and industrial pollution.

Methods to create environmental awareness:

i) .In schools and colleges
ii) Through mass – media
iii) Non – government organizations
iv) Audio - Visual media
v) Voluntary organizations
vi) Traditional techniques
vii) Cinema
viii) Newspapers
ix) Arranging competitions

**6.8.1 Compressed Natural Gas (CNG) Vehicles in Delhi:**

In 1998, three years after a lawyer filed his complaint and as a direct result of it, the Supreme Court issued a Directive setting April 2001 as the deadline for replacing or converting all buses, three-wheelers, and taxis to compressed natural gas (CNG). In addition, the Directive mandated the construction of a 70-station CNG refuelling infrastructure as well as financial incentives for fleet conversions.The National Capital Region of Delhi established a Commission in January 1998 to investigate, produce, and publish a report on the city's air pollution problem. This Commission included CSE as a member.

The government was required by the Supreme Court in 1999 to implement the EUR II standard for gasoline engines by the year 2000 for all new automobile sales. The Court ordered sulphur levels below 30 ppm, as well as particle filters for diesel engines, in response to the diesel vehicle marketing. This reignited the debate about CNG. Cleaner diesel was now available, and the car industry and the Delhi government

1

argued against CNG using scientific evidence.

In reality, the government and the automobile industry were battling diesel's negative reputation. The question of equal rights between public transportation and private automobiles was also at risk. The government had traditionally preferred diesel as a fuel. It was subsidised at first, then taxed less than gasoline. Despite the Supreme Court's decision from 1998, the government nonetheless permitted 6,000 new diesel buses to enter service in 2000. By April 2001, the initial date, nothing had been accomplished in fulfilling the Supreme Court Directive of 1998.

The automobile industry was opposed to CNG, primarily because any local legislation would threaten worldwide mass manufacturing. It continues to fight for the Supreme Court order to be repealed. Finally, in April 2002, the Supreme Court issued a direction imposing a penalty on the government for wasting the court's time, as well as a daily penalty of 1,000 Rupee per day (about 20 US$) for each diesel bus still in use. One of the projects was to switch to compressed natural gas for public transportation, which has been in use in Delhi since April 2001.Compressed Natural Gas was found in roughly 2200 buses, 25,000 three-wheelers, 6000 taxis, and 10,000 automobiles in Delhi. More than half of the cars, however, have notyet been converted to compressed natural gas.

According to a study conducted by the World Wide Fund for Nature (WWF) and E3G, the government earned recognition for drafting one of the top 12 best policies in the world once it began preparing a comprehensive action plan by passing the necessary legislation and establishing the infrastructure required for such a transition.

Due to a lack of cooperation from other government agencies in Delhi, the Indian Supreme Court's decision to switch to CNG was difficult to implement and took considerably longer than it should have. But, in the end, all diesel buses were phased out, and air quality improved. However, daily ambient air quality statistics from Delhi's busiest crossing fromJune 1999 to September 2003 show no overall increase in ambient quality due to point sources of pollution that contribute to $SO_2$ and mobile sources that contribute to $NO_2$ concentrations. After the conversion, $NO_2$ levels increased, but SPM and PM-10 levels decreased very little; CO levels decreased significantly.

Ques. 1 Answer the following Short Answer Questions:

i. The................... movement, which was started to safeguard Himalayan forests fromdestruction before independence, has its origins in the pre-independence era.

ii. An earthquake is a sudden ground disturbance caused by the abrupt displacement of ………………, generally in the top .............km of the earth's crust.

iii. State whether the statement is true or false. Give the correct answer in case of a wrongstatement

The Ministry of Youth Welfare and Sports supports the development and stabilisation of SelfHelp Groups (SHGs) as well as awareness campaigns among rural and urban women.

iv. Match the following Richter Scales (Column A) with the severity of the Earthquakes (Column B)

| Richter Scales (Column A) | Severity of the Earthquakes (Column B) |
|---|---|
| More than 8 | Insignificant |
| 5 - 5.9 | Great |
| Less than 4 | Destructive |
| 6 - 6.9 | Damaging |

v. The major Women Welfare programmes introduced in India are:

    a. Development of women and children in Rural Areas (DWCRA):

    b. Child Development Services Scheme (CDS)

    c. Swaranjayanti Rozgar Yojna (SRY)

    d. All of the above

## 6.9 SUMMARY

In this unit, effort had been made to understand the concept of human population and the impact of its growth on the environment. It has been observed that:

- Our planet's ability to support population expansion is far outstripping its ability to support it. Overcrowding, deforestation, and water pollution, as well as eutrophicationand global warming, are all linked to overpopulation.

- To promote the objective of sanitation and hygiene in India, the government of India launched the Swachh Bharat Mission on October 2, 2014 with an objective of making India Open defecation Free by October 2, 2019.
    - The development of various river valley projects has caused a large scale displacement of various people from their ancestral homes and other socio-economic consequences.
    - Similarly development of Mining sites and creation of National Parks also inhibit the prospects of the tribal people to dwell in areas which are otherwise considered important from the point of view of protection of natural resources.
    - The major natural disasters like earthquakes, floods, cyclones, landslide, etc potentially cause damage to the human population as well as the Environment and so appropriate Disaster Management strategies ought to be applied so as to mitigate the damage caused by them.
    - Historically, various environmental and ecological movements had been carried out to promote the cause of environmental protection and conservation. Chipko movementand Silent Valley were some of the popular movements that aided the objective.
    - Apart from the effect of ecological movements on environmental protection, various religions and cultures like the Indian culture have had a significant impact on environment protection.
    - Various religions like Hinduism, Sikhism, Buddhism, Jainism and Christianity have always upheld the objective of environment protection in relation to the use of resources for community development.
    - Conclusively, it has been realized that it is indeed very important to spread more awareness about the environment.
    - Educating people and masses about the need to protect and conserve the environment is becoming increasingly important, especially in the wake of increasing incidence of accidents and disasters that harm the environment as well as the human communities.

**6.10 QUESTIONS FOR PRATICE**

Ques. 1 Highlight the main issues and concerns of the Environment Movements in India?

Ques. 2 How far have the religions and cultures contributed positively in protecting the Environment?

Ques. 3 Highlight the extent of displacement caused to the tribal communities in an attempt to develop resources for development of the country. Mention two important case studies to support your answer.

Ques. 4 In your opinion, how are the environmental and ecological rights related to democracy and development in India? Explain.

Ques. 5 Using reference from the case of CNG vehicles in Delhi, discuss how and why is the need for environmental education and public awareness so critical to the objective of environmental protection in India?

**6.11 SUGGESTED READINGS**

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
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# B.Com (Hons.)
# Accounting and Taxation

SEMESTER-II

**COURSE: ENVIRONMENTAL STUDIES**

**UNIT – 7: ROAD SAFETY AWARENESS**

## STRUCTURE

**7.0 Learning Outcomes**

**7.1 Introduction**

**7.2 Concept And Significance Of Road Safety**

**7.3 Traffic Signs**

**7.4 Traffic Rules**

**7.5 Traffic Offences And Penalties**

**7.6 How To Obtain License**

**7.7 Role Of First Aid In Road Safety**

**7.8 Summary**

**7.9 Questions For Practice**

**7.10 Suggested Reading**

## 7.0 LEARNING OUTCOMES

After the study of this unit, the learners will be able to:

- Understand the meaning and importance of the concept of Road safety
- Identify the important signs that are used on roads
- Develop a proper understanding of the significance of the traffic signs
- Acquire knowledge about the various traffic rules that ought to be followed on theroad, to ensure safety
- Know about the various types of Traffic offences and penalties that are attached to theviolation of various traffic rules
- Gather an insight on the procedure that has to be followed to obtain a licence
- Understand the critical importance and role of First aid in the field of Road Safety

## 7.1  INTRODUCTION

When it  comes to the amount of traffic accidents, India ranks the highest. However, there has been progress in this area in recent years. The traffic conditions are under a lot of strain due to the significant  increase in the number of vehicles on the road. As a result, one of the mostsevere public health challenges in our country is road safety. It affects everyone, whether they drive a car, walk, or ride a bicycle.

Road safety is a multi-faceted and multi-sectoral problem. It encompasses road infrastructure construction and management, the provision of safer cars, legislation and law enforcement, mobility planning, health and hospital services,  child safety,  and urban land use planning, among other things. In other worlds, its scope includes  road and vehicle engineering on the one hand, and health and hospital services for trauma cases (in a post-crash scenario) on the other. The government and a variety of civil society stakeholders share a multi-dimensional responsibility for road safety.

In order for road safety initiatives to be successful in all nations, they must have widespread support and coordinated effort from all stakeholders. The United Nations General Assembly has designated 2011-2020 as the Decade  of  Action  for  Road Safety, with an aim of halvingroad accident mortality by half over that time period, acknowledging the devastating impact of road accidents on global health. Every year, over 1.2 million people die and 50 million are injured in traffic accidents around the world, costing the global economy 1.2 trillion dollars. Road traffic injuries are anticipated to become the fifth biggest cause of mortality in the world by 2030, according to the World Health Organization, unless coordinated action is taken.

## 7.2 CONCEPT AND SIGNIFICANCE OF ROAD SAFETY

Road safety means to safely drive on road to ensure that there is no harm or the driver of the vehicle does not cause any harm to any other vehicle moving nearby it. In other words we can say that road safety means to reduce accident  causes on the road for proper driving.

Imparting Road Safety Education to  Road users specially the  vulnerable  ones  is  a high priority area. Prosecuting the errant and undisciplined road users through focused

and concentrated enforcement action and improving the standard of safety on roads remains our priority. To familiarise the people how to remain safe on roads and to respect the rights of others, a small guide to road safety has been  compiled for the benefit of the road users, suchas the car drivers,  the commercial  vehicle drivers,  the two wheeler riders, the pedestrians etc.

It contains useful information on road safety, which teaches the citizens the safe and secureuse of roads.

In the ancient times, there was no transport system. With the passage of time human beings tamed animals and used them as mode of transportation. Invention of wheel marked the turning point in human civilization. Carriages that could carry three -four passengers, driven by animals, came into usage. In the $16^{th}$ century invention of automatic mechanism  and vehicles helped people travel from one place to another faster. The world's first  car was invented in 1769 by Nicholas Joseph Cugnot.  After that, there was no turning back, vehicles of different shapes and sizes began to be developed and introduced. All this brought with them a new threat to human life i.e. roadside accident. Ways and means were introduced for safety and smoothness of traffic on roads. Several rules were introduced to make the road safe and reduce the number of accidents. Even Manusmriti and Kautilya_s Arthashastra contains road rules and regulations in great detail.

The rules have been modified from time to time, keeping in view the local needs and requirements .New regulations have been laid down for different categories of road users.

As wheel got invented in the  Mesopotamian Civilization,  our own civilization was set to motion, for it wheeled our imagination.   In 1645 a  sort of cycle  was  invented by Jean Theson but it had no brakes, pedal  for  steering  and  needed feet  motion. Laufmachine cycle was then created by Karl Von (1817). Soon this was made into the regal Dandy Horse by Dennis Johnson. In 1839 the proper cycle was shaped by K. Macmillan. It had iron wheels and wooden frame. The manifestation of automobile horse-power was taught in 1769 by Nicolas Joseph Cugnot, who  invented the first 'Steam Truck' which the French army  thought was useful.

Then after, automobiles enveloped our life and culture. But the notion called ‒accident‖ endangered our future. The first accident of the Steam Truck in 1771 was the eye opener. During 1899 the first fatal accident took place with the death of a driver. Then onward, the world coined several road safety measures. Still today, 12 lakh people are killed and 50 millions get seriously injured all over the world every year. This accident menace makes our citizens an endangered species of the future. So we msut follow the road safety culture and be cautious about traffic rules. Today's informed child can only ensure a safe future.

India has the second largest road network in the world with over 3 million km of roads of which 60% are paved. These roads make a vital contribution to the India's economy. On the whole the facilities for the road users are not up to the mark leading to a high toll of deathvictims.

**7.2.1 Brief History**

**7.2.1.1 The First Accident:** In 1771 the first accident involving a motor vehicle took place in Paris when Cugnot's steam tractor hit a low wall in the grounds of the Paris arsenal.

**7.2.1.2 The First Act:** The Locomotive and Highway Act was the first piece of British motoring legislation. This was also known as the Red flag act of 1865 .The act required three persons in one attendance, one to steer, one to stock and one to walk 60 yards ahead with a Red flag to warn the oncoming traffic.

**7.2.1.3 First man to be challenged:** In 1895, John Henry Knight was convicted and fined for using a motor tricycle on the highway. He was probably the first motorist to appear in court.

**7.2.1.4 First fatal car accident:** The first motor car accident in Britain resulting in the death of the driver occurred in Grive Hill, Harrow-on-the Hill, London on 25th February 1899.

**7.2.1.5 Dusty Road to Tar surface:** In 1902 Tar was first used on a macadam surface to prevent dust in Monte Carlo. It was the idea of Dr. Guglieminetti, a Swiss. At first Tar was brushed on cold, but soon it was applied hot.

**7.2.1.6 The First number plate of London:** The Motor car Act of Britain came into force on1[st] January 1904. It required that all cars be registered and carry a number plate, and all motorists to have a driving licence. But there was no driving test to pass and the licence was obtained by filling up a form and paying the fee at a post office. The act made dangerous driving an indictable offence.

**7.2.1.7 The First petrol pump:** The first petrol pump was installed in USA in 1906.

**7.2.1.8 The First traffic light of the world:** The world's first traffic lights were installed in Detroit, USA in 1919. The first traffic lights in Britain were installed in Wolverhampton during 1928. However they did not come to London till 1932.

**7.2.1.9 Pedestrian crossing:** the pedestrian crossing was instituted in Britain in 1934. The roads were marked by dotted lines.On the pavements there were striped Belisha beacon light polls named after Britain's minister of transport L.Hore-Belisha .The zebra crossing with black and white stripes was developed after the Second World War.

**7.2.1.10 First Traffic police woman:** Police women were employed for traffic control duties for the first time in Paris, in 1964. In Delhi we introduced women traffic police in 1989.

**7.2.1.11 First box junction:** Box junctions, marked with yellow cross-hatching were introduced in London during 1964. The aim was to prevent traffic blocking junctions when it could not proceed and this was successful.

**7.2.2 Basic Principles of Road Side Safety**

**7.2.2.1 Respect traffic rules/regulations and signs/symbols:** As a road user our act should be governed by an inborn, will to be safe and let others be safe on roads. This would comeonly when we respect the traffic rules and regulations. We must lookout for road signs and symbols and follow them.

**7.2.2.2 Maintain cool even when in adverse situations:** We might be burdened with an unending number of problems at the home or office, but we must keep them aside before we venture on the roads. It is important to keep ourselves fresh and cool.

**7.2.2.3 Care and concern for others:** We must keep in mind that we are not the sole

ownerof roads and others have similar rights on it. It should be remembered that road is not a placeto show anger. Prevention of accidents should be a major concern of road users.

**7.2.2.4 We must be prepared for or any kind of eventuality:** The drivers and pedestrians may behave in an unpredictable manner. As a road user we should judge the situation correctly and act accordingly.

### 7.2.3 Need for Road Safety

Modern metropolitan living is getting more and more associated with traffic hazards. This can be attributed to complex and complicated road structures as well as increasing human and vehicular population. Enhanced life style and increase in the number of privately owned vehicles especially two wheelers have made traveling on roads the most dangerous tasks to be undertaken. Globalisation, free market economy and free trade policies have had a direct impact on the increase of automobiles on roads, which in turn have led to vehicular congestion. Though the number of vehicles increased, the length and breadth of roads remain static. The only way left with the authorities to cope up with the problem was to make improvisation on the already existing structures. All such hi-tech construction works involved engineering scale of a higher order and traversing on them requires driving skills of the higher border, which only a few road users have.Though this has eased congestion, chances of accidents have increased, and in maximum cases, accidents occurred because of human folly. Free flow of traffic has resulted in increase in speed of vehicles, which in turn has resulted in maximum number of accidents on flyovers because of driver's inability or incompetence to manipulate the speed properly. Most of the drivers lack intuitive judgement and defensive driving skills, the necessary qualities that a driver must possess.

Most of the road users are unaware of road realities and are ignorant about road signs and markings. They have the least hint of things to come by the way they behave. Some such callous behaviour includes improper parking, improper maintenance of vehicle which results in both air and noise pollution causing inconvenience to others, over speeding, rash driving, crossing the road at wrong places ,and many more. Any one such act on the part of any one road user may be the cause of chaos and confusion on roads.

And most of the people are either blind or inconsiderate about this and do things according to their whims. In face of all these, road safety education has become an essential aspect of road management. Making people aware of the road situations and giving them precautionary tips would be of great helpto redeem the situation.

An ideal road safety education program should be able to:

1. Inculcate a sense of road discipline in the mind of every road user
2. Develop a wilful respect for road rules
3. Help a road user tide over any adverse situation on roads
4. Instil in the minds of road users a sense of fellow feeling.

### 7.2.4 Specific Road Awareness Programmes

Specific Road awareness programs can be undertaken regarding:

1. Knowledge of road rules
2. An understanding of why road rules are broken and why doing so is dangerous
3. Enrolling students in Road Safety Patrol so that they get a feel of the road and itsrules.

### 7.2.5 Correct Road Attitude Programmes

An understanding that orderliness on roads has nothing to do with low traffic density (many notions like Japan have high density of traffic yet road rules are crupulously followed). It is important and worthwhile to wait for your turn, on the roads. Rules have to be followed in letter and spirit. Road users have to understand the value of _Live and Let Live' rather than _Live and Let Die'!

The art of time management is vital while taking to the roads. Much of the stress is due to having insufficient time to reach the intended destination, which is compounded by the confusion on the roads.

### 7.2.6 Programmes for Creating Integrated Minds and Sound Value Systems

Specific programs to develop self awareness, self confidence, collective consciousnes, critical reasoning, distinguishing right from wrong, a sound value system that steers clear of superficial material values and false sense of worth must

be evolved. Through curricular and co-curricular activities, efforts should be made to inculcate a strong moraland ethical base, a sense of social responsibility, a belief that individual goals are not different from social goals and deep rooted social sensitivity.

## 7.3 TRAFFIC SIGNS

Traffic signs are very helpful, as they give important information. The proper knowledge of road signs is essential to avoid the risk of accidents. Road signs , markings,traffic signals and other traffic devices are there to guide the road users and hence are the languages of the road. Every road user whether a pedestrian, two wheeler rider, driver of four wheeled vehicle should have knowledge regarding these traffic controlling devices and should be aware of what they signify. Traffic signs are there to regulate traffic, warn about hazards and to guide the road user.

There are three types of traffic signs:

i. **Mandatory:** Mandatory road signs are the ones that give order regarding do's anddon'ts and are to be followed strictly.

ii. **Cautionary:** Cautionary road signs are the ones that warn the road users regarding theroad situation ahead. Cautionary signs are generally in triangular shape.

iii. **Informatory:** Informatory road signs are the ones that give information regardingdirections, destinations etc. Informatory signs are generally rectangular in shape.

### 7.3.1 Mandatory Signs

### 1. Straight Prohibited or No Entry

These signs are located at places where the vehicles are not allowed to enter. It is generally erected at the end of one way road to prohibit traffic entering the Roadway in the wrong direction and also to each intersection along the one way road.

### 2. One Way Sign



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These signs are located at the entry to the one-way street and repeated at intermediate intersections on that street.

**3. Vehicles Prohibited In Both Directions:**

This sign is used at the approach and off the roads where entry to all types of vehicular trafficis prohibited, especially in areas which have been designed as pedestrian malls.

**4. Horn Prohibited:**

This sign is used on stretches of the road where sounding of horn is not allowed, near hospitals and in silence zones.

**5. Pedestrian Prohibited:**

This sign is erected on each entry to the road where pedestrians are to be prohibited.

**6. Cycle Prohibited:**

This sign is erected on each entry to the road where cycles are to be prohibited.

**7. U-Turn Prohibited:**

This sign is used at places where vehicles are forbidden to make a turn to the reverse directionof travel between the sign and the next intersection beyond it.

**8. Overtaking Prohibited:**

This sign is erected at the beginning of such sections of highways where sight distance is restricted and overtaking will be dangerous.

**9. Right/Left Turn Prohibited:**

These signs are used at places where vehicles are not allowed to make a turn to the right orleft. The signs are also used at the intersection of one- way street to supplement the one -way sign.

**10.    All Motor Vehicles Prohibited:**

This sign is used at places where entry to all types of motor vehicles is prohibited.

**11.    Trucks Prohibited:**

This sign is used at the entrance to the road where movement of trucks is prohibited.



**12.     Hand Cart Prohibited:**

This sign is erected on each entry to the road where hand carts are to be prohibited.

**13.     Bullock Cart Prohibited:**

This sign is erected on each entry to the road where bullock carts are to be prohibited.

**14.     Tonga Prohibited:**

This sign is erected on each entry to the road where tongas are to be prohibited.

**15.     No Parking:**

This sign is erected where parking is not allowed but vehicles can stop for short duration to allow passengers to get into or get out of the vehicle. The sign should be accompanied by suitable kerb or carriageway markings.

**16. No Parking Or Standing:**

This sign is erected where vehicles are prohibited to stop even temporarily.

**17. Speed Limit:**

This sign is erected at the beginning of the section of the road or area covered by a speedrestriction, with numerals indicating the speed limit in km per hour.

**18. Width Limit:**

This sign it is used where entry of vehicles exceeding a particular width is prohibited.

**19. Height Limit:**

This sign is erected in advance of an overhead structure where entry is prohibited for vehicleswhose height exceeds a certain limit.

**20. Length Limit:**

This sign it is used where entry of vehicles exceeding a particular length is prohibited.

**21. Load Limit:**

This sign is used where entry of vehicles is prohibited for vehicles whose laden weight exceeds a certain limit.

**22. Axle Limit:**

This sign is used where entry of vehicles is prohibited for vehicles whose axle load exceeds a certain limit.

**23. Stop Sign :**

This sign is used on roadways where traffic is required to stop before entering a major Road. The vehicle shall proceed past the stop line only after ascertaining that this will not cause any damage to traffic on the main road.

**24. Give Way Sign:**

This sign is used to assign right -of- way to Traffic on certain roadways and intersections, the intention being that the vehicles controlled by the sign must give way to the other traffichaving the right-of-way.

**25. Restriction Ends Sign:**

This sign indicates the point at which all prohibitions notified by prohibitory signs for moving of vehicles cease to apply.

**26. Compulsory Turn Left/Right:**

These signs indicate the appropriate direction in which the vehicles are permitted to proceed Compulsory Ahead Or Turn Left /Right :

These signs indicate the appropriate directions in which the vehicles are permitted to proceed. Vehicles are supposed to move either of the given to directions.

**27. Compulsory Ahead:**

This sign indicates that the vehicle is only permitted to proceed ahead.

**28. Compulsory Keep Left:**

This sign is most frequently used on Islands and refuges in the middle of the carriageway and at the beginning of Central reserves of dual carriageway. The vehicles are allowed to keep left only.

**29. Compulsory Cycle Rickshaw Track:**

This sign means only cycles and rickshaws are allowed on this road/ carriageway.

**30. Compulsory Sound Horn :**

This sign means the motor vehicles shall compulsorily sound horn at the location where thesign is placed. This sign is mostly put at sharp curves on hill roads.

**31. Slip Road Ahead:**

This sign means the vehicles can either go straight or turn left.

**32. Main Road Ahead:**

This sign means the vehicles can either go straight or turn right.

**33. Pedestrians Only:**

This sign means only pedestrians are allowed and traffic is not allowed on this road /carriageway.

**34. Buses Only :**

This sign means that only buses are allowed and the traffic is not allowed on this road/carriageway.

**7.3.2 Cautionary Signs**

**1. Right/Left Hand Curve:** This sign is used where the direction of alignment changes. The sign forewarns the driver to reduce the speed and proceed cautiously along the road.

**2. Right /Left Hair Pin Bend:** This sign is used where the change in direction is so considerable that it amounts to reversal of action. The symbol bends to right or left

depending upon the road alignment.



**3. Narrow Bridge:** This sign is erected on roads in advance of bridges where the clear widthbetween the kerbs or wheel guards is less than normal width of carriageway.

**4. Gap in Median:** This gap is installed ahead of a gap in the median of a divided carriageway other than an intersection.

**5. Narrow Road:** This sign is normally found in rural areas where a sudden reduction inwidth of pavement causes a danger to traffic.

**6. Road Widens:** This sign is normally found in rural areas where a sudden widening of roadcauses a danger to traffic such as, a two-lane road suddenly widening to a dual carriageway.

**7. Cycle Crossing:** This sign is erected in advance of all uncontrolled cycle crossings.
**8. Pedestrian Crossing:** This sign is erected in advance of both approaches to uncontrolledpedestrian crossings.

**9. School:** This sign is elected where school buildings or grounds are adjacent to

the roadwhere the traffic creates a hazard to children.

**10. Men at Work:** This sign is displayed only when men and machines are working on the road or adjacent to it or on overhead lines or poles. This sign is removed when the work is completed.

**11. Side Road Left /Right:** This sign is displayed in advance of the side road intersections where a large volume of entering traffic together with restricted site distance is likely to constitute a hazard. The driver is warned of the existence of a junction.

**12. Major Road:** These signs are displayed in advance of crossing with the major road, where a sufficiently large volume of traffic together with the restricted sight is likely to causea hazard.

**13. Y-Intersection:** These signs are displayed on the approach to a bifurcation of any road. This sign warns of the existence of a junction and no other indication is given.

**14. T-Intersection:** This sign is displayed in advance of T- junctions where the nature of intersection is not obviousof approaching traffic. This sign is used to warn the driver of the existence of a junction.

**15. Roundabout:** This sign is used where it is necessary to indicate the approach to a roundabout.

**16. Start of Dual Carriageway:** This sign is displayed when a single carriageway ends into a dual carriageway.

**17. End of Dual Carriageway:** This sign is displayed when a dual carriageway is ending and a single carriageway is starting.

i. Reduced Carriageway: These signs caution the driver of the reduction in the width of the carriage way ahead. This is displayed on undivided carriageway as when some portion of the carriage way is closed or reduced for repair.

ii. Two Way Operation: This sign is used to caution the driver of a changed pattern of traffic operation of the carriageway expected to carry traffic in one direction only.

iii. Cross Road: This sign is displayed in advance of the cross road where a sufficiently large volume of crossing or entering traffic with restricted sight distance is likely to constitute a hazard.

**18. Public Telephone:** This sign is displayed on long stretches of road in rural areas

indicating the distance to the nearest public telephone on supplementary plate, where it is in inconspicuous position.

**19. Filling Station:** This sign is displayed on long stretches of roads in rural areas at the entry to the road leading to the facility.

**20. Hospital:** This sign is used to notify drivers of vehicles that they should take the precautions required near medical establishments and in particular that they should not make any unnecessary noise.

**21. First Aid Post:** This sign is used to notify drivers on long stretches of roads in rural areas of the first aid facility which may be helpful in case of emergency.

**22. Eating Place:** This sign is used to indicate where a regular eating place is located.

**23. Resting Place:** This sign is used to indicate where facilities for resting and lodging are available. It is normally combined with a separate definition plate, indicating whether the place is a Rest House, Motel, and Hotel etc.

**24. Airport:** This sign is installed where the Airport is situated nearby.

**25. Repair Facility:** This sign is installed at the places where repair facility is situated.

**26. Police Station:** This sign is installed at the places where the Police Station is situatednearby.

**27. Railway Station:** This sign is installed at the places where the Railway Station is situatednearby.

**28. Bus Stop:** This sign is installed at the places where buses are designated to stop.

**29. Taxi Stand:** This sign is installed at the places where the taxis are expected to wait whennot hired.

**30. Cycle Rickshaw Stand:** This sign is installed at the places where cycle-rickshaws are towait.

**31. No Thorough Road:** This sign is used at the entrance to a road from where there is noexit.

**7.3.3 Traffic Lights**

The traffic signal passes information using a universal colour code.

**i. Red- To stop the traffic**

Bring your vehicle to a complete halt behind the stop line cross walk. Wait until the light turns green.

**ii. Amber-Caution**

If you have entered the intersection and the light turn to amber, move on very carefully. Ifyou see the amber light before entering the crossing, stop the vehicle behind the stop line or cross walk.

**iii. Green-Go on**

Go through the crossing carefully. You can turn in the direction of the arrow by giving an indicator.

**7.3.4 Flashing Signal**

A flashing red signal is provided at level crossing, airfield, fire stations, minor roads, bridgesetc. It means you must come to a full stop and proceed cautiously after making a safety check on all approaching traffic.

A flashing yellow light is provided where major road meets minor roads. You must slow down and proceed with caution, giving due attention to other traffic and pedestrians.

**7.3.5 Pedestrian Signals**

These signals help pedestrians cross intersection safely. If we face a steady red human figure, we should not enter the road. If the signal starts flashing, we can cross the road quickly. If we are already on the road, we should stop if we are about to join the road. We must walk ahead cautiously if we face a steady green human figure.

## 7.4 **TRAFFIC RULES**

Various traffic rules have been put in force to reduce the incidents of accidents. The general road safety rules are discussed as below:

**7.4.1 Negotiating an Intersection Judiciously**
- Almost 50% of all city driving collisions occur at intersections.
- We must choose the left lane if we want to turn left, the middle lane if we want to gostraight, and the right lane if turning right, at least 100 metres in advance.
- We must give proper indication before we turn.
- While approaching an unmanned intersection, we must cover the brake and be prepared to stop.
- We should slowdown while approaching an intersection.
- Stopping before stop line at red light is advisable.

- Even if the signal allows us to go, we must proceed slowly and cautiously

### 7.4.2 Negotiating a Round About

- Choose your lane as per your exit, at least 100m in advance.
- Slow down while approaching a roundabout.
- Enter the roundabout at an angle.
- Give way to Traffic on your right.
- Merge slowly with the traffic inside the roundabout.
- Move towards your exit gradually giving proper indications.
- Be watchful of a pedestrian or an animal that may suddenly appear.

### 7.4.3 While Overtaking

- Never overtake from left, always overtake from right.
- Show your intentions of over taking clearly to your fellow drivers.
- Give proper indications, before overtaking.
- Be watchful of a pedestrian or an animal that may suddenly appearin front of thevehicle you are overtaking.
- On roads having two- way traffic, overtake only when the oncoming vehicle is at asafe distance.

### 7.4.4 While Turning

- Give proper indications.
- Start changing lane only when the vehicles behind you have understood your intentions.
- Turn only when the vehicle coming from the opposite direction is at safe distance.
- The vehicle coming from the opposite direction has the right of way.
- Watch out for pedestrians as well as vehicles coming from your right side.
- Slow down while approaching the turning point.

### 7.4.5 Right of Way

- The children and the disabled have the right of way.
- Pedestrians have the first right of way at unmanned intersections.
- At an unmanned intersection traffic on your right has the right of way.
- At a roundabout, pick on your right has the right of way.
- Traffic on major Road has the right of way.
- On hilly and steep roads vehicles going uphill have the right of way.

- Emergency vehicles like fire brigade, ambulance, police have the right of way.
- These vehicles, during emergency, can jump a red light, drive in non entry areas or onwrong side.
- These vehicles should be given priority and clear passage.

### 7.4.6 Keep Left:

The driver of a motor vehicle shall drive the vehicle as close as to the left hand side of the road as may be expedient and shall allow all the traffic which is proceeding in the direction to pass on his right hand side.

### 7.4.7 Turning To Left and Right:

Whether you are going to make a left or right turn, you should be in the correct lane well before reaching the intersection. You should be in the lane closest to the direction in whichyou are going to turn. Never turn from the wrong lane across another lane of traffic. This unexpected move can be dangerous.

### 7.4.8 Passing To The Right:

The driver of a motor vehicle shall pass to the right of all traffic proceeding in the same direction as himself.

### 7.4.9 Passing To The Left:

The driver of a motor vehicle may pass to the left of a vehicle, the driver of which having inducted an intention to turn to the right has drawn to the centre to the road and may pass on either side.

### 7.4.10 Overtaking Prohibited In Certain Cases :

The driver of a motor vehicle shall not pass a vehicle traveling in the same direction as himself.

### 7.4.11 Overtaking Not To Be Obstructed:

The driver of a motor vehicle shall not, when being overtaken or being passed by another vehicle, increase speed or do anything in any way to prevent the other vehicle from passing him.

### 7.4.12 Caution Road Junction:

The driver of motor vehicle shall slow down when approaching such intersection, junction at which traffic is not being regulated, if the road entered is a main road designated as such, give way to the vehicles proceeding along the road, and in any other case give way to all traffic approaching intersection on his right hand.

**7.4.13 Giving Way to Traffic At Road Junction:**

The driver of a motor vehicle shall, on entering a road intersection, at which traffic is notbeing regulated, if the road entered is a main road designated as such, give way to the vehicles proceeding along that road, and in any other case give way to all traffic approaching the intersection on his right hand.

**7.4.14 Fire Service Vehicles and Ambulance to Be Given Free Passage:**

Every driver shall on the approach of a fire service vehicle or of an ambulance allow free passage by drawing to the side of the road.

**7.4.15 Right to Way:**

The pedestrians have the right of way a at uncontrolled pedestrian crossings. When any road is provided with footpath or cycle tracks specially for other traffic, except with permission ofa police officer in uniform, a driver shall not drive as such on footpath or track.

**7.4.16 Taking "U" Turn:**

No driver shall take a ‒U‖ turn where ‒U‖ turn is specially prohibited and on busy traffic road. If a ‒U‖ turn is allowed, the driver shall show signal by hand as for a right turn, watchin the rear view when safe to do so.

**7.4.17 Parking of the Vehicles:**

Every driver of a motor vehicle parking on any road shall park in such a way that it does not cause or is not likely to cause danger, obstruction or undue inconvenience to other road users and if the manner of parking is indicated by any sign board or markings on the roadside, he shall park his vehicle in such manner.

**7.4.18 One Way Traffic:**

A driver shall not drive a motor vehicle on the roads declared ‗ONE WAY' except in the direction specified by sign boards. Drive a vehicle in a reverse direction into a road designated ‗ONE WAY'.

**7.4.19 Driving On Channelized Roads (Lane Traffic)**

Where any load is marked by lanes for movement of traffic, the driver of a motor vehicle shall drive within the lane and change the lane only after giving proper signal.

**7.4.20 Stop Sign on Road Surface:**

When any line is painted on or inlaid in to the surface of any road at the approach to the road junction or to a pedestrian crossing or otherwise, no driver shall drive a motor vehicle so thatany part of thereof projects beyond that line at any time when a signal

to stop is being given by a police officer or by means of traffic control light or by display of any traffic sign.

**7.4.21 Towing:**

No vehicle other than a mechanically disabled motor vehicle or incompletely assessed motor vehicle, a registered trailer for a sidecar, shall be drawn or towed by any other motor vehicle, except for the purpose of delivery and to the nearest filling station or garage.

**7.4.22 Use of Horns and Silence Zones:**

A driver of a vehicle shall not:

1. Sound a horn needlessly or continuously or more than necessary to ensure safety.
2. Sound the horn in silence zones.

**7.4.23 Traffic Sign and Traffic Police:**

A driver of a vehicle and every other person using the road shall obey every direction given whether by signal or otherwise a police officer, or by notice, Traffic sign or signal fixed or operated.

**7.4.24 Distance from Vehicles in Front:**

A driver of a motor vehicle moving behind another vehicle shall keep at a sufficient distance from that other vehicle to avoid collision if the vehicle in front should suddenly slow down or stop.

**7.4.25 Abrupt Brake:**

No driver of a vehicle shall apply break abruptly unless it is necessary to do so for safety reasons.

**7.4.26 Vehicles Going Uphill To Be Given Precedence:**

On mountain roads and steep roads, the driver of a motor vehicle traveling down hill shall give precedence to vehicle going uphill wherever the road is not sufficiently wide to allow the vehicle to pass each other freely without danger, and stop the vehicle to the side of the road in order to allow any vehicle proceed in uphill to pass.

**7.4.27 Obstruction of Driver:**

A driver of a motor vehicle shall not allow any person to stand or anything to be placed in such manner or position as to hamper his control of the vehicle.

**7.4.28 Speed To Be Restricted:**

The driver of a motor vehicle shall, when passing or meeting procession or a body of

troops or police on the march or when passing workmen engaged on road repairs, drive at a speednot exceeding 25 kilometre an hour.

Speed is a relative term. You must aim at a a good average speed of travel.Over speeding with reference to a driver control, circumstances and violation of law is dangerous. Speeding with negligence is the direct cause of most road accidents leading to injury and death. Driving at a high speed does not give you sufficient reaction time to observe hazards. Other Road users too, get less time to react. The higher the speed, the greater the stopping distance and larger the chances of an accident. So make sure and drive within the stipulated speed limits. However, speed limit does not mean that it is safe to drive at that speed.

**7.4.29 Always drive keeping the following conditions in mind:**
- Condition of the road
- Traffic
- Weather and vision
- Type of vehicle
- Restricted areas
- Your own skills and concentration

**7.4. 30 Driving Of Tractors and Goods Vehicles:**

A driver when driving a tractor shall not carry or allow any person to be carried on tractor. A driver of goods carriage shall not carry more numbers of persons than that is mentioned in the registration certificate and shall not carry passengers for fare.

**7.4.31 Projection of loads:**

No person shall drive in any public place any motor vehicle which is loaded in a manner likely to cause danger to any person in such a manner that the load or any part thereof of anything extends laterally beyond the body or to the rear or in height beyond the permissible limit.

**7.4.32 Restriction to Carriage Of Dangerous Substances:**

Except for the fuel and lubricants necessary for the use of the vehicle, no explosive highly inflammable or otherwise dangerous substance, shall be carried on any public service vehicle.

**7.4.33 Restriction on Driving Backwards:**

No driver of a motor vehicle shall cause the vehicle to be driven backward without first

satisfying himself that he will not hereby cause danger or undue inconvenience to any person or in any circumstances, of any greater distance or period of time than maybe reasonably necessary in order to turn the vehicle round.

### 7.4.34 Production of Documents:

A person driving a vehicle shall always carry with him his driving licence, certificate of restoration, certificates of taxation and certificate of insurance of the vehicle and in case of transport vehicle the permit and fitness certificate, also, shall on demand by police officer in uniform or any officer of the Motor Vehicles Department in uniform or any other officer authorised by the government, produce the document for inspection.

### 7.4.35 Driving in dangerous conditions:

### Driving at Night

- Be alert: pedestrians, bicycles, animals and hand drawn vehicles that travel withoutlight are difficult to see.

- Drive at a slow speed to get a safe reaction and stoppage time.

- Turn on the headlights when darkness falls.

- Drive with dipped headlights in places where the roads are amply lit.

- Keep your windscreen clean because dirty windscreen can impair your vision.

- The headlights clear and clean and check them frequently. Also carry spare bulbs.

- Avoid looking to the dazzling light if an oncoming vehicle is driving in high beam andgradually slow down your speed.

- To reduce the glare of lights following you, switch your interior rear view mirror tothe night position or slightly tilt it or tilt the exterior rear view mirrors.

- Before overtaking ensure that the oncoming vehicle is at a safe distance.

### Driving in rain

- Check the working of wipers, windscreen washing fluid system, all vehicle lights, tyres, exhaust pipe.

- Be careful and reduce your speed as people may run across the roads in panic.

- Keep slow or away from water logged areas as water may enter the carburetor, ignition, muffler or distributor causing the vehicle to stop.

- Be considerate of other road users, avoid splashing of water.

- On slippery roads drive carefully and slowly.In case the vehicle slips,stop acceleration and press the clutch, hold the steering in a straight position

and do not break. Wait till you regain the grip.

**Driving in foggy conditions**

- Drive slow but not so slow that it becomes a hazard to others.
- Distances are hard to judge and low visibility decreases your reaction time.
- Give yourself extra time to respond to any road hazards.
- Do not hit your breaks in panic, you may get hit from the back.
- Turn on your wipers and defroster and turn off the music.
- Drive with dipped headlights, high beams produce too much glare in fog.
- Use the central verge of the road to guide you.
- Never attempt overtaking.
- Honk your horns periodically to let other drivers know you are there.

**Don"t Drive When Drunk**

- Alcohol slows down the mental process.
- It increases confidence but decreases performance.
- It affects brains ability to control and coordinate body movements.
- It slows down the reflex and hence the reaction time increases.
- It impairs vision and hearing.
- It impairs the ability to judge speed and distance.

**Seatbelt Saves**

- Seat belt saves life and reduces the severity of injuries.
- With belt tied around, become a part of the vehicle, rather than a loose object thatcan be tossed around inside in a crash or thrown outside.
- If you are thrown out of a vehicle in a crash, your chances of being killed are 25times greater than if you stay inside.
- If your vehicle goes out of control, with your seatbelt on you may be able toregain control. Without it, you may not even be able to stay in the driver's seat.

**7.4.4 Coexisting Peacefully On Road**

**7.4.4.1 When confronted by an aggressive driver**

- Avoid eye contact.
- Stay calm and relaxed.
- Make every attempt to get out of the way safely.

- Avoid confrontation.

- Do not take other driver's behaviour personally, he might have some reasonto drive erratically.

- If you feel you are being followed to closely, signal and pull over to allow theother driver to go by.

- Ignore harassing gestures and name calling, and do not return them.

### 7.4.4.2 Avoid becoming an aggressive driver

- Allow enough travel time to reach the destination on schedule.

- Alter your schedule to avoid driving during peak congestion periods.

- Do not drive when you are angry, upset or overly tired.

- Make your vehicle comfortable and avoid situations that raise your anxiety

- Do not make gestures that may offend others.

- Remember, driving is not a contest. Hence, forget about winning.

- Do not follow too closely. Allow at least a 3 second space between the vehicle ahead.

- If you commit any driving error, apologize by simply waving your hand.

- Give others the benefit of doubt; be polite, courteous and forgiving.

- When driving, relax and remain aware of your posture. Sit back in your seatand losing your grip on the steering wheel.

### 7.4.5 How to React in Case of an Accident

- Always carry a basic emergency kit in your vehicle, containing flayers andfirst aid supplies.

- If involved in a crash you must stop, regardless of the extent of damage.

- It is a criminal offence to leave the scene of an accident involving a fatality ofa personal injury.

- Exchange information with other drivers involved. Give your name, address, etc. to the other drivers and police on the scene.

- If a parked vehicle or property other than a vehicle is damaged or if a domestic animal is injured, try to locate the owner or notify the police.

- Do not stop at an accident scene unless you are involved or emergency help is needed. Otherwise, keep your attention on driving and the directions givenby traffic police.

- Shift the injured immediately to the hospital in any vehicle available.

## 7.5 TRAFFIC OFFENCES AND PENALTIES

Indian Road rules, titled ‒Rules Of The Road Regulation‖, were brought into effect since July 1989.These rules are germane to the Indian drivers (all inclusive of 2, 3 and 4 wheelers), while on the road to ensure an orderly traffic and a safer journey. Violation of these rules is a punishable transgression as per the city specific traffic police rules of the ‒Motor Vehicles Act‖.

Enforcement of these traffic laws, rules regulations and acts can bear out the road accidents. These laws are enforced by issuing ‒challans‖ in the name of the offenders and teaching them a lesson by making them pay penalties.

The rules and fines were last revised a few months back and have gotten more stringent than ever before. Basically, there has been a steep increase in the punishments both in monetaryand imprisonment terms.

For example, in case you are caught driving without a valid insurance for your motor vehicle, the earlier penalty of Rs 1,000 and/or imprisonment of up to 3 months has been changed to a fine of Rs 2,000 and/or imprisonment of up to Rs 3 months for the first-time offence. Subsequently, the punishment is increased to a fine of Rs 4,000 and/or imprisonment of 3 months. A similar increase in severity has been witnessed even with other penalties as per the new Traffic Rules and Fines for violating them. Here is a table of all the required details:

| Offence | New Penalty (From September 2019) | Old Penalty |
|---|---|---|
| General Offence | First-Time- Rs.500 Second-Time- Rs.1,500 | First-Time- Rs.100 Second Time – Rs 300 |
| Road Rules Violation | Rs.500 to Rs.1,000 | Nil |
| Travel without ticket | Rs.500 | Rs.200 |
| Disobeying orders of Authorities/Refusing to Share Demanded Information | Rs.2,000 | Rs.500 |
| Driving an Unauthorized | Rs.5,000 | Rs.1,000 |

| | | |
|---|---|---|
| Vehicle without License | | |
| Driving Without License | Rs.5,000 | Rs.500 |
| Driving With Disqualified License | Rs.10,000 | Rs.500 |
| Over speeding | Light Motor Vehicle: Rs. 1000 to Rs 2000 | Rs 400 |
| Medium Passenger orGoods Vehicle | Rs.2,000 to Rs.4,000 and impounding of DL for the Subsequent or Second-Time Offence | Rs.400 |
| Rash Driving | **First-Time Offence**: Imprisonment of 6 Months to 1 Year and/or Fine of Rs.1,000 to Rs.5,000<br>**Second-Time Offence**: Imprisonment of up to 2 years and/or Fine up to Rs.10,000 | Nil |
| Driving Under Influence of Alcohol or Intoxicating Substance | **First-Time Offence**: Rs.10,000 and/or Imprisonment of up to6 months.<br>**Second-Time Offence**: Rs.15,000 and/or Imprisonment of up to2 years | Rs.2,000 |
| Driving Oversized Vehicles withou tpermission | Rs.5,000 | Nil |
| Driving Whe nMentally/Physically Unfit | **First-Time Offence**: Rs.1,000<br>**Second-Time Offence**: Rs.2,000 | **First Time Offence**:Rs.200<br>**Second Time Offence** : Rs.500 |
| Accident Relate dOffences | **First-Time Offence:** Rs.5,000 and/or Imprisonment of up to6 months<br>**Second-Time Offence:** | Nil |
| | Rs,10,000 and/or Imprisonment of up to 1 Year | |
| Driving Uninsure d Vehicle (without valid Insurance) | **First-Time Offence**: Rs.2,000 and/or Imprisonment of up to 3 months<br>**Second-Time Offence:** Rs.4,000 and/or Imprisonment of up to 3 months | Rs.1,000 and/o rImprisonment of up to 3 months |

| | | |
|---|---|---|
| Racing and Speed-testing | **First-Time Offence:** Rs.5,000 and/or Imprisonment of up to 3 months<br>**Second-Time Offence:** Rs.10,000 and/or Imprisonment of up to 1 year | Rs 500 |
| Vehicle Without Permit | Rs.10,000 and/or Imprisonment of up to 6 months | Up to Rs.5,000 |
| Aggregators (Violations of Licensing Conditions) | Rs.25,000 to Rs.1 lakh | Nil |
| Overloading | Rs.20,000 and Rs.2,000 per extra tonne | Rs.2,000 and Rs.1,000 per extra tonne |
| Overloading of Passengers | Rs.1,000 per extra passenger | Nil |
| Not Wearing Seatbelt | Rs.1,000 | Rs.100 |
| Overloading of Two-Wheelers | Rs.2,000 and Disqualification of License for 3 months | Rs.100 |
| Not Wearing Helmet | Rs.1,000 and Disqualification of License for 3 months | Rs.100 |
| Not Providing Way for Emergency Vehicles | Rs.10,000 and/or Imprisonment of 6 months | Nil |
| Offences by Juveniles | Rs.25,000 with Imprisonment of 3 years for which the Guardian / Owner shall bedeemed to be guilty | Nil |
| Power of Officers to Impound Documents | Suspension of DL under Section 183, 184, 185, 189, 190, 194C, 194D, 194E | Nil |
| Offences Committed by Enforcing Officers | Double the Penalty under Relevant Section | Nil |

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**7.5.1 Highlights of the New Traffic Fines for Violations – (From Sep 2019)**

Regardless to say, driving under the influence of alcohol or substance is a serious

offence as it poses a threat to the safety of self and that of other road users. This is due

to the fact that chances of a mishap increase by many times in case the driver is not

alert due to the intoxication. Hence, as per the new traffic rules and fines, the offender

is liable to some serious punishment, which varies as per the alcohol level found in

the blood. Similarly, there has been a higher penalty for most other serious offences. The details have been listed outbelow:

### i. Driving Without License:

In case you are caught driving without licence, you can be fined for Rs 5,000. This is a ten-fold increase from the earlier fine of Rs 500

### ii. Driving Without Insurance:

As per the new traffic rules and fines, which came into action through the amendment of motor vehicle act 2019, the penalty for driving without insurance for the motor vehicle has been increased from Rs 1,000 and /or imprisonment of up to 3 months to Rs 2,000 and/or imprisonment of up to 3 months for the first-time offenders and Rs 4,000 and/orimprisonment of up to 3 months for the second-time offenders.

### iii. Driving With Disqualified DL:

In case your driving license has been disqualified and you are caught driving, you will have to pay a fine of Rs 10,000. This has been hiked fro Rs 500 previously.

### iv. Driving Under the Influence of Alcohol or Intoxicating Substance:

Regardless to say, driving under the influence of alcohol or substance is a serious offence as it poses a threat to the safety of self and that of other road users. This is due to the fact that chances of a mishap increase by many times in case the driver is not alert due to the intoxication. Hence, as per the new traffic rules and fines, the offender is liable to some serious punishment, which varies as per the alcohol level found in the blood.

### v. Not Wearing a Helmet:

The traffic fine for riding a two-wheeler without wearing a helmet has been increased fromRs 100 to Rs.1,000.

### vi. Racing and Speed Testing:

Racing and speed-testing on public roads is a publishable offence and its fine has been increased from Rs.500 to Rs.5,000 and/or imprisonment of up to 3 months for the first-time offence and Rs.10,000 and/or imprisonment of up to 1 year for repeat offenders.

**vii. Offences by Juveniles:**

There is no punishment to the juvenile for this but the owner of the vehicle or the guardianhas to pay a fine of Rs.25,000 with imprisonment of 3 years.

**viii. Offences Committed by Enforcing Officers:**

While there was no penalty for this offence, the new fine is double the penalty under the relevant section.

**ix. Having Two Driving Licences:**

In case you are found having two or more driving licenses, you can be penalized. Also, from now, all driving licences that are to be issued will have a smart chip that can be accessed bythe traffic police through a QR code.

## **7.6 HOW TO OBTAIN LICENSE**

Driving license is an official document certifying that the holder is suitably qualified to drive a motor vehicle or vehicles. Under the provision of the motor vehicles Act 1988, in India no person can drive a motor vehicle in any public place unless he holds a valid driving licence issued to him, authorising him to drive a vehicle of that particular category.

In India, 2 kinds of driving licence are issued that is learners licence and permanent licence.

Learners licence is valid only for 6 months. Permanent licence can be availed only after the expiry of 1 month from the date of issuance of learners licence.

### **7.6.1 What do we need to do to obtain a driving licence?**

A learner's licence is essential for obtaining a permanent licence. The eligibility for obtaining a learner's licence for a private motor vehicle for a vehicle of 50CC engine capacity and without any gear, is 16 years (if the applicant's parents or guardians give their consent). Minimum age to apply for a permanent licence to drive a private motor vehicle is 18 years.

A person who is at least 20 years old and possesses a learner's licence can obtain a licence for driving a commercial vehicle. Also one has to be conversant with the traffic

rules and regulations in all the cases.

For obtaining learner's licence you will need to apply in the prescribed format to the Local Transport Office in your region, along with your passport size photographs, proof of your age and residence, declaration of medical fitness and the required fee. After verification of your documents, you will have to go through the learner's test. Usually a handbook of traffic rules, signs and regulations is provided with the application form. On passing the learner's test, you will be issued a learner's licence. If you fail the test, you will be given a chance to take thetest again.

For obtaining a permanent licence, you must have a valid learner's licence and must apply after 30 days and within 180 days of issue of the learner's licence. You should be conversant about vehicle systems, driving, traffic rules and regulations. You will be put through a driving test, for which you must bring a vehicle with you. On passing the test, you will be issued a permanent driving licence.

### 7.6.2 How to get a driving licence?

There are two stages to get a permanent driving licence:

**Stage 1:- Obtaining a Learner"s licence**

Applicant for a learner's licence should appear personally before the licensing authority with the following:-

- Application form (available with the department)
- Fees of Rs. 30 for each of the vehicle
- Proof of age
- Proof of residence
- Medical certificate
- Three recent passport size photographs of the applicant.
- Applicants for transport vehicle licence must produce a permanent driving licence for light motor vehicle held by him at least for one year, medical certificate in form andhe should a attain the age of 20 years.
  Applicants for learner's licence shall pass a test regarding basic traffic signs and driver's responsibilities.

The learners licence so issued is valid for a period of six months from the date of issue and is renewable for another period of 6 months, during its validity.

Every applicant for the issue of a learner's licence or permanent licence or an endorsement shall produce as evidence of his address and age any one or more of the following documents in original or relevant extracts thereof duly attested by a Gazetted Officer of the Central government or of a State government or an officer of a local body who is equivalent in rank to a Gazetted officer of the government or VillageAdministration officer or Municipal Corporation Councillor or PanchayatPresident, namely:

1. Ration Card
2. Electoral Roll
3. Life Insurance Policy
4. Passport
5. Electricity or telephone bill
6. Pay slip issued by any office of the central government or State government or local body
7. House Tax Receipt
8. School certificate
9. Birth Certificate
10. Certificate granted by a registered medical practitioner not below the rank of a Civil surgeon, as to the age of the applicant.

Provided that where the applicant is not able to produce any of the above mentioned documents for sufficient reason, the licensing authority may accept any affidavit sworn by the applicant before an Executive Magistrate, or a First Class Judicial Magistrate or a Notary Public as evidence of age and address.

**Stage 2 : Obtaining a permanent licence:**

An application for a driving licence shall be made in Form 4 and shall be accompanied by:-

- An effective learner's licence to drive the vehicle of the type to which the applicationrelates.
- Appropriate fee as specified in Rule 32(CMV RULES), for the test of competence todrive and issue of licence.
- Three copies of the applicant's recent passport size photographs.

- Medical certificate in form 1A where ever applicable.An application for a medicalcertificate (Form-1A) shall contain a declaration in Form 1.
- Driving certificate in Form 5 in case of transport Licence.

For obtaining a fresh driving licence one has to undergo driving test of the relevantvehicle for which he has applied for and pass the test of competence to drive.

### 7.6.3 Is there a need to produce a Medical Certificate?

Applicants for the non transport licences, under the age of 50 years do not require a medical certificate. However, those applicants who are over 50 years of age must produce a medical certificate. All applicants for Transport vehicle licence must produce a medical certificate, irrespective of their age.

### 7.6.4 How do we obtain a learner"s licence?

Applicants for learner's licence should appear personally before the licensing authority with the following:-

- Application in Form No.2
- Fees of rupees 30 for each of the vehicle
- User charge of rupees 30
- Proof of age, appropriate for relevant class of vehicle
- Proof of residence like Ration card, electoral roll, electricity telephone bill etc. showing the name of the person.
- Application cum declaration as to the physical fitness in Form 1
- Medical certificate in form No. 1A wherever applicable.
- Three recent passport size photographs of the applicant.
- Applicants for Transport vehicle licence must produce a permanent driving licence forLight motor vehicle held by him, at least for one year.

The Learner's licence so issued is valid for a period of six months from the date of issue.

### 7.6.5 How do we obtain a permanent licence?

The applicant should appear in person along with a registered motor vehicle of the relevantcategory before the licensing authority with the following:-

- Application in Form No.4 (available with the department)

- Fees of rupees 35 for test and licence
- Valid learner's licence held by the applicant for the relevant class, which is older than30 days.
- 4 recent passport size photographs of the applicant

Applicants for Transport vehicle licence should enclose a Training Certificate in Form No. 5issued by a recognised Driving school.

The applicant shall pass a driving test on a vehicle of the type he has applied for. Licence to drive a non transport vehicle is valid for 20 years from the date of issue or until the holder attains the age of 50 years, whichever is earlier. After that, the licence is renewed every 5 years.

### 7.6.6 Renewal of driving licence:

An application for renewal of driving licence shall be made in Form No.9 to the licence authority having jurisdiction over the area in which the applicant ordinarily resides or carries on business and shall be accompanied by:-

- Appropriate fee Renewal as specified in Rule 32 CMV RULES (in Form6 Rs.15 and inForm7 Rs.40 , Late Renewal Fee Rs.10 after grace period of 30 days for every year)
- Three copies of the applicant's recent passport size photograph, if renewal is made in Form 6
- The driving licence
- The medical certificate in Form 1-a wherever applicable.An application for a medicalcertificate (Form 1A) shall contain a declaration in Form 1.

### 7.6.7 Issue of duplicate driving licence:

An application for issue of duplicate driving licence shall be made in form LLD to thelicensing authority where the licence is obtained or last renewed.

- Appropriate fee as specified in Rule 18 of APMV RULES (RS.15)
- If the duplicate licence made in Form 7, then fees is rupees 40
- 3 copies of the applicant's recent passport size photographs.

### 7.6.8 International driving licence/permit:

An application for international driving licence shall be made to the licensing authority having jurisdiction over the area in which the holder of driving licence

ordinarily resides or carries on business along with the following documents:-

- Fees Rs.500
- Attested photocopy of passport
- Valid Indian driving licence
- Copy of valid Visa
- Three recent passport size photographs
- Attested copy of birth Certificate

## 7.7 Role of First Aid In Road Safety

Many deaths and impact of injuries can be prevented with First aid if casualties are treatedimmediately.

First Aid is the initial care given to an injured person. Mostly, this timely care prior to thearrival of the medical help means the difference between life and death.

It must start immediately when the injury or illness occurs and continue until the medical help arrives on the casualty recovers.

The basic aims of first aid are:

- To save life
- To protect the casualty from getting more harm
- To reduce pain and priorities of casualty treatment

### 7.7.1 Priorities of Casualty Treatment

- Asphyxia
- Shock
- Cardiac arrest
- Severe Haemorrhage
- Other injuries/Illness

### 7.7.2 Immediate Requirement

i. **Critical four minutes:** One of the most common causes of a road accident death is due to loss of oxygen supply. This is mostly caused by a blocked airway. Normally it takes less than four minutes for a blocked airway to cause death.

ii. **The „Golden Hour":** The first hour after the trauma is called the ‒Golden hour‖. If proper first aid is given, road accident victims have a greater chance of

survival and a reduction in the severity of their injuries.

iii. **In case of Wound:** The job of first aider is to remove or reduce the problems that hamper healing such as dirt, infection, movement etc. Leave the wound undisturbed. Clean the wound by washing them with running water. If there are splinters, thornsand pieces of glass inside the wound, remove them with the pair of tweezers so as to avoid infection.

iv. **In case of Profuse Bleeding:** The easiest way to stop bleeding is to apply direct pressure on the wound. This can be done with any clean folded cloth. Lean on the wound with the heel of the hand instead of your fingers.

v. **In case of a Fracture:** In case of a fracture do not apply direct pressure; instead use a splint, combined with a gentle pressure bandage. It is safer not to give the patient anything to eat and drink. This is to protect the patient from vomiting in case he needs anaesthesia and surgery, or has a head injury.

If the wound on the arm or the leg is bleeding profusely, it can be raised. This reduces the blood flow to the wounded area.

vi. **In case of Chest or Abdomen injury:** In abdominal wounds the intestine may come out. The only thing you can do as a first aider is to cover the wound with a very wet clean cloth and get the patient quickly to a hospital. The wet cloth will keep the intestine from drying out, and will stick to the intestine.

Open wounds of the chest could be sucking in the air, making it hard for the patient to breathe. Covering and putting a bandage on the top of this may help to reduce air being sucked into the chest. Get the patient quickly to hospital.

vii. **In case part of a Limb is cut off:** If a part of the limb has been cut off it may be possible to reattach it to the body. Put it inside a clean polythene bag and place thisbag in another bag with cold water. If you can easily get ice, put some in the water to keep it cool. Make sure that the limb does not get soaked in water. If nothing else is available carry the amputated part in a clean cloth quickly to hospital.

In large crush injuries or in amputation avoidwashing the wounds, as it will lead to more blood loss. Just cover the wound with a clean cloth and tie a pressure bandage quickly. If possible keep the limp raised. Avoid using raw cotton wool

to cover a wound as it gets stuck to the wound, and it is difficult to remove and delayed healing.

viii. **In case of an Eye wound:** Do not attempt any cleaning or washing of an open eye injury. Cover the eye with the clean soft; place a stiff covering on top to prevent any pressure coming on the eye. This is important because the contents can be squeezedout even through a very small wound.

ix. **In case of bleeding from Ear:** Bleeding from ears mean either injury to the ear alone, or serious head injury. Avoid putting anything in the ears to stop bleeding as it could further damage the eardrum. The patient be asked to lie down with the injured ear facing down.

x. **In case of bleeding from Nose:** Bleeding from nose could also mean a head injury. If the patient is conscious and can sit up, ask him to pinch his nose and breathe throughhis mouth. If he can lean forward, then that could prevent blood from going to his wind pipe choking him.If the patient is unconscious, he should lie with face to oneside, for the blood to come out easily, so there is no choking.

xi. **In case of Injuries to Muscles, Bones and Joints:** When muscles joints or bones get injured, blood collects over the area, and a swelling appears. You can reduce the swelling by bringing down the bleeding. Apply cold water or ice packs if available. It reduces local blood flow and this brings down the internal bleeding and swelling. But remember not to keep ice packs on more than 10 minutes at a stretch as this will leadto something like frostbite, and not to place ice directly on skin. Always wrap it in a cloth first. A muscle injury can be made less painful by putting a splint on the injured limb.

xii. **In case of Broken Bones and Dislocated Joints:** A fracture for dislocation can be confirmed if there is obvious deformity, abnormal mobility, if the limb cannot be moved at all and if a grating feeling is there. First aid for all fractures and dislocations must aim to reduce movement, which will give relief from pain. Splinting should be done with caution.

**7.7.3 Shifting the injured to the Hospital**

1. Ensure that he is not hurt more.

2. The patient should be carried on firm board of stretcher so that spine remains stable.

3. While shifting the patient's back, neck and airway need to be protected from further injury. So always take help of another person.

4. If the patient is unconscious, place a large folded cloth or towel gently under the neck so that the neck doesn't sag against the ground.

5. The vehicle used to carry the patient to the hospital should have enough space to keep the patient's back straight and the person a company should be able to care for and resuscitate the patients if necessary.

6. During transportation keep a watch on whether the patient's airway is clear, whetherthe patient is breathing and whether you can feel the pulse in the patient.

If there is only one limb injury the patient can be safely taken to the hospital on a chair in a sitting position. Take care to splint or protect limb injuries or bleeding.

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## CHECK YOUR PROGRESS

Ques.1 Answer the following Short Answer Type Questions:

  i. You should use your right hand indicator when:

    a. You intend to slow down

    b. You intend to move to the right, at any time

    c. You are about to stop

    d. None of these

  ii. What is the minimum age for obtaining a Learner's licence for geared light motor vehicle?

    a) 18 years

    b) 17 years

    c) 20 years

    d) 19 years

  iii. Except for ……… and.............. necessary for the use of the vehicle, no explosive highly.................or otherwise dangerous substance, shall be carried on any public service vehicle.

  iv. Match the component in Column A with Column B

    Column A                                          Column

B

| | |
|---|---|
| Overtaking | turn the headlights on |
| Driving in rain | not to be obstructed |
| Confrontation with aggressive driver | severity of injury |
| reducesSeatbelt | avoid eye contact |

v.  The basic aim of first aid is to:

    a.  Save life

    b.  Reduce pain

    c.  Protect the casualty from getting more harm

    d.  All of the above

## 7.8 SUMMARY

After explaining the meaning and the concept of Road safety, the unit identifies and explains important signs that are used on roads. The significance of the traffic signs cannot be over looked as they are intrinsic for your own safety on the road. Knowledge about the various traffic rules that ought to be followed on the road, to ensure safety have been discussed in detail. Beside the unit familiarises the reader about the various types of traffic offences and penalties that are attached to the violation of various traffic rules. The procedure to obtain a driving licence has also been discussed as it gives citizens the permission to drive and at the same time acts as a valid identity proof. Apart from this the critical importance and role of First aid in the field of Road Safety has also been brought forth.

## 7.9 QUESTIONS FOR PRACTICE

Ques. 1 What are the key points to be kept in mind while shifting the injured to ahospital?

Ques. 2 How do you obtain a learner's licence?

Ques. 3 What precautions are to be taken by the driver while driving in foggy conditions?

Ques. 4 What is the need of road safety?

Ques. 5 What are the two stages to get a permanent driving licence.Explain?

## 7.10 SUGGESTED READINGS

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
- Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses,2021
- B.S. Chauhan, Environmental Studies, 2008
- P.S. Jaswal, Environmental Law, 2021
- S.R. Myneni, Environmental Law, Asia Law House, Hyderabad

# B.Com (Hons.)
# Accounting and Taxation
## SEMESTER-II

### COURSE: ENVIRONMENTAL STUDIES

### UNIT 8: STUBBLE BURNING

## STRUCTURE

**8.0 Learning Objectives**

**8.1 Introduction**

**8.2 Meaning of Stubble Burning**

**8.3 Impact on Health and Environment**

**8.4 Management and Alternative Uses of Crop Stubble**

**8.5 Environmental Legislations and Policies for Restriction of Agriculture ResidueBurning in Punjab**

**8.6 Summary**

**8.7 Questions for Practice**

**8.8 Suggested Readings**

## 8.0 LEARNING OBJECTIVES

After the study of this unit, the learners will be able to:

- Know about the meaning and concept of Stubble Burning

- Examine the impact of Stubble Burning on Health and Environment

- Know how can Crop stubble be managed and what are the alternative uses of CropStubble

- Delve deeper into the Environmental Legislations and Policies for restriction ofAgriculture Residue Burning in Punjab

## 8.1. INTRODUCTION

The agricultural industry plays a major role in the overall economic growth of the world. However, there is limited discussion on the management of agricultural waste in the published literature. It could be related to the fact that agriculture industry is not regulated as the municipal solid waste (MSW). The MSW is mainly governed by public

entities such as municipalities and hence the generation and management data are collected, recorded, and analyzed in the public domain. Agricultural waste is predominantly handled by the owners of the agricultural land which is predominantly in the private sector, with little public sector involvement.

The growing demand for food in developing countries, has led to tremendous increase in food production around the world. India accounts for about 2.4 % of the world's geographical area and 4.2% of its water resources, but supports about 17.6% of its population which highlights the fact that our natural resources are under considerable strain. The need for providing foodgrains for a growing population, while sustaining the natural resource base, has emergedas one of our main challenges. Foodgrains are a major source of energy and are thus vital for food and nutritional security. As such, food grains would continue to be the main pillar offood security and out of various crops grown, rice, wheat, and pulses are still part of the staple diet of most of the rural population. Large stretches of wasteland have been convertedto arable lands due to developments in water management systems, modern agro-technologies and large-scale agrochemical deployment. These measures have resulted in environmental pollution and increased complexity in the disposal of agricultural waste. However, the national agencies are continuously developing policies and possible options to manage these wastes, which include their conversion to reusable resources.

Waste materials derived from various agricultural operations are defined as agricultural wastes. As per the United Nations, agricultural waste usually includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run-off from fields; pesticides that enter water, air or soils; salt and silt drained from fields. The harvest waste, which is more popularly termed as crop residue can contain both the field residues that are left in an agricultural field or orchard after the crop has been harvested and the process residues that are left after the crop is processed into a usable resource. Stalks and stubble (stems), leaves, and seed pods are some common examples for field residues. Sugarcane bagasse and molasses are some good examples for process residue.

The following is a tabular presentation of the Crop Residues produced by major crops

| Source | Composition |
| --- | --- |

| Rice | Husk, bran |
|---|---|
| Wheat | Bran, straw |
| **Source** | **Composition** |
| Maize | Stover, husk, skins |
| Millet | Stover |
| Sugarcane | Sugarcane tops, bagasse, molasses |

Waste from the agricultural industry can be beneficially utilized in various agro-based applications and other industrial processing. However, the cost of collection, processing and transportation can be much higher than the revenue from the beneficial use of such waste. According to the Indian Ministry of New and Renewable Energy (MNRE), India generates on an average 500 Million tons (Mt here after) of crop residue per year. The same report shows that a majority of this crop residue is in fact used as fodder, fuel for other domestic and industrial purposes. However, there is still a surplus of 140 Mt out of which 92 Mt is burned each year. India is the second largest producer of rice and wheat in the world, two crops that usually produce large volume of residue.

## 8. 2. MEANING OF STUBBLE BURNING

Stubble burning is a practice of removing paddy crop residues from the field for sowing next crop viz. wheat. Where _combine harvesting' method is applied, there Stubble burning becomes essential because combine harvester leaves crop residue behind. Combines are machines that harvest the crops as well as thresh, means separation of the grain, and it's cleaning together, but it leaves stubble behind because it doesn't cut close enough to the ground. These residues put a burden on the farmer because these residues are not so useful for the farmer and moreover, there is pressure on the farmer to sow the next crop in time. Therefore, they clear the field by burning the stubble. According to different studies, the residues of rice and wheat crops are major contributors to the total stubble loads in India. Research studies have observed that the contribution of rice and wheat stubble loads in the total stubble was 36 and 41 %,

respectively in the year 2000, while the contribution of Punjabin the total burnt stubble of rice and wheat was 11 and 36 %, respectively during the same time period.

India relies largely on its northern states viz. Punjab, Haryana, western Uttar Pradesh and Uttarakhand for wheat production. Now, states in the south are also involved in the wheat production. But the clinching difference is that they don't have the urgency to remove the stubble to make it ready for the next crop. There are two main reasons for crop residue burning-First one is that there is a very short window of time between the harvesting of paddy and sowing of wheat, at the end of the Kharif season. To sow wheat right after paddy, the field needs to be harvested and readied for the next crop timely. In the northern states, the crucial time for the wheat crop to mature is in mid-April, when the temperature is about to cross 35 degrees C. The wheat crop requires 140-150 days to reach full maturity and give maximum yield by then; the farmer has no option but to sow the crop latest by 15 November, so that it grows for the full duration. Added to this complication the Punjab Preservation of Subsoil Water Act2009 – Punjab's water-saving law, bans sowing of paddy before 15 May and transplanting it before 15 June.Secondly, the removal of the paddy stalk that remains on the field is a labor-intensive process. With labor being unavailable and the time window between the harvesting of paddy and sowing of wheat being limited, the farmer has to burn the residue right on the field to prepare the field for wheat in just about 20 days. So, the farmer is finally left with only one option- Stubble Burning.

## 8. 3. IMPACT ON HEALTH AND ENVIRONMENT

The burning of crop residues generates numerous environmental problems. The main adverse effects of crop residue burning include the emission of greenhouse gases (GHGs) that contributes to the global warming, increased levels of particulate matter (PM) and smog that cause health hazards, loss of biodiversity of agricultural lands, and the deterioration of soil fertility.Stubble burning is a significant source of air pollutants such as carbon dioxide ($CO_2$), volatile organic compounds (VOCs), nitrogen oxides ($NO_x$) and hydrocarbons (HC) accounting for about 10% of the total emissions in the world. The emission contains particulate matter (PM) and harmful gases such as Nitrogen dioxide ($NO_2$), $N_2O$ (Nitrous oxide), Sulphur dioxide ($SO_2$), Carbon monoxide (CO), Carbon dioxide ($CO_2$), and Methane ($CH_4$), all of which severely affect

human health. This basically accounts for the loss of organic carbon, nitrogen, and other nutrients, which would otherwise have retained in soil. It is reported in a study that burning of 98.4 Mt of crop residue has resulted in emission of nearly 8.57 Mt of CO, 141.15 Mt of $CO_2$, 0.037 Mt of $SO_x$, 0.23 Mt of $NO_x$, 0.12 Mt of $NH_3$ and 1.46 Mt NMVOC, 0.65 Mt of NMHC, 1.21 Mt of PM during 2008–2009, where $CO_2$ is 91.6% of the total emissions. Remaining 8.43% consisted of 66% CO, 2.2% NO, 5% NMHC and 11% NMVOC.

The PM emitted from burning of crop residues in Delhi is 17 times that from all other sources such as vehicle emissions, garbage burning and industries. As such the residue burning in the northwest part of India contributes to about 20% of organic carbon and elemental carbon towards the overall national budget of emission from agricultural waste burning. In summary, impacts of burning may be divided into two groups- First, the on-site impact of burning, which includes removal of a large portion of the organic matter, nitrogen, phosphorus, and loss of useful microflora and fauna and second, the off-site impacts are health-related due to general air quality degradation of the region resulting in aggravation of respiratory like a cough, asthma, bronchitis, eye and skin diseases. Chronic heart and lung diseases can also be aggravated by fine particles present in smoke leading to premature deaths of people. The black soot generated during burning also results in poor visibility which could lead to increased incidence of accidents on road.

**8. 3.1 Impact on Air Quality**

Burning of stubble poses a serious threat to the air quality of the exposed environment. Research has pointed out that air quality is considerably affected by agricultural burning due to the emission of aerosols and gaseous pollutants. PM 2.5 and PM 10 are reported to have the highest effect on the health of the exposed population. In 2001, the World Bank conducted a source apportionment study (1st of its kind) on PM 2.5 for several Indian cities. They discovered that biomass burning contributes 9-28 %, 23-29%, 24%, 37-70% to the PM2.5 concentrations in Delhi, Mumbai, Chandigarh, and Kolkata respectively. In 2011, PM2.5 concentration, in Delhi, increased by 78% and 43% during the rice and wheat stubble burning periods, respectively. A comparison of the burning and non-burning periods in Delhi has found a 300 mg/m3 increase in the hourly concentration of PM10 during the burning episodes. In 2015, PM10 and PM2.5 concentrations increased by 86.7% and 53.2% for rice and wheat burning periods

respectively in Mandi-Gobindgarh city, Punjab. A source apportionment study conducted in Patiala city discovered that stubble burning contributes about 100-200 μg/m3 of PM10 to the air pollution of the city.

Despite not being the main source of pollution, stubble burning is a significant source of air pollution in India. A combination of point and nonpoint sources constitutes the composite emissions. These sources include the industries, power plants, vehicles, construction, and indoor emissions and out of these, emissions from industrial sources comprise 15% of CO, 14% of PM2.5 and 23% of SO2, while transportation emissions contain 17% of PM2.5, 13%of PM10, 53% of NOx and 18% of CO. On the other hand, stubble burning emissions are relatively lower comprising of 14% CO and 12% PM2.5.

The air quality becomes austere mostly in November of each year across the north Indian states. The air quality of the urban areas is more affected by stubble burning emissions because of the presence of the accumulated pollutants from vehicular and industrial emissions leading to a severe air quality condition.

The air quality of a region can be categorized in terms of a parameter termed as the air quality index or AQI, which is a range of categorical measurements of the pollution level which helps in interpreting the quality of air in a region on a scale of 0-500 (Central Pollution Control Board, 2014). Most of the regions in North India have AQI beyond the safe limit, especially during the burning episodes. For example, in November 2019, Delhi recorded a peak AQI of 487, Ghaziabad reported an AQI as high as 493, and Greater Noida recorded
480. These AQI values are clearly in the ‒severe‖ region as the CPCB AQI. This promptedthe government of Delhi and other northern states to close schools at primary levels and warned citizens against early morning outdoor exercises.

Table: Central Pollution Control Board, India's AQI and particulate standards (Central Pollution Control Board, 2014)

| AQI Ranges | PM$_{10}$ (24-hr) | PM$_{2.5}$ (24-hr) | Category |
|---|---|---|---|
| 0-50 | 0-50 | 0-30 | Good |

| AQI Ranges | $PM_{10}$ (24-hr) | $PM_{2.5}$ (24-hr) | Category |
|---|---|---|---|
| 51-100 | 51-100 | 31-60 | Satisfactory |
| 101-200 | 101-250 | 61-90 | Moderate |
| 201-300 | 251-350 | 91-120 | Poor |
| 301-400 | 351-430 | 121-250 | Very Poor |
| 401-500 | 430+ | 250+ | Severe |

### 8.3.2 Impact on Climate

Emissions from stubble fires have a direct effect on weather and climate through the release of greenhouse gases such as carbon dioxide ($CO_2$) and methane ($CH_4$) which may potentially lead to global warming. About 17% to 32% of the total annual greenhouse gas emissions in the world are contributed by the agricultural sector. It has been found that in 2017, crop stubble burning had resulted in the emission of

171.37 Tg of $CO_2$, 0.706 Tg of $CH_4$, and

0.073 Tg of $N_2O$ India contributes about 12.2% to the global greenhouse gas emissions, which is about 658.823 Tg $CO_2$ equivalent. It was reported that India lost about 36% of its expected annual wheat yield in 2018, which was linked to the poor quality of air and change in the weather patterns.

### 8.3.3 Impact on Soil Fertility

Stubble burning also affects soil productivity by burning the essential nutrients inside the soil. It also raises the soil temperature to about 42 °C, thus displacing or killing the important microorganisms in the soil at a depth of about 2.5 cm. This generates an additional expense of regaining back the soil fertility through the application of fertilizer or compost. Stubble burning strips the soil of the essential nutrients, i.e. Nitrogen, Phosphorus, and Potassium (NPK) as well as other micro-nutrients. For instance, the burning of rice stubble leads to a loss of about 0.445 Mt of NPK, 0.144 Mt in the case of wheat stubble burning, and 0.84 Mt in the case of sugarcane waste burning each year. It is estimated that burning of one tonne of rice straw accounts for loss of 5.5 kg Nitrogen, 2.3 kg phosphorus, 25 kg potassium and 1.2 kg sulphur

besides, organic carbon. Generally crop residues of different crops contain 80% of Nitrogen (N), 25% of Phosphorus (P), 50% of Sulphur (S) and 20% of Potassium(K). If the crop residue is incorporated or retained in the soil itself, it gets enriched, particularly with organic Carbon and Nitrogen.

| Nutrient | N | P | K | C |
|---|---|---|---|---|
| Nutrient Content in Stubble (g/kg) | 6.5 | 2.1 | 17.5 | 400 |
| Nutrient | N | P | K | C |
| Percentage Lost due to burning (%) | 90 | 25 | 20 | 100 |
| Amount lost per hectare (kg/ha) | 35 | 3.2 | 21 | 2,400 |

### 8.3.4 Impact on Agricultural Productivity

The effects of burning crop stubble extend to the agricultural sector. There is convincing empirical evidence that air pollution affects food production. The pollutants may affect agricultural productivity directly or indirectly. Direct effects entail injury to leaves, grains, or assimilation of heavy metals. For example, Nitrogen oxide can damage the tissue of plantsand cause discoloration. $SO_2$ may lead to the formation of acid rain which has severe effects on plants and soil, and may lead to plant mortality. Prolonged exposure of plants to particulates pollution may lead to Chlorosis or Bifacial Necrosis. Indirect effects include the provision of favorable conditions for the growth of pests or diseases. For example, the growth of aphid pests is favored by high concentrations of $SO_2$ and $NO_2$.

Stubble burning releases VOCs and $NO_x$ which combine to form ground-level ozone. Ozone is formed in the immediate atmosphere by the reaction of nitrogen oxide and volatile organic compounds in the presence of solar radiation. Ground-level ozone affects plant's metabolism, penetrates, and destroys leaves causing serious effects on crops in the northern parts of India. Ozone was reported to greatly affect the performance of some crops such as wheat and soy, while crops like barley were known to possess some resistance to the same. Rice and maize were reported to be moderately affected. Hence, stubble burning negatively impacts agricultural productivity and

economy and needs to be dealt with appropriately to improve agricultural production to meet the increasing food demand.

### 8.3.5 Impact on the Economic Development

Apart from its effects on health and the environment, air pollution also affects the growth of a country's economy. The effectiveness of air pollution management in a country is dependent on the economic and technological development of the country, which implies that increased pollution affects the country's economy in many ways. In recent years, tourists' inflow has decreased in Delhi by about 25-30% due to the increase in the level of air pollution. Ghosh et al. (2019) inferred that the accumulated effects of air pollution cost the economy of India about 4.5 to 7.7 % of its GDP in 2018, and when projected to 2060, the percentage rose to about 15%. The productivity of workers in different disciplines is also affected by air pollution through sickness and poor visibility. The World Bank reported that air pollution cost the global economy about $225 billion in 2013 most of which came from the developing countries (World Bank, 2016). The Indian government had delineated the cost of air pollution management and welfare to be around $14 billion annually.

The cost of air pollution management and welfare also has an impact on a local scale. For example, the economic benefit of maintaining air quality at a safe limit in a typical household in Kolkata and Delhi was measured to be 950 (about 12.7 USD, assuming 1 USD = 75 rupees) and 2086 rupees (about 27.8 USD) per annum, respectively. A similar study was conducted for the city of Kanpur and the rural areas of Punjab, and economic benefit/loss of about 255 and 76 million rupees were reported, respectively.

### 8.3.6 Impact on Health

Many studies have established a link between air pollution and the risk of several health problems especially among children, pregnant women, elderly persons, and people with pre- existing health issues. The harmful effects caused because of exposure to air pollution range from skin and eyes irritation to severe neurological, cardiovascular and respiratory diseases. In some cases, it may also lead to lethal effects especially when the exposed victim is having pre-existing respiratory problems. In chronic cases, exposure to a high level of air pollution may cause permanent health injuries such as the development of lung diseases like asthma, Chronic Obstructive Pulmonary Disease

(COPD), bronchitis, lung capacity loss, emphysema, cancer, etc. (Ghosh et al., 2019). Most of the farmers exposed to stubble smoke complain about eye and lung irritation and had spent a considerable amount of money on medical expenses.

Fine particulate matter (PM2.5) has more effects on humans than the larger sizes, for the former can penetrate through the trachea into the lungs and subsequently to the bloodstream. An epidemiologic study conducted by reported a decline of pulmonary and lung function especially in children exposed to a high level of particulate pollution. PM2.5 pollution alone accounts for about 21% of the total deaths in the southern part of Asia. Its effects range froma runny nose, coughing, and difficulty in breathing to chronic effects such as asthma and coronary diseases. A study showed that exposure to a high level of particulate emissions may lead to a decrease in the functionality of the human lungs. The effect is more austere in children as prolonged exposure may lead to asthma or chronic pulmonary diseases. Other effects of exposure to polluted air include; tuberculosis, stroke, lung cancer, cardiac arrest, and acute infections in the respiratory system.The black soot generated during burning also results in poor visibility which could lead to increased road side incidences of accident.

### 8.3.6.1 Increase in Mortality

The rates of death as a result of air pollution have been gradually increasing over recent years. For example, in South Asia, the number of deaths attributed to air pollution had increased from 1.1 million to 1.2 million between 1990 and 2015. Dwellers of the Indo- Gangetic Plain (IGP) regions were reported to have lesser life expectancy compared to the other Indian regions with about seven years difference. It was reported that air pollution had increased by about 65% from 1998 to 2016 in the IGP, and the particulate matter concentration in the region was also twice the average levels for other regions in the country (Energy Policy Institute at the University of Chicago (EPIC) 2020). Particulate matter especially PM2.5 is reported to be the most lethal of all the pollutants, and about 50% ofIndia's population is exposed to a high level of the PM2.5 with a concentration above the WHO limit (35 $\mu g/m^3$), while about 49% of the exposed population do not have access togood healthcare. This is why the South Asian countries are characterized by the highest number of premature deaths due to prolonged exposure to high concentrations of particulate matter emissions.

The first and primary target of toxic substances inhaled through the air is the respiratory system causing disorders, cancer, or even death in extreme cases. Prolonged exposure to particulate emissions may lead to an elevated rate of cardiovascular mortality.

Estimates on global effects of air pollution have shown that in India, more than 600,000 people die prematurely each year due to exposure to polluted air. The life expectancy of the Delhi inhabitants has decreased by about 6.4 years due to exposure to a high level of pollution. Delhi populace could live 9 more years if the WHO standards are met, and 6 more years if the national ambient air quality standards are met (EPIC, 2020). In Pakistan, the air pollution problem is the leading cause of diseases and premature deaths causing the deaths of nearly 135,000 people each year. In India, air pollution had claimed the lives of about 1.24 million people, in 2017, out of which 0.67 million were attributed to particulate matter emissions. Also, 51% of the total deaths in India were caused by air pollution most of which were people under 70 years of age. It has been strongly stated that the rate of trauma deathincreases by about 2.3% when suspended particulate matter concentration rises by 100 µg/m$^3$.

## 8.4. MANAGEMENT AND ALTERNATIVE USES OF CROP STUBBLE

### 8.4.1 Steps taken for Management of Crop Stubble

Several efforts have been made to reduce crop residue burning by various state and central administrations and regulatory bodies so far:

1. *Banning Crop Residue Burning:* Crop residue burning has been notified as an offense under the Air Act of 1981, the Code of Criminal Procedure, 1973 and other appropriate Acts. In addition, a penalty is being imposed on any offending farmer. Enforcement is being done by the village and block-level administrative officials.

2. *Detection and prevention:* For detection and prevention of burning in real time, a combination of remote sensing technology—use of satellite imagery—and a team comprising local officials–Sub-Divisional Magistrates (SDM), Tehsildars, Block Development Officers (BDO), Patwaris and village-level workers is effective.

3. *Establishment of a marketplace for crop residue burning:* Efforts have been and are being made to increase the possibilities for the alternate usage of paddy straw and other crop residues. For instance, paddy straw has a considerable calorific

value, so, it can be used as a fuel in biomass-based power plants. Similarly, it can be further utilized for the preparation of biofuels, organic fertilizers and in paper and cardboard making industries. The strategy, behind all of these measures, is to assign a real economic and commercial value to the agricultural residue and making burning it an economic loss to the farmer.

4. *Outreach and public awareness campaigns:* There are ongoing efforts to highlight the health effects of crop residue burning. As has been mentioned earlier, it produces extremely high levels of toxic particulates, which affect the health of the people. Moreover, efforts are also have been and being made through Kisan camps, training and workshops, apart from campaigns through various print media, T.V. shows, and radio jingles, in informing farmers about the alternative usage of crop residue.

5. *Subsidy on agri-implements:* The state governments, in collaboration with the Centre, provides subsidy on mechanical implements that help tillage of the soil, so that the crop residue can be retained in the soil, adding to its fertility, or alternately, a collection of crop residue for putting it to commercial usage. Still, these implements cannot be afforded by the majority of farmers because of high cost only a small number of farmers have access to these implements at the moment.

6. *Crop Diversification:* Cultivation of alternate crops (apart from rice/paddy and wheat) that produce less crop residue and have greater gap periods between cropping cycles, may be prompted. Various efforts are being made for diversification of cropping techniques resulting into prevention of crop residue burning.

## 8.4.2 Suggested Alternatives for Management of Stubble

Various approaches have been developed for management of rice stubbles but no one alone can substitute stubble burning effectively. Therefore, these all approaches must be used simultaneously and there is strong need for other innovative approaches for the effectivesubstitution of stubble-burning.

1. *In Situ Incorporation:* Incorporation of stubbles into the field is the easiest way to manage it. But, farmers don't prefer in-situ incorporation as the stubble takes time to decompose in the soil that may adversely affect the wheat productivity in

various ways such as late sowing of wheat and immobilization of inorganic nitrogen and its adverse effect due to nitrogen deficiency. Incorporation of crop stubble requires more tillage operations than of post burning. It has been observed that the in-situ incorporation is the best alternative available to burning of rice residue. It is believed that if the rice residue is incorporated in the soil 10, 20 or 40 days before sowing the wheat crop, then the productivity of the subsequent wheat and rice crops is not adversely affected.

The incorporation of the straw in the soil has a favorable effect on the soil's physical, chemical and biological properties such as Ph, organic carbon, water holding capacity and bulk density of the soil. On a long-term basis it has been seen that it increases the availability of zinc, copper, iron and manganese content in the soil and it also prevents the leaching of nitrates. By increasing organic carbon it increases bacteria and fungi in the soil. In a rice-wheat rotation, it is observed that soil treated with crop residues held 5– 10 times more aerobic bacteria and 1.5–11 times more fungi than soil from which residues were either burnt or removed. Due to increase in microbial population, the activity of soil enzymes responsible for conversion of unavailable to available form of nutrients also increases. Mulching with paddy straw has been shown to have a favorable effect on the yield of maize, soybean and sugarcane crops. It also results in substantial savings in irrigation and fertilizers. It is reported to add 36 kg/ha of nitrogen and

4.8 kg/ha of phosphorous leading to savings of 15–20 % of total fertilizer use.

2. *Happy Seeder:* Happy Seeder is a technique, used for sowing wheat without any burningof rice residue. This technology is eco-friendly with the environment; make the good health of soil as well as it also saves water. Dasmesh Turbo Happy Seeder has been considered as the most successful implement for sowing wheat in rice residue without burning rice residue.

3. *Stubble-burry Scheme:* In order to curb stubble burning, the districts of the Punjab statewith the help of Agriculture Department had started a ‗stubble-burry' scheme for small and marginal farmers. Under the scheme, the farmers can remove paddy stubble from the main field and bury it in a pit either in their own agricultural land or wasteland. The District Administration has a responsibility to provide workers to farmers under the Mahatma Gandhi National Rural Employment

Guarantee Scheme (MGNREGA) to dig up the compost pits. Moreover, under the scheme of MGNREGA, small farmers are also provided job cards for getting compost pits dug up on their land. But this scheme requires at least takes seven to ten days to manage stubble in a pit, so farmers may be unhappy with it.

4. *Straw Decomposing Bacteria and Fungi:* Straw burning can be substituted with efficient decomposition. Microorganisms which are efficient to degrade cellulose and lignin, required for Straw decomposition. This decomposition of rice straw recovers the soil fertility by recycling the carbon, nitrogen and other nutrients back to the soil. Under both aerobic and anaerobic conditions, general microbial processes may take place. But for most soils, the aerobic pathway is of greater importance than the anaerobic one. In addition to rice straw, other agricultural wastes such as coir pith, banana sheath (dried), sugarcane trash, millets and pulse waste, cotton stubbles can be decomposed with white rot fungus (*Pleurotus sp*.). Some widely used species of white rot fungus are *eous, platypus, djamor* or *sajorcaju.*

5. *Use of Rice Residues as Fodder for Animals:* Rice residues can be used as a fodder for animals. But, this is not a very popular practice among farmers in Punjab because of the high silica content in the rice residue. However, almost 40 % of the wheat straw produced in this state is used as dry fodder for animals. However, to encourage the use of rice residue as fodder for animals, a pilot project was taken up by Punjab State Council for Science & Technology PSCST at PAU, Ludhiana. Trials on natural fermentation of paddy straw for use as protein enriched livestock feed was conducted at PAU. The cattle fed with this feed showed improvement in health and milk production.

6. *Use of Crop Residue in Bio Thermal Power Plants:* Rice residue can also be used for generation of electricity. The thermal plant at Jalkheri, District Fatehgarh Sahib is the first Plant in India which is based on the use of Biomass i.e. renewable energy source. This plant can utilize rice husk, waste wood chips, the straw of various plants e.g. paddy, wheat, etc. for the generation of electricity. The project is providing additional income to thousands of farmers from the sale of agricultural waste as well as reducing the release of smoke and other pollutants caused by burning of wastes.

7. *Use of Rice Residue as Bedding Material for Cattle*: Studies on rice residue as

bedding material have been conducted by the Department of Livestock Production and Management, College of Veterinary Sciences, Punjab Agricultural University (now Guru Angad Dev Veterinary And Animal Sciences University) farmers of the state have been advised to use paddy straw as bedding material for crossbred cows during winters. This paddy straw bedding provides comfort, udder health and leg health to the animals resulting the increased quality and quantity of milk. It helps the animals to keep themselves warm and to maintain the reasonable rates of heat loss from the body. It also provides a clean, hygienic, dry, comfortable and non-slippery environment, which prevents the chances of injury. The use of paddy straw as bedding material was also found to result in increased net profit per animal per month from the sale of an additional amount of milk. The PAU has been demonstrating this technology to farmers through training courses, radio/TV talks and by distributing leaflets.

8. *Use of Rice Residues for Mushroom Cultivation:* Paddy straw is also being used for the cultivation of mushrooms such as *Agaricusbisporus, Volvariellavolvacea,* and *Pleurotus spp.* One kg of paddy straw yields 300, 120–150 and 600 g of these mushrooms, respectively. Paddy Straw Mushrooms (*Volvariellavolvacea*) also called grass mushrooms are so named for their cultivation on paddy straw. In addition to paddy straw, this mushroom can be grown on a variety of agricultural wastes for preparation of the substrate such as water hyacinth, oil palm bunch waste, dried banana leaves, cotton or wood waste. Paddy straw mushroom accounts for 16 % of total production of cultivated mushroom inthe world.

9. *Use of Rice Residues in Paper Production:* Paddy straw is also used as an ideal raw material for paper and pulp board manufacturing. The paddy straw is also being used in conjunction with wheat straw for paper production. The technology is already operationalin some paper mills, which are meeting 60 % of their energy requirement through this method.

10. *Use of Rice Residues for Making Bio Gas:* Biogas production from agricultural wastes canbe used as an alternative fuel to replace fossil fuels. Agricultural crop residues, such as rice straw is a chief source of lignocellulose which is required for biogas production.

11. *Production of Bio-oil from Straw and Other Agricultural Wastes:* Wheat straw and rice hull-shave been and is being used for the production of Bio-oil. But, the

feasibility of this technology with paddy straw needs to be assessed. Bio-oil is a high-density liquid produced from agricultural biomass through rapid pyrolysis technology. Bio-oil can be stored, pumped and transported like petroleum-based product and can be combusted directly in boilers, gas turbines and slow and medium speed diesel for heat and power applications.

12. *Mixing of Green Waste and Brown Waste for the Production of Bio-Compost:* Initiation of composting process depends upon the carbon and nitrogen ratio (C: N ratio) of 30:1 has been considered ideal for composting. To get a narrow C: N ratio (30:1), carbon and nitrogen-rich material should be mixed together. Nitrogen-rich sources are green colored waste materials like gliricidia leaves, parthenium, freshly harvested weeds; sesbania leaves whereas brown colored waste material like straw, coir dust, dried leaves and dried grassesare rich in carbon. To get a quicker result in composting, alternating layers of carbon-rich material, animal dung, and nitrogen-rich material need to be heaped while making heap formation. Regular addition of bio-compost to the field improves the physical, chemical and biological properties of the soil.

13. *Bio-Char:* PAU, Ludhiana has come up with an innovation to convert stubble into ‗biochar' which would help in reducing the environmental pollution upto a great extent and would also help in increasing the fertility of the soil. Dr. RK Gupta, a senior soil chemist, Department of Soil Sciences at the PAU, said the burning of the rice and wheat stubble leads to a loss of nutrients and the smoke caused by leads to air pollution. "We have been working on this project for the past three years and the experiments conducted have given a positive result. We found that making ‗biochar' from stubble, instead of burning it will help in reducing the environmental pollution caused by it by 70 percent," said Dr. Gupta. ‒After successful experimentation for three years now, we will be askingthe KVK of the PAU to make biochar and disseminate knowledge about it to the farmers so that they can also adopt this method,‖ he said. He said apart from curbing the pollution, using biochar as manure would help in improving the soil health, along with 10 percent increase in the grain yield. It also leads to the improvement in the infiltrationrate and water-holding capacity of the soil. Bio-char will help in improving the grain yield indirectly by improving the soil health (infiltration rate and water holding capacity of soil).

## 8.5 ENVIRONMENTAL LEGISLATIONS AND POLICIES FOR RESTRICTION OFAGRICULTURE RESIDUE BURNING IN PUNJAB

The core administrative bodies regulating emissions and promoting air quality in India are the Ministry of Environment, Forest and Climate Change (MoEF&CC), the Central Pollution Control Board (CPCB), and its subsidiaries at the state level. The board coordinates with the MoEF&CC and other institutions to provide efficient monitoring and control of air pollution- related problems. The major air quality legislation in India is the Air (prevention and control of pollution) Act established in 1982, under which the guidelines for air quality control were clearly outlined. The Air (prevention and control of pollution) Act together with the environmental (protection) Act provides the basis for monitoring air quality across the country. Other guidelines were stated by the Environment (protection) rule, 1986.

The Indian air quality monitoring program was initiated in 1967 and later established as the National Air Quality Monitoring Scheme (NAQMS). Under this scheme, the number of air quality monitoring stations was increased from 28 (in 1985) to 731 (in 2016). The stations were designed to measure sulfur dioxide ($SO_2$), $NO_x$, $PM_{2.5}$, $PM_{10}$, and meteorological parameters such as wind speed, wind direction, ambient temperature, ambient pressure, and relative humidity. Other pollutants like lead, ammonia, CO, $H_2S$, and aromatic hydrocarbons were later added. The national air quality index AQI in India was established on the 17th of November, 2014 by the MoEF&CC under the Swachh Bharat Abhiyan (Clean Air Campaign). It constituted 8 main criteria pollutants namely; $PM_{10}$, $PM_{2.5}$, $NO_2$, $SO_2$, CO, $O_3$,$NH_3$, and lead.

The Hon'ble Delhi High Court, on October 8, 2016, compelled the states of Uttar Pradesh, Delhi, Punjab, Haryana, and Rajasthan to execute an exhaustive policy to curb the issue of outdoor stubble burning at their respective provinces. Following this directive, the above states immediately enacted strict policies including fines on the burning of any stubble in their respective states. For example, in Haryana, on 26th November 2016, 1406 farmers were fined a total of 1.375 million rupees after been caught violating the policy.

In 2014, the Union government released the National Policy for Management of Crop

Residue. Since then, crop residue management has helped make the soil more fertile, thereby resulting in savings of Rs 2,000/hectare from the farmer's manure cost.

The Indian government in 2019, established the national clean air program (NCAP) to be implemented in the coming 5 years. The program was focused on bringing down the particulate matter emission to 20-30 % by 2024 taking 2017 as the base year. The program mandates a collaborative and participatory approach between agencies at various levels and all the stakeholders. It was also planned to address the transboundary transport of pollutants, by planting trees, worth 2.3 billion tons of $CO_2$ equivalent by 2060. Studies have reported that successful implementation of this goal would increase the average life expectancy of the country's populace by up to 2 years for the Northwest India's residents.

Male' declaration (1998) was focused on the promotion of clean air through the control and prevention of air pollution especially at the trans-boundary level in the southern part of Asia which covers the countries of India, Pakistan, Bangladesh, Nepal, Iran, Srilanka, Maldives, and Bhutan. After about 22 years of establishment, several policies were made by the Indian government but were, however, ineffective in tackling most of the pollution issues.

**8.5.1 Steps taken in Punjab to Restrict Agriculture Residue Burning**

In 2017, the Punjab government distributed direct seeders to many farmers which helped in easily incorporating the paddy straws into the soil. The government also proposed to reduce the cultivated area for paddy farming by about 7 Lakh acres by 2020, which is about 10% of the total paddy area cultivated in 2019.

The Ministry of New and Renewable Energy (MNRE), Government of India has installed about 500 power plants across the country fueled either completely or partially by biomass. Agricultural stubbles form a significant portion of the biomass used in many of these plants. For instance, the 10 MW thermal power stationed at Jalkheri, Fatehgarh Sahib District (established in 1992) is India's first plant focused on the use of biomass for power production.

The plant has an estimated total biomass requirement of 82,500 Mt annually at 100% capacity. The farmers (within the plant's vicinity) sell their crop stubble to be used in theplant at 350 rupees/ton (around 5 USD). This plant uses rice husk, waste wood chips, the straw of different plants e.g. paddy, wheat, etc. The project offers additional

revenues, through the sale of biomass stubbles, to thousands of farmers and also lessens the dischargeof particulates and other gases resulting from the waste burning.

Another plant with an installed capacity of 7.5 MW was established by Malwa Power Pvt. Ltd. in 2002 at Gulabewella in district Mukatsar, Punjab. The plant was set up to utilize the crop stubble (available in the area) such as mustard and cotton stalks, rice husk, and sawdust. It was designed with an estimated biomass requirement of 72,270 Mt annually to supply

465.1 GWh to the grid within 10 years (2005-2015).

In Bhatinda district the paddy straw was totally burnt with no other end use. In Amritsar district the use of rice residue for other uses apart from burning is the maximum with 18.2 % being used for fodder, 19.6 % being sold in the market and 9.4 % given to poor landless families. In the Gurdaspur district, 20.6 % of the rice residue is provided to poor landless families, 12.9 % used as fodder almost the rest of the rice stubble burnt. In Patiala district

11.7 % of the rice stubble is used as fodder for animals and 5.9 % sold in the market and the rest 81.5 % being burnt. In the Ferozepur district, 18.8 % of the rice stubble is provided topoor landless families, 8.8 % is incorporated in the soil and the rest 68.1 % is burnt. It can be observed that except Ferozepur district, the rice stubble is hardly incorporated in the soil in rest of the state.

However, for the wheat crop, a significant proportion of the stubble is used as fodder for animals, in 7 districts of Amritsar, Bhatinda, Faridkot, Gurdaspur, Kapoorthala, Ludhiana and Sangrur, the average being 47 %. Only in the Gurdaspur district 2.4 % of the wheat stubble is incorporated in the soil.From the literature it is clear that farmers seldom incorporate rice and wheat stubble in the soil. Wheat stubble is used as fodder for animals, but the usage of rice stubble as fodder for animals is not much. The paper mills procured rice-straw at a rate of Rs. 200–300 $t^{-1}$. The wheat straw was generally sold after making chaff. The price of chaff varied between Rs. 2,500 and 3,700 $ha^{-1}$.

**Different management techniques for rice and wheat stubble in Punjab, India**

| Management method | Rice (Percent Total stubble) | Wheat (PercentTotal stubble) |
| --- | --- | --- |
| Incorporation into soil | 1 | <1 |
| Fodder | 7 | 45 |
| Rope making | 4 | 0 |
| Burnt | 81 | 48 |
| Miscellaneous | 7 | 7 |

In cognizance of this fact, Department of Farm Power and Machinery, Punjab Agricultural University has developed Happy Seeder machine to solve the problem of straw management in collaboration with CSIRO Land and Water Resources, Australia, under financial assistance from Australian Centre for International Agricultural Research (ACIAR). The machine is compact and lightweight and is tractor mounted. It consists of two separate units, a straw management unit and a sowing unit. The Happy Seeder can handle the paddy straw and do the sowing job without any tillage. It consists of straw cutting and chopping unit and a sowing drill combined in one machine. It sows the seed of next crop in one operational passof the field, while retaining the rice residue as surface mulch.

Though there are some apprehensions such as increased chances of rodents, etc., the many advantages of adopting the technology are as under:

1.  Allows sowing of wheat even when stubble is standing in the field. This is finally incorporated into the soil.
2.  Mulching effect of straw causes weed suppression.
3.  Possibility of saving first irrigation by sowing wheat in residual moisture.
4.  Leads to conservation of water due to moisture retention. There is no loss of nutrients.

This environment friendly technology will prove a boon to the farmer community and the state can help them in making provision of this tool for improving soil health and environment for sustainable agriculture. The Happy Seeder machine has low adoption because of its high price and less popularity among the farmers. The state although is providing subsidy on Happy Seeder but it needs to make the farmers

educated on the various benefits of Happy Seeder machine. The state needs to undertake demonstration of this technology to make the farmers understanding this technology appropriately. There is also need to encourage farmers adopting Happy Seeder by developing cooperatives or farmers groups and provide the facility to the small and marginal farmers through custom hiring bas

## CHECK YOUR PROGRESS

Ques. 1 Answer the following Short Answer type Questions:

i. The residues of …….and ……… crops are major contributors to the total stubbleloads in India.

ii ...............................................can damage the tissue of plants and cause discoloration inthem.

iii. The states of India which are the largest producers of wheat are:
   a. Punjab, Haryana, Western U.P and Uttrakhand
   b. Punjab, Uttar Pradesh, Gujarat, Maharasthra
   c. U.P, Uttarakhand, Haryana, parts of Delhi
   d. None of the above

iv. Paddy straw can be used for...........................which is another way of wealth generation.

v. The Act that makes it mandatory for farmers in Punjab to transplant paddy lateduring the Kharif season to prevent loss of water is the:
   a. The Punjab Preservation of Subsoil Water Act, 2009
   b. Farmers and Farm Workers Commission Act, 2017
   c. The APMC Act, 1961
   d. None of the above

## 8.6 SUMMARY

After studying this chapter, it has been observed that:

- Stubble burning is a practice of removing the crop residue from the field for sowingthe next crop.
- Since the combine harvester leaves crop residue behind, so the farmers clear the fieldby burning the stubble.

- The burning of crop residues generates numerous environmental problems likeemission of greenhouse gases (GHGs) that contributes to the global warming,

  increased levels of particulate matter (PM) and smog that cause health hazards, loss of biodiversity of agricultural lands, and the deterioration of soil fertility

- Several steps can be taken to reduce crop residue burning such as finding an alternate usage of paddy straw and other crop residues, providing subsidy on mechanical implements that help tillage of the soil

- Alternatively, the stubble or the crop residue can be managed by in-situ incorporation, i.e. allowing the stubble to decompose in the field itself, using Happy Seeder technique, allowing the decomposition of rice straw, selling off the crop residue for electricity generation by thermal plants, etc.

- Stubble or crop residue can also be used for making paper, bio-gas and bio-oil which can further augment the incomes of the farmers.

- Various regulatory measures and legislations have been adopted by the govt of India to control the level of pollution and gas emissions that are released into the air because of stubble burning.

- However, there is still need for more efforts and support to be provided by the state governments in the form of financial incentives and subsidies so that the farmers are encouraged to either allow their stubble to decompose naturally or are facilitated so as to use their stubble as an additional source of income generation.

## 8.7 QUESTIONS FOR PRACTICE

Ques 1. Why is the issue of Stubble Burning so significant from the point of view of Environment protection?

Ques. 2 Discuss the impact of crop residue burning on the

environment? Ques 3. How does stubble burning cause health hazards

to the human beings?

Ques. 4 What kind of policy measures should be adopted to prevent stubble

burning?Ques. 5 Examine the main causes of stubble burning in the northern

states of India?

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**8.8 SUGGESTED READINGS**

- R. Rajagopalan, Environmental Studies : From Crisis to Cure, 2015
- Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses,2021
- B.S. Chauhan, Environmental Studies, 2008
- P.S. Jaswal, Environmental Law, 2021
- S.R. Myneni, Environmental Law, Asia Law House, Hyderabad

**The Motto of Our University
(SEWA)**

**S**KILL ENHANCEMENT

**E**MPLOYABILITY

**W**ISDOM

**A**CCESSIBILITY

**JAGAT GURU NANAK DEV**
**PUNJAB STATE OPEN UNIVERSITY, PATIALA**
(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

# B. COM (HONS.)
# (ACCOUNTING AND TAXATION)

## SEMESTER-II

## BCB31202T

## BUSINESS LAW

Head Quarter: C/28, The Lower Mall, Patiala-147001
Website: www.psou.ac.in

The Study Material has been prepared exclusively under the guidance of Jagat Guru Nanak Dev Punjab State Open University, Patiala, as per the syllabi prepared by Committee of Experts and approved by the Academic Council.

# JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA
## (Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

# PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open University of the State, entrusted with the responsibility of making higher education accessible to all, especially to those sections of society who do not have the means, time or opportunity to pursue regular education.

In keeping with the nature of an Open University, this University provides a flexible education system to suit every need. The time given to complete a programme is double the duration of a regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skill-based and employability-enhancing education. The study material provided in this booklet is self-instructional, with self-assessment exercises, and recommendations for further readings. The syllabus has been divided in sections, and provided as units for simplification.

The University has a network of 80 Learner Support Centres/Study Centres, to enable students to make use of reading facilities, and for curriculum-based counselling and practicals. We, at the University, welcome you to be a part of this instituition of knowledge.

Prof. G.S. Batra

Dean Academic Affairs

B. Com (Hons.)
(Accounting and Taxation)
CORE COURSE (CC)
SEMESTER-II
(BCB31202T): BUSINESS LAW

MAX. MARKS: 100
EXTERNA: 70
INTERNAL: 30
PASS: 40%

**Objective:**                                                                                                       Credits: 6

The objective of the course is to impart basic knowledge of the important business Legislation along with relevant case law.

**Course Outcomes:**

| CO 1: | To understand the fundamentals of contracts to draft agreements and contracts and Recognize and distinguish the unique contracts. |
|---|---|
| CO 2: | To equip the students about the legitimate rights and obligations under The Sale of Goods Act. |
| CO 3: | To equip the students with the abilities to launch business initiatives as LLP |
| CO 4: | Understand the meaning, characteristics, and elements of different kinds of Negotiable instruments. |

**Section A**

**Block I: The Indian Contract Act, 1872**

The Indian Contract Act, 1872, General Principles of Contract: - Contract- meaning, characteristics and kinds, Essentials of a valid contract - Offer and acceptance, consideration, contractual capacity, free consent, legality of objects. Void agreements.

**Block II: Discharge of a contract and Specific Contracts**

Discharge of a contract and Specific Contracts– modes of discharge, breach and remedies against breach of contract. Contingent contracts, Quasi – contracts

Specific Contracts: Contract of Indemnity and Guarantee, Contract of Bailment, Contract of Agency.

**Block III: The Sale of Goods Act, 1930**

The Sale of Goods Act, 1930, Contract of sale, meaning and difference between sale and agreement to sell. Conditions and warranties.

Transfer of ownership in goods including sale by a non-owner, Performance of contract of sale, Unpaid seller – meaning, rights of an unpaid seller against the goods and the buyer.

**Section B**

**Block IV: The Partnership Act, 1932**

The Partnership Act, 1932, Nature and Characteristics of Partnership, Registration of a Partnership Firms, Types of Partners, Rights and Duties of Partners, Implied Authority of a Partner, Incoming and outgoing Partners, Mode of Dissolution of Partnership.

**Block V: The Limited Liability Partnership Act, 2008**

The Limited Liability Partnership Act, 2008: Salient Features of LLP, Differences between LLP

and Partnership, LLP and Company, LLP Agreement, Partners and Designated Partners, Incorporation Document, Incorporation by Registration, Partners and their Relationship.

**Block VI: The Negotiable Instruments Act, 1881**
The Negotiable Instruments Act 1881: Meaning, Characteristics, and Types of Negotiable Instruments: Promissory Note, Bill of Exchange, Cheque, Holder and Holder in Due Course, Privileges of Holder in Due Course. Negotiation: Types of Endorsements, Crossing of Cheque, Bouncing of Cheque.

**Suggested Readings:**

1. Kuchhal, M.C. and Kuchhal, Vivek (2017), *Business Law*, Vikas Publishing House, New Delhi.
2. Singh, Avtar (2018), *Business Law*, Eastern Book Company, Lucknow.
3. Kumar Ravinder (2021), *Legal Aspects of Business*, Cengage Learning, Noida.
4. Maheshwari, S.N. and Maheshwari,S.K.(2018), *Business Law*, National Publishing House, New Delhi.

**INSTRUCTIONS FOR THE CANDIDATES:**
Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA**
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# B. COM (HONS.)

## (ACCOUNTING AND TAXATION)

### SEMESTER II
### BCB31202T: BUSINESS LAW
### COURSE EDITOR: DR. ROHIT KUMAR

### COURSE COORDINATOR: DR. SULAKSHNA

### SECTION A

| UNIT NO. | UNIT NAME |
|---|---|
| UNIT 1 | ESSENTIALS OF A VALID CONTRACT, OFFER AND ACCEPTANCE, CONSIDERATION |
| UNIT 2 | CONTRACTUAL CAPACITY, FREE CONSENT, LEGALITY OF OBJECTS, VOID AGREEMENTS |
| UNIT 3 | DISCHARGE OF CONTRACT, REMEDIES FOR BREACH OF CONTRACT, CONTINGENT AND QUASI CONTRACTS |
| UNIT 4 | SPECIAL CONTRACT – INDEMNITY, GUARANTEE, BAILMENT AND AGENCY |
| UNIT 5 | SALE OF GOODS ACT 1930 |
| UNIT 6 | TRANSFER OF OWNERSHIP |

### SECTION B

| UNIT NO. | UNIT NAME |
|---|---|
| UNIT 7 | NATURE OF PARTNERSHIP, REGISTRATION OF FIRM AND TYPES OF PARTNERS |
| UNIT 8 | RIGHTS AND DUTIES OF PARTNERS, DISSOLUTION OF PARTNERSHIP FIRM |
| UNIT 9 | LIMITED LIABILITY PARTNERSHIP ACT, 2008 |
| UNIT 10 | NEGOTIABLE INSTRUMENT: MEANING, BILLS OF EXCHANGE AND PROMISSORY NOTES |
| UNIT 11 | CHEQUES-MEANING AND CROSSING, PARTIES TO THE NEGOTIABLE INSTRUMENTS |
| UNIT 12 | TRANSFER AND DISHONOUR OF NEGOTIABLE INSTRUMENT |

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

## UNIT-I ESSENTIALS OF A VALID CONTRACT, OFFER AND ACCEPTANCE, CONSIDERATION

## <u>STRUCTURE</u>

## 1.0 <u>OBJECTIVES</u>

- To understand the meaning of contract
- To study the  essential elements of a valid contract
- To discuss the types of various types of contracts that can be formed under the Indian Contract Act,1872
- To understand the meaning of Offer and acceptance
- To discuss the essentials of valid offer
- To discuss the essentials of valid Acceptance
- To study the different types of offer
- To understand the meaning of Consideration
- To discuss the essentials of Valid Consideration
- To explain the exceptions when consideration may not be present

### 1.1 <u>INTRODUCTION</u>

Contracts have become indispensable part of our lives. When we are purchasing milk  or bread in the morning or boarding a bus or booking a railway ticket,  we are entering a contract, though we may not be aware of it. Indian Contract Act codifies  the way we enter into a contract, perform a contract, and implement provisions of the contract and effects of breach of a contract. Law of Contract is the most vital and primary part of Mercantile Law. It is the basis for many other laws falling under the category of Mercantile Laws.

Indian Contract Act is one of the oldest Acts. Initially, the Act contained the provisions in respect of Sale of Goods Act and Partnership Act. Later, Chapter VII in the Contract Act(Sections 76 to 123) was repealed and a separate Sale of Goods Act was passed in 1930.The break-up of the sections is as follows:

<u>SECTION</u>

General Principles of Law of Contract                    1 to 75

Contracts relating to Sale of Goods                      76 to 124

Special kinds of Contracts

(for example, indemnity, guarantee, bailment & pledge    125 to 238

Contracts relating to Partnership                        239 to 266*

*These sections were repealed from the Contract Act 1872 and two new Acts were enacted for the same:

(1)    Sale of Goods Act.1930

(2)    Partnership Act.1932

The Indian Contract Act in its present form may be divided into two parts. The first part (Sections 1 to 75) deals with the general principles of the law of contracts which apply to all types of contracts irrespective of their nature. The second part (Sections124 to 238) deals with special types of contracts namely Indemnity and Guarantee, Bailment and Pledge, Agency etc.

Besides laying down the general principles, the Contract Act deals with certain special types of contracts, for example indemnity, guarantee, agency etc.

**1.2 <u>DEFINITION OF CONTRACT</u>:** A contract is an agreement to do or not to do an act. It is a legally binding agreement, which is, enforceable at law.

According to Halsbury, ''an agreement between two or more persons which is intended to be enforceable at law and is constituted by the acceptance by one party of an offer made to him by the other party to do or to abstain from doing some act.''

According to Salmond ''Contract is an agreement creating and defining obligations between the parties.''

Section 2(h) of the Contract Act defines a Contract as ''an agreement enforceable by law.''

Thus, there are two essential elements of a contract:

(1)    An Agreement        (2)    Its enforceability at law.

These two components together constitute the basis for a contract and are explained as follows:

1. **AGREEMENT**. An agreement is defined under Section 2 (e) as __every promise or every set of promises forming the consideration for each other.''

A promise is defined in section 2(b) as, __a proposal when accepted becomes a promise.''An agreement involves proposal or offer by one party and acceptance of the same by the other party. It requires existence of two or more persons i.e. plurality of persons because a person cannot enter into an agreement with himself.

It also implies that the parties have a common intention about the subject-matter of their agreement. The two contracting parties should be thinking of the same thing in the same sense at the same time. Thus, an agreement is the outcome of two consenting minds i.e. _consensus ad idem.'

**Thus, Agreement = Offer+ Acceptance**

2. **ENFORCEABLE AT LAW:** An agreement to become a contract must create a legal obligation. The common acceptance formed and communicated between the two parties must create legal relations and not merely the relations which are purely social or domestic in nature.

For Example, Mr.Ram invites Mr. Sham to a dinner at his house. Mr. Sham accepts the invitation. It is purely social agreement. If Mr. Sham fails to arrive at the dinner or Mr.Ram has to go out and is not available at his home at the dinner time due to some urgency, either of the parties cannot sue other for not fulfilling the promise. This is because there was no intention between two parties to create any legal obligation.

In the above circumstances there was, in the eye of law, no contract between Ram and Sham . Other kinds of obligations which do not constitute a contract are the agreements made between husband and wife. Such agreements are purely domestic and are not intended to create legal relationships.

The Leading case on this point is**: Balfour v. Balfour(1919)**

Mr. Balfour was employed in Ceylon, Mrs. Balfour owing to ill health, had to stay in England and could not accompany him to Ceylon. Mr. Balfour promised to send her 30 per month

while he was abroad. But Mr. Balfour failed to pay that amount. The court held that it was a mere domestic agreement and that the promise made by the husband in this case was not intended to be legal obligation.

In this case, the intention not to create a legal obligation was clear from the conduct of the parties.If the parties specify or the circumstances indicate that the parties intend to create legal relationship through it, even an agreement between husband and wife will be legally enforceable. On the contrary, if the two parties do not create lawful obligation explicitly, the agreement will be unenforceable though it may be a trade agreement.

The Law of contract creates rights in personam as distinct from rights in rem. _Rights in rem' means a right against or in respect of a thing. This right is available against the whole world. _Right in personam' means a right against or in respect of a particular person/persons.

Examples: 1. If Mr. Andy owns a plot of land and Mr. Brown is the immediate neighbor, Mr. Andy has a right of complete possession and enjoyment of land not only against Mr. Brown but against the whole world. This right is right in rem.

2. Mr. X is entitled to receive a sum of money from A. This right can be exercised by Mr. X only and that too against Mr. A. only. This is right in personam.

## 1.3 ESSENTIAL ELEMENTS OF A VALID CONTRACT

All agreements are not contracts. Agreement which is enforceable at law is a contract. An agreement which is not enforceable at law cannot be a contract. Thus, the term agreement is broader in scope than contract. All contracts are agreements but all agreements are not contracts.

An agreement to be enforceable by law, must possess the vital elements of a valid contract as contained in Section 10 of the Indian Contract Act. According to Section 10, __All agreements are contracts if they are made by the free consent of the parties, competent to contract, for a lawful consideration and with a lawful object and are not expressly declared to be void.'' The following are the essential elements of a valid contract:

1. **OFFER AND ACCEPTANCE.** In order to create a valid contract, there must be a _lawful offer' by one party and _lawful acceptance' of the same by the other party. The adjective _lawful means'offer and its acceptance 'must confirm to the rules laid down in the India Contract, Act regarding valid _offer and acceptance' and its communication.

**2. INTENTION TO CREATE LEGAL RELATIONSHIP.** In case, there is no such intention on the part of parties, there is no contract. Agreements of social or domestic nature do not imply legal relations.

The leading case in this context is Balfour vs. Balfour(1919).

**3. LAWFUL CONSIDERATION.** Consideration has been defined in various ways.

Consideration is known as quid-pro-quo or something in return. Consideration is a vital element in a contract. Promises made for nothing are unenforceable under the Indian Contract Act. The law enforces only those promises which are made for consideration. An agreement without consideration, subject to certain exceptions is void. In the absence of consideration, a promise or undertaking is purely gratuitous and, however, sacred and binding, creates no legal obligation. The legal maxim being Ex nudo pacto non oritur action (out of a bare agreement no action arises). Consideration may be in the form of money, goods, services, a promise to marry, a promise to forbear from suing the promise etc. Consideration can be past, present or future. But it must be real and lawful.

**4. CAPACITY OF PARTIES.** The parties to an agreement must be competent to contract. If either of the parties does not have the capacity to contract, the contract is not valid.

According to Section 11 ‗‗every person is competent to contract, who is of the age of majority according to the law to which he is subject, and who is of sound mind and is not disqualified from contracting by any law to which he is subject.''

The following persons are incompetent to contract:

(a)     minors,                    (b)     persons of unsound mind, and

(c)     persons disqualified by law to which they are subject.

**5.     FREE CONSENT:** ‗Consent' means the parties must have agreed upon the same thing in the same sense. According to Sec.13. ‗‗Two or more person are said to consent when they agree upon the same thing in same sense.'' This is called Consensus ad idem in English Law.

Example: X who owns two cars, one Indigo and the other Swift, offers to sell Y one car.

A intend  to sell Indigo car. Y accepts the offer thinking that it is the Swift.

There is no consensus between the two parties and hence no contract.

According to Section 14, Consent is said to be free when it is not caused by-

(1)     Coercion, or   (2)     Undue influence, or   (3)             Fraud, or

(4)     Mis-representation, or        (5)     Mistake

An agreement should be made by the free consent of the parties.

**6. LAWFUL OBJECT:** The object of an agreement must be lawful. Object has nothing to do with consideration. It means the intent or purpose of the contract. Thus, when one hires a house for use as a gambling house, the object of the contract is to run a gambling house and is unlawful. The object is said to be unlawful if-

(a)     it is forbidden by law;

(b)      it is fraudulent;

 (c)      it is of such nature that if permitted it would defeat the provisions of any l aw;

(d)     it involves an injury to the person or property of any other;

(e)     the court regards it as immoral or opposed to public policy.

**7.     CERTAINTY OF MEANING.** According to Section 29, "Agreements the meaning of which is not certain or capable of being made certain are void."

The terms of the contract must be clear and certain. It cannot be left ambiguous. A contract may be void due to uncertainty. Thus, clearly a purported acceptance of an offer to buy a building _on hire-purchase terms' does not constitute a contract if the hire-purchase terms are never clearly mentioned and agreed upon. Similarly, an agreement _subject to war clause' is too vague to be enforceable.

**8.     POSSIBILITY OF PERFORMANCE**.  If the act is impossible in itself, physically or legally, it cannot be enforced at law. For Example, Mr. X agrees to grow mangoes within two hours. Such Agreement is not enforceable as this is practically impossible.

**9.     NOT DECLARED TO BE VOID OR ILLEGAL:** The agreement though satisfying all the essentials for a valid contract must not have been expressly declared void by any law in force in the country. Agreements mentioned in sections 24 to 30 of the Act have been

expressly declared to be void for example agreements in restraint of trade, marriage, legal proceedings etc.

10.      **Legal Formalities**. An oral contract is a perfectly valid contract, except   in those cases where writing, registration etc. is required by some statute. In India, writing is required in cases of sale, mortgage, lease and gift of immovable property, negotiable instruments; memorandum and articles of association of a company, etc. Registration is required in cases of documents  coming within the scope of section 17 of the Registration Act.

All the aforesaid elements must be present in order to constitute a valid contract. If any one of them is absent the agreement does not become a contract.

## 1.4 <u>TYPES OF CONTRACT</u>

1.      **VALID CONTRACT.** An agreement enforceable at law is a valid contract. An agreement becomes a contract when all the essentials of a valid contract as laid contract as laid down in Section 10 are fulfilled. Mohan offers to sell his car for Rs.3 lakhs to Sohan. Sohan  agrees to buy it for this price. It is a valid contract. A contract to enter into a contract is, however, not a valid contract.

Agreements not meeting the  legal requirements of section 10are Invalid Contracts.

**2.VOID CONTRACT**. An agreement which was legally enforceable when entered into but which has become void due to impossibility of performance.A void contract  is  not necessarily unlawful, but is devoid of legal effects. The law will not enforce such a contract, nor can it be made valid by the parties.

**3.VOID  AGREEMENT**. According to Section 2(g), __An agreement which is not enforceable by law by either of the parties is void.''

No legal rights or obligations can arise out of a void agreement. It is void ab initio i.e. from its very inception, for example an agreement without consideration or with a minor.

**VOID CONTRACT AND VOID AGREEMENT**

A void contract should be distinguished from void agreement. An agreement not enforceable at law is a void agreement. In the case of a void agreement no contract comes into existence. An agreement with a minor is void. But in the case of void contract, a contract does come into existence but subsequently ceases to be enforceable by law. An agreement which is void

never matures into a contract. An agreement which becomes illegal in the course of performance is a case of a void contract, while an agreement which is null and void ab initio is a case of a void agreement.

**4.     VOIDABLE CONTRACT**. According to Section 2(i), __An agreement which is enforceable by law at the option of one or more of the parties but not at  the option of the other or others is a voidable contract.'' This is due to the absence of Free consent in the contract. This is because the rights and duties are created and the contract is valid-until the option to avoid it is exercised by the person whose consent to the agreement was not free, as it was obtained by coercion, undue influence, fraud or misrepresentation. The other party who induced the consent cannot take advantage of his own fraud because Thus, a  voidable contract is valid and enforceable until it is rescinded by the party entitled to avoid it.

**DISTINCTION BETWEEN VOIDABLE CONTRACT AND VOID AGREEMENT**

A void agreement is devoid of legal effects right from the beginning. It is unenforceable at law. A voidable contract is one which one of the parties may accept or discard at his option. It is valid and enforceable till it is repudiated or rescinded.

The defect in the case of voidable contract is curable and may be condoned. But a void agreement is void ab initio and its defects are incurable. In the case of a void agreement even a  third party cannot acquire any right from person claiming under such contract while in the case of voidable contract, a third party can acquire a valid title from a person claiming under such a contract.

**5.     UNENFORCEABLE CONTRACTS.** It is a contract which is otherwise valid, but cannot be enforced because of some technical snag like absence of a written form or absence of a proper stamp. Such contracts must be sued upon by one or both of the parties. Such contracts cannot be proved in the court. Such contracts will not be enforced by the courts until and unless the defect is corrected.

**6.     ILLEGAL AGREEMENT**. A contract which is either prohibited by law  or otherwise against the policy of law is an illegal agreement.  It is void ab initio. Thus, a contract to commit robbery in a bank is an illegal contract and cannot be enforced at law. An illegal contract should be differentiated from a void contract. All illegal agreements are void but all void agreements or contracts are not necessarily illegal.

Agreement with a minor is void but not illegal. Every void agreement is not illegal unless its object or consideration is(a) immoral (b) opposed to public policy etc. A void contract does not affect a collateral contract. An illegal agreement is like an infectious disease and is fatal not only to the main contract but to collateral contracts as well.

**DISTINCTION BETWEEN ILLEGAL AND VOID AGREEMENTS**

Void Agreements are broader in scope. Such agreements may be void due to some reason other than illegality. All illegal agreements are void. Parties to a void agreement may not be punished but parties to an illegal agreement may be liable for punishment. Transactions collateral to void agreement is enforceable by law. However, transactions collateral to illegal agreements are also tainted with illegality and hence become void because there can be no cause of action out of illegal agreement.

**1.5 <u>CONTRACTS ACCORDING TO FORMATION</u>**

1. **EXPRESS CONTRACT.** An express contract is one entered into by words either spoken or written. Where the proposal and acceptance is made in words, it is an express contract.

2. **IMPLIED CONTRACT**. Where the proposal or acceptance is made otherwise than in words, it is an implied contract. Implied contracts can be sensed from the immediate circumstances,customs ,usage and the conduct of the parties who made them. So, where a person orders food in a restaurant, law implies that he has to pay for the food.

3. **CONSTRUCTIVE OR QUASI- CONTRACT.** It is a contract in which operations of law create rights and obligations and not agreement between the parties. In these contracts,there is no intention on either side to make a contract, but the law imposes a contract. Thus, a finder of lost goods is under an obligation to search out for the true owner and return the goods.

4. **E-COM CONTRACTS/CONTRACTS OVER INTERNET.** These contracts are entered into between the parties using internet. These are known as EDI contracts or cyber contracts or mouse click contracts.

5. **STANDARD FORM CONTRACTS.** Business firms have to enter numerous contracts daily. For the sake of convenience, firms may use standard form of contracts

e.g. an insurance company may draft an insurance policy contract, railways/airport authorities may print various terms and conditions in Time Tables. Similarly, dry-cleaner receipts, hotel-tickets may have terms and conditions printed on them/their back. The contract in such a case is not made by process of negotiation.

There is no legal bar on such contracts,if consent is free with full understanding of terms and conditions of the contract and there is no attempt by one dominating party to take undue advantages at the cost of weaker party. Such contracts carry a binding condition and it is essential to highlight it by a sufficient notice e.g. __For conditions see back'' or obtaining signatures on the document containing the terms etc.

## 1.5.1 SELF-CHECK EXERCISE1

(i) A............... agreement has from the very beginning no legal effects.

(ii)A ……………… contract is one which one of the parties may affirm or reject at his option.

(iii) A Contract which is otherwise valid, but cannot be enforced because of some technical defect like absence of a written form or absence of a proper stamp is ………………………………..

(iv) The contract which is not made by process of negotiation is called………………….

## 1.6 CONTRACTS ON THE BASIS OF PERFORMANCE

Contracts may be classified on the basis of extent of their performance. Such contracts may be:

1.    **EXECUTED CONTRACT.** An executed contract is one where both the parties have completed their obligations or carried out the terms of the contracts.        In      other words, it is a completed contract.

    Example: E sells a refrigerator   to F for Rs. 10,000. F   makes   the payment and E gives the refrigerator to F.

2.    **EXECUTORY CONTRACT.** Where the contract is yet to be discharged either wholly or partly or one or both the parties have yet to complete their obligations, the contract is executory contract.

Example: G agrees to make almirah for H for Rs. 8,000 Mr. G has yet to make the almirah. Mr. H has not made the payment. So, both G and H are yet to perform their obligations. Suppose G makes the almirah but H has yet to make payment, it is executed on G's part by executory on H's part.

Thus, executory contracts are of two types:

(1)    Unilateral    (2)    Bilateral

**(1)    UNILATERAL CONTRACT.** A unilateral contract is one in which a promise on one side is exchanged for an act on the other side.In this contract one party has performed his obligation either before or at time of entering into contract.

Example: Mr. X, a labourer cleans the godown at the request of Mr. Y on a specific day. On finishing the cleaning, it is Y's obligation to pay him wages because X has already discharged his obligation.

**(2)    BILATERAL CONTRACT.** A promise made by one party    is exchanged for a promise by the other party.

### 1.6.1 SELF-CHECK EXERCISE 2: TRUE/FALSE

(i) Completed contract is called Executory contract.

(ii) Bilateral Contract is a contract where a promise on one side    is    exchanged    for    a promise on the part of other party.

(iii)  Where the contract is yet to be performed either in its entirety or partly or one or both the parties have yet to discharge their obligations, the contract is executed contract.

(iv) A unilateral contract is one in which a promise on one side is exchanged for an act on the other side.

### 1.7 CONCLUSION

The law of Contracts is one of the oldest and most basic form of commercial contracts and forms the basis of modern commerce and business. The Indian Contract Act,1872 provides the essential elements to constitute a valid contract in order to be enforceable in the eyes of law.The different types of contracts can be formed under this Act on the basis of

performance,validity and formation.With the changing modes of commerce in contemporary business transactions,the Act accepts E-contracts as valid.

## 1.8 KEYWORDS

**CONTRACT:** A contract is a legally binding agreement to do or not to do an act.

**VOID CONTRACT**. An agreement which was legally enforceable when entered into but which has become void due to supervening impossibility of performance .

**AGREEMENT:** An agreement involves proposal or offer by one party and acceptance of the same by the other party.

**FREE CONSENT**: It means the parties must have agreed upon the same thing in the same sense.

**VALID CONTRACT:** An agreement becomes a contract when all the essentials of a valid contract as laid contract as laid down in Section 10 are fulfilled.

**VOIDABLE CONTRACT**. An agreement which is enforceable by law at the option of one or more of the parties but not at the option of the other or others is a voidable contract.

**EXPRESS CONTRACT.** An express contract is one entered into by words which may be either spoken or written.

**IMPLIED CONTRACT**. Where the proposal or acceptance is made otherwise than in words, it is an implied contract.

**EXECUTED CONTRACT.** An executed contract is one where both the parties have performed their obligations or carried out the terms of the contracts.

**EXECUTORY CONTRACT.** Where the contract is yet to be discharged either wholly or partially or one or both the parties have yet to perform their obligations, the contract is executory contract.

## 1.9 INTRODUCTION

A contract is an agreement enforceable by law. An agreement matures when an offer is reciprocated with its acceptance. An agreement is every promise and every set of promises forming the consideration for each other [Section2(e)]

Section 2(b) defines a promise as, "A proposal, when accepted, becomes a proposal." It means an agreement is an accepted proposal. Therefore, these must be proposal or offer by one party and its acceptance by the other party for making an agreement.

For example: X offers to sell his Santro car to Mr. Y for Rs. 2 lakhs. Y accepts the offer. It will result into a contract.

So, offer and its acceptance subsequently is the universally accepted process for creating a contract whether it is express or implied.

## 1.10 <u>MEANING OF PROPOSAL OR OFFER</u>

Offer or proposal is the starting point in the formation of a contract. Section 2(a) defines proposal as,"When one person signifies to another his willingness to do or to abstain from doing anything with a view to obtaining the assent of that other to such act or abstinence."

The word proposal is synonymous with the English word 'Offer'. The person making the proposal is called the proposer or offeror and the person to whom the proposal is made is called the offeree.

Example: C offers to sell his motor cycle to D for Rs. 5,000. D agrees to pay C Rs. 5,000 for the motor cycle .Here C is called the offeror or promisor  and D the offeree or promisee.

Thus, a proposal is an expression of will or intention. A person making the  proposal expresses that he is willing to contract on the terms stated in it provided the other party to whom the proposal is made will similarly express his assent to the same terms. Section 2(a) enlists 3 vital elements in an 'offer ':

  (a)   Expression of willingness to do or not to do something.
  (b)   made to another person i.e. a person cannot make an offer to himself.
  (c)   with the object of gaining the consent of the other person to such act or abstinence.
        Thus, a casual enquiry, information, a statement of fact or statement of mere intention, lacking the above mentioned three essentials are not offers.

## `1.11 <u>KINDS OF  OFFER</u>:

Offers or Proposals may be categorized on the basis of:
        (1)  Formation of an offer
        (2)  To whom an offer is made?

1. **FORMATION OF AN OFFE**R: An offer may be either **express or implied** from the conduct of the parties. An express offer is one which may be made by words spoken or written such as letter, telegram telex, fax message, e-mail or through internet. Thus, where C offers to sell his Mobile to D Rs.6000; it is an express offer. An implied offer is one which is tacit and has to be understood from the deportment of the party or the circumstances of the case. Thus, where a person goes to a doctor for treatment, his conduct implies an offer that if the treatment is given, the offeree or will pay the usual charges. Similarly, stepping into a local bus, consuming eatables at a restaurant, without being asked to do so etc. create implied promises for the benefits enjoyed.

2. .**TO WHOM AN OFFER IS MADE**: An offer made to a certain person is called a **specific offer.** A specific offer can be accepted only by the persons to whom it is made. On the contrary, if an offer is addressed to the whole world, it is called a **general offer**. A general offer is open to be accepted by any member of the public. Where X promises to give Rs. 500 to Z if he brings back his missing dog, this is a specific offer and can only be accepted by Z ;but if X issues a public advertisement to the effect that he would give Rs. 500 to anyone who brings back his missing dog, such an advertisement amounts to a general offer and any member of the public can accept the offer by searching for and bringing back his missing dog. Such an advertisement amounts to a general offer and any member of the public can accept the said offer by searching for and bringing back X's missing dog.

**THE LEADING CASE IN THIS REGARD IS CARLIL VS. CARBOLIC SMOKE CO.(1983).**

Carbolic Smoke Ball Co. offered by advertisement a reward of £ 100 to any person who should contract influenza after having used the smoke ball three times daily for two weeks according to the printed directions .It was added that £ 100 were deposited in the bank showing its sincerity in the promise. The plaintiff, Mrs. Carlill, used the smoke-ball according of the directions to the company but contracted influenza. It was held that she could recover the reward because the advertisement was not a mere invitation to offer but an offer at large. Performance of the conditions is a sufficient acceptance without notification.

**AN OFFER MUST BE DISTINGUISHED FROM**

(a)    A mere expression of intention, e.g. , an announcement of a forthcoming auction sale.

(b)     An invitation to offer e.g. an advertisement in a newspaper, the display of goods in shop window with prices marked upon them; the display of priced goods in a self-service store.

(c)     Communication of information in the course of discussions eg. statement of the lowest price made in answer to a query as to the lowest price for sale.

A catalogue of goods for sale e.g. a book – seller's catalogue of books with the prices stated.

(d)     A casual enquiry e.g. "Do you intend to sell your computer?" is not an offer.

(e)     A prospectus inviting the public to subscribe to the shares or debentures of a company.

(f)     Advertisement for the tenders.

## 1.12 <u>ESSENTIALS OF A VALID OFFER</u>

**1.     offer must be capable of creating lawful relations.** The offer or must intend the creation of legal relations. He must intend that if his offer is accepted a legally enforceable agreement shall be formed.

C accepts an invitation to dine at D's place on a certain date but does not come on the fixed date.D cannot be sued for breach of a contract, because in contracts regulating societal or domestic arrangements, the presumption is that parties do not intend legal consequences to arise from the breach of a contract. The essential element is that there must be an express or implicit reference to the legal relations of the consenting parties.

The leading case is in this context is **Balfour Vs. Balfour**

**2. offer must be certain, definite and not vague.** No contract can come into existence if the terms of the offer are ambiguous     and unclear. Both the parties should be clear about the legal consequences arising out of contract.For eg. the words __P to receive a reasonable share of the profits'' do not constitute a valid offer.The leading case in this regard is **Taylor Vs. Portington (1855)**

X agreed to take Y's house on rent for two years at the rent of 9 per annum provided the house was put into through repair and the drawing rooms were decorated __according to present style''.

It is an ambiguous term, because the term __present style'' may mean one thing to X and another to Y. Hence the agreement was void on the ground that the terms of offer were vague and uncertain.

**3.      offer must be communicated to the offeree.** There can be no offer by a person to himself. It must always be communicated to the offeree. If there is no communication of an offer, there is no acceptance resulting in the contract. Thus, if J writes a letter to K offering to sell his mobile for Rs. 20000 but never posts the letter and keeps it on his desk, it is not an offer and K can never accept it.

The leading case on this point is **Lalmam Shukla Vs Gauri Dutt (1913)**

D sent his servant P to trace his missing nephew. D, in the meantime announced a reward for providing information about the missing boy. P, in ignorance of the announcement traced the boy and informed D. P later on came to know of the reward and he claimed it. His claim was dismissed on the ground that he was ignorant of the offer. It was further held that it was the duty of the servant to search for the boy.

**4.      Offer must be made with a view to obtaining the assent of the other party.** An offer must be distinguished from mere expression of intention.

**5.      Lapse of an offer.** An offer lapses
(a)      If either offeror or offeree dies before acceptance.
(b)      If it is not accepted within(i) the specified time, or (ii) a reasonable time,    if no time
          is specified. Reasonable time depends on the circumstances. Five months has been
          held to be an unreasonable delay in accepting an offer to buy shares in a company.
(c)      If the offeree does not make a valid acceptance, for example, he makes a
          counteroffer or conditional acceptance or if a particular manner of  acceptance has
          been requested, he accepts in some other manner for example by sending a
          letter by mail when a reply by hand was requested.
(d)      An offer can also lapse by revocation. A person who makes an offer can     withdraw it

 at any time before acceptance. A proposal may be made for a    certain  period.  The  offer will automatically lapse if it has not been accepted till then. Where no time limit has been specified, the offer will        lapse after a reasonable time.

**6.     An invitation to offer does not constitute an offer.** An offer must be distinguished from an invitation to offer. In the case of an __invitation to offer'' the aim is merely to spread information of readiness to discuss business with anybody, who on such information comes to the person sending it. Such invitations are not offers in the eyes of law and do not become promises on acceptance.

**1.13 <u>STANDING or OPEN OFFER</u>:** Where large quantities of goods are required by railways or other bodies from time to time, it is usual to call tenders for the supply of such goods. An advertisement inviting tenders is not an offer but a mere invitation to offer. It is the person who sends a tender for the supply of such goods is deemed to have made an offer. An offer for the continuous supply of a certain article at a certain rate over a definite period is called a standing offer. Such offers though accepted do not give rise to contract unless an actual order is placed.  The offeror can withdraw his offer at any time before an order is placed with him. A, by means of an offer agrees to supply coal to B at a particular rate for a period of two years. B accepts the tender. In this case B is not bound to place an order for all the coal which he requires nor A is bound to keep that offer alive during the course of two years unless there is an extra-consideration.

The leading case on this point is **Hyde Vs. Wrench (1840)**

A offered to sell a farm for 1,000pound. X said he would give 950pound. A refused and X then said he would give 1,000pounds and when A declined to adhere to his original offer tried to obtain specific performance. Held there was no contract as X's offer to pay 950 pounds was a refusal of the offer and a counter-offer; and that when he later said he would pay 1,000pounds he was making a new offer, which would have to be accepted by A before a binding contract could come into existence.

## COMMUNICATION OF SPECIAL CONDITIONS

When special terms and conditions are to be included in a contract, they must not only be specifically stated but also communicated to the concerned party. It is the duty of the person who delivers a document to give adequate notice to the offeree of the terms and conditions contained in the document. When this is not done the acceptor will not be bound by such terms.

## SELF-CHECK EXERCISE1

(i) is the starting point in the formation of a contract.

(ii) An offer made to a definite person   is called a................. offer.

(iii) When an offer is addressed to the whole world, it is called a.............. offer.

(iv) An offer for the continuous supply of a certain article at a certain rate over a definite period is called a ......................offer.

## 1.14 <u>ACCEPTANCE</u>

When the person to whom the proposal is made indicates his affirmation, it is an acceptance of the proposal. An accepted proposal is called a promise or an agreement. [Section 2 (b)] An application for the shares in a company is in the nature of offer while the allotment of the shares by the company is an acceptance resulting into a contract. An acceptance must be communicated to the offeror in order to complete the acceptance. Mental acceptance is no acceptance .A common example of an act amounting to acceptance is the fall of the hammer in the case of an auction sale.

Example: L offers to sell his horse to M for Rs.800. M accepts the offer to buy the horse for Rs. 800. This is acceptance.

Acceptance may be express or implied. Thus, where a person boards a train or bus, he impliedly accepts to pay the usual fare. Similarly, when a person goes to a hotel and eats some food, he impliedly accepts to pay for it.

**Who may accept?** An offer can be accepted only by the person to whom it is made. It means that only the offeree can alone accept it. It cannot be accepted by another without the consent of the person making it. Thus, where offer is made by A to B, the acceptance by C would be inoperative.

## 1.15 <u>ESSENTIALS OF VALID ACCEPTANCE</u>

1.      **Acceptance must be total and unconditional.** An acceptance must be unconditional and unqualified. Accepting an offer with conditions, variations and reservations amounts to counter offer and rejection of the original offer.

**2.    Acceptance must be communicated to the offeror.** If the offeree remains silent and does nothing to show that he has accepted the offer, no contract is formed. The acceptor should something to signify his intention to accept. Acceptance must be communicated to the offeror himself. A communication to any other person is as ineffectual as if no communication has been made.

**Ramsgate Victoria Hotel  Co.Vs. Montefiore(1866)**

A person applied for shares in a company in June. He cannot be bound by an allotment made late in November.

**3.  It must be according to the mode prescribed or usual or reasonable mode.**

Acceptance has to be made in the mode indicated by the offeror. Section 7(2) states that if the acceptance is not made in the manner prescribed, the proposer may within a reasonable time after the acceptance is communicated to him, insist that the acceptance must be made in the manner prescribed. Failure on the part of the offeror to do so, will imply that he has given his assent although it is not in the desired manner.

Example: A sold his business to his manager B without disclosing the fact to his customers. C, a customer who had a running account with A, sent an order for the supply of goods to A by name. B received the order and executed the same. C refused to pay the price. It was held that there was no contract between B and C because C never made any offer to B and  as such C was not liable to pay the price to B.

**4. Acceptance must be given before the offer lapses or before the offer is revoked.**  It means that acceptance must be made while the offer is operative i.e. before the offer has been withdrawn or lapsed.

A prospective resignation to quit a post is an offer and it can be withdrawn before the resignation is accepted by a competent authority.

**5.Acceptance cannot be implied from silence.** Pankaj told Radha**,** _I offer you my car for Rs.40,000. If you don't reply in ten days' time, I shall assume that you accept the offer'' Ram kept silent. It was held that  there was no contract.

**6.    Acceptance cannot be implied from silence**. A contract cannot be formed if the offeree remains silent and does nothing to indicate that he has accepted the offer.

**EFFECT OF SILENCE ON ACCEPTANCE**

Proposal made to another cannot mature into an agreement merely because the offeree makes no reply even though the proposal states that silence will be taken to amount to acceptance. Thus, mental acceptance is no acceptance.

## 1.16 COMMUNICATION OF OFFER, ACCEPTANCE AND REVOCATION

When the contracting parties are physically present and discuss in person, an agreement comes into existence the moment, the offeree gives his total and unconditional acceptance to the proposal made by the offeror. When the parties are far away and the offer and acceptance are exchanged through post, rules contained in sections 4 and 5 apply. These rules are discussed below.

### 1. COMMUNICATION OF AN OFFER (SECTION 4)

The communication of a proposal is complete as soon as it comes to the knowledge of the offeree. Section 4 clearly indicates that actual communication of the offer is not necessary. It is sufficient if the offer comes to the knowledge of the offeror. Then it is for the latter to accept or reject the offer.

When an offer is sent by post, its communication will be complete when the letter making the offer reaches the offeree. The offer is completed not at the place from where it was sent but where it was received. Thus X from Madras offers by a letter to sell his TV set to Y at Delhi, the communication of the offer will be complete only when Y receives the letter at Delhi.

### 2. COMMUNICATION OF ACCEPTANCE (SECTION 4)

Communication of an acceptance is complete (a) as against the proposer when it is put in course of transmission to him, so as to be out of the power of the acceptor to withdraw the same,(b) as against the acceptor when it comes to the knowledge of the proposer.The leading case in this regard is **Dunlop Vs. Higgins(1848).**

D in an answer to an enquiry as the price of pig iron wrote to H,__We shall be glad to supply you with 2000 tons of pig iron at 65s per ton'', and after further correspondence wrote on the 28th January, that the price was 65s net. H received this on the 30th January and on the same day wrote __We will take the 2000 tons pig iron you offer us''. The post was then delayed and the acceptance was received six hours later than the scheduled hour. D refused to sell the

iron. It was held that the posting of the letter was an acceptance of the offer and that D could not refuse to supply the iron.

**Communication of acceptance shall be complete against the acceptor himself when the letter reaches the offeror.** It means that when the letter or acceptance is received by the offeror, acceptor cannot revoke his acceptance, because communication against the acceptor has been completed.

### 3. <u>COMMUNICATION OF REVOCATION OF PROPOSAL (SECTION 5)</u>

‗‗A proposal may be revoked at any time before the communication of its acceptance is complete as against the proposer but not afterwards.''

An offer can be evoked at any time but before its acceptance is complete against the proposer. Therefore, the letter revoking the offer must be received before the letter of acceptance is posted by the acceptor. Once the letter of acceptance is posted, offer cannot be revoked.

### 1.17 <u>MODES OF REVOCATION OF OFFER (SECTION 6)</u>

According to Section 6 of the Act, a proposal may be revoked in any of the following ways.

**1.** **BY NOTICE OF REVOCATION:** Offer may be revoked by a communication of a notice of revocation by the offeror to the other party before acceptance is complete against the offeror himself. A notice of revocation to be effective must be communicated to the offeree.

**2.** **BY LAPSE OF TIME:** A proposal will come to an end by the lapse of time prescribed in such proposal for its acceptance or, if no time is so prescribed by the lapse of reasonable time.

**3.** **BY NON-FULFILLMENT OF CONDITION PRECEDENT:** A proposal is revoked when the acceptor fails to fulfil a condition precedent to the acceptance of the proposal which was conditional offer.

**4.** **BY DEATH OR INSANITY:** A proposal is revoked by the death or insanity of the proposer if the fact of his death or insanity comes to the knowledge of the acceptor before acceptance.

In addition to the four modes of revocation given above, an offer will also be revoked in the following cases.

**5.** **BY COUNTER OFFER:** An offer comes to an end when the offeree makes a counter offer or rejects the offer. Qualified acceptance amounts to a counter offer. An offer once rejected cannot be revived.

**6.** **BY THE NON-ACCEPTANCE OF THE OFFER ACCORDING TO THE PRESCRIBED OR USUAL MODE:** The offer will also stand revoked if it has not been accepted according to the mode prescribed.

**7.** **BY SUBSEQUENT ILLEGALITY:** An offer lapses if it becomes illegal after it is made and before it is accepted. Thus, where an offer is made to sell 10 bags of wheat for Rs. 2500 and before it is accepted, a law prohibiting the sale of wheat by private individuals is enacted, the offer comes to an end.

## 1.18 <u>COMMUNICATION OF REVOCATION OF ACCEPTANCE (Section 5)</u>

An acceptance can be revoked at any time before the communication of acceptance complete as against the acceptor, but not afterwards.''

Where an acceptance is sent by post, it stands complete against the acceptor when the letter reaches offeror. It means that acceptance can be revoked before the letter actually reaches the offeror.

Therefore, the communication of revocation of acceptance must reach the offerer before acceptance.

**SELF-CHECK EXERCISE2 TRUE/FALSE**

(i) Acceptance must be absolute and unconditional.

**(ii)** Acceptance can be implied from silence**.**

(iii) An offer comes to an end when the offeree makes a counter offer or rejects the offer.

(iv) When an offer is sent by post, its communication will be complete when the letter is posted by the offerer.

## 1.19 CONCLUSION

The foremost requirement of a contract is a valid offer followed by its acceptance unconditionally. A valid offer and acceptance are the first condition for an agreement to mature into a contract. Offer or proposal is the starting point in the formation of a contract to be followed by its absolute acceptance. Mere silence does not amount to acceptance when the offer is made. The acceptance has to be communicated as mental acceptance is no acceptance.

## 1.20 KEYWORDS

**OFFER:** When one person signifies to another his willingness to do or to abstain from doing anything with a view to obtaining the assent of that other to such act or abstinence.

**ACCEPTANCE**: When the person to whom the proposal is made signifies his assent, it is an acceptance of the proposal.

**PROPOSER/OFFEROR:** The person making the proposal is called the proposer or offeror.

**OFFEREE:** The person to whom the proposal is made is called the offeree.

**STANDING/OPEN OFFER**: An offer for the continuous supply of a certain article at a certain rate over a definite period.

**SPECIFIC OFFER**: An offer made to a definite person is called a specific offer.

**GENERAL OFFER**: When an offer is addressed to the whole world, it is called a general offer.

## CONSIDERATION

## 1.21 INTRODUCTION

Consideration is the foundation of every contract. The law enforces only those promises which are made for consideration. Where one party promises to do something, it must get something in return. This _something in return' is called consideration. Consideration is the

very life-blood of every contract. In the absence of consideration a promise or undertaking is purely gratuitous. However, sacred and binding in honour, it creates no legal obligation.

**1.22 <u>DEFINITION</u>** Consideration has been defined in many ways. It is something which is of some value in the eyes of law. It may be some benefit to the plaintiff. It is also used in the sense of quid pro quo i.e. something in return. A most commonly accepted definition of consideration is given in the famous English case **Currie v. Misa** as __Some right , interest, profit or benefit accruing to one party or some forbearance, detriment, loss or responsibility, given, suffered or undertaken by the other.'

**Section 2(d)** of the Indian Contract Act defines consideration as-

(a)     when at the desire of the promisor,

(b)     the promisee or any other person,

(c)     has done or abstained from doing, or does or abstains from doing, or        promises to do or abstain from doing.

(d)     something, such act or abstinence or promise is called a consideration for  the promise.

Consideration is something of value which the promise has given, gives or promises to give in return for the promise. It does not mean payment of money only. Forbearance to sue is good consideration. A promise can be a consideration for another promise. A single consideration may support more than one promise. It can also consist in performance. Settlement of dispute can be a good consideration for the promise. But the mere doing of a thing which a person is already legally bound to do is no consideration for a new promise in his favour.

Examples: (a) Jack agrees to sell his horse to Max for Rs.7,000. Here Jack's promise to sell his horse is for Max's consideration to pay Rs. 7,000. Similarly, Max's promise to pay Rs.7,000 is for Jack's consideration to sell his horse to Max.

(b) A agrees to give Rs.1,000 to B as a voluntary donation for a temple building. This promise is not binding on A because there is no reciprocal consideration for his promise. However, if B has undertaken any liability on the faith of A's promise, the contract is binding on A.

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(c)A promises to maintain B's child and B promises to pay Rs. 20,000 yearly for this purpose. Here the promise of each party is the consideration for the promise of the other party.

## 1.23 ESSENTIALS OF A VALID CONSIDERATION

**It must move at the desire of the promisor.** The first essential characteristic of consideration is that the act or abstinence must have been done at the desire of the promisor. It follows that any act performed at the desire of a third party cannot be consideration. The desire of the promisor may be express or implied. A gratuitous service rendered by the promisee without any request of the promisor does not constitute a consideration enforceable at law. But it is not necessary that what is done by the promise by way of consideration should benefit the promisor. Any benefit conferred by B on C at the request of A would be good consideration for A's promise.

Example: X sees Y drowning and saves his life. X cannot demand payment for his services as it is a voluntary act on his part and Y never asked him to do so.

The leading case on this point is: **Durga Prasad Vs. Baldeo (1880)**

D promised to pay P a commission on articles sold by him in a bazaar in which he occupied a shop in consideration of P having expended money in the construction of such bazaar. The money had not been spent by P at the request of D but was spent by him at the desire of the Collector of the District. In a suit by P it was held that there was no consideration for the promise made by D and hence no contract.

A promise to subscribe to a public or a charitable object is unenforceable because there is no benefit to the promisor. But where the other party has undertaken a liability on the faith of the promise made by the promisor, it is enforceable.

2.    It must move from the promisee or any other person. As long as there is a consideration for a promise, it is immaterial who has given it. It may move from the promisee, or if the promisor has no objection, from any other person. This is wider than the concept in England, where consideration can move only from the promise. Consideration may move from a stranger but it must flow at the desire of the promisor.

**The leading case is: Chinayya Vs. Ramayya (1882)**

An old lady made a gift of her property to her daughter with a direction to pay a certain sum of money to the maternal uncle by way of annuity. On the same day, the daughter executed a writing in favour of the brother agreeing to pay the annuity. The daughter did not, however, pay the annuity and the uncle sued to recover. It was held that there was sufficient consideration for the uncle to recover the money from the daughter.

Example: X, Y and Z enter into an agreement under which X pay Rs. 4,00,000 to Y and Y agreed to build a house for Z. Here, Z is a party to the contract but stranger to consideration and can enforce the contract.

3. **Consideration may be past, present or future.** The words, ＿has done or abstained from doing; or does or abstains from doing: or promises to do or do abstain from doing'' indicate that consideration may be past, present or future.

4. **Past consideration.** When the consideration for a present promise was given before the date of the promise, it is said to be past consideration. A past consideration, if given at the request of the promisor will support a subsequent promise. A past consideration is as good as present or future consideration. Under the English law consideration must be present of future, and there is no such thing as past consideration.

**Present consideration** . When the consideration for a promise is given simultaneously with the promise it is called present consideration. A present consideration consists in doing or abstaining from doing something. A promise to give time to a debtor is good consideration.

Example: X sells computer to Y for Rs.50,000 and Y in return gives Rs.50,000 to X. In this case, the performance by both the parties (seller and buyer) is simultaneous.

**Future consideration.** A future or executory consideration is a promise to do or give something in return in future for the promise then made. It is also called a promise for the promise. Mutual promises to marry, a promise to do work in return for promise of payment are examples of future consideration.

**4.** **It need not be adequate**. It is not essential that consideration should be commensurate to the promise. Sufficiency has to be decided by the parties at the time of making the agreement. Inadequacy of consideration is no ground for refusing the performance of the promise, unless it is evidence of fraud. It should be of some value in the eyes of law. Even a smallest consideration is sufficient provided it has some value. If a man

gets what he contracted for, the court will not inquire whether it was an equivalent to the promise which he gave in return. Where in an agreement the consent of the promisor has been freely given, an inadequacy of the consideration will not render it unenforceable.

**5.    Consideration must be real.** Though consideration need not be adequate, yet it must be actual and not illusory. Thus, a promise to do that which a person is by law bound to do, does not amount to consideration. Consideration has also to be competent. If it is physically impossible, vague or legally impossible, the contract cannot be enforced. Thus, a promise by a man to grow mango within two days is no good consideration.

**6.    Consideration must be lawful**. The consideration for an agreement must be lawful. An agreement is void, if it is based on unlawful consideration. The consideration of an agreement is lawful unless-

(i)      is of such a nature that if permitted it would defeat the provisions of any   law; or

(ii)     it is forbidden by law; or

(iii)    is fraudulent; or

(iv)     involves or implies injury to the person or property of another; or

(v)      the  court regards it as immoral or opposed to public policy.

**7.    It must be something which the promisor is not already bound to do.**  A promise to do what one is already bound to do, either by general law or under an existing contract, is not a good consideration for a new promise. There will be no detriment to the promise or benefit to the promisor over and above their existing rights or obligations.

## 1.24 <u>STRANGER TO  CONSIDERATION</u>

Under the Indian Contract Act 1872 consideration for a contract may move from the promise or any other person i.e., a stranger to the consideration can also enforce the contract,.In India the consideration may move from a stranger. This law was established in the case of **Chinayya Vs. Ramayya.**

**STRANGER TO CONTRACT**

It is a general law of contract that a person who is not a party to the contract cannot sue upon it. This means that unless there is a privity of contract, a party cannot sue on it. Privity of

contract means the relationship subsisting between the parties to a contract. It means that no one but the parties to a contract can be bound by it or be entitled under it.

Example: A had mortgaged some property to X. A then sold his property to B, B having agreed with A to pay off the mortgage debt to X. X brought an action to recover the mortgage money against B. The Privy Council held there was no contract between X and B. X could not enforce the contract to recover the amount from B.

The leading Case is:**Dunlop Pneumatic Co. Vs. Selfridge & Co. (1915)**

A sold a large quantity of tyres to B at a certain price on entering into a covenant not to sell the tyres below the price mentioned in price list supplied by A. B sold the tyres to C a retail dealer under a contract stipulating the same covenant as between A and B. C sold the tyres at less than the list price. A sued C for the breach. It was held that A could not sue C A was not a party to the contract between B and C.

**4. Where a charge is created in favour of a stranger on specific immovable property**. A stranger to a contract can sue for the money made payable to him by it where the money is charged on immovable properties.

**5. Where the promisor has by his conduct created privity of contract with the stranger.** If A admits to C, that he had received money from B for payment to C, he constitutes himself as the agent of C, who can successfully recover the amount from A. Similarly, where under an agreement between a tenant and his sub-tenant the latter was paying the rent directly to the landlord, the landlord was allowed to recover unpaid rent from sub-tenant.

**6. Where it is conducive to justice**.

**7. Contract entered into by an agent can be enforced by the principal.**

**8. Covenants Running with the land.** At the time of transfer of immovable property, a notice that the owner of land is bound due to certain obligations created by an agreement relating to land, the new purchaser will be bound by them though he was not a party to the original covenant.

**1.25 IMPORTANCE OF CONSIDERATION** : Consideration is the foundation of every contract. The law insists on the existence of consideration if a promise is to be enforced as creating legal obligations .A promise without consideration is null and void. It is called a

naked promise or "Nudum Pactum". Thus, if A promises to pay B Rs. 1,000 without anything in return, this constitutes a bare promise and gives no right of action.

Section 25 of the Indian Contract Act provides that agreement without consideration is void, subject to certain exceptions.

**SELF-CHECK EXERCISE1**

(i) Consideration must move from the ………………………….

(ii) A gratuitous service rendered by the promisee without any request of the promisor is not …………………………. at law.

(iii) Unless there is a ……………. of contract, a stranger to contract cannot sue on it.

## 1.26 NO CONSIDERATION NO CONTRACT: EXCEPTIONS

Every contract to be enforceable at law must be supported by valid consideration. An agreement made without consideration is void and is unenforceable except in certain cases. Section 25 specifies the cases where an agreement though made without consideration will be valid. These are as follows:

### 1. Natural love and affection [Sec.25(1)]

An agreement though made without consideration will be valid if it is in writing and registered and is made on account of natural love and affection between parties standing in a near relation to each other. An agreement without consideration will be valid provided -

  i.     it is expressed in writing;
 ii.     it is registered under the law for the time being in force;
iii.     it is made on account of natural love and affection; and
 iv.      it is between parties standing in a near relation to each other.

All these essentials must be present to enforce an agreement made without consideration. The presence of only one or some of them will not suffice.

Example: A for natural love and affection, promises to give his son B, Rs. 1,000 . A makes a promise to B into writing and registers it. This is a contract.

The mere existence of a near relation between the parties without the moving force of natural love and affection will not make an agreement enforceable even though it is in writing and registered. Thus, where an agreement for separate residence and maintenance was arrived

at between a husband and wife but the cause was constant quarrels between the two, it was held that the agreement was void. Proximity in relationship does not essentially imply natural love and affection.

### 2. COMPENSATION FOR SERVICES RENDERED [SEC.25(2)]

An agreement made without consideration may be valid if it is a promise to compensate wholly or in part a person who has already voluntarily done something for the promisor or something which the promisor was legally compellable to do. To apply this rule, the following essentials must exist:

(a)    The act must have been done voluntarily;

(b)    for the promisor or it must be something which was the legal obligation     of     the promisor;

(c)    the promisor must be in existence at the time when the act was done;

(d)    the promisor must agree now to compensate the promisee.

Examples: (a) A finds B's purse and gives it to him. B promises to give A Rs.100 This is a contract.

(b)    A supports B's infant son. B promises to pay for A's expenses incurred for this purpose. This is a contract.

A promise to pay for past services voluntarily rendered would be enforceable under this rule. If, however, something has not been done voluntarily, this clause will not apply.

### 3. TIME-BARRED DEBT [SEC.25(3)]

A promise to pay a time -barred debt is also enforceable. But the promise must be in writing and be signed by the promisor or his agent authorized in that behalf. The promise may be to pay the whole or part of the debt. A verbal promise to pay a time-barred debt is unenforceable.

The clause does not apply to promises to pay time-barred debts of third persons. The debt must be such which the creditor might have enforced in law for recovery of the payment. The promise to pay referred to in section25(3) must be express.An acknowledgement of a debt coupled with an agreement to pay interest has been held to be an agreement with a promise to pay covered under Section 25(3).Even a statement in a balance sheet of a partnership firm signed by a partner showing that the firm is liable to particular person in respect of stated sum has been  held to be an implied promise to pay.

### 4. COMPLETED GIFTS : The rule _No consideration, No contract' shall not affect validity of any gifts actually made between the donor and the donee. Thus, if a person

gives certain properties to another according to the provisions of the Transfer of Property Act, he cannot subsequently demand the property back on the ground that there was no consideration.

**5. AGENCY (SE.185):** There is one more exception to the general rule. It is given in section 185 which says that no consideration is needed to create an agency.

**6. GUARANTEE (SEC 127):** A contract of guarantee is made without consideration.

**7. REMISSION (SEC 63):** No consideration is required for an agreement to receive less than what is due. This is called remission in the law.

Doctrine of Promissory Estoppel. The person making the representation or promise becomes bound by the same, if another person has acted on the faith of such promise or representation. The promisee can ask for enforcing the promise even if there is no consideration.

Example: Mr. X establishes an industrial unit on the faith of tax concession announced by a State Govt. for a particular specified period. The state is bound by estoppels and cannot withdraw tax concession earlier than promised by it.

**SELF-CHECK EXERCISE 2: TRUE/FALSE**

**(i)** An agreement though made without consideration will be valid if it is made on account of natural love and affection between parties standing in a near relation to each other.

**(ii)** A promise to pay a time -barred debt is not enforceable.

**(iii)** Consideration is needed to create an agency.

## 1.27 <u>CONCLUSION</u>

**C**onsideration must be present to constitute a valid contract. Consideration is the main motive of the promisor to get the work done under a contract. The cons ideration may move from a stranger. A stranger to a contract can sue only in case of trust, marriage settlement and partition. Consideration is not required in cases of natural love affection, compensation for services rendered,

Time-barred debt,gifts ,agency ,guarantee and remission.


## 1.28 <u>KEYWORDS</u>

**Consideration:** Some right , interest, profit or benefit accruing to one party or some forbearance, detriment, loss or responsibility, given, suffered or undertaken by the other.''

**Stranger to contract**: A person who is not a party to the contract, is stranger to contract and cannot sue upon it.

**Privity of contract**: It means the relationship subsisting between the parties to a contract.

### 1.29 ANSWERS TO SELF-CHECK EXERCISE

Self-check Exercise 1(i)Void(ii)Voidable(iii)Unenforceable(iv)Standard

Self-check Exercise 2(i)False(ii)True(iii)False(iv)True

**QUESTIONS FOR EXERCISE**

i.Discuss the meaning and essentials of a valid contract under the Indian Contract Act,1872.

ii.Explain the different types of contracts that can be formed under the Indian Contract Act,1872.

iii.Define

a.Void Contract

b.Quasi-contract

c.Express contract

d.Distinguish between Void Contract and Void Agreement.

e.Standard form Contract

**ANSWERS TO SELF-CHECK EXERCISES:**

Self-Check Exercise1(i)Offer(ii)Specific(iii)General(iv)Standing

Self-Check Exercise2 (i)True(ii)False(iii)True(iv)False

**QUESTIONS FOR EXERCISE**

i.Explain the essentials of a valid offer.

ii.Discuss the requirements for a valid Acceptance.

iii.Discuss the rules of communication of Offer and acceptance.

iv.Define

a.Specific Offer

b.Standing offer

c.Modes of Revoation of Offer

**ANSWERS TO SELF-CHECK EXERCISES**

Self-check Exercise 1(i)Promisee(ii)Enforceable(iii)Privity

Self-check Exercise 2(i)True(ii)False(iii)False

**QUESTIONS FOR EXERCISE**

1.Define consideration and explain its essentials.

2.Explain the exceptions to the rule‖No Consideration No Contract‖.

3.'Consideration may be executed,executory or past.'Explain.

4.' A Stranger to consideration can sue but a stranger to contract cannot sue'.Discuss.

**RECOMMENDED READINGS**

Mercantile Law by M.C.Kuchal

Mercantile Law by N.D.Kapoor

Taxmann'Business and Corporate Laws by V.S.Datey

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II
### COURSE: BUSINESS LAW

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## UNIT II CONTRACTUAL CAPACITY, FREE CONSENT, LEGALITY OF OBJECTS, VOID AGREEMENTS

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## STRUCTURE

2.0   **Objectives**

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2.2   **Who is Competent to Contract?**

2.3   **Rules Relating to an Agreement with a Minor**

      **2.3.1 Who is Minor?**

      **2.3.2 Position of Agreements with a Minor**

2.4   **Rules relating to an Agreement with Person of Unsound Mind**

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2.5   **Persons Disqualified from Contracting**

      **Test Your Knowledge 1**

•     **Short Answer Questions**

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2.6   **Introduction**

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2.7   **Coercion**

      **2.7.1  What is Coercion?**

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**Check Your Progress 3**

- **Short answer questions**

- **Long answer questions**

**Answers to Check Your Progress**

**Let Us Sum Up**

**Key Words**

   **Terminal Questions**

   **Suggested Reading\**

## 2.0 <u>OBJECTIVES</u>

After studying this chapter the learner should be able:

1. To define the contractual capacity, free consent, legality of objects and idea about void agreements.

2. To ascertain the important attributes of valid contract.

3. To find out the legality of objects in contract.

## 2.1   <u>INTRODUCTION OF CONTRACTUAL CAPACITY</u>

The parties to a contract must be competent to contract. If any one of them is incompetent to contract, the agreement shall be void, i.e., it cannot be enforced by law according to Section 10 of the Indian Contract Act, 1872. In this unit, you will learn as to who are competent to contract and what shall be the exact position of a contract in case any one of the parties thereto is incompetent of contracting.

## 2.2   <u>WHO IS COMPETENT TO CONTRACT?</u>

Section 11 of the Contract Act requires that parties must be competent to contract. Competence of the parties to make a contract is one of the most essential elements of a valid contract.

Competence to contract is defined in Section 11 of the Indian Contract Act, 1872:

*"Every person is competent to contract who is of the age of majority according to the law to which he is subject, and who is of sound mind and is not disqualified from contracting by any law to which he is subject."*

Thus, section 11 declares the following persons to be competent to contract:

1. Who attained the Age of Majority

2. Who is of sound mind

3. Who has not been disqualified by law.


## 2.3    RULES RELATING TO AN AGREEMENT WITH A MINOR

• 2.3.1 WHO IS MINOR?

According to Section 3 of the Indian Majority Act, a person is deemed to have attained majority (i) when he completes 18 years or (ii) where a guardian of person or property or both has been appointed by a Court of Law (or where his property has passed under the superintendence of the Court of Wards), he attains majority on completion of 21 years. In other words, normally a person shall be treated as minor if he has not attained the age of 18 years. In the following two cases, however, he is treated as minor until he attains the age of 21 years.

i)      where a guardian of a minor's person or property is appointed under the guardians and Wards Act, 1890, or

ii)     where the superintendence of minor's property is assumed by a Court  of Wards.


### 2.3.2    POSITION OF AGREEMENTS WITH A MINOR

The law relating to minor's agreements and effects thereof can be summed up as under:

- **AN AGREEMENT WITH A MINOR IS VOID:** An agreement with a minor is void from the very beginning and void absolutely. In other words, an agreement wan a minor does not create any legal rights and obligation between the concerned parties.
- **THE RULES OF ESTOPPEL DOES NOT APPLY TO A MINOR:** A minor is not bound by his misrepresentations. But if a minor enters into a contract by fraudulently representing himself to be a major, he cannot be prevented from pleading minority as defense. The rule of estoppel cannot be applied against the minor.
- **A MINOR"S AGREEMENT CANNOT BE RATIFIED BY MINOR ON HIS ATTAINING MAJORITY:** Ratification implies approval or confirmation. A minor cannot confirm an  agreement made by him during minority on  attaining majority. This is because ratification relates back to the date of making of the contract and therefore a contract which was void from the very beginning cannot be made valid by subsequent ratification.
- **MINOR"S LIABILITY IN TORT:** The term _tort' implies a civil wrong for which a suit can be filed by the affected party. If a minor enters into an agreement by misrepresenting his age,  he cannot be sued either for damages for breach or in the form of damages for tort (i.e., deceit) because this would be indirectly enforcing the

agreement which is void. However, if wrongful act (i.e.tort) of minor is independent of the contract, then minor is liable for damages in tort. In the ease of Burnard vs Haggis, A, a minor borrowed a mare from B for riding only under instructions not to jump it. He lent the horse to his friend who jumped and killed her. He was held liable for tort.

- **BENEFICIAL CONTRACTS:** A minor can be a beneficiary or promisee. In other words, if a contract is beneficial to a minor, it can be enforced by him. In Raghava Chariar vs. Srinivasa, A executed a mortgage in favor of B (a minor) who advanced a certain sum of money to A. The court in this case held that the mortgage is enforceable by minor as the transaction was for his benefit.
- **MINOR"S LIABILITY FOR NECESSITIES:** Section 68 of the Indian Contract Act, provides that _if a person incapable of entering into a contract or anyone whom he is legally bound to support is supplied by another person with necessaries suited to his condition in life, the person who has furnished such supplies is entitled to be reimbursed from the property of such incapable person'. So if a minor or his dependents are supplied necessities by someone, minor's property is liable.
- **POSITION OF MINOR"S PARENTS OR GUARDIAN:** Minor's contract does not impose any liability on his parents or guardian even if the contracts are for necessaries. However, when the minor acts as an agent of his parents or guardian, they can he held liable for his acts.
- **MINOR AGENT:** A minor can act as an agent but he Will not be personally liable for any of his acts. The principal will be liable to the third parties for the acts of the minor agent which he does in the ordinary course of dealings.
- **MINOR PARTNER:** Section 30 of partnership Act provides that a minor may be admitted to benefits of partnership with the consent of all other partners. His liability is limited to his share in partnership. He cannot take part in management.
- **MINOR AS AN INSOLVENT:** A minor cannot be declared as an insolvent. This is so because all agreements with a minor are void. Moreover, the minor is not personally liable for any debt incurred during the period of his minority.
- **MINOR SHAREHOLDER:** A minor cannot become shareholder in a company since, he is incompetent to enter into a contract. A company can also refuse to register, transfer or transmission of shares in favor of a minor unless the shares are fully paid. In case a minor inherits certain shares, he may become a shareholder acting through his lawful guardian.
- **MINOR UNDER NEGOTIABLE INSTRUMENTS ACT:** Minor can draw or negotiate negotiable instruments (i.e. Bill of Exchange, Promissory Note, Cheque). But he incurs no personal liability in such cases. A negotiable instrument drawn in favor of a minor can be enforced by him. A minor can be a promisee or payee. He can also become an endorsee by transfer of a negotiable instrument.

## 2.4  RULES RELATING TO AN AGREEMENT WITH PERSON OF UNSOUND MIND

### 2.4.1 WHO IS A PERSON OF UNSOUND MIND?

According to Section 11 only a person of sound mind can make a contract. Section 12 further defines the term sound mind in these words, ‒A person is said to be of sound mind for the purpose of making a contract if, at the time when he makes it, he is capable of

understanding it and of forming a rational judgment as to its effect upon his interest.‖ Thus two essentials of ‗Sound mind‘:

- Capacity to understand
- Capacity to make a rational judgment

There must be free and full consent of the parties so as to bind them to the contract. Consent is an act of reason accompanied by deliberations. It is due to the absence of rational and deliberate consent that conveyance and contracts of persons of unsound mind are deemed to be invalid. In **Mohori Bibee v. Dharmodas Ghosh,** a minor Dharmodas Ghosh mortgaged his immovable property to Brahmo Dutt a money lender to secure a loan of Rs. 20,000. The actual amount was not paid by the plaintiff as he paid Rs. 8000 only and refused to pay the rest amount. Minor‘s mother said that his son is not liable to pay the sum as he was a minor. The privy council held that the minor contract is void and accordingly the Brahmo Dutt‘s appeal was dismissed.

A person of unsound mind may be divided into two broad categories:

**IDIOTS:** An Idiot is one who has lost mental powers completely, i.e., his brain has not developed enough to enable him, at all to understand the contract or of forming a rational judgment of its effects upon his interest. Hence an agreement with him is always void. However, he can be sued for necessaries of life supplied to him or to anybody dependent upon him.

**LUNATIC:** Lunacy arises from the illness of the brain or mental or bodies distress. The essential element of lunacy is that the mental powers of the lunatic are so deranged that he cannot make a rational judgment of any subject the period of lunacy.

## 2.5   PERSONS DISQUALIFIED FROM CONTRACTING

Apart from minors and persons of unsound mind, there are also other persons such as Foreign sovereigns, convicts, alien enemy, insolvents and so on are disqualified from contracting partly or wholly or they are not competent to contract. Therefore, contracts by such persons are void. These are explained as:

**ALIEN ENEMY:** A citizen of a foreign country is known as an alien. **Foreign sovereigns and their Ambassadors:** Foreign sovereigns and their Ambassadors in India can enter into contracts with Indian citizens and can sue them in Indian courts but no suit can be filed against them in local courts unless the permission of the Central Government.

**CORPORATION:** A corporation is an artificial person created by law. Being a legal person only, it cannot act by itself. It has to act through some agent.

**INSOLVENTS:** When a person is adjudged as insolvent, he loses contractual powers over his                                                                                            property.

**Convicts:** A person against whom a sentence of imprisonment is passed loses the capacity to                                                                                            contract.

**MARRIED WOMEN:** A married woman used to suffer from certain disabilities with regard to making of contracts under English Law before 1935. A woman, married or single, in Indian Law, is under no disability as regard, entering into contracts with regard to the property that belongs to her (e.g. Stridhan of a married women). Her contracts can be enforced against her husband's property if he has failed to provide necessaries of life to her and the contract relates to necessaries of life.

## CHECK YOUR PROGRESS 1
### STATE WHETHER FOLLOWING STATEMENTS ARE TRUE OR FALSE
i)  A contract with a minor cannot be enforced by a minor even for his
benefit .................
 ii) A minor cannot recover the price of his goods sold on credit to a major
person ...................
iii) A person of sound mind can make a valid contract even when he is so drunk that he is incapable of forming a rational judgement. .....................
iv) An alien friend can acquire property in Indian ship. ...........
v) A company, though an artificial person, can make all such contracts that an individual can. ...................

- **SHORT QUESTIONS**

1) Who is competent to contract? State the position of contracts with a minor.
2) What shall be the effect on a contract where a minor, a party to the contract, is guilty of deliberate misrepresentation with regard to his age.
3)  Examine the legal position of (i) a minor as a promisee, (ii) a minor as an agent.

- **LONG QUESTIONS**

1) Name persons who are treated as persons of unsound mind. State the legal Positions of contracts with such persons.
2) Enumerate persons forbidden under other laws for the time being in force and state the legal position of the contracts with them

## ANSWERS TO CHECK YOUR PROGRESS 1
### TRUE OR FALSE
- (i)        False
- (ii)       True
- (ii)       False
- (iv)       False
- (v)        True (with the exception of contracts of personal nature

e.g., a contract to marry).

## **2.6    INTRODUCTION TO FREE CONSENT**
### 2.6.1 MEANING OF CONSENT
The concept of ‗Consent' has been defined in Section 13 of the Act as two individuals agreeing to the same thing in the same sense. While it is important for both parties to give their consent to the rights and obligations imposed in the contract.

### 2.6.2 CONCEPT OF FREE CONSENT
The said consent should be free in nature and not be caused by coercion, undue influence, fraud, misrepresentation and mistake. The definition of free consent has been mentioned in Section 14 of the Act. It lays down the elements or causes which

can exclude freedom of consent. If there are two consenting parties to a contract but the consent of one is not free, then the contract is voidable at the option of such party.

## 2.7   COERCION

### 2.7.1 WHAT IS COERCION?

Coercion as defined in Section 15 of the Act includes instances in which an individual commits or threatens to commit an act which is forbidden by the Indian Penal Code, or detains an object unlawfully or threatens to do so with the intention of forcing someone to enter into a contract. The enforcement of the Indian Penal Code in the place where the coercive act was performed is immaterial.

In the case of *Chikkam Ammiraju v. Chikkam Seshama*, the Court was posed with the question of whether the threat to commit suicide could be considered to be a constituent of coercion. The facts of this case were that a husband was threatening his wife that he'll commit suicide. This was done with the intention of inducing and coercing the wife and the son to execute a release in favour of his brother with respect to properties over which rights were claimed by the wife and the son. The Court in its judgement opined ‒that the threat of suicide amounted to coercion within Section 15 and the release deed was, therefore, voidable‖.

### 2.7.2 EFFECT OF COERCION

It is quite obvious that the contract entered into due to the effect of coercion do not have free consent. In this way, the following instances are possible:

- The contract brought about due to coercion becomes voidable, at the option of the aggrieved party.

- With respect to the result of rescission i.e. revocation of a voidable contract, the party who revokes a void contract, have to restore any benefit received from the other party.

- If due to coercion money has been paid or certain stuff is provided, it must be repaid or returned.

  It must be noted that mere threat by one party to other to prosecute does not result in coercion. The aggrieved party must have entered into a contract out of that threat, which can be avoided on account of coercion.

### 2.7.3 BURDEN OF PROOF

The burden of proof lies with the party defending the coercion. The burden of proof is heavier on him. This is because pure probability or fear is not a threat. In order to create coercion, a person must show that there was a risk that was prohibited by law and that forced him to enter into a contract that he would not otherwise have.

## 2.8   UNDUE INFLUENCE
### 2.8.1 WHAT IS UNDUE INFLUENCE?

- A contract is said to be induced by "undue influence" under section 16 of Indian Contract Act, where the relations subsisting between the parties are such that one of the parties is in a position to dominate the will of the other and uses that position to obtain an unfair advantage over the other.
- In particular and without prejudice to the generality of the foregoing principle, a person is deemed to be in a position to dominate the will of another-

-where he holds a real or apparent authority over the other, or where he stands in a fiduciary relation to the other; or

-where he makes a contract with a person whose mental capacity is temporarily or permanently affected by reason of age, illness, or mental or bodily distress.

- Where a person who is in a position to dominate the will of another, enters into a contract with him, and the transaction appears, on the face of it or on the evidence adduced, to be unconscionable, the burden of proving that such contract was not induced by undue influence shall lie upon the person in a position to dominate the will of the other.

## 2.8.2 EFFECT OF UNDUE INFLUENCE

When consent to an agreement is caused by undue influence, the agreement is a contract voidable at the option of the party whose consent was so caused. Any such contract may be set aside either absolutely, or if the party who was entitled to avoid it has received any benefit there under, upon such terms and conditions as the Court may deem, just (Sec 19 A). Only a party to the contract can avoid or rescind the contract. This right does not lie in the hands of a third party.

## 2.8.3 DISTINCTION BETWEEN COERCION AND UNDUE INFLUENCE

| | Coercion | Undue Influence |
|---|---|---|
| 1. | Consent is obtained by threat of an offence. The person is forced to give his consent. | Consent is obtained by the dominating will of the other. |
| 2. | It is mainly of physical character. | Consent is given in good belief, but under moral influence |
| 3. | It is of violent character. | Confidence is reposed, but betrayed It is most subtle in character. |

## 2.9 FRAUD

### 2.9.1   WHAT IS FRAUD?
Section 17 defines ─fraud║ as under:
Fraud means and includes any of the following acts committed by (a) a party to a contract: or (b) with his connivance; or (c) by his agent, with intent to deceive another party thereto or his agent, or to induce him to enter into the contract –

- Fraud must be committed by a party to the contract directly or indirectly or by his agent. However, where the contract was a result of a 3rd person being instrumental for his own ulterior motives, the contract cannot be avoided;
- Intention to deceive or inducing the other party to contract is a must.
- In a suit against fraud, to claim relief, the plaintiff has to show that the defendant made fraudulent representations and the plaintiff was in fact deceived and acted to

his prejudice. In lay terms, a plaintiff cannot claim any right to redress in cases of both deceit without damage and damage without deceit.

### 2.9.2   DOES SILENCE AMOUNT TO FRAUD?

Mere silence as to facts likely to affect the willingness of a person to enter into a contract is not fraud unless the circumstances of the case are such that, regard being had to them, it is duty of the person keeping silence to speak, or unless his silence is, in itself equivalent to speech.

e.g. A and B, being traders, enter upon a contract. A has private information of change in prices which would affect B's willingness to proceed with the contract. A is not bound to inform B.

### 2.9.3 CONSEQUENCES OF FRAUD

When consent has been obtained by fraud, the contract becomes voidable u/s 19 of the Indian Contracts act. Thus, the party defrauded has an option either to rescind the contract or insist that the contract be performed to place him in such a position as he would have been if the misrepresentation had been true. If the defrauded party chooses to avoid the contract, he is liable to restore the benefit received (if any) back to the fraudulent party u/s 64 and may claim damages. The consequences of Fraud has been explained as -

- the Defendant is bound to make reparation for all the damage directly flowing from the transaction;
- although such damage need not have been foreseeable, it must have been directly caused by the transaction;
- in assessing such damage, the Plaintiff is entitled to recover by way of damages the full price paid by him, but he must give credit for any benefits which he has received as a result of the transaction;
- as a general rule, the benefits received by him include the market value of the property acquired as at the date of acquisition; but such general Rule is not to be inflexibly applied where to do so would prevent him obtaining full compensation for the wrong suffered;
- although the circumstances in which the general Rule should not apply cannot be comprehensively stated, it will normally not apply where either (a) the misrepresentation has continued to operate after the date of the acquisition of the asset so as to induce the Plaintiff to retain the asset or (b) the circumstances of the case are such that the Plaintiff is, by reason of the fraud, locked into the property;
- In addition, the Plaintiff is entitled to recover consequential losses caused by the transaction; (7) the Plaintiff must take all reasonable steps to mitigate his loss once he has discovered the fraud.‖

### 2.10    WHAT IS MISREPRESENTATION?

Section 18 of The Indian Contract Act, 1872 defines ‒Misrepresentation‖ means and includes:

- the positive assertion, in a manner not warranted by the information of the person making it, of that which is not true, though he believes it to be true;
- any breach of duty which, without an intent to deceive, gains an advantage of the person committing it, or any one claiming under him, by misleading another to his prejudice, or to the prejudice of any one claiming under him;

- causing, however innocently, a party to an agreement, to make a mistake as to the substance of the thing which is the subject of the agreement.

e.g. A is entitled to succeed to an estate at the death of B; B dies: C, having received intelligence of B's death, prevents the intelligence reaching A, and thus induces A to sell him his interest in the estate. The sale is voidable at the option of A.

### 2.10.1 ESSENTIALS OF MISREPRESENTATION
- The misrepresentation must be of material facts.
- The misrepresentation must be false, but the person making it honestly believes it to be true.
- The misrepresentations must induce the other party to enter into contract.
- The misrepresentation must have been addressed by one party to the party misled.

### 2.10.2 EFFECT OF MISREPRESENTATION
According to Section 19, when consent to an agreement is caused by misrepresentation, the agreement is a contract voidable at the option of the party whose consent was so caused. A party to a contract whose consent was caused by fraud or misrepresentation, may, if he thinks fit, insist that the contract shall be performed, and that he shall be put in the position in which he would have been if the representations made had been true.

A fraud or misrepresentation which did not cause the consent to a contract of the party on whom such fraud was practiced, or to whom such misrepresentation was made, does not render a contract voidable.

### 2.10.3 DISTINCTION BETWEEN FRAUD AND MISREPRESENTATION

**Fraud** means a willful misrepresentation of a material fact while **Misrepresentation** means a bonafide representation which is false. The former is an untrue statement given by one party that induces other party to enter to the contract, whereas the latter is the statement of fact, made by one party, believing that it is true, then this is innocent misrepresentation.

| | Fraud | Misrepresentation |
|---|---|---|
| 1. | In a fraud, the party making the representation knows that the statement is not true. | In misrepresentation, the party making the representation believes the statement made by him is true, which subsequently turned out as false. |
| 2. | The aggrieved party, has the right to claim for damages. | The aggrieved party has no right to sue the other party for damages. |
| 3. | The contract is voidable even if the truth can be discovered in normal diligence. | The contract is not voidable if the truth can be discovered in normal diligence. |
| 4. | Section 2 (17) of the Indian Contract Act, 1872. | Section 2 (18) of the Indian Contract Act, 1872. |

### 2.11 MISTAKE
A mistake refers to an incorrect belief that is innocent in nature which leads one party to misunderstand the other. It usually takes place when the parties to the contract are not completely aware of the terms of the agreement and understands the terms in a different

sense. Therefore there is no *consensus ad-idem* i.e. meeting of minds between the parties and thus do not understand the same thing in the same sense. *The Indian Contract Act,1872* states two kinds of mistakes -

- **Mistake of Law (Section 21)**

- **Mistake of Fact (Section 20 &22)**


### 2.11.1 MISTAKE OF LAW

The Latin maxim *Ignorantia Juris Non Excusat* means that ignorance of the law is no excuse. Therefore under Section 21of the *Indian Contract Act, 1872,* a contract cannot be said to be voidable due to the mistake of the parties in understanding any laws that are in force in India. Hence the parties to the contract cannot claim relief on the grounds that they were unaware of the Indian law. **For Example**, A man was caught by a ticket conductor for traveling on a train without a ticket. The man cannot claim that he was not aware that a ticket is required while traveling and shall be punished under of *The Indian Railways Act, 1989 (Section 138).*

### 2.11.2 MISTAKE OF FACT

The maxim *Ignorantia Facti Excusat which* means that the Ignorance of fact excuses. Therefore under Section 20 of the *Indian Contract Act, 1872,* a contract is said to be void when both the parties to the agreement are under a mistake as to a matter of fact.

**A mistake of Fact can be of two kinds -**

- Bilateral Mistake - Section 20

*Section 20* will only apply when the following three conditions are fulfilled:

- The mistake must be committed by both the parties i.e. must be mutual.

- The mistake must be regarding some facts.

- It must relate to a fact which is essential to the contract.

Therefore if the mistake is made regarding the existence of the subject matter or a fact essential to the contract, it would be a void contract since there is *no consensus ad idem.*

But an incorrect opinion regarding the value of the thing which forms the subject matter of the agreement is not said to be a mistake of fact and is considered inconsequential to the agreement.

Types of Bilateral Mistakes

- Mistake regarding the existence of the subject matter

Sometimes the existence of the subject matter of the contract ceases to exist before the agreement was made and the parties to the contract may not be aware of this fact. If the subject matter on which the contract exists is not present, it is considered that the contract has perished and hence the agreement would be considered void.

In the case of *Galloway vs. Galloway(1914)*, A man and woman believed that they were married and therefore made a separation agreement but it was later discovered that the man's first wife was alive. **It was held that the separation agreement was void as it had been entered into on the basis of the common assumption that the parties were married to each other.**

- Mistake regarding the quality of the subject matter

If the parties to the contract are not mistaken regarding the subject matter of the contract but regarding its quality, the contract would be said to be valid.

In the case of Smith Vs. Hughes (1870), The plaintiff agreed to buy certain Oats from the defendant believing that they were old when in reality they were new. **It was held that the defendant cannot avoid the contract on the ground that he was mistaken as to the oldness of the oats.**

- Mistake regarding the quantity of the subject matter

If both the parties to the contract are under a mistake as to the quantity of the subject matter, the agreement is said to be void.

**For Example**, Vishal agreed to buy a car from Sarvesh based on his letter in which the price mentioned was ₹70000 instead of ₹7lakhs due to a typing error. The said agreement is considered void due to a mistake as to the quantity of the subject matter.

- Mistake regarding the title of the subject matter

Sometimes the buyer of said property or good may already be the owner of what the seller wishes to sell. Both the parties here might be under a mutual mistake as to the title of the said good or property. Since in such a case there is nothing that the seller can transfer, there is no contract which subsequently becomes void.

- Unilateral Mistake - Section 21

*Section 21* of the act says that a contract cannot be said to be voidable just because one of the parties to the contract was under a mistake as to a matter of fact concerned to the contract. Therefore a unilateral mistake does not affect the validity of the contract and cannot be a ground for setting aside the contract in the court of law.

In the case of Tapline Vs. Jainee (1880),The buyer at an auction brought a property described with reference to a plan. The buyer was under the assumption that he was well versed with the property and therefore did not refer to the plan. Later he discovered that a garden plot which he thought was a part of the property was not in fact included in the plan. It was held that the buyer cannot revoke the contract on the grounds of the unilateral mistake made by him and was bound by the contract.

### 2.11.3 EFFECT OF MISTAKE

A contract is not voidable because it was caused by a mistake as to any law in force in India; but a mistake as to a law not in force in India has the same effect as a mistake of fact under Section 21 of Indian Contract Act, 1872. In case of unilateral mistake, the contract will not be void. So the Section 22 of the Act states that just because one party was under a mistake of

fact the contract will not be void or voidable. So if only one party has made a mistake of fact the contract remains a valid contract.

## CHECK YOUR PROGRESS 2

State whether the following statements are True or False.

i) In the absence of consent, there can be no contract. ; ...............................

ii) A threat amounting to coercion must necessarily proceed from a party to the contract. ........................

iii) When consent is obtained by coercion, the contract is void. .: ....................

iv) A threat to commit suicide amounts to coercion ...............

v) Undue influence involves use of moral pressure ..............

vi) There is a presumption of undue influence in the relationship of creditor and debtor. ...................................................................................

vii) Undue influence can be exercised only by a party to the contract. ..............

viii) When a person positively asserts that a fact is true when his information does not warrant it to be so, though he believes it to be true, there is misrepresentation.

ix) A contract induced by fraud is voidable at the option of either party to the contract.

x) A mere attempt to deceive is fraud whether the other party has been deceived or not.

xi) Mere silence as to facts likely to affect the willingness of a person to enter into a contract is not fraud.

xii) If there is no damage, there is no fraud.

xiii) The aggrieved party in case of active fraud loses the right to rescind the contract if he had the means of discovering the truth by ordinary diligence.

## •      SHORT ANSWER QUESTIONS

**1)** Define consent.

**2)** When is consent said to be free?

**3)** What is coercion ?

4) Define 'Fraud'.

5) What is 'Misrepresentation'?

## LONG ANSWER QUESTIONS

1. Define Consent. When Consent is said to be free?
2. What is the effect of coercion on the validity of the contract?
3. Define fraud and point out its effects on the validity of the contract.
4. Mere silence as to facts is not fraud". Explain with examples.
5. Distinguish between :
    i) Coercion and undue influence
    ii) Fraud and Misrepresentation

## ANSWER KEY

i) True, ii) False, iii) False, iv) True, **v)** True, vi) False,
vii) True viii)  True, ix) False, x) False, xi) True, xii) True, xiii) False

## **2.12    LEGALITY OF OBJECT AND CONSIDERATION**

Section 23 of the Indian Contract Act, 1872 specifies three issues, for example, consideration for the agreement, the object of the agreement and the agreement in essence. The word ‒Object‖ used in Section 23 indicates and signifies ‒purpose‖ and doesn't imply importance in a similar sense as ‒consideration‖. Therefore, despite the fact that the consideration of an agreement might be legal and genuine, that won't stop the agreement from being unlawful if the purpose (object) of the agreement is illicit.

For a contract to be a valid contract two things are absolutely essential – lawful object and lawful consideration. So the Indian Contract Act, 1872 gives us the parameters that make up such lawful consideration and objects of a contract. Let us take a look at the legality of object and consideration of a contract.

### LAWFUL CONSIDERATION AND LAWFUL OBJECT

Section 23 of the Indian Contract Act clearly states that the consideration and/or object of a contract are considered lawful consideration and/or object unless they are

- specifically forbidden by law
- of such a nature that they would defeat the purpose of the law
- are fraudulent
- involve injury to any other person or property
- the courts regard them as immoral
- are opposed to public policy.

### 2.12.1 AGREEMENTS OPPOSED TO PUBLIC POLICY

Certain types of agreements are harmful to Society. Such agreements are called agreements opposed to public policy. Such agreements are declared as Void by Status. The following are the agreements opposed to public policy.

- Agreements in Restraint of Trade
- Agreements in Restraint of Marriage
- Agreements in Restraint of Personal Freedom
- Agreements in Restraint of Parental Rights
- Agreements with regard to Compromise of offence
- Agreements with regard to sale of Public Offices and Titles
- Agreements with Alien Enemy
- Agreements based on Bribes
- Agreements to form Monopoly
- Agreement to Commit a Crime
- Agreements to defraud Creditors

- Agreements to defraud Government

## 2.13 VOID AGREEMENTS

The Indian Contract Act, 1872 defines a void agreement as ‒an agreement that is not enforceable by law‖. There can be many times of void agreements, some of which we have covered in the previous articles. But the contract states certain agreements that are expressly declared as void agreements.

### 2.13.1 AGREEMENT IN RESTRAINT OF MARRIAGE

Any agreement that restrains the marriage of a major (adult) is a void agreement. This does not apply to minors. But if an adult agrees for some consideration not to marry, such an agreement is expressly a void agreement according to the contract act.

e.g. A agrees that if B pays him ₹50,000/- he will not marry such an agreement is a void agreement.

### 2.13.2 AGREEMENT IN RESTRAINT OF TRADE

An agreement by which any person is restrained from plying a trade or practicing a legal profession or exercising a business of any kind is an expressly void agreement. Such an agreement violates the constitutional rights of a person. However, there are a few exceptions to this rule. If a person sells his business along with the goodwill then the buyer can ask the seller to refrain from practicing the same business at the local limits. So if according to such an agreement as long as the buyer or his successor carries on such a business the agreement to restrain the trade of the seller will be valid.

One point to keep in mind regarding the above agreements is that the terms of such an agreement have to be reasonable. Such reasonable terms are not defined under the act but are to be judged according to each unique situation and circumstance.

For example the case of physician A who employs B as his assistant for three years. For this duration of three years, B agrees not to practice medicine anywhere else. This is a valid agreement even though it is in restraint of trade.

But A a lawyer sells his legal practice to B along with the goodwill. And A agrees never to practice as a lawyer anywhere in the state for the next 20 years. This is not a valid agreement since the terms are completely unreasonable.

### 2.13.3 AGREEMENT IN RESTRAINT OF LEGAL PROCEEDINGS

An agreement that prevents one party from enforcing his legal rights under a contract through the legal process (of courts, arbitration, etc) then such an agreement is expressly void agreement. However, there are exceptions like, if the agreement states that any dispute between parties will be referred to arbitration and the amount awarded in such arbitration will be final will be a valid contract. Also if the parties agree that any dispute between them in the present or the future will be referred to arbitration, then such an agreement is also valid. But such a contract has to be in writing.

## 2.14 UNCERTAIN AGREEMENTS

An agreement whose meaning is uncertain cannot be a valid agreement, it is a void agreement. If the essential meaning of the contract is not assured, obviously the contract cannot go ahead. But if such uncertainty can be removed, then the contract becomes valid.

Say for example A agrees to sell to B 100 kg of fruit. This is a void contract since what type of fruit is not mentioned. But if A exclusively sells only oranges then the agreement would be valid because the meaning would now be certain.

## 2.15 WAGERING AGREEMENTS

According to the Indian Contract Act, an agreement to wager is a void agreement. The basis of a wager is that the agreement depends on the happening or non-happening of an uncertain event. Here each side would either win or lose money depending on the outcome of such an uncertain event.

The essentials of a wagering agreement are as follows. If all elements are met then the agreement will be void.

- Must contain a promise to pay money or money's worth.
- Is conditional on the happening or non-happening of a certain event.
- The event must be uncertain. Neither party can have any control over it.
- Must be the common intention to bet at the time of making the agreement.
- Parties should have no other interest other than the stake of the bet.

The following agreements are not considered wagering agreements,

i. Chit Fund
ii. Commercial Transactions, i.e. Transactions of the Share Market.
iii. Athletic Competition and Competitions involving Skills
iv. Insurance Contracts

## 2.16 AGREEMENTS TO DO IMPOSSIBLE ACTS

Section 56 of Indian Contract Act, 1872 defines an agreement to do an act impossible in itself is void. Contract to do act afterwards becoming impossible or unlawful: A contract to do an act which, after the contract is made, becomes impossible or, by reason of some event which the promisor could not prevent, unlawful, becomes void when the act becomes impossible or unlawful.

Compensation for loss through non-performance of act known to be impossible or unlawful: Where one person has promised to be something which he knew or, with reasonable diligence, might have known, and which the promisee did not know to be impossible or unlawful, such promisor must make compensation to such promisee for any loss which such promisee sustains through the non-performance of the promise.

e.g. A contracts to act at a theatre for six months in a consideration of a sum paid in advance by B. On several occasions A is too ill to act. The contract to act on those occasions becomes void.

Section 56, the following conditions must be filled for agreements to do impossible acts:

- There should be a valid and subsisting contract between the parties,
- There must be some part of the contract yet to be performed,
- The contract after it is entered becomes impossible to be performed,
- The impossibility is by reason of some events which the promisor could not prevent, and
- The impossibility is not induced by the promisor or due to his negligence.

## 2.17 CONTINGENT CONTRACTS

Under Section 31 of the Indian Contract Act, 1872 contingent contracts are defined as follows: ‖If two or more parties enter into a contract to do or not do something, if an event which is collateral to the contract does or does not happen, then it is a contingent contract.‖
e.g. Ankur is a private insurer and enters into a contract with Jayanth for fire insurance of Jayanth's house. According to the terms, Ankur agrees to pay Jayanth an amount of ₹5 lakh if his house is burnt against an annual premium of ₹ 5,000. This is a contingent contract.

## ESSENTIALS OF CONTINGENT CONTRACTS

- Depends on happening or non-happening of a certain event.

- The event is collateral to the contract.

- The event should not be a mere will of the promisor.

- The event should be uncertain.

### 2.17.1 RULES REGARDING ENFORCEMENT OF CONTINGENT CONTRACTS

Sections 32 to 36 of the Indian Contract Act, 1872, list certain rules for the enforcement of a contingent contract.

- **RULE 1 – CONTRACTS CONTINGENT ON THE HAPPENING OF AN EVENT**

A contingent contract might be based on the happening of an uncertain future event. In such cases, the promisor is liable to do or not do something if the event happens. However, the contract cannot be enforced by law unless the event takes place. If the happening of the event becomes impossible, then the contingent contract is void. This rule is specified in Section 32 of the Indian Contract Act, 1872.

e.g. Parekh promises to pay Johan ₹ 50,000 if he can marry Julia, the prettiest girl in the neighborhood. This is a contingent contract. Unfortunately, Julia dies in a car accident. Since the happening of the event is no longer possible, the contract is void.

- **RULE 2 – CONTRACTS CONTINGENT ON AN EVENT NOT HAPPENING**

A contingent contract might be based on the non-happening of an uncertain future event. In such cases, the promisor is liable to do or not do something if the event does not happen. However, the contract cannot be enforced by law unless happening of the event becomes impossible. If the event takes place, then the contingent contract is void. This rule is specified in Section 33 of the Indian Contract Act, 1872.

Rajeev promises to pay Sumesh ₹ 50,000 if the ship named Titanic which leaves on a dangerous mission does not return. This is a contingent contract. This contract is enforceable by law if the ship sinks making its return impossible. On the other hand, if the ship returns, then the contract is void.

- **RULE 3 – CONTRACTS CONTINGENT ON THE CONDUCT OF A LIVING PERSON WHO DOES SOMETHING TO MAKE THE EVENT OR CONDUCT AS IMPOSSIBLE OF HAPPENING**

Section 34 of the Indian Contract Act, 1872 states that if a contract is a contingent upon how a person will act at a future time, then the event is considered impossible when the person does anything which makes it impossible for the event to happen.

Rajeev promises to pay Sumesh ₹ 5,000 if he marries Julia. However, Julia marries Oliver. Julia's act thus renders the event of Sumesh marrying her impossible. (A divorce is still possible though but the happening of the event is considered impossible.)

- **RULE 4 – CONTRACTS CONTINGENT ON AN EVENT HAPPENING WITHIN A SPECIFIC TIME**

There can be a contingent contract wherein a party promises to do or not do something if a future uncertain event happens within a fixed time. Such a contract is void if the event does not happen and the time lapses. It is also void if before the time fixed, the happening of the event becomes impossible. This rule is specified in Section 35 of the Indian Contract Act, 1872.

Rajeev promises to pay Sumesh ₹ 5,000 if the ship named Titanic which leaves on a dangerous mission returns before June 01, 2019. This contract is enforceable by law if the ship returns within the fixed time. On the other hand, if the ship sinks, then the contract is void.

- **RULE 5 – CONTRACTS CONTINGENT ON AN EVENT NOT HAPPENING WITHIN A SPECIFIC TIME**

Contingent contracts might be based on the non-happening of an uncertain future event within a fixed time. In such cases, the promisor is liable to do or not do something if the event does not happen within the said time. The contract can be enforced by law if the fixed time has expired and the event has not happened before the expiry of the time. Also, if it becomes certain that the event will not happen before the time has expired, then it can be enforced by law. This rule is specified in Section 35 of the Indian Contract Act, 1872.

Rajeev promises to pay Sumesh ₹ 5,000 if the ship named Titanic which leaves on a dangerous mission does not return before June 01, 2019. This contract is enforceable by law if the ship does not return within the fixed time. Also, if the ship sinks or is burnt, the contract is enforced by law since the return is not possible.

- **RULE 6 – CONTRACTS CONTINGENT ON AN IMPOSSIBLE EVENT**

If a contingent contract is based on the happening or non-happening of an impossible event, then such a contract is void. This is regardless of the fact if the parties to the contract are aware of the impossibility or not. This rule is specified in Section 36 of the Indian Contract Act, 1872.

Rajeev promises to pay Sumesh ₹ 50,000 if the sun rises in the west the next morning. This contract is void since the happening of the event is impossible.

## 2.17.2 DIFFERENCE BETWEEN A CONTINGENT CONTRACT AND A WAGERING AGREEMENT

| | Factors | Contingent Contract | Wagering Agreement |
|---|---|---|---|
| 1. | Meaning | It is a contract to do or not to do something with reference to a collateral event happening or not happening. | It is a promise to give money or money's worth with reference to an uncertain event happening or not happening. |
| 2. | Reciprocal promises | It may not contain reciprocal promises. | It consists of reciprocal promises. |
| 3. | Uncertain event | The event is collateral. | The uncertain event is the core factor |
| 4. | Nature of contract | Contingent contract may not be wagering in nature. | A wagering agreement is essentially contingent in nature. |
| 5. | Interest of parties | Contracting parties has interest in the subject matter in a contingent contract. | The contracting parties have no interest in the subject matter. |
| 6. | Mutuality of loss and gain | Contingent contract is not based on the doctrine of mutuality of loss and gain. | A wagering contract is a game, losing and gaining alone matters. |
| 7. | Effect of contract | Contingent contract is valid. | A wagering agreement is void. |

## CHECK YOUR PROGRESS 3

Are the following contracts valid and enforceable by law?
i) A contracts to pay B Rs. 10,000 if B's house is burnt.
*ii)* A contracts with B to buy B's horse ifA survives *C.*
iii) A ,agrees to pay B Rs, t0,000, if he makes two parallel lines meet.

- **SHORT ANSWER QUESTIONS**
- What is Wagering agreements?
- Explain contingent contracts.
- **LONG ANSWER QUESTIONS**
  - "An agreement in restraint' of trade is void". Examine this statement mentioning exceptions, if any.
- Discuss the law regarding wagering agreements under the Indian Contract Act.

**ANSWER KEYS**
i)Yes    ii) Yes   iii) No, restraint of trade

**LET US SUM UP**

For a valid contract, capacity to contract is an essential element. The person incompetent to contract like minor, unsound mind and persons disqualified by law are not eligible to contract and contract with such type of person is unenforceable by law. Not only that, an agreement with a minor cannot be ratified even after he attains majority. He cannot become partner in a firm but can be admitted to the benefits of the firm. He can, however, become a shareholder in a company provided the shares held by him are fully paid up and the articles of association do not prohibit it. A person is said to be of a sound mind if, at the time of contracting, he is capable of understanding the terms of the contract and of forming a rational judgement as to its effects upon his interests. The consideration or object of a contract shall be unlawful where: i) it is forbidden by law, ii) if permitted would defeat the provisions of any law, iii) it is fraudulent, iv) it involves or implies injury to the person or property of another, and v) the court regards it as immoral, or opposed to public policy.

**KEY WORDS**

**ALIEN**: A resident of a foreign country.
**CONVICT**: A person found guilty of an offence.
**IDIOT:** A person so mentally deficient by birth as to be incapable of ordinary reasoning or rational conduct.
**LUNATIC**: A person affected by lunacy or of an unsound mind. A person can become lunatic at any stage of his life.
**MINOR**: A person who has not attained the age of 18 years (21 years in some situations).
**AGGRIEVED PARTY**: The party to an agreement whose consent is not free.
**BILATERAL MISTAKE**: Where both the contracting parties are working under common mistake.
**COERCION**: Threatening to commit any act forbidden by the Indian.
Penal Code or detaining or threatening to detain any property of another to his prejudice with the intention of causing him to enter into an agreement.
**FREE CONSENT**: Consent to an agreement without influence or pressure of any type.
**FRAUD**: A false representation made wilfully with a view to deceive the other party.

**MISREPRESENTATION**: **A** false representation made innocently, without any intention to deceive the other party

**NECESSARIES**: Items necessary for living suitable to the condition in life of an individual and to his actual requirement at the time of sale and delivery.

**VOID-AB-INITIO**: Void from the beginning.

**COLLATERAL TRANSACTION**: A transaction which is helping or subsidiary to the main transaction.

 **PRIMA FACIE**: Latin expression which means on the face of it.

**TRIBUNALS**: Courts and other judicial machinery., Void-ab-initio: Latin expression which means unenforceable from the beginning.

## TERMINAL QUESTIONS

1) Who is competent to contract? State the position of contracts with a minor.

2) What shall be the effect on a contract where a minor, a party to the contract, is guilty of deliberate misrepresentation with regard to his age.

3) What are necessaries? When is a minor liable on **a** contract for necessaries?

4) Examine the legal position of (i) a minor as a promisee, (ii) a minor as an agent.

5) Name persons who are treated as persons of unsound mind. State the legal positions of contracts with such persons.

6) Enumerate persons forbidden under other laws for the time being in force and

state the legal position of the contracts with them.

Define fraud and point out its effects on the validity of the contract.

7) "Mere silence as to facts is not fraud". Explain with examples.

8) Distinguish between :

i) Coercion and undue influence

ii) Fraud and Misrepresentation

9) Define mistake and explain various types of mistakes.

10) Explain  and illustrate the effect of a 'mistake of fact' on contracts:

11) On whom 'the burden of proof lie in case of undue influence? State the cases

in which undue influence is presumed.

## WEB LINKS

https://www.indiacode.nic.in/bitstream/123456789/2187/1/A1872-9.pdf

https://www.taxmanagementindia.com/visitor/detail_act.asp?ID=7165

https://www.advocatekhoj.com/library/bareacts/indiancontract/238.php

https://kanooniyat.com/2021/01/free-consent-elements-vitiating-freeconsent/

https://www.ourlegalworld.com/capacity-to-contract-under-indian-contract-act-1872/

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Kuchhal, M.C. 1989. Merantile Law, Vikas Publishing House, Private Limited, New Delhi

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# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

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**UNIT 3 DISCHARGE OF CONTRACT, REMEDIES FOR BREACH OF CONTRACT, CONTINGENT AND QUASI CONTRACTS**

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**Discharge of Contract**
**STRUCTURE**

3.0 Learning Outcomes

3.1 Introduction

3.2 Discharge of Contract

3.3 Methods of Discharge of Contract

    3.3.1By performance (Section 37-67)

    3.3.2   By agreement (Section 62-67)

    3.3.3   By impossibility of performance (Section 56)

    3.3.4    Lapse of time

    3.3.5    Operation of Law

    3.3.6    Breach of contract (Section 39)

  SAQ 1

3.4  Breach of Contract

3.4.1  Meaning

3.5  Remedies for Breach of Contract

3.5.1  Rescission

3.5.2  Damages

3.5.3  Quantum Meruit

3.5.4  Specific Performance

3.5.5  Injunction

  SAQ 2

3.6  Quasi Contracts

3.6.1  Introduction

3.6.2  Types of Quasi Contracts

  SAQ 3

3.7  Contingent Contracts

### 3.0 LEARNING OUTCOMES:
  **After reading this unit, the learner should be able to:**
1. **What is Discharge of Contract?**
2. **What is Breach of Contract**
3. **Enlist the remedies in case of breach of contract**
4. **Define quasi contracts and describe various types of Quasi contracts**
5. **Define Contingent contracts**
6. **Understand the basic purpose of remedies**


### 3.1 INTRODUCTION:
When all the obligations related to a contract come to an end then it is said to be discharged. In other words, discharge of contract means all the contractual relations between the parties is terminated. There are various modes of discharge of contract. It is either in positive way i.e., by performance or negative by breach or failure to perform contractual obligation by either of the parties.


### 3.2 DISCHARGE OF CONTRACT:
It refers to the way in which contract comes to as end. Contract comes into existence when both the parties give assent and are ready to perform their contractual obligations. When the parties to contract leave the contract, it is called discharge of contract. It means two or more than two parties form a contract by framing different rules and regulations and thereafter, if any of the parties to contract do not obey or follow the set rules, contract would be in a condition of discharge.


### 3.3 METHODS OF DISCHARGE OF CONTRACT:

**3.3.1) DISCHARGE BY PERFORMANCE:** When parties to contract perform their promises then contract is said to be discharged in a natural mode, i.e., discharge by performance. If only one of the concerned parties perform his part of his promise, then he is said to be discharged from the contract. He can take action against other party who is guilty

of breaching the contract. For example; two parties P and Q make a contract to build a mall in a city. P is the municipal authority of the city and Q is the construction company. Due to unavoidable reasons, the contract dets discharged. Therefore, both the parties are free from the obligations of contract, i.e., the rights and obligations of the parties come to an end.

Performance may be of two types:

- Actual performance
- Attempted performance

a) Actual performance: when all the concerned parties related to contract complete the contract according to the terms of agreement, then contract is said to be discharged by performance. For example; T and S entered into a contract to build a railway bridge. S builds the bridge in the prescribed manner and T provides the consideration to S. Both the parties performed their obligations and rights. Contract comes to an end by the performance.

b) Attempted performance or Tender: tender being not an actual performance is only an offer to perform the obligation in the contract. When the promisor offers to perform his obligation, but the promisee refuses to accept the performance, tender is identical to actual performance, except in case of tender of money. The effect of a valid tender is that the contract is considered to have been performed.

**3.3.2) DISCHARGE BY AGREEMENT:** It is the agreement between the parties which creates a legal binding between them; therefore, contract can be discharged by having further agreement. It can be said that contractual obligation may be discharged by creating an agreement which can be expressed or implied.

There may be cases of discharge of contract by mutual agreement dealt in sections 62 and 63.

a) **NOVATION:** It means substituting the legal prevailing contract with a new contract and the transfer is mutually agreed upon by the concerned parties to the contract. In case of novation the original contract becomes void. Section 62 of Indian Contract Act, 1872 states that ‒if the parties to the contract agree to substitute a new contract for it or to rescind it or alter it, the original contract need not to be performed.‖ Novation takes place if, new contract has been substituted between one of the same parties of the contract with the third party on same terms. The contract is withdrawn in terms of consideration. For example; a creditor on the request of a debtor agrees to take another person as his debtor in place of the original debtor. Consideration is the means to discharge the old contract. Novation should take place before time lapses for the performance of original contract otherwise it would be breach of contract.

b) **RECISSION:** Recission means all or some of the terms of the contract are cancelled and parties to contract may decide not to enter into new contract to replace the original contract. Promise of performing the contract is not demanded from each other.

It may be:

(i) by mutual consent of the parties concerned

(ii) when one of the parties to contract fails to perform his obligation and another party may revoke the contract without claiming compensation for breach of contract. e.g., Amrita and Bhavya enter into a contract that Amrita will deliver the goods to Bhavya on 15<sup>th</sup> April, 2021 and Bhavya will pay the price on May 1, 2021. Amrita does not supply the goods. Bhavya can revoke the contract and need not to pay the price.

Recission of contract can be partial or total. Total recission means contract is discharged entirely and partial recission means that original contract will be replaced with some variations either by withdrawing some of the terms of the contract or by replacing new terms in the original contract or by adding new terms without revoking the original contract.

c) **ALTERATION:** One or more of the terms of the original can be altered by mutual agreement of the parties concerned to the contract. In this case original contract is discharged. For example: Madhuri enters into a contract with Disha to deliver 100 meters of white cotton at her boutique next month. Both may alter the terms of the contract by mutual consent.

d) **REMISSION:** Remission means accepting of lesser fulfilment of promise, it means giving concession. For example; paying 80% of the debt in discharge of 100% debt. It is not necessary that consideration will be considered for remission time can also be extended to perform the contract. For example; P encourages B to enter

e) **WAIVER:** When parties to contract agree to that there is no longer any contract or agreement between them, it is called discharge of contract by mutual consent. For example; X promises to paint a picture for Z. Z afterwards prohibits him to do so. X is no longer bound to perform the promise.

f) **MERGER:** Merger takes place when inferior rights accumulating to a party in contract mergers into a superior right to the same party under the same contract or same another contract.

**3.3.3) DISCHARGE BY IMPOSSIBILITY OF PERFORMANCE:** After the establishment of the contract, sometimes, though not because of anybody's fault performance of contract becomes impossible, or illegal, or fundamentally different from the original one.

However, if whatsoever happens to prevent the performance of the contract

a) has not been caused by either of the parties to contract,

b) could not have been foreseen, and

c) its effect could destroy the origin of the contract,

Court will state that performance of the contract has become impossible because of the death or incapacity of the parties to contract or main subject matter of the contract has been destroyed or change in the contract renders the performance of the contract illegal. The performance of the contract becomes impossible and contract is said to be discharged.

For example; X promises Q to sell his pet on June 1<sup>st</sup>, 2021 but before that day, the pet dies. Now it is impossible to fulfill the performance due to impossibility of performance. Such

impossibilities in which at the time of contract, contract was capable of being performed, but subsequently, its performance becomes impossible, it is called ‒Supervening Impossibility.‖

**3.3.4) DISCHARGE BY LAPSE OF TIME:** The contract must be performed within a specified period, called period of limitation. If the promisee on non-performance of contract does not take action within time, cannot claim for remedy. It can be said that contract is terminated. For example: if goods sold on credit to be paid within three years and expiry of fixed period of credit would make the debt time-barred and hence declared as irrecoverable.

For example; the period of limitation to file a money suit is 3 years. If within 3 years the creditor fails to file the suit to recover his amount, the debtor is discharged.

**3.3.5) DISCHARGE BY OPERATION OF LAW:** A contract may be discharged at the wish of the parties to contract, by operation of law. It includes discharge:

**a) BY DEATH:** A contract may be terminated on the death of the person concerned (promisor) if the contract is based upon his personal skill or liability. Otherwise, rights and obligations of the deceased promisor pass on to the legal beneficiaries of the departed person.

**b) BY INSOLVENCY:** If one of the parties to contract is adjudged insolvent, then he is discharged from the obligations of the contract incurred prior to his clearing of insolvency.

**c) BY UNAUTHORIZED ALTERATION IN THE TERMS OF A WRITTEN AGREEMENT:** If any of the practices to contract makes any material alteration in the contract with the consent of all the parties concerned, the contract becomes void if material alteration made has changed the legal character of the contract. Immaterial alteration does not lead to discharge of contract.

**d) BY RIGHTS AND LIABILITIES BECOMING VESTED IN THE SAME PERSON:** When the rights and liabilities in a contract vest in the same person the contract is discharged for other parties.

**3.3.6) DISCHARGE BY BREACH OF CONTRACT:** When obligation related to contract has not been fulfilled it is called breach of contract. Breach can be done by not fulfilling contractual obligations without any lawful excuse.

Breach can be of two parts:

**i)      ACTUAL BREACH OF CONTRACT:**

- It may take place at the time when actual performance of contract is due and one of the parties to contract refuses or fails to perform his obligations under the contract. For example; X agrees to deliver 5 bags of rice to Z on Jan 1st. He fails to do so. There is a breach of contract by A.

- It may take place during the performance of the contract and one of the parties to contract refuses to perform his obligation. Refusal can be expressed or implied. When one of the concerned parties to contract personally refuses by his words to continue the contract, the contract is said to be discharged. And on the other hand, when party to contract make the

performance of the contract impossible, then only it effects to the breach of contract and other party is discharged from the contract.

ii) **ANTICIPATORY BREACH OF CONTRACT**: Anticipatory breach: when the party concerned to the contract asserts his intention of non-performance of the contract before the due date of the contract either by

- particularly abandoning his obligation under the contract, or
- enacting through his performance so as his promise becomes impossible.

For example; X promises to sell his house to B on before 1$^{st}$ May, 2021. X sells his house to Z. Here X performed such a voluntary act that the performance of his obligation towards B is impossible and Anticipatory Breach by impossibility is committed.

The aggrieved party has the right in case of attempted breach either by treating the contract as discharged, or can take immediate legal action against breach of contractor could wait till the time the act was to be done.

He can expressly revoke the contract or by doing an act which makes the performance of the contract impossible. It does not necessarily discharge the contract until promisee to the contract chooses to do so. If he does so, then promisor may perform the contractual obligations. And if contract is alive and happening of a particular event discharges the contract on legal terms then promisor may take an advantage to discharge the contract. The promisee loses his right to be compensated. If contract is kept alive till the date of performance of contractual obligations of the contract, the damages will be the difference between price presently prevailing on the date of performance and the contract price.

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**SAQ 1**
**STATE WHETHER FOLLOWING STATEMENTS ARE TRUE OR FALSE**

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**i)** If only one party to a contract performs his promise, the contract is discharged.

**ii)** In case of anticipatory breach, the promisee has to wait till the time the act was to be done to take legal action for breach of contract.

**iii)** When all or some of the terms of a contract are altered, rescission takes place.

**iv)** Novation means substitution of a new contract for an old one.

**FILL IN THE BLANKS:**

i) As long as all terms have been carried out properly and completely, the contract is discharged by_____.

ii) A court's award that reimburses a buyer for reasonable expenses when the seller has breached a contract is_____damages.

iii) After reaching the age of majority, a person may _____ a contract made during minority by using, selling, or keeping the item, or by making payments.

iv) _____occurs when one party to a contract does not do what he or she agreed to do.

v) People sometimes enter into_____contracts without saying a word.

### 3.4 BREACH OF CONTRACT:

**3.4.1 MEANING:**

When a promisor does not observe the contractual obligation or he fails to perform the contract, it is called breach of contract. Where there is a right, there is a remedy. When either of the parties to contract breaches the contract, it gives the right to aggrieved party to sue him for remedy.

Contract gives correlative right and obligations if one of the party of parties to contract breaches the contract then the aggrieved party has right to get remedy. Remedy is given by law to the person who bears the loss. It is a means given to enforce the right to get compensated.

### 3.5 REMEDIES FOR BREACH OF CONTRACT:

There are many remedies which injured party can use to get compensation. Following are some of the remedies:

**3.5.1 RESCISSION:** One of the parties to a contract which has been discharged by breach of contract may sue to repeal the contract and further refuse to performance. In such situation, he is free from all the obligations of the contract.

Example: X promises to Amrita to supply 20 bales of cotton on a certain day. Amrita agreed to pay the price after the receipt of the cotton. X doesn't supply cotton. Amrita is discharged from the liability to pay. The court may grant rescission if contract is voidable and moreover if the contract is unlawful.

**3.5.2 DAMAGES:** Monetary compensation allowed to the aggrieved party by the court for the injury suffered by him by breach of contract is known as damages. The object behind rewarding the damages to the injured party is to put him in a position as if he had not been injured. It is called doctrine of restitution. The foundation of modern law of damages, both in India and England has been found in the judgement in the case of Hadley vs. Baxendale, (1854). The main facts of the case were: X's mill was stopped by the breakdown of a shaft. Shaft was sent to a manufacturer through a common carrier, Y, to copy it to make a new one and did not tell Y that delay would lead to loss in profits. Because of negligence of Y shaft's delivery was delayed in transit beyond the reasonable time. Y was not entitled to loss of profits as he was not prior conveyed that delay would lead to loss of profits to mill. Section 73 of Contract Act which deals with compensation of loss caused by breach of contract is based on the judgement of the above case.

When a contract has been broken the aggrieved party is entitled to:
- the damages which arose in usual course of things from such breach. It related to ordinary damages
- such damages which were known to the parties when they entered into the contract, to be likely to result from the breach, called special damages. But:

- such compensation should not be given for any indirect loss sustained by reason of the breach; and
- such compensation for damages arising from breach of a quasi-contract shall be same as in any other contract.

The rules relating to damages are as:

a) **ORDINARY DAMAGES ARISING NATURALLY**: Ordinary damages are proximate consequences of the breach of contract. When contract is discharged in breach of contract, then the aggrieved party can recover the compensation from the other party which arose naturally in the usual course of things from the breach.
Example: X promises to sell and deliver 100 quintals of wheat to Amit at Rs 775 per quintal, price to be paid at the time of delivery. But price rises to Rs 800 per quintal and X refuses to sell the wheat. Amit can claim the damages @ Rs 25 per quintal.

b) **SPECIAL DAMAGES:** Damages which cannot be claimed as a matter of right are called special damages. These can be claimed when special circumstances occur because of special loss in case of breach and are brought into the notice of the other party.

c) **EXEMPLARY DAMAGES**: There are the damages given in the form of compensation for the loss suffered and not by way of punishment. These damages have no place in law such as breach of a promise to marry.

d) **NOMINAL DAMAGES:** When the injured party has not in fact injured by breach of contract or the damages are very small.

e) **DAMAGES FOR LOSS OF REPUTATION**: When breach of contract damages the reputation and is generally irrecoverable.
**EXAMPLE:** If banker wrongfully refuses to honor a customer cheque which otherwise is bonafide.

f) **DAMAGES FOR DISCOMFORT:** - Damages may be recovered for the physical discomfort and are measured but no affected the motive of the breach.

g) **MITIGATION:** Aggrieved party cannot claim the compensation which is not because of breach of contract but due to his own negligence to mitigate the loss after breach of contract.

h) **DIFFICULT TO ACCESS:** Though the damages which cannot be assessed and recovered but precession does not prevent the aggrieved party from recovery then the court's decision to estimate the loss may be taken into account.

i) **COST OF DECREE:** The aggrieved party is entitled to get the cost of getting decree for damages. Cost for suit for damages is in the discretion of court.

j) **DAMAGES AGREED UPON IN ADVANCE OF BREACH:** If amount to be paid in case of breach is mentioned in the contract the injured party would be recovering the reasonable amount as compensation not exceeding the amount mentioned in contract.

**QUANTUM MERUIT:** Literally meaning of Quantum Meruit is ‒as much as earned' or in proportion to work done‖. When one of the parties to contract has per formed a part his contractual obligation and the contract has been discharged because of the default of other

party and contract has become void. The remedy is not an original contract but it is an implied promise made by other party to pay for what has been done or not on the original contract which has been discharged.

**3.5.3 SPECIFIC PERFORMANCE:** In some of the situations of breach of contract, many a times money is not an adequate remedy. Rather, court may in such cases, ask for the party in breach to perform his promise according to the terms of the contract. Here court gives specific performance.

There are many cases where court can ask the party in breach to perform the contractual obligation. Only specific performances are granted:

a) Where compensation in monetary terms or the non-performance of the contract is not adequate relief.
b) When actual damages cannot be ascertained.
c) When aggrieved party probably would not get the compensation for non-performance of the contract.
    There are some cases where specific performance is not granted:
a) Where damages are adequate remedy.
b) Where contract is inadequate to all the parties to contract.
c) Contract is revocable in nature.
d) Where trustees made the contract in breach of the trust.
e) Where contract is personal in nature.
f) Where contract made by the company in excess of its powers mentioned in Memorandum of Association and
g) Where court cannot supervise it carrying out.

**3.5.4 INJUNCTION:** When breach of contract is in negative terms of the contract then court may, restrain the concerned party to do what he promised not to do. Such an order is called injunction
Example: Anita, a dancer, agreed to perform for Sony' TV exclusively for a year and nowhere else. During the year she made a contract to act in Dubai. She was restrained by injunction from doing so.

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**SAQ 2**

**STATE WHETHER FOLLOWING STATEMENTS ARE TRUE OR FALSE**

a) The most common remedy for a breach of contract is an award of equitable remedies.
b) Substantial performance occurs when there has been a material breach of contract.
c) A material breach of a contract occurs when a party renders inferior performance of his or her contractual obligations that impairs or destroys the essence of the contract.
d) If a contract has been breached, the law places a duty on the innocent non-breaching party to make reasonable efforts to mitigate the resulting damages.
e) Where there is a right, there is a remedy.

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**FILL IN THE BLANKS:**

a) The rule on special damages was for the first time laid down in the case of. .....................
b) The measure of ordinary damages is the difference between. ........ .price . and the. ..............price.
c) Specific performance of a contract will not be granted where the contract is of a.. ...................
d) Quantum Meruit means................
e) Actual breach of a contract may take place (a) at the time when performance is due, or (b). ......

## 3.6  QUASI CONTRACTS

### 3.6.1 INTRODUCTION:

In a train, if a shoe shiner comes to you and without saying starts polishing your shoes. When shoe-polish is done he asks for money. Whether you are obliged to pay the money? Or you would tell him, ―Did I ask you to polish my shoes anyway?‖

In another situation, if somebody's Amazon package with payment already done, is delivered at your doorstep. Will you be excited to get it by saying, ―Wow, free gift!‖ or you would make an effort to find out the real owner?

These are the situations in which certain obligations arise but  are not absolute contracts one or the other basic elements of the valid contract are missing. But these obligations are still enforceable. These obligations under Indian Contract Act are known as quasi contracts. Firstly, it should be noted that before contract, it is necessary that there must be  an agreement. No agreement no contract. But there are many uncommon situations where people are under some obligations but they do not have any agreement originally. These obligations are not known as contracts but are necessarily enforceable under law.

Quasi-contracts are based on the principle of ―Nemo debet locupletari ex aliena jactura*",* which means _No man should grow rich out of another person's loss. Therefore, liability in the case of quasi-contractual obligations is based on the principle of _unjust enrichment'. It essentially means that no man should get unjustly enriched at the cost of another person's loss. The term Quasi Contract is  derived  from  the  Roman Law *"Obligatio quasi ex contractu".* Quasi Contract is not real Contract entered into by parties intentionally. It resembles a contract in which law imposes on obligation on a person to perform an obligation on the ground of equity.

Quasi contracts are based on the principle of unfair enrichment. No man should grow rich out of another person's loss. Under quasi contracts, the liability arises on the principle named unfair enrichment. No one should earn unjustly. The origin of the quasi contracts does not lie in the offer and acceptance. Parties to quasi contracts do not enter into contract intentionally. Law imposes an obligation on the persons concerned on the ground of equity. These contracts are rather based on good concise, equity and justice.

According to Salmond, "There are certain obligations which are not in truth contractual in the sense of resting on agreement, but which the law treats as if they were."

For example: Amrita leaves her wristwatch at Jiya's house by mistake. Here Amrita has Quasi-contractual obligation to return it to Jiya.

### 3.6.2 TYPES OF QUASI CONTRACTS:

There are five kinds of contractual obligations which are identified as quasi contracts. Section 68 to Section 72 of the Indian Contract Act, 1872 deals with Five Kinds of Quasi-Contract which are as follows –

1. **SUPPLY OF NECESSARIES:** Person who provides necessaries to the persons or to his dependents, incompetent to contract can claim the price from that person's property. The claims and be compensated only if necessaries have been supplied. Supplies of luxuries cannot be claimed.

   For example: If Amit supplies necessaries to Ajay, an insane, or to his family to whom Ajay is liable to provide necessaries of life. In such situation Amit can claim the price of the goods supplied from the property of Amit. But Amit has to prove that the goods supplied were actually required by Ajay and his family. Supply of luxuries cannot be claimed.

2. **PAYMENT BY INTERESTED PERSON:** Person who has paid an amount of money for another person who is indebted to pay, is entitled to be reimbursed by the later provided that sum of money which has been paid by the former was to protect his own interest. But the payment made should be the protection of one's interest in a bonafide sense. It must not be paid by the former willingly and the later must be assured by the law to pay the said money under law. For example: the goods which belonged to Wasim were wrongfully delivered to Government in an order which were the arrears of the government's revenue due to Akram. Wasim paid the amount to save the goods from sale. It was held that Wasim was entitled to recover the amount from Wasim.

3. **OBLIGATION TO PAY FOR NON-GRATUITOUS ACTS:** When lawfully a person does something for another person or delivers some goods to him, not with gratitude and another person enjoys the benefits of the goods delivered to him, is bound to pay for those delivered goods as he restores the goods which are not delivered to him intentionally. But if the purpose of the person is to show gratitude towards another person to whom he helps and circumstances has shown that the former has been carrying a gesture of gratitude then no reward can be demanded. For example: Amrita leaves a packet of jewelry at Neelima's house by mistake, which she bought for her sister. Neelima treated that packet as a gift for her own from Amrita. But Neelima is bound to pay for the jewelry.

4. **RESPONSIBILITY OF FINDER OF GOODS:** A person, if finds the goods which otherwise belongs to another person and he takes the goods in his custody, should take care of the goods in his custody, should take care of the goods as he would have been taking care of his own goods. He should find the real owner of the goods. The finder can sell the goods in certain circumstances such as:

**a)** if goods found are of perishable nature

**b)** if by putting all possible efforts, owner cannot be found

**c)** if owner found, but refused to pay the charges to the finder and

**d)** If the lawful charges to be paid to the finder for the goods found are two-third of the value of the goods found.

**5) MISTAKE OR COERCION:** Person to whom goods have been delivered or money paid by mistake or under coercion should repay or return it to the person who has delivered or paid by mistake. For example: Rishi delivers goods to Mahira by mistake. It actually belongs to Mansi. Mahira must return the goods to Rishi. However, Mansi cannot recover the goods from Mahira as they do not carry privity to contract.

It can be said that quasi contracts are not contracts as per Indian Contract 1872 but obligations imposed by law and only in certain situations. Quasi contracts only creates obligation so that there is no unjust enrichment on one party.

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**SAQ 3**

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**STATE WHETHER FOLLOWING STATEMENTS ARE TRUE OR FALSE:**

a) Quasi contract is not a contract at all.

b) A finder of the lost goods can hold the goods against the whole world except the true owner.

c) Any person, who voluntarily makes a payment on behalf of another, can recover it.

d) A person to whom money has been paid by mistake or under coercion must repay or return it to the person who paid it by mistake.

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## 3.7  CONTINGENT CONTRACTS

### 3.7.1 INTRODUCTION:

A contract is known as absolute contract when promisor executes it without any condition whereas, where the contract is executed by the promisor with a certain condition met it is called as contingent contract. For example; Z enters into a contract with P to pay him ₹ 10,000 on delivery of hard disks. This is not a contingent contract as Z has an obligation to pay for an event that is part of contract but not a collateral contract.

Section 31 of the Indian Contract Act, 1872 defines the term contingent contract as follows: ‗A contingent contract is a contract to do or not to do something if some event collateral to such contract does or does not happen.'

Pollack and Mulla defined collateral event as ‒an event which is neither a performance directly promised as part of the contract, nor the whole of the consideration for a promise.

In simple words contingent contracts are the contracts in which the acceptor performs his obligation when certain conditions are met.

The essentials of the contingent contract are:

1) The performance of the contingent contract depends upon happening or non-happening of as event. For example: Vinay promises to pay Ajay ₹ 15,000 if the train reaches Delhi on time. This is a contingent event.

2) The collateral event attached to the contract must be uncertain. If event to be performed will be certain then contract will become due to be performed and then it is not a contingent contract. For example: Amrita promises to pay Deepali ₹ 10,000 if it rains in Punjab in the month of July. This does not constitute a contingent contract as in July, rains are certain in Punjab.

3) The event must not be the part of the contract. The event should be collateral to the contract. It cannot be the promise to be performed or must not be the consideration for a promise. For example: Anant enters into a contract with Ajay and promises him to deliver 10 LEDs to him. Ajay promises to pay him ₹ 1,50,000 on delivery. This is not a contingent contract as Ajay's obligation depends upon the event which is a part of the contract and not a secondary event.

4) The event must not be a will of the promisor. For example; Amit promises to pay Heena ₹ 50,000 if India wins the world cup 2018. This is not a contingent contract rather it is not a contract at all. Another example is Puneet promises to pay Anil ₹ 50,000 if he leaves Delhi for Singapore on August 16, 2019. This is a contingent contract. Going to Singapore can be Ajay's will but it is not merely his will.

### 3.7.2 RULES REGARDING CONTINGENT CONTRACTS:

1. Contingent contracts depend on the happening of an uncertain collateral event which cannot be enforced until unless the event has happened. Contract becomes void if that event becomes impossible.
2. Performance of a contingent contract depends on non-happening of a particular event.
3. If a specified uncertain event does not happen within a fixed time, it may be enforced if the event does not happen or becomes impossible to happen before the expiry of the time.
4. If the happening of the event becomes void whether or not the facts are known to the parties to contract.
5. If a contract is contingent on the behavior of a person at an unspecified period of time, the event become impossible that he should act within a definite period of time.

### 3.7.3 DIFFERENCE BETWEEN CONTINGENT CONTRACT AND A WAGERING CONTRACT

| Basis of Difference | Contingent Contract | Wagering Contract |
|---|---|---|
| **Meaning** | A contract in which enforceability depends upon to do or not to do | Promise to give money or money's worth for an uncertain |

| | something is called contingent contract. It is related to the happening or not happening of a collateral event. | event's happening is called a wagering agreement. |
|---|---|---|
| **Effect of Contract** | It is a valid contract. | It is void contract. |
| **Nature of Contract** | Contingent contract may or may not be a wagering contract. | A wagering contract is necessarily a contingent in nature. |
| **Uncertain Event** | The uncertain event is collateral in a contingent contract. | The uncertain event in a wagering agreement is a core factor. |
| **Interest of Contracting party** | In contingent contract, the parties to contract have interest in subject matter. | In wagering agreement, the parties to contract have no interest in subject matter. |
| **Reciprocal Promises** | Contingent contract may or may not have reciprocal promises. | Wagering agreements have reciprocal promises. |

## 3.8 CONCLUSION:

A contract is an agreement which is enforceable by law. For every contract, there should be an agreement which is made by the free consent of parties competent to contract, for a lawful consideration and with a lawful object. The agreement should not be declared void hereby to form a contract. Every contingent contract is a contract primarily. Like any other contract, it is also a contract to do or not to do something. It is not an absolute and unconditional one, without any reservations or conditions, which is to be performed under any event. Its performance is dependent on some event's happening or not happening- the contingency. The performance of the contract must be conditional. The said event must be collateral to such contracts and the event should not be at the discretion of the promisor. These are some rules that have to be followed for a contingent contract to be enforceable. For instance, on the happening of an event, on the event not happening and, on the event, not happening within a specified time. There are some situations when a contingent contract becomes void. Some of them are: the event being impossible, not happening of event within fixed time, agreements contingent on impossible events and on the conduct of a living person.

**TEST YOUR KNOWLEDGE:**

**VERY SHORT ANSWER QUESTIONS**

1. Write notes on:
   a) Anticipatory breach
   b) Rescission
   c) Quasi Contract
   d) Quantum Meruit
   e) Suit for Injunction

**SHORT ANSWER QUESTIONS**

1. Explain the anticipatory breach of contract.
2. Distinguish between general damages and special damages.
3. What are Quasi Contracts? Discuss its nature and kinds.
4. Define contingent contracts.
5. Distinguish between contingent contracts and wagering agreements.
6. Discuss the finder of goods?

## LONG ANSWER QUESTIONS:

1. What do you understand by anticipatory breach of contract'? State the legal position of the parties in such a case.

2 What are the rules under the Indian Contract Act for estimating the loss or damage arising from a breach of contract'?

3 What is 'Breach of Contract? What remedies are available to an aggrieved party on the breach of a contract?

4 "Compensation is not to be given for any indirect loss or damage sustained by reason of the breach of contract‖ Discuss.

5 Explain the terms 'Penalty' and 'Liquidated Damages' clearly indicating the difference between the two.

6 What are the Quasi contracts? Enumerate the type of such contracts dealt within the Indian Contract Act.

### SUGGESTED READINGS:

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# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

## UNIT 4 – SPECIAL CONTRACT – INDEMNITY, GUARANTEE, BAILMENT AND AGENCY

## STRUCTURE

## 4.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the Meaning of special contracts.
- Know the meaning of contract of indemnity.
- Describe the rights available to indemnity holder and indemnifier.
- Find out meaning of contact of guarantee.
- Appraise themselves about rights of surety and termination of the agency.
- Understand the difference between indemnity and guarantee.
- Define the meaning of contract of Bailment.
- Find the rights and duties of Bailor and Bailee of the contract.
- Understand the meaning of Bailee's Lien
- Contrast between general and particular lien.
- Explain the meaning of Agency
- Discuss the rights and duties of the Principal and Agents.
- Explain various methods of termination of the agency.

## 4. 1 INTRODUCTION:

      Indian contract act is one of the important act and may considered as mother of a number of other acts that take its basics from the Contract Act. This act deals with a

number of contracts. Broadly we can divide these contract in two categories i.e General Contracts that are covered in section 1 to 123 of the contract and special contracts that are been covered in  sections 124 to 238 of the Indian Contract Act. The term special contract here means that these section deals with specific types of contracts. These special contracts includes contract of Indemnity, Guarantee, Bailment, Pledge and contract of Agency. In this unit we will study all these special contracts one by one.

## 4.2 CONTRACT OF INDEMNITY (SECTION 124- 125)

The term indemnity is a special type of contract covered under the Indian Contract Act. Indemnity is a contract in which one person gives assurance to the other person that if there is some loss to him due to any event or any situation, person giving the assurance will compensate the person who has incurred the loss. Contract of Insurance can be one of the best example of contract of indemnity. In Insurance contract, insurance company gives assurance to policy holder that if there is some loss to policyholder, insurance company will compensate such loss.

### 4.2.1  DEFINITION (SECTION 124)
According to Sec. 124 of the Contract Act, the contract of indemnity has been defined as:
*"A contract by which one party promises to save the other from loss caused to him by the conduct of the promisor himself or by the conduct of any other person".*
There are two parties involved in the contract of indemnity:

- **INDEMNIFIER:** Indemnifier is the person who give assurance to other person to compensate his loss like in the example of insurance contract insurance company gave assurance to other party so it is indemnifier.
- **INDEMNITY-HOLDER:** He is the person to who assurance is given under the contract of Indemnity. So in the insurance example policyholder is the Indemnity Holder as he gets the assurance from the insurance company.

### 4.2.2  CHARACTERISTICS OF A CONTRACT OF INDEMNITY
The important features of an Indemnity Contract are as follows:
1. **ESSENTIALS OF A VALID CONTRACT:** Contract of indemnity is also a contract like any other contract and is also covered under the Contract Act. So, all the essentials of contract act like free consent, consideration, capacity of party, lawful object etc are also applicable on the indemnity contract. If these features are not there, contract of indemnity is invalid.
2. **EXPRESS OR IMPLIED:** The contract of indemnity like any other contract may be a express contract or a implied contract. Further this contract may be oral contract or written contract.
3. **COMPENSATION OF LOSS:** In contract of indemnity one party assures other party to compensate the loss, this is most important feature of contract of indemnity. Without this feature contract of indemnity is not valid.

### 4.2.3  RIGHTS OF AN INDEMNITY HOLDER (SECTION 125) :-
Following are right of Indemnity holder according to section 125 of the contract act:

1. **RIGHT TO RECOVER DAMAGES: -** In contract of  For example in a partnership firm A give guarantee to his partner B that his profit will not be less than Rs. 50000 in any case, but the amount of profit earned by B is Rs. 40000, in such case B can recover Rs. 10000 from Partner A.

2. **RIGHT TO RECOVER COST**: The indemnity holder has right to recover any cost incurred by him on any matter incidental to the act done by him related to the matter of indemnity.

3. **RIGHT TO RECOVER ALL SUM PAID: -** He can also recover any amount paid under the compromise of any suit related to sach indemnity. However, it is  necessary that such compromise must be done by him as per directions of the indemnifier.

4. **SUIT FOR SPECIFIC PERFORMANCE: -** Indemnity Holder can file suit agains indemnifier for specific performance of the contract agreed upon under the contract of indemnity.

## 4.2.4 RIGHTS OF AN INDEMNIFIER:

1. **RIGHT TO SUBROGATION**: - Once indemnifier pays the amount of loss to the indemnity holder right of subrogation. It means the indemnifier will take the right vested in the goods to the indemnity holder. For example if insurance company pay the amount of loss by theft of car to the owner, but later the car was found, insurance company will be  treated as owner of the car.

2. **RIGHT TO EQUITIES**: - In case more than one indemnifier,    then one indemnifier has the right to recover proportionate amount from other indemnifier.

3. **RIGHT TO REFUSE INDEMNITY**: Indemnifier has right to refuse any amount  of loss that is not covered under the provisions of the contract. For example if an insurance company has given fire insurance to a person but good are damaged due to excessive heat of summer season,  it is not covered in the contract and   indemnifier could refuse the payment.

## 4.3  CONTRACT OF GUARANTEE (SECTION 126-147)

Guarantee is a special type of contract covered under the Indian Contract Act 1872. Under the contract of guarantee some amount is payable by one person to the other person. In such case a third person give assurance to the person to whom amount is due that if the person by whom amount is payable fails to pay the amount, then he will pay such amount. Section 126 of the Contract Act define the term guarantee as:

*"A contract of guarantee is a contract to perform the promise, or discharge the liability, of a third person in case of his default."*

Normally any contract involve two parties,  but in the contract of guarantee there are three parties involved in the contract. three parties are are surety, principal debtor  and creditor.

- **SURETY:** Surety is the person who gives guarantee to other person for making the

payment in case of default by Principal Debtor..

- **PRINCIPAL DEBTOR**: Principal debtor is the person by whom amount is originally payable under the contract. If he fails to make the payment then surety will be liable to make the payment. It is not necessary that principal debtor must be a person competent to enter into a contract. Even if he is minor, guarantee will be valid.
- **CREDITOR:** The person by whom amount is receivable under the contract is called creditor.

**EXAMPLE:** Abhay give money to Ratan as loan on the request made to him by Rajan. Rajan promised to Abhay that if Ratan fails to repay the amount due then hewill make the payment. This contract is a guarantee contract and Rajan is surety in this contract, abhay is creditor and the Ratan is Principal debtor in the contract.

### 4.3.1 <u>CHARACTERISTICS OF A CONTRACT OF GUARANTEE</u>

The essential features of a contract of guarantee are as follows:

1. **THREE PARTIES:** The most important feature of contract of guarantee is that there are three parties that are involved in the contact, these are principal debtor, creditor and surety.
2. **EXISTENCE OF A LIABILITY:** In a contract of guarantee there must exist some liability due from one party to another party. On failure to meet this liability the contract of guarantee will be performed.
3. **CONSENT OR IDENTITY OF MIND:** In the contract of guarantee all the three parties must show their consent on the same subject matter. They must have consensus on the same subject matter. For example if A has taken two loans from B, C gives gurantee to B in respect of first loan but B is thinking that guarantee is for second loan then this guarantee is not valid.
4. **PRIMARY AND SECONDARY LIABILITY:** In the contract of guarantee the primary liability of making the payment is of Principal debtor. The liability of surety is secondary. Only after Principal Debtor fails to make the payment, the liability of surety will arise.
5. **NO MISREPRESENTATION:** There must not be any misrepresentation by one party to other in the contract of guarantee. If there is some misrepresentation then the contract of guarantee will not be valid.
6. **ESSENTIALS OF A VALID CONTRACT:** The contract of guarantee will be valid only if it possesses all the essential characteristics of a valid contract.
7. **SURETY'S LIABILITY MUST BE CONDITIONAL:** The liability of surety in the contract of guarantee is conditional and will arise only if there is default in payment by principal debtor.
8. **NO CONCEALMENT:** No party should hide material information related to the contract of guarantee from other party. Material information means some important information which could have bearing on the contract. For example. A has taken the loan from B and defaulted the payment. Now he is again seeking the loan from B and C is giving the guarantee to B for making payment in case of default by A without having knowledge of the fact that A has defaulted the payment earlier also. It is liability of B to inform C about

earlier default by A. If he fails to do so the contract of guarantee will be invalid.

### 4.3.2 KINDS OF GUARANTEE

1. **SPECIFIC GUARANTEE:** Specific guarantee is the guarantee given for a particular transaction. Normally this guarantee is only for single transaction and the very moment that transaction is complete the guarantee is also over.
2. **CONTINUING GUARANTEE:** Continuing guarantee is not for a single transaction rather it is for a series of transaction. This type of guarantee will continue until it is revoked by the surety.
3. **ABSOLUTE GUARANTEE:** in absolute guarantee there is no condition that is to be fulfilled for completing the guarantee. In other words, this guarantee is without putting any condition.
4. **CONDITIONAL GUARANTEE:** Conditional guarantee is the guarantee in which surety will make only E payment after some condition is fulfilled. For example A gives guaranteed to B that he will make payment in case of default of payment by C due to his insolvency. Now if C is not insolvent but he defaulted the payment due to some other reason, A will not be liable to make the payment.
5. **RETROSPECTIVE GUARANTEE:** If some transaction has already been carried and guarantee is given at the later stage, it is called retrospective guarantee.
6. **PROSPECTIVE GUARANTEE:** If some transaction is yet to be carried and guarantee is given for such transaction, it is called prospective guarantee.
7. **FIDELITY GUARANTEE:** This type of guarantee is given for the honesty or good conduct of the person. For example A give employment to B on the guarantee of C, that he will make good any loss arising due to fraud or misappropriation by B. This guarantee is Fidelity Guarantee.
8. **LIMITED OR UNLIMITED GUARANTEE:** In Limited guarantee, the guarantee is not given for the full amount involved in the transaction rather it is given only for a part of the amount involved in the transaction. Whereas in case of unlimited guarantee, there is no limit on the amount for which guarantee is given.

### 4.3.3 REVOCATION OF CONTINUING GUARANTEE

A person can revoke the continuing guarantee in the following manners.
1. **BY NOTICE OF REVOCATION BY THE SURETY**: - According to Section 130 of the Act any Surety could revoke the continuing guarantee anytime. But for this purpose he has to give due notice to the creditor. Further, this revocation will be for future transactions and not for the transitions that have already been carried..
2. **BY THE DEATH OF THE SURETY**:- As per sec.131, In case of death surety the guarantee will be revoked. However, it is important to mention here that the property of the surety will be responsible for all the transactions that have been carried before the death of surety.
3. **BY NOVATION: -** Novation means entering into a new contract in place of the old contract. So, if there is some new contract between the parties that has been ratified by

all the parties, the old contract automatically comes to an end..

4. **BY ALTERING THE TERMS OF CONTRACT**: According to Sec 133 Any change in contract between principal debtor and creditor could take place only with the consent of surety. If principal debtor and creditor make any change in the contract unilaterally without consent of surety, the guarantee will be automatically revoked.

5. **BY RELEASE OF PRINCIPAL DEBTOR**: If creditor in the contract release the principal debtor, means he forego the payment from principal debtor, the surety is also been discharged from the contract.

6. **BY CREDITORS ACT OF OMISSION:** According to Section 139 of the act, any thing done by the creditor which result into loss of remedy available to Surety against Principal debtor, will result into revocation of the guarantee.

### 4.3.4 <u>RIGHTS OF SURETY</u>

The Act recognizes certain rights of the surety, besides imposing liability on him by virtue of Section 128. This right may be studied under the following three heads:
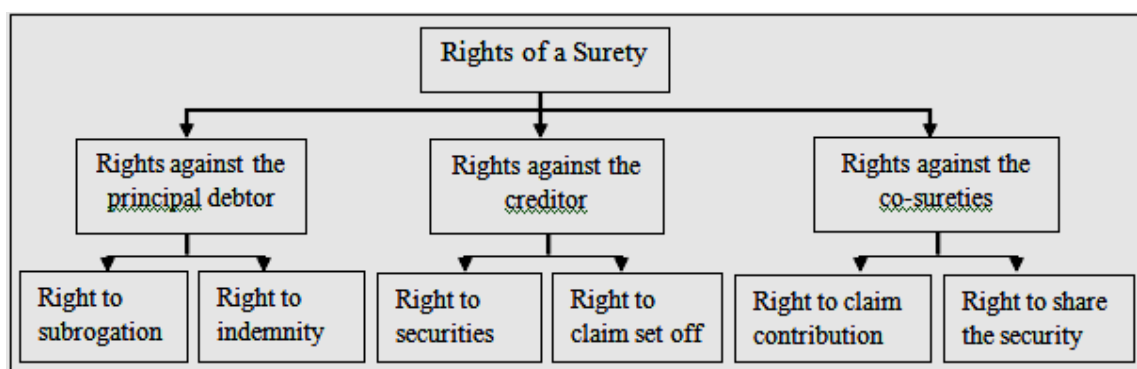


1. **RIGHTS OF THE SURETY AGAINST THE PRINCIPAL DEBTOR**

   *a) RIGHT OF SUBROGATION [SECTION 140]:* If there is default by principal debtor due to which surety makes the payment to the creditor, the surety will take place of the creditor. In other words he will get all the rights that were available to the original creditor.

   *b) RIGHT TO CLAIM INDEMNITY [SECTION 145]:* In the contract of guarantee, there is implied acceptance by principal debtor to the surety of compensating him for any amount rightfully paid by him to the creditor. However, this right is only four rightful payment and not for any excess payment.

2. **RIGHTS OF THE SURETY AGAINST THE CREDITOR**

   *a) RIGHTS TO CLAIM SECURITIES:* If principal debtor has given something as security for the transaction, surety has right to claim that security from creditor once he clears the amount due to creditor..

   *b) RIGHT TO CLAIM SET-OFF:* If any amount is due by creditor towards the surety under the same transaction, the surety has right to set off such amount.

   *c) RIGHT TO SHARE REDUCTION:* Out of the amount payable by surety under the contract of guarantee, he can claim reduction of the part of amount that has been claimed by creditor from Principal Debtor.

### 3. RIGHTS OF THE SURETY AGAINST THE CO-SURETIES:

It may be possible that more than one surety is involved in the contract of guarantee. These sureties involved in the contract are called co-sureties. Now in such case a single surety cannot be compelled to make the whole payment due under the contract. Following are the rights of a surety against the co-surety:

a) *RIGHT TO CONTRIBUTION [SECTION 146]:* If more than one surety is involved in the contract, he has right to ask the agreed contribution from the other co-surety. In case no particular contribution was decided, all the sureties will contribute equally in the contract.

b) *RIGHT TO SHARE BENEFITS OF SECURITIES:* As discussed earlier, the surety has right to claim any thing given by security to the creditor by principal debtor once he clears the debe. In case such security is received by on co-surety, other co-sureties have right to clasim their share from such security.


### 4.3.5 DISCHARGE OF SURETY FROM LIABILITIES:

The following are the circumstances under which a surety is discharged from his liability.

1. **REVOCATION BY GIVING NOTICE**: - If there is continuing guarantee by one person to the other, such surety is relieved from the guarantee once he give notice of revocation to the creditor. However, this revocation will be for future transactions.

2. **REVOCATION BY DEATH OF SURETY: -** , In case of death surety the guarantee will be revoked. However, it is important to mention here that the property of the surety will be responsible for all the transactions that have been carried before the death of surety.

3. **VARIANCE IN TERMS OF CONTRACT: -** Any change made in the contract by debtor and creditor without consent of surety, will discharge the surety from the contract.

4. **NOVATION:** Any new contract entered in by the debtor and creditor in place of the old contract without the consent surety will revoke the liability of the surety.

5. **RELEASE OR DISCHARGE OF THE PRINCIPAL DEBTOR: -** If creditor in the contract release the principal debtor, means he forego the payment from principal debtor, the surety is also been discharged from the contract.

6. **IMPAIRING SURETY"S REMEDY**:- Any thing done by the creditor which result into loss of remedy available to Surety against Principal debtor, will result into revocation of the guarantee.

7. **LOSS OF SECURITIES**: *:* If principal debtor has given something as security for the transaction to the creditor and such security is lost by him, the surety will be discharged from the guarantee up to the amount of value of such security

8. **GUARANTEE OBTAINED BY MISREPRESENTATION**: There must not be any misrepresentation by one party to other in the contract of guarantee. If there is some misrepresentation then the contract of guarantee will not be valid.

9. **GUARANTEE OBTAINED BY CONCEALMENT-:** No party should hide material information related to the contract of guarantee from other party. Material information

means some important information which could have bearing on the contract. In any concealment is there, the surety will be discharged.

10. **FAILURE OF CONSIDERATION**: There must be consideration present in the contract of guarantee. If consideration is missing, the contract of guarantee will be invalid.

11. **LACK OF ANY ESSENTIAL ELEMENT OF CONTRACT:** The contract of guarantee will be valid only if it possesses all the essential characteristics of a valid contract. In such case the Surety will be discharged from his liability.

## 4.3.6 DISTINCTION BETWEEN A INDEMNITY AND GUARANTEE:

The following are the differences between contract of indemnity and guarantee:

| Basis | Contract of Indemnity | Contract of Guarantee |
|---|---|---|
| 1. Number of Parties | In this contract there are two parties involved that are indemnifier and the indemnified. | In this contract there are three parties involved that are creditor, principal debtor and surety. |
| 2. Number of Contracts | In this there is only one contract between indemnifier and the indemnified. | The contract of guarantee comprise of three sub contracts that are first between principal debtor and creditor, second between cireditors and surety, third between principal debtor and the surety. |
| 3. Nature of Liability | Indemnifier has primary liability and such liability is unconditional. | Surety has secondary liability which occur only on failure of principal debor. |
| 4. Subrogation | Indemnifier does not get the right of subrogation. He cannot sue the third party in his own name. | Surety gets the right of subrogation. He can sue the third party in his own name. |
| 5. Request | In indemnity contract it is not necessary that the indemnifier will act on the request made by the indemnified. | In case of Guarantee, the surety always act on the request made y the principal debtor. |
| 6. Existence of Risk | The liability of indemnifier will only arise on happening of certain event or contingency. | The liability in case of guarantee contract is already existing. |
| 7. Rights of Parties | Indemnifier has no right to file a suit against a third party without any assignment of claim in his favour. | Surety can file suit against the principal debtor immediately he clears the debt towards the creditor. |
| 8. Parties Interests | Indemnifier may have own interest in the contract of indemnity. | The surety has no own interest in the transaction except the guarantee. |
| 9. Purpose | The main objective of the contract of indemnity is to save the indemnity holder from loss due to some event. | The main objective of the contract of guarantee is to save creditor from loss in case of default by debtor. |

1. Mark the right answer
   a. There are _____ number of contracts in guarantee.
      - Two
      - Three
      - Four
      - Five
   b. Following is not necessary condition for contract of indemnity.
      - It must have essentials of valid contract.
      - It must be legal
      - It must be for saving one party from losses.
      - It must be in writing
   c. In the contract of Guarantee the person who undertakes the guarantee is known as
      - Principal Debtor
      - Creditor
      - Surety
      - Indemnifier
   d. The guarantee given for the minor's debt is
      - Valid
      - Voidable
      - Void
      - Illegal
   e. The liability of the surety is
      - Primary
      - Secondary
      - Coextensive
      - Surety has no liability

2. Write True or False
   a. Contract of Insurance is an example of contract of indemnity.
   b. Fidelity guarantee is a continuing guarantee.
   c. A person cannot revoke continuing guarantee.
   d. Continuing Guarantee can be revoked retrospectively.
   e. Co-sureties will share equal burden of guarantee.
   f. Guarantee obtained by concealing material facts is valid.
   g. The release of Debtor by creditor will also release the surety.

3. Write Five difference between Indemnity and Guarantee:

| No. | Indemnity | Guarantee |
|-----|-----------|-----------|
| 1. | | |

| | | |
|---|---|---|
| **2.** | | |
| **3.** | | |
| **4.** | | |
| **5.** | | |

## 4.5  CONTRACTS OF BAILMENT (SECTION 148-171)

In our daily life, we often see many practices under which one person gives something to another person of his or her purpose and after the said purpose is fulfilled, that item is returned to him, such as a book given to friend to read, to give scooter for service, to give clothes to the tailor for sewing etc. This type of events are called 'Bailment'. Bailment' is also considered to be a special kind of contract under the Contract Act. Sections 148 to 181 of the Indian Contract Act gives special provisions related to Bailment of items.

### 4.5.1  MEANING AND DEFINITION OF BAILMENT

The delivery of items for some specific purpose by one person to another is called ' Bailment ' in English. This term originated from the French word 'Bailor' which literally means 'to deliver'. But in the legal language, it means 'voluntary transfer of something by one person to another person'.

According to Section 148 of the Indian Contract Act , "If one person delivers goods to another person for a specific purpose on the contract that the goods will be returned on completion of the purpose or will be disposed off as per his order." Then such a contract would be called a Bailment contract. Thus the person who delivers the goods is called 'Bailor' and the person to  whom such goods are is called 'Bailee'. For example – Ragini   gives cloth to _Mahila Boutique ' for stitching her suit, then the contract between Ragini and _Mahila Boutique is a Bailment contract in which Ragini is a Bailor and _Mahila Boutique  is a Bailee.

### 4.5.2  CHARACTERISTICS OF CONTRACT OF BAILMENT

1. **TWO PARTIES -** There are two parties in agreement Bailment like any other contracts, one who delivers the goods and the other who pick up said goods.
2. **DELIVERY OF GOODS** - Delivery of goods is must in the contract of Bailment. Delivery of goods refers to the transfer of the possession of goods by one person to another person by their will but it is not transfer of ownership. Generally, goods can be supplied in the following three ways.
   - **ACTUAL DELIVERY** - When goods are actually moved from one person to another person's it is called actual delivery. Just like 'Ajay' gives its phone for repair to 'Bihari', it is the real delivery  of the goods.
   - **CONSTRUCTIVE DELIVERY** – If goods are already in the possession of person and he agrees to keep the goods with him under Bailment, though no actual delivery take place but still it will be considered as delivery. In this case it is called

Constructive Delivery. For example Radha buys a Sewing Machine from Gupta and leaves it at his shop with the instruction that the machine will be delivered to her house it is Constructive Delivery. Here even though Radha did not give any real delivery to Gupta. Radha would be considered a Bailor and Gupta as Bailee.

- **SYMBOLIC DELIVERY** – Some time goods are very heavy to actually deliver. In such case doing some action that represent transfer of goods is also delivery. Such delivery is known as Symbolic Delivery. For example sale of Car by Ravi to Rajat, in this case handing over keys of car is symbolic delivery.

3. **TEMPORARY PURPOSE** - In Bailment delivery of goods is for a temporary purpose. As Manav gives his mobile for repair to mechanic who will returns it to Manav after repairing the mobile.

4. **TRANSFER OF POSSESSION** –There must be transfer of goods. Merely guarding or taking care of goods cannot be called Bailment in the absence of transfer of goods such as a servant taking care of the goods of his master is not bailment as there is no transfer.

5. **RIGHT OF RETURN OF GOODS** -Bailment delivery of goods is subject to the condition that Bailee has to return the goods after completion of the object for which these are delivered or otherwise dispose off the goods as per instructions of the Bailor.

6. **OWNERSHIP IS NOT TRANSFERRED** - Bailment agreement deals with the transfer of goods, not ownership. Ownership of goods always remains with the Bailor and on the basis of this, he can retrieve his goods.

7. **BAILMENT OF MOVABLE GOODS ONLY** - Bailment can only be of movable property, immovable property, such as houses, land etc. are not covered in Bailement.

8. **MAY NOT BE IN SAME STATE** - Materials to be returned in not necessarily in the same state. There may be change in appearance or form of goods. Like giving cloth for stitching and getting back the suit.

### 4.5.3 <u>KINDS OF BAILMENT</u>

1. **BAILMENT ON THE BASIS OF CHARGES OR REWARD**
   a) **GRATUITOUS BAILMENT:** In case goods are delivered by one person to another under Bailment without making any charges or payment, it is known as gratuitous bailment.
   b) **NON-GRATUITOUS BAILMENT:** Where the persons involved in bailment charge certain amount, remuneration, o r p a y m e n t , i t i s c a l l e d non-gratuitous Bailment.

2. **BAILMENT ON THE BASIS OF BENEFITS**
   a) **BAILMENT FOR THE EXCLUSIVE BENEFIT OF BAILOR:** When goods are transferred under Bailment for the exclusive benefit of the person who is transferring the goos, it is a contract of bailment for the benefit of the bailor. In this case bailee does not gets any benefit from such transfer. For example A given his computer to his friend for uploading some software, who will not charge any amount from A for this service.
   b) **BAILMENT FOR THE EXCLUSIVE BENEFIT OF BAILEE:** It is a transaction in the bailee only will get some benefit and the bailor is not benefitted. For example _A' give his computer game to his friend _B' who will return the game

after playing. A is not making any charge for this.

c) **BAILMENT FOR THE MUTUAL BENEFIT OF BOTH PARTIES:** It is a transfer of goods under the contact of bailment in which both the parties will get some benefit. For example A has given his computer for repair to mechanic.

3. **BAILMENT ON THE BASIS OF USE**
   a) **BAILMENT FOR SAFE DEPOSIT** - When depository submits goods aimed at protecting goods, it is known as deposit for security. For example, jewelery or other important documents kept in a bank locker.
   b) **BAILMENT FOR USE** - When goods are given for use by one person to other. The delivery is on the condition that the object will be returned to the transferor at the end of the specified purpose or specified time. For example, if Prince gives his Bike to his friend Raghave for one day for going to Chandigar, it will be Bailment for use.
   c) **BAILMENT FOR HIRE** - When such goods are given on rental basis, it is called delivery for hire, for example rental of tent and crockery on marriage.
   d) **BAILMENT BY PLEDGE** - When a debtor assigns the creditor as a pledge anything for the purpose of security of the loan, it iss called Bailment by Pledge.
   e) **BAILMENT FOR REPAIRS** - If an object is assigned by the person for repair, it is called Bailment for repair.
   f) **BAILMENT FOR CARRIAGE** - When an object is delivered to the person fro transport from one place to another, it is called transportation-related Bailment.

### 4.5.4 DUTIES OF BAILOR

1. **TO DISCLOSE KNOWN DEFECTS IN THE GOODS:** According to section 150, it is the important duty of a Bailor to disclose to the Bailee all the defects which he has knowledge and which impedes the use of the goods by the Bailee or may put him in extraordinary distress while depositing using the goods. If the Bailor does not perform its duty, it will be liable for direct loss to the Bailee due to such defects. If the Bailement of goods is non gratitutious, then the Bailor shall be liable to the Bailee for all such defects which he may or may not have knowledge of. For example, Sharma gives his car to his friend Gupta to drive. The car is unsafe, But Sharma has no idea about it. If Gupta gets hurt due to the car being unsafe, then Sharma will not be responsible for it as he has no knowledge of defect. If Sharma had rented his car, he would have been responsible for Gupta's injury due to the car being unsafe even if he is not having any knowledge of defect.

2. **TO BEAR ORDINARY EXPENSES:** The Bailor is obliged to pay all such necessary expenses as the Bailee may have incurred for the purpose of Bailment. For example, Rahul gives his Horse to Amit to take to his city. On the way, Rahul pays the necessary expenses for fodder for the horse. Amit will be bound to pay the expenses paid by Rahul.

3. **TO BEAR EXTRAORDINARY EXPENSES:** In case of non-gratuitous bailment,

when goods are given by Bailor to Bailee after charging some amount, it is the duty of the Bailee to bear normal expenses. However, in case there are some abnormal expenses, these are to be borne by Bailor. For example it a gives his car to B for going to other city, the expense of petrol etc will be borne by the B. But if there occurs some problem in the car which in not routing type, and B incur some expense on repair, he will get back such amount.

4. **TO INDEMNIFY BAILEE:** In case Bailor has defective title of the goods and due to his defective title Bailee has to incur some loss, it is the duty of the Bailor to indemnify the Bailee. For example it a gives his car to B for going to other city and as the document related to car has some defect, B has to pay some amount as fine. In such case B has right to recover amount from A.

5. **TO RECEIVE BACK THE GOODS:** Bailment is an agreement where goods are given by one party to other for some particular purpose. Once that purpose is complete it is duty of the Bailor to get back such goods. He cannot refuse to take back the goods given by him under the Bailment.

6. **TO BEAR THE RISKS:** Under the Bailment it is duty of the Bailee to take good care of the goods just like he takes care of his own goods. Once it is done by the Bailee, any loss arising to goods due to some reason will be borne by Bailor. For example A give his horse to B under Bailment. Though B took good care of the horse, still horse died. It was held that loss is to be borne by A.

## 4.5.5 <u>DUTIES OF BAILEE</u>

1. **TO TAKE REASONABLE CARE OF THE GOODS BAILED:** It is the duty of a Bailee to take as much care of the deposited goods as a man of ordinary intelligence does in the same circumstances with his own goods of the same variety and value. If the Bailee has taken such care of the deposited object, he will not be generally liable to lose, destroy or spoil the object. There is no difference between paid and free Bailment from this point of view. If the deposited goods are not so well taken care of by the Bailee, he is bound to compensate the Bailor.

2. **NOT TO MAKE ANY AUTHORIZED USE OF GOODS BAILED:** In accordance with Section 153 it is duty Baille that he must comply fully with the terms of the Bailment Agreement. If the Bailee performs any act in relation to the deposited goods that is against the terms of the Bailement contract, the Bailor may terminate the contract at its will and withdraw the bailed goods. For example, 'A' gives 'B' his car for a personal use and 'B' runs the said car on hire basis, A can terminate the contract.

3. **NOT TO MIX GOODS BAILED WITH HIS OWN GOODS:** Under the Bailment contract it is necessary that the Bailee keep goods he get under Bailment separate from his own goods. He must not mix his own goods with the goods he got on Bailment basis. If he mix the goods, following could be circumstances.

   a) **MIXING OF GOODS WITH BAILOR'S CONSENT:** In case Bailee mix the goods with his own goods with the consent of Bailor, the mixed goods will be distributed among both the parties in ratio of the original goods. For example if A mix 60 Kg. of rice of Bailor with his own rice 40 Kg. with his consent, in such

case the mixed rice will be distributed among Bailor and Bailee in ratio of 60:40 even if there was difference in quality of the goods.

b) **MIXING WITHOUT BAILOR'S CONSENT, BUT GOODS CAN BE SEPARATED:** If the bailee mixes the goods he got on bailment basis with his own goods but no consent was given by the bailor, but goods are of such nature that these can be separated, than it is responsibility of Bailee to get goods separated and any expense or loss on such separation shall be borne by him. **(Section 156)**.

c) **MIXING OF GOODS WITHOUT BAILOR'S CONSENT, GOODS ARE NOT SEPARABLE:** If the bailee mixes the goods he got on bailment basis with his own goods but no consent was given by the bailor and goods are of such nature that these cannot be separated, than it is responsibility of Bailee to compensate the Bailor for any loss incurred by him due to such act of Bailee. For example A mix 60 Kg. of rice valued at Rs. 50 per kg of Bailor with his own rice 40 Kg. valued at Rs. 30 per Kg. with his consent, in such case he shall pay any loss incurred by Bailor due to such mixing. (Section 157).

4. **TO RETURN THE GOODS AFTER ACCOMPLISHMENT OF OBJECTIVE:** It is responsibility of Bailee under the contract act that he must return the goods to the Bailor who has given him the goods after the objective for which goods are given is accomplished or the time period for which goods are lent is over.

5. **NOT TO SET UP ADVERSE TITLE:** The Bailment give right to Bailee for use of good and it does not makes him owner of the goods. So, he cannot his own title or a third party's title on the goods which he got on Bailment basis.

6. **TO GIVE BACK ANY ACCRETIONS TO THE GOODS:** In the absence of any contrary contract, if goods are given by Bailor to Bailee and there is some accretion to the goods, such accretion belong to Bailor and not the Bailee. For example A give his cow to B and calf is born to the cow, such calf belong to A and not B.

### *4.5.6 RIGHTS OF BAILOR*

1. **RIGHT TO CLAIM DAMAGES IN CASE OF NEGLIGENCE (SECTION 152):** Every bailee must take normal care of the goods or in case of special contract he must take special care of the goods. But if he fails to do so and due to his negligence goods are lost or destroyed, Bailor has right to claim damages.

2. **RIGHT TO TERMINATE THE BAILMENT(SECTION 153):** Bailee must use the goods bailed to him only as per the instruction given by the bailor. In case he does not use the goods as per the instructions of the Bailor and have some unauthorized use of goods, bailor has right to terminate the bailment.

3. **RIGHT TO CLAIM COMPENSATION FOR UNAUTHORIZED USE OF GOODS (SECTION 154):** If Bailee have some unauthorized use of goods and due to that there is some damage to goods, Bailor can claim compensation for the same.

4. **RIGHT TO CLAIM SEPARATION OF GOODS (SECTION 154):** It is responsibility of bailee not to mix the goods bailed to him with his own goods. In case he mix the goods, Bailor has right to ask Bailee to separate both of the goods.

5. **RIGHT TO CLAIM COMPENSATION WHEN GOODS ARE NOT**

**SEPARABLE (SECTION 157):** If bailee mix his own goods with the goods of Bailor with his permission and the nature of goods is such that goods cannot be separated, Bailor has right to claim compensation from the bailee for any loss incurred by him due to this.

6. **RIGHT TO DEMAND RETURN OF GOODS (SECTION 158):** In bailment goods are given to bailee for some particular purpose. Once the purpose for which goods are given is over, Bailor has right to ask Bailee for return of the goods.
7. **RIGHT IN CASE OF UNAUTHORIZED RETENTION:** It is the responsibility of bailee to return the goods after the purpose for which goods are bailed is accomplished. If he does not return the goods and due to his unauthorized retention goods are destroyed or deteriorated, Bailor has right to claim compensation from the Bailee.
8. **RIGHT TO FILE A SUIT AGAINST WRONG-DOER:** If there is any wrong doing by the bailee that is against the provisions of the contract, Bailor has right to file the suit against the Bailee.
9. **RIGHT TO CLAIM ANY ACCRETION (SECTION 163):** if goods are given by Bailor to Bailee and there is some accretion to the goods, such accretion belong to Bailor and he has right to claim such accretion.

### 4.5.7 **RIGHTS OF BAILEE**

1. **RIGHT TO ENFORCE BAILOR DUTIES:** If bailor does not fulfill his duties under the contract of Bailment, bailee has right to file a suit against the Bailor.
2. **RIGHT TO CLAIM COMPENSATION IN CASE OF FAULTY GOODS (SECTION 150):** It there is some defect in the goods bailed by bailor to the bailee and due to such defect there is some injury to the bailee, he can claim compensation for the same. In case of gratuitous bailment the bailor is responsible for only those defects that were known to him. But in case of non-gratuitous bailment, bailor is responsible whether the defect is known to him or not.
3. **REIMBURSEMENT OF EXPENSES (SECTION 158):** If Bailee incur any expense on the goods bailed to him by the bailor, he can claim reimbursement of such expenses from the Bailor. In case of gratuitous bailment he can claim only ordinary expenses while in case of non-gratuitous bailment he can claim reimbursement for both ordinary as well as extra ordinary expenses.
4. **RIGHT TO BE INDEMNIFIED FOR PREMATURE TERMINATION (SECTION 159):** If in case of gratuitous bailment, if bailor terminate the contract before completion of the bailment and the loss to bailee is more than the benefit derived by him from such bailment, he can claim compensation for the same.
5. **RIGHT TO RECOVER LOSS IN CASE OF BAILOR"S DEFECTIVE TITLE (SECTION 164):** It the right of Bailor over the goods is defective and due to this bailee incur some loss, he can claim compensation for the same from Bailor.
6. **LOSS DUE TO BAILOR"S REFUSAL TO TAKE GOODS BACK (SECTION 164):** It is responsibility of the Bailor to take the goods back after the accomplishment of the objective for which goods are bailed. If he refuse to take the goods back and

there is some loss to bailee, he can claim the compensation from the bailor.

7. **RIGHT TO RETURN THE GOODS TO ANYONE OF THE JOINT BAILERS (SECTION 165):** In case of Joint owner of the goods, bailee must return the goods to the owner which is mentioned in the agreement. But in case of absence of agreement, he can return goods to any of the joint owner.

8. **RIGHT OF ACTION AGAINST THIRD PARTIES:** A bailee must use the goods peacefully and if any third party wrongfully deprive him from this right, he can take action against the third party also even though he is not the owner of the goods bailed.

9. **RIGHT OF LIEN:** In case Bailee has done some work on the goods that needs some labour or skill, he has right of lien over the goods till he receives such payment. For example A gave his mobile to B for repair. Now B has right of lien over the phone till he gets remuneration for repair of the phone.

## 4.5.8 BAILEE"S LIEN

Right of lien is a special right in which a person who is not the owner of the good can retain the possession of goods until any amount payable to him by the owner of the goods is cleared. For example A gave his mobile to B for repair. Now B has right to keep possession of the phone till he gets remuneration for repair of the phone.This right of B is called right of lien. Lein can be divided into two categories that are particular lien and general lien.

a) **PARTICULAR OR SPECIAL LIEN [SECTION 170]:** Particular lien is available only for those goods against which some amount is due by the bailor to the the Bailee. In this Bailee can keep the possession of that particular item for which amount is due and not the other items of the Bailor. For example, A has given his mobile phone and his watch for repair to B. B has repaired both the items and A has made the payment of repair charges in respect of the mobile phone but failed to pay the repair charges of the watch. In such a case A has right of lien only on the watch in respect of which the remuneration is due. He does not have any right of lien over the mobile phone. Bailee has the right of lien, only if the following conditions are satisfied.

   i. The Bailee has done some work on the goods which involve some labour or skill.
   ii. this work is done by the Bailee as per terms of the contract for bailment.
   iii. The bailee still has possession of the goods bailed to him.
   iv. There is no condition in the contract of bailment that the payment will be made in future.
   v. In case bailee has done the work on credit basis he does not have the right of lien till the credit period allowed is over.
   vi. This right is available to Bailee only if some contrary contract is not there. For example if the contract of bailment bears some condition that Bailee will not be having the right of lien, then such right is not available to the bailee.

b) **GENERAL LIEN [SECTION 171]:** A general lien is a situation in which Bailee is having the right of lien not only in respect of the goods for which some amount is due, rather he has the right of lien over all the items bailed to him by the Bailor. For example, A has given his mobile phone and his watch for repair to B. B has repaired both the items and A has made the payment of repair charges in respect of the mobile phone but failed to pay the repair charges of the watch. In such a case if A has right of general lien then he can keep possession of both mobile and watch even though the amount related to repair of mobile is already paid by bailor to him. He will have this right until full amount due to him is paid by the bailor. In absence of any agreement, normally a bailee has particular lien only. According to law a few persons only have the right of general lien that include Bankers, Policy brokers, Factors, Wharfinger etc.

| Basis | Particular lien | General lien |
|---|---|---|
| Goods | This is available for only those good for which some amount is due by Bailor to the bailee. | It is regarding all the goods of bailor until the whole amount due is cleared by the Bailor. |
| Entitled person | This lien is available to every type of bailee. | This lien is available to a few bailees only that include Bankers, Policy brokers, Factors, Wharfinger etc. |
| Nature of exercise | This can be exercised only on those goods for which amount is due. | It can be exercised on all goods that are in the possession of bailee. |

### 4.5.9 FINDER OF LOST GOODS

Sec. 71 of the contract act put some special provisions for the Finder of the Lost goods. Goods of a person are lost and some other person finds such goods, there is no liability of the finder of the goods if he does not pick the goods. But in case goods are picked by him then he becomes finder of the Lost goods as per contract act and is treated as Bailee of the goods. In such cases the Contract Act has given some rights to the finder of the goods but at the same time it has also put some obligations on the finder of the Lost goods. Following are the rights and duties of Finder of the Lost goods in this regard

**RIGHTS OF THE FINDER OF LOST GOODS**

1. **RIGHT OF LIEN [SECTION 168]:** The finder of the Lost goods has a right of lien over the goods until the owner of the goods make payment to him for the expenses incurred by him in respect to following matters
   a) Any expense incurred to preserve the goods

b) Any expense incurred to find the owner of the goods.

2. **RIGHT TO SUE FOR REWARD [SECTION 168]:** In case some reward is announced by the owner of the goods for finding the goods, the Finder of the lost goods has right to sue the owner of the goods if he refugees to make payment of the reward.

3. **RIGHT TO SELL [SECTION 169]:** Normally the finder of the goods has no right to sell the goods as he is not the true owner of the goods. But in following cases the right to sell the goods is available with the finder of the Lost goods.:
   a) if the finder of the goods fails to find the true owner even after putting diligent efforts; or
   b) The owner of the goods refuse to pay the genuine expenses incurred by finder of the Lost goods on preservation of the goods or on finding the true owner of the goods; or
   c) The goods are of perishable nature and cannot be preserved for long; or
   d) If the expenditure incurred by Finder of the Lost goods already exceeded two third of the value of the goods found by him.

## DUTIES AND LIABILITIES OF THE FINDER OF LOST GOODS

1. It is responsibility of the finder to take reasonable care of the goods found by him.
2. Once the true owner is found and he make the payment of expenses incurred by the finder, it is the responsibility of the finder to return the goods to the owner..
3. A finder of the goods cannot use goods for his own purpose.
4. The finder of goods must keep the goods found by him separate and he must not mix such goods with his own goods.
5. In case of some accretion to the goods, the finder must also return such accretion to the owner.
6. The finder must put genuine efforts to find the true owner of the goods.

## 4.6 TEST YOUR UNDERSTANDING (B)

1. Mark the right answer
   a. Bailment can be done for .
      - Movable goods only
      - Immovable goods only
      - Both movable and immovable goods
      - None of the above
   b. State in which of the following situation the bailment is not termianted.
      - When object is over.
      - When Bailor is declared insolvent
      - When time period of Bailment expired.
      - On death of Bailor
   c. Who has right of General lien.

- Buyer
- Bailor
- Pledger
- Banker

d. Any Accretion of goods belongs to
- Bailor
- Bailee
- Government
- Both Bailor and Bailee

e. A gives his mobile for repair to B, than B is
- Pledger
- Pledgee
- Bailor
- Bailee

2. Write True or False
   a. In Bailment there must be actual Delivery of goods.
   b. Putting jewellery in bank locker is Bailment .
   c. The Bailee has general lien.
   d. Founder may sell the goods if his expense exceeds two third of the value of goods.
   e. Founder of owner may sue owner for award.
   f. Gratuitous Bailment is for benefit of both the parties.
   g. In non-gratuitous bailment, bailor is responsible for all the defects that are known to him or not known to him.

3. Write four Rights of Bailor.

| No. | Rights of Bailor |
|-----|------------------|
| 1.  |                  |
| 2.  |                  |
| 3.  |                  |
| 4.  |                  |

## 4.7 CONTRACT OF AGENCY (SECTION 182-238)

In a contract, normally two parties are involved in the contact. One party makes the offer to the other party and on acceptance of offer by the other party, a contract is made. However, it is not necessary that a person himself must enter into the contract,   a person may enter into contract through some other person also.  In other words, we can say that if a person may enter into contract on behalf of other person if he is authorised to do so. When a

person enters into a contract through some other person, normally it is said that he has done the contract through his agent. A person for whom contract is done is known as ‗Principal' and the person who is entering into contract on behalf of principal is known as ‗Agent '. Section 182 of the Contract Act defines an ‗agent' as ―a person employed to do any act for another or to represent another in dealings with third parties‖.

## 4.7.1 ESSENTIALS AF A CONTRACT OF AGENCY

1. **EXISTENCE OF AGREEMENT:** The contract of agency can be done only if there is an agreement between the principal and the agent in this regard. It is important to mention here that it is not necessary to have an express contract of agency, this contract may be implied also.

2. **COMPETENCY OF THE PRINCIPAL**: Contract of agency is valid only if the Principal is competent to enter into a contract. In case principal does not fulfill conditions of competent person for entering into a contract, the contract of agency will be void.

3. **ANY PERSON MAY BECOME AN AGENT (SECTION 184):** As for as agent is concerned, there is no condition regarding competency of agent for entering into contract. According to the Contract Act, any person is eligible to be appointed as agent. Even a minor can be appointed as an agent.

4. **NO CONSIDERATION IS REQUIRED TO CREATE AGENCY (SEC. 185):** There cannot be any contract without presence of consideration in the contract. However, the contract of agency is an exception to this rule. The presence of consideration is not necessary for making any person agent of other person.

## 4.7.2 CREATION OF AGENCY

1. **AGENCY BY EXPRESS AGREEMENT (SEC. 187):** When agency is created by an express contract between the Principal and the agent, it is known as express agency. Law does not provide that such contract must be in written form only. It may be an oral contract also.

2. **AGENCY BY IMPLIED AGREEMENT (SECTION 187):** Sometime there is no express contract of creation of agency, rather agency is created by implied contract between the Principal and the Agent, it is known as Implied agency. Depending on the circumstances many a time Parents, Spouse or the Servant is treated as an agent of the person.

3. **AGENCY BY ESTOPPEL (SECTION 237):** Sometime a person knowingly say to some other person that he is agent but in reality he is not agent. Such conduct is shown by the person willfully by using some words. This is known as Agency by Estoppel. For example A himself said to B that C has appointed him as an agent whereas in reality C has not appointed A as an agent. Now A will be treated as Agent by Estoppel.

4. **AGENCY BY HOLDING OUT:** In many circumstances the conduct of the person is such that it gives impression to other person that he is agent of some person. Though he may not be using any words in such case but his conduct is such that the

impression is created in the mind of other person that he is agent of some person. For example A in presence of B said to C that B is his agent but in reality A has not appointed B as an agent. B does not deny the fact before C. Now B will be treated as agent by Holding out.

5. **AGENCY BY NECESSITY: NORMALLY AGENT IS BEEN APPOINTED BY PRINCIPAL. But s**ometime due to emergency a person is forced to act as an agent of other person. Such agency is known as Agency by Necessity. In this case principal does not appoint the agent rather the person is assumed as an agent. Following are some of the conditions for Agency in necessity.
   (a) This agency is created only in case of emergency on behalf of Principal, in normal situation it cannot be created.
   (b) Circumstances were such that it was not possible for the agent to contact with the Principal.
   (c) The agent in this case must act in bonafide manner in the best interest of the Principal.
   (d) Agent must take reasonable care in this case and must adopt the most practical approach to deal with emergency.
6. **HUSBAND AND WIFE RELATIONS:** There is implied agency between Husband and Wife. Law allows the wife to purchase household necessities on the credit basis from the market and in such case husband is bound to make the payment for the same.
7. **AGENCY BY OPERATION OF LAW:** Sometime agency is not created by the persons himself rather agency is created due to certain provision of the law it is known as Agency by operation of the law. For example in a partnership firm there is a concept of mutual agency and each partner is treated as agent of other partner.
8. **AGENCY BY RATIFICATION:** Sometime a person act as agent of other person without having authority of being agent. But later on his act is approved by the Principal. This is known as Agency by Ratification. For example A made a contract to sell car of B for Rs. 3,00,000 to C, but B never asked A to sell his car. Later on when B came to know about the deal, he approved the deal. It is agency by ratification

### 4.7.3 SUB-AGENT [SECTION 191]

Sub agent is the person appointed by Agent under the contract of agency and he acts under the control and supervision of the agent. In other words agent of the agent is known as Sub-Agent. According to Contract Act, in following cases sub agent can be appointed:
1. If this appointment is done as per the custom of the trade.
2. Sometime such appointment becomes necessary due to the nature of the business.
3. Sub-Agent can be appointed in such a case where the competency or the discretion is not required for doing the job.
4. Sub agent can be appointed with the permission of the principal.
5. If there is any emergency situation, Sub-Agent can be appointed.

## 4.7.4 DIFFERENT KINDS OF AGENTS

1.  **GENERAL AGENT:** When a person is not appointed as agent for a particular task rather he is responsible for carrying out many acts of Principal, it is called General Agent. For example a servant appointed by a person is his general agent as he is responsible to do number of acts for the principal.

2.  **SPECIAL AGENT:** When a person is appointed to perform a particular task, it is known as Special Agent. The authority of agent in this case is restricted to that task only. For example A appointed to B as an agent to sell his car. In this case B is authorized to sell only car of A, he is not authorized to perform any other activity.

3.  **UNIVERSAL AGENT:** Universal agent has unlimited authority. All the act done by the Universal Agent are binding on the Principal. Universal agent has authority to act anything on behalf of the Principal.

4.  **COMMERCIAL OR MERCANTILE AGENT:** Mercantile agents are appointed for carrying out business transactions of the principal. they are normally responsible for buying and selling of goods or for collection of money from the customers. They can also raise the money on security of the goods. Following are some of the mercantile agents.

5.  MA mercantile agent is a person having authority either to sell the goods or to consign the goods or to raise money on the security of goods. Mercantile agents may be of several kinds which are as follows:

    a)  **BROKER:** Broker is the person responsible for buying and selling the goods on behalf of the principal. Generally he will be selling the goods on behalf of the principal and in return he will get some amount as Commission or Brokerage. Normally the amount of brokerage depends upon the sales made by him.

    b)  **FACTOR:** The main responsibility of Factor is to collect the money from customers. The principal will be selling the goods to customers and the factor is responsible for collecting the sales proceeds from customer. In return he will be getting some commission.

    c)  **AUCTIONEER:** The main responsibility of the Auctioneer is to carry out the auction of the goods on behalf to the Principal. He will get commission for auctioning of the goods.

    d)  **COMMISSION AGENT:** Commission agent is a broader term. In business terminology this term is used for both Brokers as well as Factors.

    e)  **BANKER:** Banks also act as Agent for the customers. As agent they are responsible for collection of funds for the customers, making certain payment, collect dividend etc .

    f)  **DEL-CREDERE AGENT:** A del- credere agent gives guarantee to the Principal for collection of funds from the third party. In case of non payment by the third party, loss in not borne by the Principal rather agent bears the loss and in return he is eligible to get certain commission.

6.  **NON-MERCANTILE AGENT:** These are the persons who are appointed as agent not for business purpose rather some non business purpose. For example advocate, wife etc

are Non-Mercantile agents of the person.

### 4.7.5 <u>DUTIES OF AN AGENT</u>

1. **TO CONDUCT BUSINESS AS PER DIRECTIONS OR CUSTOM OF TRADE [SECTION 211]:** The main responsibility of the agent is to work as per the directions given by the principal.   As the agent is working on behalf of the principal, he is bound by all the directions given by the principal. In case no direction is  given  by the principal,  the agent must act according to the customs of the trade.
2. **TO ACT WITH REASONABLE CARE, SKILL AND DILIGENCE [SECTION 212]:** It is expected from the agent that he will carry out any act with reasonable care, due diligence and using his skill.  agent must take same care   when he is acting on behalf of the principal, as he might have taken when he is acting on his own behalf.
3. **DUTY TO RENDER PROPER RECORDS [SECTION 213]:** An agent must render record of all the transactions carried on by him whenever the principal ask him to share such record.
4. **TO COMMUNICATE WITH PRINCIPAL [SECTION 214]:** There is  some problem or difficulty, it is responsibility of the agent to have communication with the Principal and obtain instructions from him regarding the problem or difficulty.
5. **DUTY NOT TO DEAL ON HIS OWN ACCOUNT [SECTION 215 & 216]:** When a person is acting as an agent, he must carry out transactions on behalf of principal only and he must not deal on his own account. It is his responsibility to bring all the material facts in the knowledge of principal. In case an agent wants to deal on his own behalf, he must get permission from the principal.
6. **DUTY TO PAY SUM RECEIVED [SECTION 218]:** An agent must render all the payment received by him on behalf of the principal to the Principal. However, out of such amount due, he can deduct any lawful expenditure incurred by him for the agency and he can also deduct the amount of agreed commission as per the Contract.
7. **TO PROTECT AND PRESERVE THE INTEREST [SECTION 209]:** In case of death of the principal or the principal became the person of unsound mind, it is a responsibility of the agent to take all the necessary steps that are required to protect the interest of properties entrusted to him by the principal.
8. **NOT TO DELEGATE AUTHORITY [SECTION 190]:** When a person appoints another person as his agent, it is the responsibility of the Agent not to delegate his authority further. In other words, an agent cannot appoint sub agent without the permission of the principal. However, in case of custom of trade or nature of work is such that needs appointment of sub agent,  the sub agent may be appointed.
9. **DUTY NOT TO SET UP ADVERSE TITLE:** If any property is entrusted to the agent by the principal, agent must not create the adverse title of the property without the consent of the Principal.
10. **DUTY NOT TO LEAK THE INFORMATION:** Agent might be getting some information when he is acting on behalf of the principal. It is his responsibility not to share such information to the third party and must maintain secrecy of the information.
11. **DUTY NOT TO MAKE ANY SECRET PROFIT FROM AGENCY**:   An agent

must render true account of the funds related to the agency to the principal. He must not make any secret profit out of transactions carried on behalf of the agency.

## 4.7.6 RIGHTS OF AN AGENT

1. **RIGHT OF RETAINER [SECTION 217]:** An agent can deduct any lawful expenditure incurred by him for the agency and he can also deduct the amount of agreed commission as per the Contract. In case he made any advance to the Principal, he can deduct the amount of advance also.
2. **RIGHT TO RECEIVE REMUNERATION [SECTION 219 & 220]:** In case there is agreement between the Principal and the Agent for payment of some commission by the Principal to the Agent, agent has right to claim such commission. In case of absence of such agreement, the commission will be paid as per the usage of the trade.
3. **RIGHT OF LIEN [SECTION 221]:** An agent has right of lien on any of the goods or property entrusted by Principal to him until any amount payable by principal to him is cleared. Once all the amounts are cleared, his right of lien will be over.
4. **RIGHT TO INDEMNIFICATION [SECTION 222]:** If agent is take due care and diligence, still some loss is incurred by him while doing some act of the agency, it is responsibility of the principal to compensate such loss to the agent.
5. **RIGHT TO BE INDEMNIFIED AGAINST CONSEQUENCES OF FACTS DONE IN GOOD FAITH [SECTION 223]:** If an agent is working in the good faith for the principal and as consequences of the act of agency he got some loss, that loss will be indemnified by the principal. For example A sent some smuggled goods to B and B in good faith sold those goods to C, later B has to pay some penalty for this act. In such case B has right to get compensation from A.
6. **RIGHT TO COMPENSATION [SECTION 225]:** If there is some defect in the goods and due to that defect, agent got some injury, agent has the right to get compensation for such injury.

## 4.7.7 DUTIES OF PRINCIPAL

1. It is duty of the principal to pay due remuneration to the agent as per agreement. In case of no agreement, remuneration will be paid as per customs of the trade.
2. It is duty of the principal to indemnify the agent for any loss incurred by him when he is acting on behalf of the agency and has take due care and diligence.
3. It is duty of the principal to indemnify the agent for any loss incurred by him when agent is acting in good faith.
4. If there is some defect in the goods and due to that defect, agent got some injury, it is duty of the principal compensate the agent for such injury.

## 4.7.8 RIGHTS OF PRINCIPAL

1. Principal can demand the accounts of all the transactions carried on by the agent from him.
2. Principal can check whether the agent is carrying out the transactions as per his

instructions. In case no instructions are given by him, than the agent must carry out all the acts as per the usage of trade.

3. In case of negligence of the agent, non exit application of due diligence or care by him, if some loss is incurred by the principal, he can ask the agent to compensate such loss.

4. Whenever there is an difficulty, principal has the right to give instructions to the agent.

5. Principal can clean all the benefits profits earned by the agent when he has carried out any transaction on behalf of the principal..

6. Principal has the right to cancel any transaction in which some material information is concealed by the agent. However, if such transaction is with the third party, then he cannot cancel such transaction.

7. Principal can receive any money collected by the agent from any transaction related to the agency. In such case agent will be authorised to deduct any lawful expenses, Commission aur advance made by him.

8. Principal has right to stop the remuneration of Agent unless the act is completed by him. However, in case of any contrary contract, this right will not be available to the principal.

9. Principal has right to refuse payment of remuneration to the agent in case agent is found guilty of any misconduct.

## 4.7.9 LIABILITY OF AGENT TO THIRD PARTIES [AGENT PERSONALLY LIABLE]

As agent is entering into the contract not on his behalf rather on behalf of the principal, he is not liable to the third party for performance of the contract. But there are some situations in which agent is personally held liable for the performance of the contract. Following are such situations:

1. **WHERE THE AGENT ACTS FOR A FOREIGN PRINCIPAL [SEC. 230 (L)]:** In case the principal is living abroad and agent enters into a contract on his behalf, it will be personal responsibility of the agent to complete the contract..

2. **WHERE THE AGENT ACTING FOR A PRINCIPAL WHO CANNOT BE SUED [SEC. 230 (2)]:** Some time the position of the principal is that the third party cannot sue him for example a foreign sovereign, person of unsound mind, company before incorporation, the agent will be personally liable for any contract enter on behalf of such principal.

3. **WHERE AN AGENT ACTS FOR A NON- EXISTENT PRINCIPAL:** In case the principal is a fictitious person and agent acts on behalf of such principal, he will be personally liable for the contract.

4. **WHERE THE AGENT ACTS FOR AN UNDISCLOSED PRINCIPAL [SEC. 231]:** Sometime agent does not reveal the name of the principal before the third party and enters into the contract in his own name with the third party, he will be personally liable for the contract..

5. **WHERE THE AGENT EXPRESSLY PROVIDES [SEC. 230]:** It there is any express condition in the contract that agent will personally be held liable for the contract entered into by him on behalf of the principal, he shall be help personally liable for the contract.

6. **WHERE THE AGENCY IS ONE COUPLED WITH INTEREST:** It the agent has some interest in the subject matter of the contract, he will be personally liable for the contract. However, in such case his liability will be limited to his interest in the subject matter only.

7. **WHERE THE AGENT EXCEEDS HIS AUTHORITY:** If agent does not comply with the instructions given to him by the principal and his acts exceeds the authority provided to him by the principal, he will be personally liable for such acts.

8. **WHERE THERE IS TRADE USAGE OR CUSTOM:** Sometime it is usage of trade that agent is personally liable for some acts. In such case it will be personal liability of the agent to perform the contract.

9. **WHERE AN AGENT RECEIVES MONEY BY MISTAKE OR FRAUD:** If third party has made some payment to the agent by mistake or agent has taken some payment from the third party through fraud, it is his personal liability to return such money.

10. **WHERE THE AGENT SIGNS THE NEGOTIABLE INSTRUMENT IN HIS OWN NAME:** An agent must sign negotiable instrument on behalf of his principal by disclosing the fact that signs are on behalf of the principal, if he fails to do so and signs instrument in his own name, he will be personally liable for the same..

11. **PRETENDED AGENT [SECTION 235]:** If a person pretends to be agent of some other person, but in reality he is not the agent, he will be personally liable to compensate the third party for any loss due to his such act.

## 4.7.10 LIABILITIES OF PRINCIPAL TO THIRD PARTIES

1. **WHERE THE AGENT ACTS WITHIN THE SCOPE OF HIS AUTHORITY [SEC. 226]:** If agent work as per directions given by the principal and does not exceeds his authority, principal will be liable to the third party for any act done by the agent.

2. **WHERE THE ACT WITHIN AGENT'S AUTHORITY IS SEPARABLE FROM THAT WHICH IS BEYOND HIS AUTHORITY (SEC. 227):** If agent does some act which was not in his authority, but his act is separable from what was authorized to him, principal will be liable to third party upto the limit he gave authority to the agent. Beyond that he will not be personally responsible.

3. **LIABILITY OF PRINCIPAL FOR MISREPRESENTATION OR FRAUD OF THE AGENT (SEC.238):** if agent do some fraud or made some misrepresentation to the third party, principal will be liable for such act of the agent provided such act was within the authority of the agent.

4. **WHERE THE AGENT ACTS FOR AN UNNAMED PRINCIPAL:** Sometime agent enters into some act in which he discloses to the third party that he is agent but does not disclose the name of the principal, the principal will be liable for such act of the agent.

5. **RESPONSIBILITY OF PRINCIPAL EVEN WHERE THE AGENT IS PERSONALLY LIABLE:** As discussed earlier in some cases the agent has personal

liability towards the third party. But in such cases the liability of principal also co-exists with the liability of the agents.

6. **BOUND BY NOTICE GIVEN TO AGENT [SECTION 229]:** If some party gives some notice to the agent, it will be assumed that such notice has been served to the principal. In such case principal shall be liable to the third party.

### 4.7.11 TERMINATION OF AGENCY

1. **TERMINATION BY THE ACT OF PARTIES:**

A contact of agency can be terminated by the parties with their mutual agency or the one party unilaterally in certain cases. Further in some cases agency can be terminated by the operation of law also.

   a) **BY AGREEMENT BETWEEN THE PARTIES:** If both the parties mutually agree to terminate the agency, the agency will be terminated. But in this case all the contracts entered before termination of agency will remain valid.

   b) **BY REVOCATION OF AUTHORITY BY THE PRINCIPAL:** Law provides power to the principal to revoke any authority that he has given to the agent. But such revocation can take place only before agent use such authority.

   c) **BY RENUNCIATION OF AGENCY BY THE AGENT:** After giving the due notice, renunciation of the agency can take place any time by the principal.

2. **TERMINATION BY OPERATION OF LAW:**

Some time agency is terminated due to some legal provisions. Following are such situations:

   a) **COMPLETION OF THE BUSINESS OF AGENCY:** If agency is created for some specific task and such task is completed, agency will be terminated automatically.

   b) **EXPIRY OF TIME:** Some time agency is created for a specific term. Upon completion of that term, agency is automatically terminated. However, if principal wants, he can extend the agency also.

   c) **DEATH OR INSANITY OF THE PRINCIPAL OR AGENT:** In case of death of the principal or he becomes person of unsound mind, agency is automatically terminated.

   d) **INSOLVENCY OF THE PRINCIPAL:** If any principal is declared insolvent, it will result into termination of the agency.

   e) **DESTRUCTION OF THE SUBJECT MATTER:** If the subject matter for which agency is created is destroyed, agency is automatically terminated. For example A appointed B to sell his car but his car is totally destroyed in an accident, in such case agency will be terminated.

   f) **DISSOLUTION OF COMPANY:** If the principal is a company, on dissolution of such company, agency is automatically terminated.

   g) **PRINCIPAL BECOMING AN ALIEN ENEMY:** In case the principal and agent are from two different countries and due to war with that country, government declared that country as enemy country, agency is automatically terminated.

   h) **TERMINATION OF THE SUB-AGENT"S AUTHORITY:** If a person terminate the agency of the agent, in such case the sub agency will also be terminated.

**4.8 TEST YOUR UNDERSTANDING (C)**

1. Mark the right answer
   a. Which of following statement is true.
      - Principal must be competent to contract
      - Agent must be competent to contract
      - Both must be competent to contract
      - None must be competent to contract
   b. Which of the following is not the right of Agent.
      - Right to be indemnified.
      - Right of Remuneration
      - Right of Lien
      - Right to resell the goods
   c. What is liability of Del Credere Agent.
      - Purchase of goods
      - Sale of Goods
      - Finding appropriate goods
      - Ensuring collection from debtors
   d. When Agency cannot be terminated
      - Completion of Agency
      - Insolvency of Prinicpal
      - Agent exceeds authority
      - Death of Agent
   e. After revocation of agency
      - Principal is not bound by act done prior to revocation
      - Principal is not bound by acts done after revocation
      - Principal is bound by all acts
      - Principal is not bound for any act.

2. Write True or False
   a. Minor can become Principal but he cannot become agent.
   b. There cannot be any agency possible without consideration .
   c. Agent can go beyond his authority in case of emergency.
   d. Normally sub agent is not under direct control of principal
   e. Agent can never appoint sub agent
   f. Termination of agent automatically results into termination of sub agent.
   g. Agency can be revoked for future acts only

3. State whether following are agents or not?
   a. Servant engaged by Mr. A
   b. Contractor who is constructing of building for Mr. A

c. Wife of Mr. A purchasing household item on credit.

d. Mr. A appointed Mr X to purchase goods for him for 10% commission.

e. Mr. A appointed Mr X to purchase goods for him for without commission.


## 4.9 LET US SUM UP

- Contract act has some special contracts like indemnity, guarantee, bailment, agency etc.
- In indemnity one party ensure other party to compensate the loss incurred by him.
- There are two parties in indemnity that are indemnity holder and indemnifier.
- In guarantee one party give assurance to other that if third party fails to make the payment, payment will be made by him.
- It has three parties, Creditor, Principal Debtor and Surety.
- Principal Debtor has primary liability.
- The liability of surety is secondary.
- Guarantee may be one time or continuing.
- Continuing .guarantee cannot be revoked retrospectively.
- Fidelity guarantee is for the honesty of the third party.
- In bailment goods are given by one person to other for specific purpose.
- It has two parties Bailor and Bailee.
- Bailment may be gratuitous or non gratuitous.
- Gratuitous bailment is for benefit of one party which may be bailor or bailee.
- In agency one person act on behalf of other known as agent and the person on behalf of whom he is working is known as principal
- Principal must be person who is capable of contract.
- Any person can be appointed as agent including Minor.
- Normally agent has no personal liability to third party but in some cases he has personal liability towards third party.


## 4.10 KEY TERMS

- **INDEMNITY CONTRACT:** ‑A contract by which one party promises to save the other from loss caused to him by the conduct of the promisor himself or by the conduct of any other person".
- **INDEMNIFIER:** Indemnifier is the person who give assurance to other person to compensate his loss like in the example of insurance contract insurance company gave assurance to other party so it is indemnifier.
- **INDEMNITY-HOLDER:** He is the person to who assurance is given under the contract of Indemnity. So in the insurance example policyholder is the Indemnity Holder as he gets the assurance from the insurance company.
- **GUARANTEE CONTRACT:** ‑A contract of guarantee is a contract to perform the promise, or discharge the liability, of a third person in case of his default.‖
- **SURETY:** Surety is the person who gives guarantee to other person for making the payment in case of default by Principal Debtor.

- **PRINCIPAL DEBTOR**: Principal debtor is the person by whom amount is originally payable under the contract. If he fails to make the payment then surety will be liable to make the payment. It is not necessary that principal debtor must be a person competent to enter into a contract. Even if he is minor, guarantee will be valid.
- **CREDITOR:** The person by whom amount is receivable under the contract is called creditor.
- **SPECIFIC GUARANTEE:** Specific guarantee is the guarantee given for a particular transaction. Normally this guarantee is only for single transaction and the very moment that transaction is complete the guarantee is also over.
- **CONTINUING GUARANTEE:** Continuing guarantee is not for a single transaction rather it is for a series of transaction. This type of guarantee will continue until it is revoked by the surety.
- **RETROSPECTIVE GUARANTEE:** If some transaction has already been carried and guarantee is given at the later stage, it is called retrospective guarantee.
- **PROSPECTIVE GUARANTEE:** If some transaction is yet to be carried and guarantee is given for such transaction, it is called prospective guarantee.
- **FIDELITY GUARANTEE:** This type of guarantee is given for the honesty or good conduct of the person. For example A give employment to B on the guarantee of C, that he will make good any loss arising due to fraud or misappropriation by B. This guarantee is Fidelity Guarantee.
- **CONTRACT OF BAILEMENT:** "If one person delivers goods to another person for a specific purpose on the contract that the goods will be returned on completion of the purpose or will be disposed off as per his order."
- **GRATUITOUS BAILMENT:** In case goods are delivered by one person to another under Bailment without making any charges or payment, it is known as gratuitous bailment.
- **NON-GRATUITOUS BAILMENT:** Where the persons involved in bailment charge certain amount, remuneration, o r p a yme n t , i t i s c a l l e d non-gratuitous Bailment.
- **PARTICULAR OR SPECIAL LIEN [SECTION 170]:** Particular lien is available only for those goods against which some amount is due by the bailor to the the Bailee. In this Bailee can keep the possession of that particular item for which amount is due and not the other items of the Bailor.
- **GENERAL LIEN [SECTION 171]:** A general lien is a situation in which Bailee is having the right of lien not only in respect of the goods for which some amount is due, rather he has the right of lien over all the items bailed to him by the Bailor.
- **AGENT:** ‒a person employed to do any act for another or to represent another in dealings with third parties‖.
- **AGENCY BY EXPRESS AGREEMENT (SEC. 187):** When agency is created by an express contract between the Principal and the agent, it is known as express agency. Law does not provide that such contract must be in written form only. It may be an oral contract also
- **AGENCY BY IMPLIED AGREEMENT (SECTION 187):** Sometime there is no express contract of creation of agency, rather agency is created by implied contract

between the Principal and the Agent, it is known as Implied agency. Depending on the circumstances many a time Parents, Spouse or the Servant is treated as an agent of the person.

- **AGENCY BY ESTOPPEL (SECTION 237):** Sometime a person knowingly say to some other person that he is agent but in reality he is not agent. Such conduct is shown by the person willfully by using some words. This is known as Agency by Estoppel.

- **AGENCY BY HOLDING OUT:** In many circumstances the conduct of the person is such that it gives impression to other person that he is agent of some person. Though he may not be using any words in such case but his conduct is such that the impression is created in the mind of other person that he is agent of some person.

## 4.11   REVIEW QUESTIONS

1.  Write a detailed note on contract of Indemnity.
2.  What is contract of Guarantee? Distinguish between indemnity and guarantee.
3.  What are rights and duties of surety.
4.  Give different types of guarantees.
5.  When surety is discharged from his liability.
6.  How guarantee can be revocated?
7.  What is Bailment? Give its essential features.
8.  Give different types of Bailment.
9.  Give rights and duties of Bailor.
10. Give rights and duties of Bailee.
11. What is Bailee's Lien. Give different types of lien.
12. How termination of Bailment take place?
13. What are contract of Agency? Give salient features of contract of Agecny.
14. What are different types of Agents.
15. Give different modes of creation of agency.
16. What are rights and duties of agents?
17. What are rights and duties of Principal?
18. Give liability of the agent towards third party.
19. Give liability of the Principal towards third party.
20. Give the method of termination of agency.

## 4.12    ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

1 (a) Three

1 (b) It must be in writing.

1 (c) Surety

1 (d) Valid

1 (e) Secondary

2 (a) True

2 (b) True

2 (c) False

2 (d) False

2 (e) True

2 (f) False

2 (g) True

## TEST YOUR UNDERSTANDING -B

1 (a) Movable

1 (b) When Bailor is insolvent.

1 (c) Banker

1 (d) Bailor

1 (e) Bailee

2 (a) False

2 (b) False

2 (c) False

2 (d) True

2 (e) True

2 (f) False

2 (g) True

## TEST YOUR UNDERSTANDING -C

1 (a) Principal must be competent to contract

1 (b)  Right to resell the goods.

1 (c) Ensuring collection from debtors

1 (d) Agent exceeds the authority

1 (e)  Principal is not bound by acts done after revocation

2 (a) False

2 (b) False

2 (c) True

2 (d) True

2 (e) False

2 (f) True

2 (g) True

2 (a) Servant is employee not the agent.

2 (b) Independent contractor is not an agent.

2 (c) Wife purchasing household items on credit is an agent.

2 (d) Mr. X is agent as he is acting on behalf of Mr. A

2 (e) Mr. X is agent as he is acting on behalf of Mr. A whether he is getting commission or not is not necessary.

## 4.13    FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
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3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
4. P C Tulsian and Bharat Tulsian, *Business Law*, McGraw Hill Education
5. Sharma, J.P. and Sunaina Kanojia, *Business Laws*, Ane Books Pvt. Ltd., New Delhi

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# B. COM (HONS.)
## (Accounting and Taxation)

**SEMESTER II**

**COURSE: BUSINESS LAW**

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# UNIT 5  SALE OF GOODS ACT 1930

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## STRUCTURE

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## 5.1 OBJECTIVES

After reading this chapter, students will able to
- Define the meaning of contract of sale
- Describe essential elements of contract of sale
- Differentiate between sale and agreement to sell
- Explain the meaning of conditions and warranties relating to contract of sale
- Distinguish between condition and warranty
- Know the situations when a condition can be treated as a warranty.
- Describe Express and Implied conditions and warranties.

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## 5.2 INTRODUCTION

Sale of Goods is one of the important types of contract which is regulated by law in India. Initially, it was the part of Indian Contract Act 1872. But later on, it was deleted from the Indian Contract Act and passed as a separate Act. The act came into force on July 1, 1930 and it is applicable to the whole of India except the state of Jammu and Kashmir. Although this law has its provisions related to the sale of movable goods yet it also includes general principles of the Indian Contract Act 1872 such as free consent, the capacity of a person to enter into a contract, consideration, lawful object, etc.

## 5.3 SALE OF GOODS ACT 1930

### 5.3.1 MEANING OF CONTRACT OF SALE OF GOODS

As per Section 4 of the Sale of Goods Act 1930,

‒A contract of sale of goods is a contract whereby the seller transfers or agrees to transfer the property in goods to a buyer for a price.‖

### 5.3.2 TYPES OF CONTRACT OF SALE

- **ABSOLUTE SALE**

  When property in goods is transferred from seller to buyer immediately, it is known as an absolute sale. For example, if A goes to a grocery shop of B and buys 10 Kg of Basmati rice and makes payment for it immediately. It is called as an absolute sale.

- **CONDITIONAL SALE**

  When the property in goods is transferred from seller to buyer on some future date after fulfilling some conditions then it is called an agreement to sell. For example, Bharat has a bakery shop. Ram orders a birthday cake to Bharat and Bharat promises to deliver that cake in the evening after preparing it as per the specifications of Ram. It is called a conditional sale.

### 5.3.3 ESSENTIAL ELEMENTS OF CONTRACT OF SALE OF GOODS

- **TWO PARTIES**

  There must be at least two parties in a contract of sales such as seller and buyer. The seller is the person who sells the goods or promises to sell the goods in future and buyer is the person who buys the goods or promises to buy the goods in future.

- **GOODS**

  Goods must be the subject matter of the contract between buyer and seller. Goods must be of movable nature but it does not include money and actionable claims. Goods can be in form of stock and shares, growing crops, grass, wood etc.

  **TYPES OF GOODS**
  - **EXISTING GOODS**

  Goods that are in the possession of seller at the time of contract of sale are called existing goods.

**Example:** Basmati rice available in a grocery store.

**TYPES OF EXISTING GOODS**

- o **SPECIFIC GOODS**

  Goods that are identified and agreed upon at the time of contract of sale are called specific goods.

  **EXAMPLE:** Pushap wishes to sell a car of a certain model and year of manufacture to Kamal and Kamal agrees to buy at that time. Here, car is an ascertained good with specific model and year of manufacture.

- o **ASCERTAINED GOODS**

  Goods that are identified and agreed upon after the contract of sale as per the terms decided between buyer and seller are called ascertained goods.

  **EXAMPLE**

  Ruchi wishes to buy 20 air coolers for his office. Shopkeeper makes a contract with Ruchi to supply 20 air coolers. Ruchi then selects 20 air coolers out of 100 air coolers which are available at the shop of seller. This is called ascertained goods. In other words, goods which are identified after contract of sale is made are called ascertained goods.

  The basic difference between specific goods and ascertained goods is that in case of specific goods, goods are identified by the buyer before the contract of sale is made. Whereas in case of ascertained goods, goods are identified after the contract of sale is made between parties.

- o **GENERIC/ UNASCERTAINED GOODS**

  Goods that are not specifically identified but are indicated by description are called generic/unascertained goods.

  **EXAMPLE:** Krishan goes to a grocery store to buy 10 Kg of sugar. The grocery store has 100 Kg sugar in his container at that time. But the owner of grocery store will give only 10 Kg of sugar to Krishan. In this case, sugar is an unascertained good as it cannot be identified or ascertained.

```
                      Types of Goods
                            |
          ┌─────────────────┴─────────────────┐
    Existing Goods                        Future Goods
          |
          ├──────────────┐
   Specific Goods   Generic/Unascertained
          |              Goods
          |
   Ascertained Goods
```
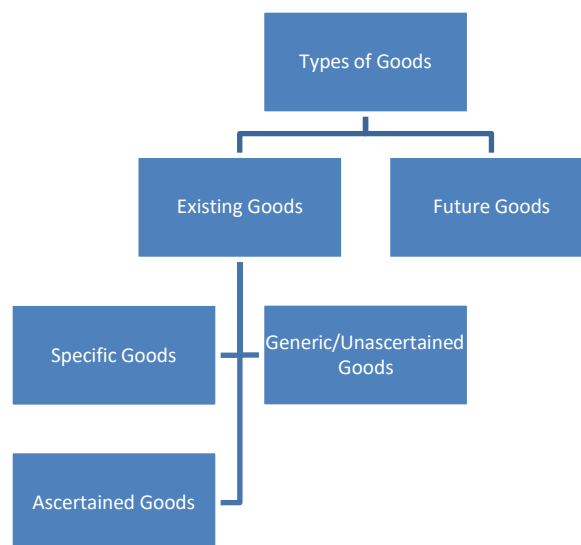
- o **FUTURE GOODS (SECTION 2 (6)**

Goods that a seller does not possess at the time of contract of sale are called future goods. These goods are yet to be manufactured or produced by the seller in the future.

**EXAMPLE:** A sweet shop owner will prepare sweets for his customers on their orders and supplies to them in future.

- **PRICE**
A price must be decided between the parties in consideration of selling of goods. Without money consideration, the sale is not completed. Goods must be exchanged for a fixed price. Exchanging goods with other goods is not a contract of sale, it is a barter system. But in case the consideration is partly in cash and partly in goods, this forms a valid contract of sale.
**EXAMPLE**:
A seller ready to sell a new mobile to buyer as an exchange offer in which the buyer will give his old mobile to seller and make part payment in cash or by cheque is a valid contract of sale. The price may be fixed by the parties themselves at the time of contract, or by some third party, or may be determined by the parties later based on some circumstances.
- **TRANSFER OF PROPERTY/DELIVERY OF GOODS**
The transfer of property from seller to buyer must take place. In other words, the possession of goods must be transferred from seller to buyer to complete a contract of sale. Seller can also give authority to third party to receive delivery of goods on his behalf.
**TYPES OF DELIVERY**

```
                    ┌──────────────┐
                    │   Types of   │
                    │   Delivery   │
                    └──────────────┘
            ┌──────────────┼──────────────┐
      ┌──────────┐  ┌──────────────┐  ┌──────────┐
      │  Actual  │  │ Constructive │  │ Symbolic │
      └──────────┘  └──────────────┘  └──────────┘
```
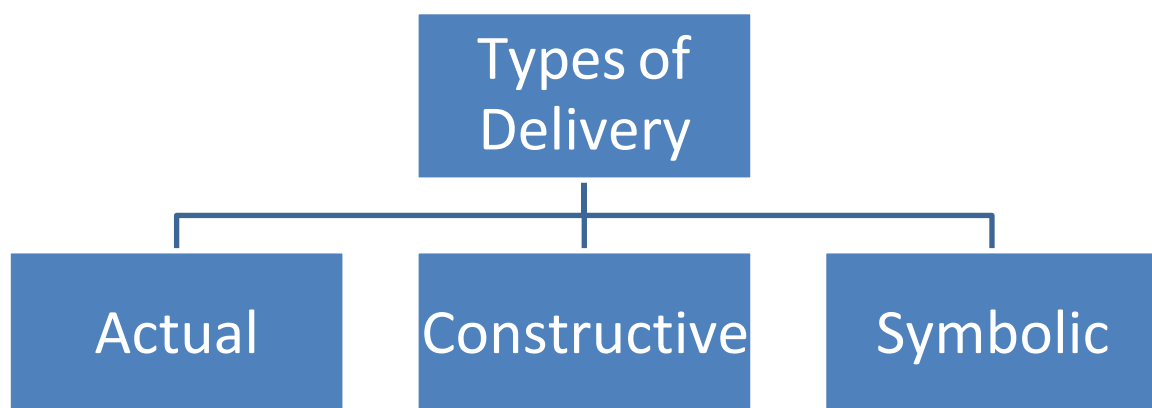
- ○ **ACTUAL DELIVERY**
When possession of goods are actually transferred from seller or his authorized agent to buyer or his authorized agent at the time of sale then it is called actual delivery of goods.
**EXAMPLE:** Rabia goes to a shop to buy LED bulb and gets delivery of LED bulb at the same time after making payment of Rs 500.
- ○ **CONSTRUCTIVE DELIVERY**

When possession of goods is not directly transferred from seller to buyer at the time of sale but ownership of goods is transferred then it is called constructive delivery. Third party is involved in constructive delivery.

**EXAMPLE:** If Karan gets the delivery of a parcel on behalf of Arjun, it is called constructive delivery.

- o **SYMBOLIC DELIVERY**
  When goods are not actually delivered to buyer but he obtains the right to use the goods, it is known as symbolic delivery. Such type of delivery is possible in case of heavy weight goods.
  **EXAMPLE:** When bulky goods are kept in a warehouse and in spite of transferring these goods physically, seller gives the keys of warehouse to buyer.

- **NATURE OF CONTRACT OF SALE**
  Contract of sale must be absolute or conditional. Absolute contract of sale means that property in goods transfers to the buyer immediately after the contract is completed. Conditional contract means that property in goods will be transferred to the buyer only after fulfilling all conditions.

- **ESSENTIALS OF A VALID CONTRACT**
  This contract must fulfill the essentials of a valid contract as free consent, consideration, lawful object, the capacity of parties to enter into a contract etc.
  **EXAMPLE:**
  Suppose A wishes to sell a new Air Conditioner to B for Rs. 80, 000. In this example, two parties are involved such as A and B. A is a seller and B is a buyer. The subject matter of the contract is an Air Conditioner. This is a contract of Sale between A and B.

## 5.4 DIFFERENCES BETWEEN SALE AND AGREEMENT TO SELL

Both are the types of Contract of Sale, yet there are some differences between sale and agreement to sale which are explained as below:

| S. No. | Basis of Differences | Sale | Agreement to Sell |
|---|---|---|---|
| 1 | **Transfer of property in goods** | Property in goods is transferred from seller to buyer immediately at the time of sale. | Property in goods is transferred from buyer to seller after fulfilling some conditions or on some future date. |
| 2 | **Nature of Contract** | It is an executed contract. In other words, it is a contract which has been completed now. | It is an executory contract. In other words, it is a contract which has not completed yet. |
| 3 | **Right to Resell** | A seller cannot resell the goods as the property in goods is with the buyer. | A seller can resell the goods as the property in goods lies with him. The seller can become |

| | | | liable for breach of contract but the subsequent buyer gets the good title. |
|---|---|---|---|
| 4 | **Risk of Loss** | As the goods are transferred from seller to buyer immediately, the risk of damage of goods is borne by the buyer only. | The risk of loss due to damage of goods is borne by the seller only till the property in goods is transferred from seller to buyer. |
| 5. | **Breach of Contract** | In case of breach of contract by buyer, the seller can ask for the price of goods or damages both. | In case of breach of contract by buyer, the seller can sue for damages only and not for the price. |
| 1. | **Insolvency of Buyer** | If the buyer becomes insolvent, the seller can only recover a proportionate amount from the official receiver for the price of goods. He cannot get back delivery of goods. | If the buyer has not made payment for goods, the seller can refuse transfer of property in goods to the official receiver. |
| 7 | **Insolvency of Seller** | If buyer has made payment for the goods to the seller, the buyer has the right to receive the goods from the official assignee. | As ownership of goods has not been transferred to the buyer, the buyer is entitled to only a rateable dividend but not the goods. |

**TRACK YOUR PROGRESS I**

1. What do you mean by Contract of Sale? Explain different types of Contracts of Sale.

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2. Write a detailed note on essential elements of the Contract of Sale.

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3. Discuss the differences between Sale and Agreement to Sale.

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**4. STATE WHETHER FOLLOWING STATEMENTS ARE TRUE AND FALSE**

a). The Sale of Goods Act 1930 deals with the law relating to sale of goods in India.

b). The terms Sale and Agreement to sale are similar and have same meanings.

c). In order to make a valid contract of sale, all the essentials of a valid contract must be fulfilled.

d). The subject matter of contract of sale such as Goods can be of immovable nature.

e). There is difference between transfer of possession of goods and transfer of ownership of goods.

**Answers:** a. True      b. False        c. True        d. False        e. True.

## 5.   FILL IN THE BLANKS

a). A contract of Sale is an_____contract.

b). An agreement to sale is an_____contract.

c). The goods which are identified before the contract of sale are called_____goods.

d). There are two parties in a Contract of Sale_____and_____.

e). Sale of Goods Act was passed in_____.

**Answers:** a. Executed   b. Executory   c. Specific    d. Seller, Buyer  e. 1930

## 5.5 CONDITIONS AND WARRANTIES

Sometimes seller appreciates his product in front of buyer to sell his product to the buyer. If the statement is not much meaningful then it is just an expression of opinion called a 'puff'. But in case if statement is given by the seller about an important feature of good and the presence of such feature is mandatory for buyer to buy the product then the statement is known as 'stipulations'. In some situations, these stipulations are called  conditions and in other situations, they are called Warranties.

**EXAMPLE:**

If a seller X sells a horse to buyer Y by saying that it is very lucky. If you buy this horse, something good will happen to you. Y buy the horse but nothing good will happen at his house. In this case, Y cannot take any action against X because X's statement was a mere expression of his opinion and does not amount to a stipulation.

### 5.5.1. <u>MEANING OF CONDITION AND WARRANTY</u>
**MEANING OF CONDITION**

When a stipulation is mandatory for the contract, it is called a condition.  If the condition is not fulfilled by the seller at the time of sale then buyer has the right to cancel the contract and refuse to buy the goods. If buyer has paid some money to seller, then he can recover the amount from the seller for not fulfilling such condition. If buyer has suffered some losses due

to seller's breach of a condition related with good. The buyer has also the right to claim damages from the seller.

**EXAMPLE**

Sham runs an ice-producing factory. Ram sells a refrigerator to Sham for Rs 1,00,000 by saying that it produces ice quickly. Sham buys the refrigerator on believing this statement. But in reality, the refrigerator does not produce much ice. In this case ice production is an important reason for Sham to buy that refrigerator but this feature is not working in the refrigerator. So Sham has the right to return the refrigerator to Ram or he can claim damages or file a case against Ram for not fulfilling such condition.

**MEANING OF WARRANTY**

If a stipulation is a subsidiary promise and it is not mandatory for the contract of sale, it is called a warranty. In case of breach of a warranty, the buyer cannot cancel the contract, he can claim only damages.

**EXAMPLE**

Sunil went to a car dealer Saurav to buy a car. Saurav sells a car to Sunil by saying that the mileage of this car is 20 Km per liter. Sunil buys that car and when he runs this car on road, he found that the maximum mileage of this car is only 15 Km per liter. Sunil went to Saurav for breach of condition. But Saurav explains that it was just a breach of Warranty because no such condition was kept by Sunil in front of Saurav for buying a car. In this case, Sunil can recover only the damages for suffering some losses. He cannot cancel the contract.

**5.5.2. DIFFERENCES BETWEEN CONDITION AND WARRANTY**

The differences between condition and warranty can be explained as below.

**Difference between Condition and Warranty**

| S. No. | Basis of Difference | Condition | Warranty |
|---|---|---|---|
| 1 | Meaning | When a stipulation is mandatory for the contract, it is called a condition. | If a stipulation is a subsidiary promise and it is not mandatory for the contract of sale it is called a warranty. |
| 2 | Non-fulfillment of Condition/Warranty | If the condition is not fulfilled by the seller at the time of sale then buyer has the right to cancel the contract and refuse to buy the goods. If buyer has paid some money to seller, then he can recover the amount from the seller for not fulfilling such condition. | In case of breach of a warranty, the buyer cannot cancel the contract, he can claim only damages. |
| 3 | Option | Breach of the condition can be treated as breach of | Breach of warranty cannot be treated as |

| | | warranty by aggrieved party. But in this case, the party has the right to claim damages only. He cannot cancel the contract. | breach of condition |
|---|---|---|---|

## 5.5.3. TREATMENT OF A CONDITION AS A WARRANTY

A condition may be treated as a warranty in the following cases:

- **WAIVER BY THE BUYER**
  If any condition is imposed on sale of goods and it is waived by the buyer then the condition is treated as a Warranty.
  **EXAMPLE:**
  Buyer goes to a shop to buy detergent powder. With a pack of detergent powder of Rs 100, the condition is that a detergent bar is free. At the time of sale, seller is not able to find free piece of detergent bar and buyer is ready to buy only detergent powder at the same price. In this case, the condition is treated as warranty.
- **ACCEPTANCE OF GOODS BY THE BUYER**
  o **ACCEPTANCE OF WHOLE OF GOODS**
  If a seller does not sell similar goods as per specifications given by the buyer and the buyer accepts the whole of goods without any objection then the condition is treated as a warranty. In that case, buyer cannot return the goods. He can only claim damages.
  **EXAMPLE:**
  Rashi orders a shopkeeper a red color cotton suit for her. But the shopkeeper delivers a pink color suit and Rashi accepts this pink suit without any objection. In this case, a condition is treated as a warranty. Now in this case, Rashi cannot return the suit. She can claim damages only.
  o **ACCEPTANCE OF THE PART OF GOODS**
  Sometimes a seller does not sell whole of goods and delivers only a part of goods. If these goods are not according to buyer's specifications but accepted by him without any objections then there can be two circumstances as follows:
  - If the goods are indivisible, buyer cannot return the other part of goods. He can claim damages only.
  - If the goods are divisible, the buyer can reject those part which he has not accepted yet.

  **EXAMPLE**:

  A asked B to deliver 100 Kgs of Basmati Rice to him. B delivers 50 kgs of rice to A but those rice were not of Basmati quality. B accepted 50 Kgs of rice but refuse to take delivery of other 50 Kgs of rice on the ground that rice were not of Basmati

quality. A can claim damages for first order of 50 Kgs rice and refuse to take delivery of other 50 Kgs. This is an example of divisible goods.

## 5.5.4. EXPRESS AND IMPLIED CONDITIONS AND WARRANTIES

A brief explanation of express and implied conditions and warranties are given as follows:

- **EXPRESS CONDITIONS AND WARRANTIES**
  Express conditions and warranties are either in written or oral form. At the time of contract of sale, if some features or conditions are explained by buyer to seller by expressing their views in written or oral form, then these are called ‒express conditions or warranties‖.
  **EXAMPLE**
  If a Lenovo brand dealer sells a specific model of a laptop to a customer by explaining its configuration and price to buyer and buyer agrees to buy the laptop with the same configuration/ features, then it is an express condition. In this case, the dealer must sell the same laptop to buyer about which he has told to buyer. On the other hand, at the time of selling a ceiling fan of Crompton Brand, if seller gives a warranty for 6 months then it is an express warranty.

- **IMPLIED CONDITIONS AND WARRANTIES**
  Sometimes conditions and warranties are not explained by parties at the time of contract of sale. These are assumed to be incorporated by law in the contract of sale. Such conditions and warranties are called implied conditions and warranties.

**IMPLIED CONDITIONS**

- **CONDITION AS TO TITLE (SECTION 14)**
  As per the Sale of Goods Act, there are implied conditions for every seller that:
  - In case of sale, he has ownership of goods and the right to sell the goods.
  - In case of an Agreement to sale, he will have a right to sell the goods when the property is to pass to buyer.

The buyer on the other hand has the right to return the goods if the title of good is defective.

**EXAMPLE:**

Amir buys a second-hand car for Rs 5,00,000 from a car dealer. He drives this car for two months. After two months, the original owner of the car came to Amir and claims for his car. He also shows the original documents of the car to Amir. Now as per law, Amir is bound to return car to the original owner. Amir returns the car to the original owner and he can now claims the purchase price of the car from car dealer.
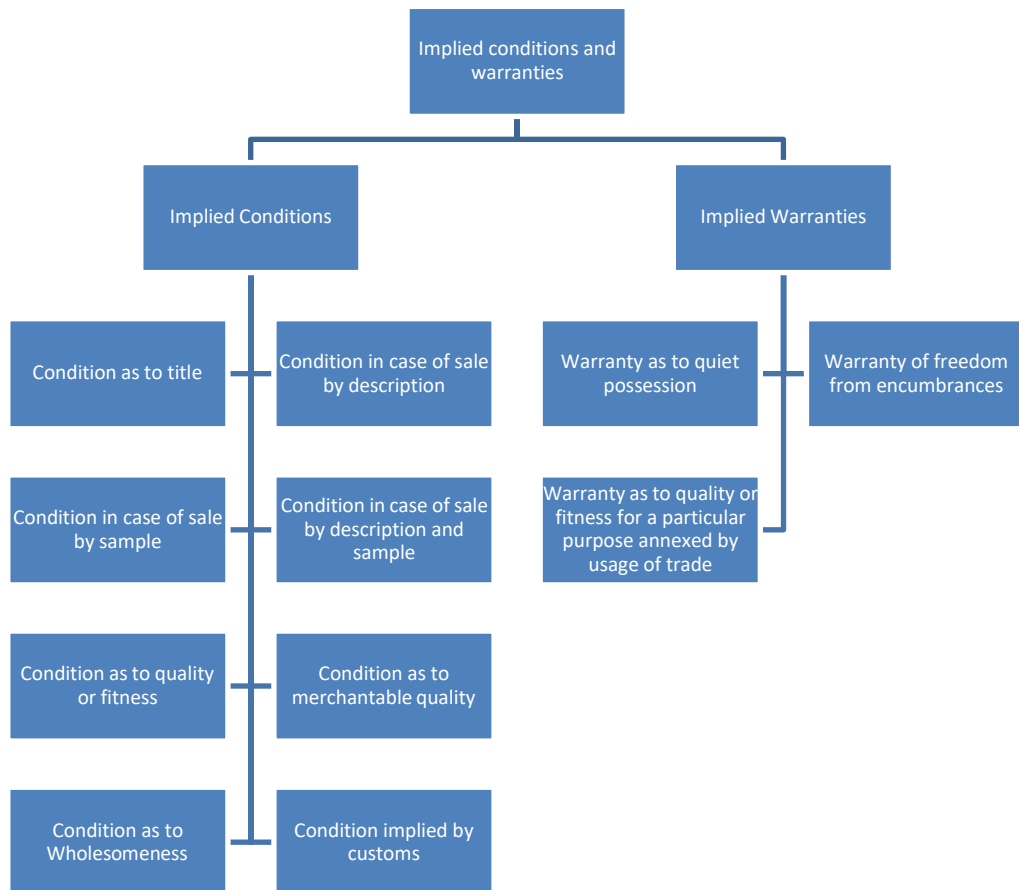
- **CONDITION IN CASE OF SALE BY DESCRIPTION (SECTION 15)**

Sometimes in a contract of sale, goods are also sold by the owner of goods by describing its features to customers. So as per this implied condition, if some description is given by seller to a buyer then goods that are delivered to buyer must match with the description given by the seller. In case goods do not include those features for which description is given, the buyer can return the goods to seller and claim for his money.

**EXAMPLE:**

A is a seller who has a shop of home decoration material. At the time of selling an electric lamp to customers he explains that the body of the lamp is made of copper metal. But in reality, it was made with iron material. When the electric lamp is delivered to buyer, he did not find the copper body. In this case, he can return the electric lamp to seller as it is not as per description given by seller and claim his money back from him.

- **CONDITION IN CASE OF SALE BY SAMPLE (SECTION 17)**

Businessmen sometimes also show some goods as sample to customers and then on the basis of sample, they take orders from customers for the bulk quantity of goods. In this case, there is an implied condition that ordered goods must match with sampled goods and buyer must have reasonable time and opportunity to compare sampled goods with ordered goods. In case supplied goods are different from sampled goods, the buyer has the right to return the goods and claim his money back from the seller.

**EXAMPLE:**

Suresh has a grocery store. Mukesh wishes to buy super quality Basmati rice from Suresh. He goes to a grocery store of Suresh and ask him to show super quality Basmati rice. He also buys 1 Kg super quality Basmati rice from grocery store and cooks those rice. After that, he orders Suresh for 10 Kg of the same super quality Basmati rice as he bought already from his grocery store. But those 10 Kg rice were not correspond with the 1 Kg rice. In this case, Mukesh can return 10 Kg rice to Suresh by saying that the quality of rice does not match with the quality of 1 Kg rice and claim his money back from Suresh.

- **CONDITION IN CASE OF SALE BY DESCRIPTION AND SAMPLE**

If a seller sells the goods to buyer by description as well as by sample then there is an implied condition that bulk of goods must match both with description as well as sample. In case, goods are matched with the sample but not with description or goods corresponds to description but those are not as per sample, the buyer has the right to repudiate the contract and can claim for refund of money.

**EXAMPLE:**

If a fabric painter shows a colored fabric to customer by claiming that while painting it, eco-friendly colors are used. On this statement, one customer orders 10 pieces of colored fabric. But later on, he found that it is a normal color and not eco-friendly color. As the color does not correspond with description given by fabric painter, the customer has right to cancel the contract and claim a refund.

- **CONDITION AS TO QUALITY OR FITNESS (SECTION 16 (1)**

Under a contract of sale, there is no implied condition as to the quality or fitness for any purpose of goods supplied. But if buyer explains the purpose of buying a product to seller then condition as to quality or fitness will apply. The implied condition as to the reasonable quality or fitness of goods would apply if the following conditions are satisfied:

a. The buyer requires goods for a special purpose.
b. The buyer explain the purpose of buying that good to the seller.
c. The buyer has strong faith in the skill and judgment of the seller.
d. Seller generally deals in those goods. Either he is a manufacturer or trade in those goods.

**EXAMPLE:**

Ramesh purchased a flask by telling to shopkeeper that he needs a water bottle in which hot water can be stored for 8-9 hours. The shopkeeper sells a flask to Ramesh. But the water will remain hot only for one hour in a flask. A breach of condition as to the quality was thus committed. Hence Ramesh can return that flask to shopkeeper and can claim for refund as well as for damages as he has already explained the purpose of buying a flask to a shopkeeper.

However, if buyer does not explain the purpose of buying a particular good or does not rely upon the skill and judgment of seller then there is no implied condition.

- ## CONDITION AS TO MERCHANTABLE QUALITY (SECTION 16 (2)

This condition is applied only if goods are sold by description by seller to buyer. As per this implied condition, goods shall be of merchantable quality. The –Merchantable quality‖ means goods should be free from defects and should be resalable in the market under the particular description by which they are known. In other words, if goods have some defects due to which they cannot be used properly or cannot be sold again to others or goods are such that a reasonable person knowing of their condition would not buy them, such goods lack merchantable quality.

- ## CONDITION AS TO WHOLESOMENESS

In case of the sale of eatables goods, there is an implied condition in a contract of sale that goods shall be wholesome or sound. In other words, the goods should be fit for consumption by human beings.

### EXAMPLE:

Sanyam goes to a restaurant and orders a plate of pav bhaji. The pav bhaji was prepared one week before and is not fit for human consumption. But the restaurant owner serves him with stale pav bhaji. Sanyam consumes it and is diagnosed with a stomach infection. Later on, it was found that the major reason for stomach infection was the consumption of stale pav bhaji. In this case, there is a breach of condition as to the fitness of the eatables and the restaurant owner is liable to pay damages to Sanyam in this case.

### IMPLIED WARRANTIES

- ## WARRANTY AS TO QUIET POSSESSION (SECTION 14B)

There is an implied warranty in case of a contract of sale of goods that buyer must have quiet possession of the goods. He has right to enjoy quiet possession of goods. In case if any other person has a superior title of goods other than seller, the buyer has a right to claim damages from the seller.

- ## WARRANTY OF FREEDOM FROM ENCUMBRANCES (SECTION 14C)

At the time of buying goods from seller, there is an implied warranty that goods must be free from any charge or encumbrances in favor of any third party. The buyer will not be liable for any charge which was imposed on goods before transferring the possession of goods from seller to buyer and at the time of sale, buyer was unaware of it. In case such a charge arises in near future, buyer can claim damages from seller. However, if seller informs the buyer about such encumbrances/ charges before transferring the possession of goods from seller to buyer then this warranty is not applicable.

- **WARRANTY TO DISCLOSE DANGEROUS NATURE OF GOODS**

Another important implied warranty is that the seller must disclose the dangerous nature of goods to buyer at the time of selling a product.

**EXAMPLE:**

Sunita went to a chemist shop to buy hand sanitizer. The sanitizer contains 70% alcohol which may catch fire. So seller warns Sunita to keep away this hand sanitizer from fire. Sunita keeps hand sanitizer near the gas stove and suddenly it catches fire and destroys some other products in Kitchen. Now, in this case, she cannot claim damages because seller has already told him about mixing alcohol in hand sanitizer and keep it away from fire.

- **WARRANTY AS TO THE QUALITY OF FITNESS FOR A PARTICULAR PURPOSE ANNEXED BY THE USAGE OF TRADE (SECTION 16(4)**

In case of contract of sale, there is an implied warranty as to quality of fitness for a particular purpose annexed by usage of trade.

**TRACK YOUR PROGRESS II**

1. What do you understand by Conditions and Warranties in case of contract of sale? Explain differences between Conditions and Warranties.

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2. Explain those situations, in which a condition may be treated as a warranty. Give examples to support your answer.

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3. Write a detailed note on express and implied Conditions and Warranties in a contract of sale.

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…………………………………………………………………………………………
…………………………………………………………………………………………

**4. STATE WHETHER FOLLOWING STATEMENTS ARE TRUE AND FALSE**

a. When a stipulation is mandatory for the contract, it is called a condition.

b. There is no implied warranty in case of a contract of sale of goods that buyer must have quiet possession of the goods.

c. If a stipulation is a subsidiary promise and it is not mandatory for the contract of sale it is called a warranty.

d. If goods are bought by description from a seller who deals in goods of such description, there is no implied condition that goods shall be of merchantable quality.

e. The terms Implied conditions and Implied warranties are similar and have same meanings.

**Answers: a. True     b. False      c. True       d. False       e. False**

**5. FILL IN THE BLANKS**

**a.** Stipulations in contract of sale are known as_____and_____.

**b.** A condition is a stipulation which is_____to the main purpose of contract of sale.

**c.** Conditions and Warranties can be_____or_____.

**d.** In case of a contract for sale by sample, there is an implied condition that bulk shall _____with the sample.

**e.** There is an implied warranty in case of a contract of sale of goods that buyer must have quiet_____of the goods

**Answers** a. Conditions, Warranties    b.  Essential   c. Express, Implied     d. correspond

e.  possession

## 5.6. SUMMARY

Sale of Goods Act 1930 protects the interests of consumers in a competitive business environment. This act explains the definition of sale, agreement to sale, essential elements of sale. The act provides information about express and implied conditions and warranties. Besides it also explains actions that customers may take in case of breach of express and implied conditions and warranties. As per this act, if there is any breach of express or implied conditions or warranties then the customer may claim damages. In certain cases, customers can also return goods to seller. The act also explains situations, in which a condition may be treated as a warranty.

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## 5.8. FURTHER READINGS

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- http://www.legalserviceindia.com/legal/article-241-implied-conditions-and-warranties-under-the-sale-of-goods-act-1930-with-reference-to-the-rule-of-caveat-emptor.html
- https://www.srdlawnotes.com/2018/08/implied-condition-and-warranties-law-of.html
- https://www.vedantu.com/commerce/express-and-implied-conditions

## 5.9. ANSWERS:

### CHECK YOUR PROGRESS I

1. Refer Section 5.3.1 and 5.3.2.
2. Refer Section 5.3.3.
3. Refer Section 5.4.

### CHECK YOUR PROGRESS II

1. Refer Section 5.5.1 and 5.5.2.
2. Refer Section 5.5.3.
3. Refer Section 5.5.4.

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

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## UNIT 6 TRANSFER OF OWNERSHIP

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**Suggested Reading**


**Learning Outcomes:**
After studying this unit, the learner should be able to:
1. Demonstrate the rules regarding the passing or transfer of property.
2. Understand how sale by non owners is done under Sale of Goods Act 1930.
3. Describe the rules relating to delivery of Goods.
4. Differentiate between Right of Lien and Right of Stoppage in transit
5. Illustrate the rights of a seller against goods and buyer personally.

## 6.1 INTRODUCTION

Transfer of property means the transfer of ownership of the goods from the seller to the buyer. The transfer of possession is different from transfer of ownership. A person may be in possession of goods but he may not be the owner of the  goods. In other words, it can be stated that a buyer is having the ownership of the goods but the seller is in possession of the goods even after sale of the goods and a buyer may have the possession of the goods but the ownership still lying with the seller.

A contract of sale of goods involves transfer of Ownership in three important stages:

1. Passing of Property
2. Delivery of Goods
3. Passing of Risk

Sale of goods basically involves transfer of ownership from seller to buyer. It is very essential to ascertain the time at which the ownership of property or goods passes from the seller to buyer.

**SIGNIFICANCE OF THE TIME OF TRANSFER**

The general rule is that risk passes with the property. In case, if  goods are damaged or lost, the burden of loss will be endured by the person who is the owner at the time when the goods are lost or damaged. When the goods are damaged by the act of third party, it is only the owner who can take the action. Seller can sue for price only when the property has passed to the buyer.

## 6.2 PASSING OF PROPERTY

Passing or transfer of property constitutes the most important factor to decide legal rights and liabilities of sellers and buyers. Passing of property means passing of ownership. If the property has passed to the buyer, the associated risk in the goods sold is that of buyer and not of seller, though the goods may still be in the seller's possession.

The rules regarding the passing of property depend upon the fact whether:

1. The goods are ascertained or
2. The goods are unascertained.

### 6.2.1 RULES REGARDING PASSING OF ASCERTAINED GOODS (SECTION 19)

When there is a contract for the sale of specific or ascertained goods, the property is transferred to the buyer at such times as the parties to the contract intend it to be transferred **[Section 19(1)].** Thus, the parties are left free to decide about the transfer of property according to their intensions. According to **[Section 19(2)],** intension of the parties can be gathered from:

(i)      The terms of the contract
(ii)     Conduct of the parties
(iii)    Circumstances of the case.

## STAGES OF GOODS WHILE PASSING THE PROPERTY

1.  **SPECIFIC GOODS IN A DELIVERABLE STATE (SECTION 20):** When the goods are in deliverable state, the goods passes to the buyer immediately as the contract is made. It is immaterial whether the time of payment of the price or the time of delivery of the goods or both is postponed. The following three conditions must be fulfilled for the application of this rule:
    **(i)**      The goods are specific i.e. goods have been identified and agreed upon at the time of making a contract.
    **(ii)**     The contract of sale is unconditional.
    **(iii)**    The goods are in deliverable state.

    **EXAMPLE: UNDERWOOD V. BURGH CASTLE CEMENT SYNDICATE (1922)**

There was a sale of engine. It was to be delivered through railway. When the engine was being loaded on a rail, it got accidently damaged. The buyer refused to take delivery. Held, the buyer could reject the engine because property in engine had not passed to him since the engine was not in a deliverable state.

2.  **SPECIFIC GOODS TO BE PUT INTO A DELIVERABLE STATE (SECTION 21):** When there is a contract for the sale of specific goods and the seller is bound to do something to the goods for the purpose of putting them into a deliverable state, the property does not pass until that particular thing is done and buyer has notice thereof.
3.  **SPECIFIC GOODS IN A DELIVERABLE STATE, WHEN THE SELLER HAS TO DO ANYTHING THERETO IN ORDER TO ASCERTAIN PRICE (SECTION 22):** When there is a contract for the sale of specific goods in a deliverable state, but the seller is bound to weigh, measure, test or do some other act or thing with reference to the goods for the purpose of ascertaining the price, the

property does not pass until such act or thing is done and the buyer has notice thereof.

**EXAMPLE:** In a sale of goat skin, it was the seller's duty to see whether the bales contain the number specified in the contract. Before the seller had done this, the bales were destroyed by fire. The loss fell on the seller. **Zagury Vs Furnell (1809)**

4. **GOODS SENT ON APPROVAL OR "ON SALE OR RETURN" (SECTION 24)**

   When goods are delivered to the buyer on approval or –on sale or return‖ or other similar terms, the property therein passes to the buyer-
   1. When he signifies his approval or acceptance to the seller or does any other act adopting the transaction.
   2. If he does not signify his approval or acceptance to the seller but retains the goods without giving notice of rejection, then
      (a) if a time has been fixed for the return of the goods, on the expiration of such time and
      (b) If no time has been fixed, on the expiration of reasonable time.

Thus, the essence of this rule is that the property passes either by acceptance or by failure to return goods.

**In Elphick Vs Barnes case,** the buyer took a horse on trial for 8days. The horse died within this time without the fault of the buyer. It was held that the property in the horse had not yet passed to the buyer and therefore, the seller could not recover the price from him.

### 6.2.2    RULES REGARDING PASSING OF UNASCERTAINED GOODS

Where there is a contract for the sale of unascertained goods, no property in the goods is transferred to the buyer unless and until the goods are ascertained **(Section 18).** The contract of sale of unascertained goods is not a sale but an agreement to sell. Thus, the ascertainment of the goods is an essential condition for transforming an agreement to sell into a sale.

**FOR THE TRANSFER OF THE UNASCERTAINED GOODS, THE FOLLOWING TWO CONDITIONS MUST BE SATISFIED:**

1. The goods must be ascertained **(Section 18).**
2. The goods must be appropriated to the contract **(Section 23).**

## 6.3  <u>APPROPRIATION OF GOODS</u>

Appropriation of goods involves selection of goods with the intension of using them in performance of the contract and with the mutual consent of the seller and the buyer.

The essentials are:

(a) The goods should confirm to the description and quality stated in the contract.
(b) The goods must be in a deliverable state.

(c) The goods must be unconditionally (as distinguished from an intention to appropriate) appropriated to the contract either by delivery to buyer or his agent or the carrier.

(d) The appropriation must be by seller with the assent of buyer or by buyer with the assent of seller.

(e) The assent may be expressed or implied.

(f) The assent may be given either before or after appropriation.

## 6.4 RISK PRIMA FACIE PASSES WITH PROPERTY

**Section 26** of Sale of Goods Act lays down the general rule that ―Risk Prima Facie‖ (i.e. at first sight) passes with property (Ownership). In other words, Risk always follows ownership. As a general rule, the goods remain at the seller's risk until the property therein is transferred to the buyer. But the moment the property is transferred to the buyer, the risk also passes to the buyer whether the goods are delivered to him or not.

**EXCEPTIONS:** The exceptions to the general rule ―Risk follows Ownership‖ are as follows:

i. Where the parties have agreed to the contrary, for example, where the seller agrees to deliver the goods at his own risk to the buyer who is at distant place and to whom ownership has passed.

ii. Where the delivery of goods have been delayed either through the fault of buyer or seller. In such circumstances, the goods are at the risk of the party in fault.

**CHECK YOUR PROGRESS 1**

**STATE WHETHER FOLLOWING STATEMENTS ARE TRUE OR FALSE**
i) The term 'property in goods' and 'possession of goods' means the same thing.
ii) Seller can file a suit for the price against the buyer only when the property in goods have passed to him.
iii) Risk follows ownership only when goods have been delivered.
iv) Property in goods can pass only in case of ascertained goods.

**FILL IN THE BLANKS**
(i) According to Section 26 of Sale of Goods Act 1930, Risk always follows _____.
(ii) Passing of property means passing of _____.
(iii) According to **Sec [19(2)],** intension of the parties can be gathered from:
(a) _____
(b) _____
(c) _____
(iv) The two conditions that must be fulfilled for the transfer of the unascertained goods:

(a) _____
(b) _____

## 6.5 <u>SALE BY NON- OWNERS</u>

According to **Section 27** of the Sale of Goods Act, where goods are sold by a person who is not the owner thereof and who does not sell them under the authority or with the consent of the owner, the buyer acquires no better title to the goods than the seller had. It gives protection to the buyer. If the title of the seller of the goods is good, the buyer shall get better title. Conversely, if the title of the seller is defective, the title of the buyer shall also be defective. This rule is expressed in the Latin maxim **"Nemo dat quad non habet"** which means that no one can give what he has not got.

**EXAMPLE:** Mr. A sold a gold ring to Mr. B for Rs 5000. It is known later on that the gold ring was a stolen property. Under the circumstances, the title of the seller (Mr. A) is defective. Therefore, the title of Mr. B is also defective. Mr. B will have to return the gold ring to the real owner although he has purchased the gold ring in full confidence and paid the right price.

If this rule is enforced rigidly, then the innocent buyers may be put to loss in many cases. Therefore, to protect the interests of innocent buyers, a number of exceptions have been provided to this rule.

### 6.5.1 EXCEPTIONS:

**1. TRANSFER OF TITLE BY ESTOPPEL [(SEC. 27)]**
When the true owner of the goods by his conduct or  words or by any act or omission leads the buyer to believe that the seller is the owner of the goods or has the authority to sell them, he cannot afterwards deny the seller's authority to sell. The buyer in such a case gets a better title than that of the seller.

**EXAMPLE:**
1. _O' who is the true owner of the goods, causes the buyer _B' to believe that _S' has the authority to sell the goods. _O' cannot afterwards question the seller's want of title on the goods. 2. _A' was the true owner of goods. _B' the seller told the buyer _C' that the goods belonged to him. _A' was present but remained silent. _C' purchased the goods from _B'. Now A cannot question the title of _C' over the goods.

**2. SALE BY A MERCANTILE AGENT [PROVISO TO SEC. 27]**
Sale of goods by a mercantile agent gives a good title to the purchaser even in cases where the agent acts beyond his authority, provided the following conditions are satisfied—
(i) The agent is in possession of the goods or of a document of title to the goods.
(ii) Such possession is with the consent of the owner.
(iii) The agent sells the goods in the ordinary course business.
(iv) The purchaser acts in good faith and has no notice that the agent had no authority to sell.

The Expression Mercantile agent means an agent who has authority in the customary course of business:

    (a) To sell or buy the goods or

    (b) To raise money on the security of goods.

*Good faith* means honestly, whether done negligently or not.

**EXAMPLE:** An agent was entrusted a car by the owner for sale at a stated price and not below that. Contrary to the authority the agent sold the car below the reserve price to a bona fide purchaser and misappropriated the proceeds. The plaintiff sued the defendant, (the buyer) to recover the car back from him. It was held though the agent acted without authority, yet the buyer had purchased the car from the mercantile agent in good faith, he had a good title and the plaintiff was not entitled to recover the car.

### 3. SALE BY ONE OF SEVERAL JOINT OWNERS [SEC. 28]

This section enables a co-owner to sell not only his own share but also of his other co-owners. If one of several joint owners of goods has the sole possession of them by permission of the co-owners, the property in the goods is transferred to any person who buys them from such joint owner provided the buyer acts in good faith and without notice that the seller had no authority to sell.

Section 28 lays down three conditions for validating a sale by one of co-owners:—

(a) He must be in sole possession by permission of his co-owners.

(b) The purchaser acts in good faith *i.e*. with honesty.

(c) The purchaser had no notice at the time of the contract of sale that the seller had no authority to sell.

**EXAMPLE:** A, B & C own certain truck in common. A is in possession of the truck by permission of his co-owners. A sells the truck to X. X purchases bona fide. The property in the truck is transferred to X.

### 4. SALE OF GOODS OBTAINED UNDER A VOIDABLE AGREEMENT [SEC. 29]

When the seller of goods has obtained possession thereof under a voidable agreement but the agreement has not been rescinded at the time of sale, the buyer obtains a good title to the goods, provided he buys them in good faith and without notice of the seller's defect of title. It is to be noted that the above section applies when the goods have been obtained under avoidable agreement, not when the goods have been obtained under a void or illegal agreement. If the original agreement is of no legal effect (void *ab-initio*) the title to the goods remains with the true owner and cannot be passed on to anybody else.

**EXAMPLE:** X fraudulently obtains gold necklace from Y. This contract is voidable at the option of Y. But before the contract could be terminated, X sells the ring to Z, an innocent purchaser. Z gets the goods title and Y cannot recover the necklace from Z even if the contract is subsequently set aside.

### 5. SALE BY THE SELLER WHO HAS ALREADY SOLD THE GOODS BUT CONTINUES IN POSSESSION THEREOF [SEC. 30(1)]

Under this exception, a second sale by the seller remaining in possession of the goods will give a good title to the buyer acting in good faith and without notice. Three conditions should be fulfilled under this exception:

(a) The seller must continue in possession of the goods or of the documents of title to the goods as seller. Possession as a hirer or bailee of the goods from the buyer after delivery of the goods to him will not do.

(b) The goods must have been delivered or transferred to the buyer or the documents of title must have been transferred to him.

**EXAMPLE:** X sold certain goods to Y, but continued to remain in possession of them with the consent of buyer. Thereafter, X sold the goods to Z. Z bought the goods in the good faith and without any notice of prior sale. Held, Z had acquired the good title.

### 6. SALE BY BUYER IN POSSESSION OF GOODS OVER WHICH THE SELLER HAS SOME RIGHTS [SEC. 30(2)]

This exception deals with the case of a sale by the buyer of goods in which the property has not yet passed to him. When goods are sold subject to some lien or right of the seller (for example for unpaid price) the buyer may pledge, or otherwise dispose of the goods to a third party and give him a good title, provided the following conditions for sale, are satisfied:

(i) The first buyer is in possession of the goods or of the documents of title to the goods with the consent of the seller.

(ii) Transfer is by the buyer or by a mercantile agent acting for him.

(iii)The person receiving the same acts in goods faith and without notice of any lien or other right of the original seller.

**EXAMPLE:** The Furniture was delivered to X under an agreement that the price was to be paid in two installments, the furniture to become the property of X on payment of the second installment. X sold the furniture before second installment was paid. It was held that the buyer acquired a good title. [Lee v. Butler (1893) 2 Q.B.318].

### 7. SALE BY AN UNPAID SELLER [SEC. 54]

An unpaid seller of goods can, under certain circumstances, re-sell the goods. The purchaser of such goods gets a valid title of the goods.

### 8. SALE UNDER THE CONTRACT ACT

(a) A Pawnee may sell the goods of pawner if the latter makes a default of his dues. The purchaser under such a sale gets a good title. [Sec. 176 of Contract Act]

(b) A finder of goods can sell the goods under certain circumstances. The purchaser gets a good title. [Sec. 169 of Contract Act]

(c) Sale by an Official Receiver of Liquidator of the company will give the purchaser a valid title.

**CHECK YOUR PROGRESS 2**

1.  Good Faith means_____
2.  ―Nemo dat quad non habet‖ means_____
3.  Section 28 lays down three conditions for validating a sale by one of co-owners:—

    (a)  _____
    (b)  _____
    (c)  _____

4.  Under Section 54, an unpaid seller of goods can, under certain circumstances, _____ the goods.

## 6.6 PERFORMANCE OF THE CONTRACT OF SALE (SECTION 31 TO 44)

**6.6.1 DEFINITION OF DELIVERY [SECTION 2(2)]:** Delivery means voluntary transfer of possession from one person to another.

Thus, if the possession is taken through unfair means, there is no delivery of goods. The performance on the part of the seller means that the seller must deliver the goods i.e. handover the possession of goods to the buyer. The seller may deliver the goods before or after transferring the ownership rights in the goods. Until the seller gives the possession of goods, the contract is not said to be performed by the seller. Section 31 states that, it is the duty of the seller to deliver the goods according to the contract of sale of goods.

Delivery of goods is done when one person who has possession of goods transfers the possession of goods to another person. Such transfer of possession is done voluntarily and lawfully.

**6.6.2 TYPES OF DELIVERY:-**

**1. ACTUAL DELIVERY**:   It means actual physical delivery of the goods to the buyer or his authorized agent by the seller or his authorized agent.

**2. SYMBOLIC DELIVERY**: When goods are not physically delivered but the means of obtaining possession of goods is delivered to buyer. Symbol is used for delivery. **Example: Handing over of keys of warehouse where goods are safely kept etc.**

**3. CONSTRUCTIVE DELIVERY:** Third party is involved in delivery. Seller doesn‘t deliver the goods directly. **Example: Seller-----Warehouseman  Buyer**

**6.6.3  RULES RELATING TO DELIVERY OF GOODS:**
  **(1) PAYMENT AND DELIVERY ARE CONCURRENT (SECTION 32):** Payment and delivery are concurrent, which means both should be performed at the same time unless otherwise agreed. Example: Cash sale (this is not applicable for credit sale)
  **(2) DELIVERY OF GOODS AS AGREED UPON:** The seller and buyer mutually decide upon when goods must be delivered, how payment is to be made and when

payment is to be made. As decided mutually, the goods must be delivered according to the terms of the contract.

(3) **MODES OF DELIVERY (SECTION 33):** Delivery of goods should be in a way which enables the buyer to exercise his control over the goods. In other words, through delivery the goods must be put in the possession of the buyer. Delivery can be:

- Actual Delivery
- Symbolic Delivery
- Constructive Delivery

**(4) EFFECT OF PART DELIVERY (SECTION 34):** IF the order placed is so big and delivery of goods takes place in parts so when buyer accepts the part delivery then that means, buyer is giving the acceptance to the whole delivery.

**(5) BUYER TO APPLY FOR DELIVERY (SECTION 35):** The seller is not bound to deliver the goods until the buyer applies for delivery. If the buyer never applied for delivery of the goods and the seller did not deliver the goods, then the buyer cannot hold seller liable for non delivery of goods. But the buyer can sue the seller for non delivery of goods if he had applied for the delivery of goods but the seller was unable to deliver the goods. Moreover, one thing is important that **buyer must apply properly.**

**EXAMPLE:** The contract of sale provided that the delivery of goods should be made in November on seven days' notice. The buyer gives a notice in early November. Held, the buyer is said to have applied properly and now, if the seller fails to deliver the goods in time, he would be liable for breach of contract**. [Juggemath Khan v. Maclachlan (1881)]**

**(6) PLACE OF DELIVERY [SECTION 36(1)]:** Place of delivery should be specified by the parties, in case when no agreement is there/ parties are silent about it then place of contract will be considered as place of delivery. Example: If place of contract is factory then place of delivery will also be considered as factory. In other words,:

(i) The goods must be delivered at the place which has been mutually decided between the parties.

(ii) If the parties have not decided upon the place of delivery then, goods should be delivered at the place where they are at the time of contract of sale.

(iii) For future goods, the place of delivery is the place at which they are manufactured or produced.

**(7) TIME FOR DELIVERY OF GOODS [SECTION 36(2)]:** Delivery should be done within specified time. If no time is specified then delivery should be completed within a reasonable time and reasonable hours.

Example: A contracts to sell and deliver the goods to B in the first week of January. The seller offered to deliver the goods on 4th January but at 9 pm. Held, the delivery of goods was not done at the reasonable hour.

**(8) GOODS IN POSSESSION OF THIRD PARTY [SECTION 36(3)]:** If goods are in possession of third party like warehouseman/ warehouse keeper then seller needs to acknowledge the sale to third person like warehouseman who will then deliver the goods to buyer.

**(9) EXPENSES OF DELIVERY [SECTION 36(5)]:** Seller will borne all the expenses to bring the product to deliverable state and for obtaining the delivery, buyer will borne all the expenses. In other words, if the parties have arrived at some agreement with respect to the expenses for putting the goods in deliverable state or the expenses incidental thereto the said agreement will be applicable regarding these expenses. However, the buyer is to bear all the expenses in connection with the receiving of the delivery.

**(10) DELIVERY OF WRONG QUANTITY (SECTION 37):** The seller is bound to deliver the same quantity of goods to the buyer as contracted for.

(i) **DELIVERY OF LESSER QUANTITY:** In case of short delivery by the seller, the buyer may either accept or reject the goods so delivered.

(ii) **DELIVERY OF LARGER QUANTITY:** In case of excess delivery, buyer may accept the whole goods or reject the whole or he may accept the contracted quantity and reject the excess.

(iii) **DELIVERY OF GOODS MIXED WITH OTHER GOODS:** When the seller delivers the goods contracted for mixed with goods of some different description, the buyer may reject the whole, or he may accept the goods which are in accordance with the contract and reject the remaining goods.

**(11) DELIVERY THROUGH INSTALLMENTS (SECTION 38):** When the parties to contract mutually agree that the delivery of goods shall be made through installments, then it should be done as agreed upon.

But where nothing was agreed upon for the delivery by installments, then the buyer is not bound to accept the delivery of goods through installments.

**EXAMPLE:** A buyer agreed to buy 30 articles, to be delivered through ship in the January-February shipment. The seller, however, shipped 20 parcels in February and 10 parcels in March. The buyer rejected the entire 30 parcels. The seller sued the buyer for non-acceptance. Held, the buyer could reject the entire lot as it was never agreed upon to deliver parcels through installments.

**(12) DELIVERY TO CARRIER:** Subject to the terms of contract, the delivery of the goods to the carrier for transmission to the buyer is prima facie deemed to be delivery to the buyer. **[Section 39(1)]**

**(13) DETERIORATION DURING TRANSIT**: When goods are delivered at a distant place, the liability for deterioration necessarily incidental to the course of transit will fall on the buyer, though the seller agrees to deliver at his own risk**. (Section 40)**

**(14) BUYER'S RIGHT TO EXAMINE THE GOODS:** When goods are delivered to the buyer, who has not earlier examined the goods, he is entitled to a reasonable opportunity of examining them in order to confirm whether they are in conformity with the contract. **(Section 41)**

### 6.6.4 RULES RELATING TO ACCEPTANCE OF DELIVERY OF GOODS (SECTION 42): Acceptance is deemed to take place when the buyer:

(i)     Intimate to the seller that he had accepted the goods or

(ii)    Does any act to the goods, which is inconsistent with the ownership of the seller or

(iii)   Keeps goods even after the lapse of a reasonable time, without intimating the seller that he has rejected them.

**BUYER NOT BOUND TO RETURN REJECTED GOODS (SECTION 43):** When goods are delivered to the buyer and he refuses to accept them, having the right so to do, he is not bound to return them to the seller but he needs to intimate to the seller that he refuses to accept them.

**LIABILITY OF BUYER FOR NEGLECTING OR REFUSING DELIVERY OF GOODS (SECTION 44):** When the seller is ready and willing to deliver the goods and requests the buyer to take delivery, and the buyer dies not within a reasonable time after such request take delivery of the goods, he is liable to the seller for any kind of loss occurred by his neglect for taking delivery and also for a reasonable charge for the care and custody of the goods.

**CHECK YOUR PROGRESS 3**

**(a) EXPLAIN VARIOUS TYPES OF DELIVERY.**

**(b) EXPLAIN DIFFERENT MODES OF DELIVERY.**

**(c)  WHAT ARE THE RULES REGARDING PLACE OF DELIVERY?**

## 6.7 RIGHTS OF AN UNPAID SELLER

An unpaid seller is defined under **Section 45(1)** as:

‒The seller of goods is deemed to be an unpaid seller:

(a) When the whole of the price has not been paid.

(b) When a bill of exchange or other negotiable instrument has been received as conditional payment and the condition on which it was received has not been fulfilled by reason of the dishonor of the instrument or otherwise.‖

The term ‗Seller' here includes any person who is in the position of a seller, as, for instance, an agent of the seller to whom the bill of lading has been endorsed or a consignor or agent who has himself paid or is directly responsible for the price **[Section 41(2)].**

**EXAMPLE:** X sold goods to Y for Rs 60,000 and received a cheque for a full price. On presenting the cheque to bank, cheque was dishonored by the bank. X is an unpaid seller.

An unpaid seller has been expressly given the rights against the goods as well as the buyer personally which are discussed as under:

### 6.7.1 RIGHTS OF UNPAID SELLER AGAINST THE GOODS

(1) **SELLER"S LIEN (SECTION 47):** The unpaid seller of goods who is in possession of them is entitled to retain possession of them until payment has been done, in the following cases:
  (i)    Where goods have been sold without any stipulation as to credit.
  (ii)   Where the goods have been sold on credit, but the term of credit has expired.
  (iii)  Where the buyer becomes insolvent.

Lien can be exercised only for non-payment of the price. Part payment of price cannot terminate right of lien.

**PART DELIVERY (SECTION 48):** Where an unpaid seller has made part delivery of the goods, he may exercise his right of lien on the remaining goods unless such part delivery has been made under such circumstances as to show an agreement to waive the lien.

**TERMINATION OF LIEN (SECTION 49):** The unpaid seller of goods loses his lien:

**(a)** When he delivers the goods to a carrier or other bailee for the purpose of transmission to the buyer without reserving the right of disposal of the goods.
**(b)** When the buyer or his agent lawfully obtains possession of the goods.
**(c)** By waiver thereof.

**EXAMPLE:** The goods which were sold were handed over to the buyer‘s agent who put them on ship. They were landed back and returned to the seller for repacking. While the goods were still with the seller, the buyer became insolvent and seller exercised his lien for the price which was still due. It was held that the seller was not entitled to the lien as he lost the right when the goods were handed over to buyer‘s agent. **(Valpy Vs. Gilbson, 1847)**

**(2). RIGHT OF STOPPAGE IN TRANSIT (SECTION 50 TO 52):**

**RIGHT OF STOPPAGE IN TRANSIT (SECTION 50):** Subject to the provisions of this Act, when the buyer of goods becomes insolvent, the unpaid seller who has parted with the possession of the goods has the right of stopping them in transit, that is to say, he may resume possession of the goods as long as they are in the course of transit and may retain them until paid or tendered price of the goods.

**DURATION OF TRANSIT (SECTION 51):**

**(1)** Goods are deemed to be in the course of transit from the time when they are delivered to a carrier or other bailee for the purpose of transmission to the buyer, until the buyer or his agent in that behalf takes delivery of them from such carrier or other bailee.

**(2)** If the buyer or his agent in that behalf obtains delivery of the goods before their arrival at the appointed destination, the transit is at an end.

**(3)** If, after the arrival of the goods at the appointed destination, the carrier acknowledges to the buyer or his agent that he holds the goods on his behalf and continues in possession of them as bailee for the buyer or his agent, the transit is at an end.

**(4)** If the goods are rejected by the buyer and the carrier continues in possession of them, the transit is not deemed to be at an end, even if the seller has refused to receive them back.

**HOW STOPPAGE IN TRANSIT IS EFFECTED (SECTION 52)**

**(1).** The unpaid seller may exercise his right of stoppage in transit either by taking actual possession of goods or by giving notice of his claim to the carrier in whose possession the goods are.

**2.** When notice of stoppage in transit is given by the seller to the carrier in possession of the goods, he shall re-deliver the goods to, or according to the directions of the seller. The expenses of such re-delivery shall be borne by the seller.

**RIGHT OF LIEN AND RIGHT OF STOPPAGE IN TRANSIT**

| Basis of difference | Lien | Stoppage in transit |
|---|---|---|
| 1. Possession | Actual possession | Possession with carrier. |
| 2. Insolvency | This right can be exercised even if the buyer is not insolvent. | Only when buyer is insolvent. |
| 3. Mode | Right exercised by the seller himself. | Right exercised through a carrier. |
| 4. Termination | As soon as goods go out of possession of the seller. | When buyer acquires the possession. |
| 5. Nature of right | To retain the possession | To regain the possession |
| 6. Commencement | When buyer makes default | When buyer becomes insolvent. |

| | 7. Essential element | Seller's possession. | Goods in transit. |
|---|---|---|---|

**RIGHT OF RESALE:**

The unpaid seller has two important rights, namely, Right of Lien and Right of Stoppage in Transit. In case, he exercises any of his rights, he again gets the possession of the goods which had been sold earlier by him.

The unpaid seller can re-sell the goods under the following circumstances:

(i) Where the goods are of a perishable nature i.e. vegetables, milk and milk products.

(ii) Where the unpaid seller has exercised his right of lien or stoppage in transit and given notice to his buyer of his intension to resell the goods and where the buyer has not within a reasonable time paid or tendered the price.

(iii) Where the seller expressly reserves a right of resale in case the buyer should makes default. No notice of sale is required in this case.

## 6.7.2 RIGHTS OF AN UNPAID SELLER AGAINST THE BUYER PERSONALLY

In addition to the above mentioned rights of an unpaid seller against the goods, he has certain remedies against the buyer personally, which are given below:

1. **SUIT FOR PRICE:** This can be discussed under two specific conditions:
   (i) **WHERE THE PROPERTY HAS PASSED TO THE BUYER [SECTION 55(1)]:** When the property in the goods has passed to the buyer and the buyer refuses to pay for the goods as per given in the contract, the seller may sue him for the price of the goods.
   (ii) **WHERE PRICE IS PAYABLE ON A SPECIFIC DAY [SECTION 55(2)]:** Sometimes, the contract of sale stipulates that the price is payable on certain day irrespective of delivery but the buyer wrongfully refuses to pay such price. In such a case, the seller may sue the buyer for the price although the property in the goods has not passed and the goods have not been appropriated to the contract.

2. **SUIT FOR DAMAGES FOR NON-ACCEPTANCE OF DELIVERY (SECTION 56):** When the buyer wrongfully refuses to accept and pay for the goods, the seller may sue him for damages for non-acceptance of delivery of goods.

3. **SUIT FOR DAMAGES FOR REPUDIATION OF THE CONTRACT:** When either party to a contract repudiates the contract before the date of delivery, the other party to a contract has two options:
   **(a)** Either treat the contract as subsisting and wait till the date of delivery, or
   **(b)** Treat the contract as cancelled and sue for the damages for the breach.

4. **SUIT FOR INTEREST:** In the absence of any contract to the contrary, no interest shall be payable by the buyer on the delayed payment. Interest may be recovered only when there is a specific agreement in this respect. If, there is no such agreement, the seller may give notice to the buyer of his intension to charge interest on delayed payment.

### 6.7.3 RIGHTS OF BUYER AGAINST THE SELLER (SECTION 57 TO 61)

1. **DAMAGES FOR NON-DELIVERY (SECTION 57):** Where the seller wrongfully refuses to deliver the goods to the buyer, the buyer may sue the seller for damages for non-delivery.

2. **SPECIFIC PERFORMANCE (SECTION 58):** Where the seller commits the breach of the contract of sale, the buyer can appeal to the court for specific performance. The court can order for specific performance only when the goods are ascertained or specific.

3. **SUIT FOR BREACH OF WARRANTY (SECTION 59):** Where there is breach of warranty on the part of seller, the buyer is not entitled to reject the goods only on the basis of such breach of warranty. But he may-

(a) Set up against the seller the breach of warranty in diminution or extinction of the price or

(b) Sue the seller for damages for breach of warranty.

4. **REPUDIATION OF CONTRACT BEFORE DUE DATE (SECTION 60):** Where either party to a contract of sale repudiates the contract before the date of delivery, the other may treat the contract as subsisting and wait till the date of delivery or he may treat the contract as cancelled and sue for damages for the breach.

5. **SUIT FOR INTEREST (SECTION 61):** In the absence of a contract to the contrary, the court may award interest at such rate as it thinks fit on the amount of the price to the buyer in a suit by him for the refund of the price in a case of a breach of the contract on the part of seller from the date on which the payment was made.

### AUCTION SALE (SECTION 64)

One of the methods of selling the goods is to sell them by auction. Auction sale means a public sale where intending buyers assemble at one place and offer the price at which they are ready to buy the goods. The offer of the price is generally called 'bid' and the other person who is making the bid is known as the 'bidder'. The owner of the goods may himself sell them by auction or appoints an 'auctioneer' to sell the goods on his behalf. The relationship between the owner of the goods and the auctioneer is that of the principal and agent. The rule of the auction says that the goods are sold to the highest bidder. When goods are to be sold by auction, the auctioneer gives information to the public regarding the time, date and place of sale. The bidders are given an opportunity to inspect the goods. The auctioneer is not bound to sell the goods on the date, time and place announced earlier, he can cancel or postpone the sale and the intending buyers have no right to sue the auctioneer since it was only an invitation. The various rules regarding auction sales are given in Section 64 of the Sale of Goods Act, they are as follows:

i)      Where the 'goods are put up for sale in lots, each lot is prima facie deemed to be the subject of a separate contract of sale [Section 64(1)].

ii)    The sale is complete when the auctioneer announces its completion by the fall of the hammer or in other customary manner, for example, by saying "one, two and three".

iii)    When the auctioneer announces the completion of the sale, the sale is complete and the property in goods, passes; immediately to the buyer.

iv)    Since offers are invited from the public, before the sale is completed, the bidders have a right to withdraw their bid (offer). Until the announcement of the completion of sale is made, any bidder may retract his bid [Section 64(2)].

v)    A right to bid may be reserved expressly by or on behalf of the seller. When the right to bid is reserved, the seller or any other person on his behalf may bid at the auction [Section 64(3)].

vi)    If a seller makes use of pretended bidding to raise the price, the sale is voidable at the option of the buyer [Section 64(6)].

vii)    Puffers are persons employed by the seller for the purpose of raising the price. A puffer has no intention to buy the goods. The seller can appoint only one puffer and not more.


## CHECK YOUR PROGRESS 4

1. Under Section 49 of Sale of Goods Act, 1930, the unpaid seller of goods loses his lien in following cases:

  (a) _____
  (b) _____
  (c) _____

2. The unpaid seller has two important rights:

  (a) _____
  (b) _____

3. When the buyer wrongfully refuses to accept and pay for the goods, the seller may sue him for _____

4. When either party to a contract repudiates the contract before the date of delivery, the other party to a contract has two options:

  a.    _____
  b.    _____

## LET US SUM UP

The main aim of a contract of sale of goods is to **transfer the property** in terms of goods to the buyer. It should be noted here that property in goods means the ownership of the goods and not the possession of goods. The ownership of goods can pass to the buyer even though the goods have not been delivered or the buyer has not paid the price. It is very important to know the exact time as to when the ownership passes to the buyer because of these reasons: (i) risk passes with the ownership; (ii) right to take action against third party (iii) suit for the price; and (iv) in the event of insolvency of seller or buyer. In case of specific goods, the

ownership passes to the buyer when the parties intend it to pass. When the intention is not clear, following rules shall apply:

**i)** In case of specific goods in a deliverable state, the property passes immediately when the contract is made.

**ii)** In case the goods are specific but not in a deliverable state, the ownership passes when they are put in a deliverable condition and the buyer has notice for the same.

**iii)** When the seller has to do something to the goods to be sold for ascertaining the price, the ownership passes when the seller has done that and the buyer has been informed about this.

**Delivery** means voluntary transfer of possession of goods from one person to another.

Delivery may be made by doing anything which has the effect of putting the goods in possession of the buyer. Delivery may be actual, symbolic or constructive.

An **unpaid seller** is the one who has not received the full price or if the price is received in the form of a negotiable instrument, it has been dishonored. A seller who has been partly paid is also an unpaid seller.

An unpaid seller has two rights - against the goods and against the buyer personally.

**KEY WORDS:**
1. **AUCTION:** It is a public sale, where goods are sold usually to the highest bidder.
2. **BID:** It is the price offered by the intended buyer.
3. **Carrier:** One to whom the goods are delivered for transportation to the buyer.
4. **LIEN: A** right to retain possession of the goods until the amount due from another person is received.
5. **PUFFER:** A person who is employed by the seller to raise the price and who has no intention to buy the goods.
6. **RESERVE PRICE:** The price below which the goods are not to be sold.
7. **TRANSIT:** Transit means when the goods are neither in the possession of the seller nor in the possession of the buyer but are with an independent carrier.
8. **UNPAID SELLER:** A seller who has not received the price in full.
9. **GOOD FAITH** means honestly, whether done negligently or not.
10. **"NEMO DAT QUAD NON HABET"** means that no one can give what he has not got.

## ANSWERS TO CHECK YOUR PROGRESS 1

**TRUE OR FALSE**

(i)     False
(ii)    True
(iii)   False
(iv)    True

**FILL IN THE BLANKS**
(i)     Property (Ownership)
(ii)    Ownership
(iii)   (a) Terms of the Contract (b) Conduct of the parties (c) Circumstances of the case.
(iv)    (a) The goods must be ascertained (b) The goods must be appropriated to the contract.

**ANSWERS TO CHECK YOUR PROGRESS 2**

1. **GOOD FAITH** means honestly, whether done negligently or not.
2. **"NEMO DAT QUAD NON HABET"** means that no one can give what he has not got.
3. (*a*) He must be in sole possession by permission of his co-owners.
   (b) The purchaser acts in good faith *i.e.* with honesty.
   (c) The purchaser had no notice at the time of the contract of sale that the seller had no authority to sell.
4. Re-sell

**ANSWERS TO CHECK YOUR PROGRESS 3**
   **(a) Refer to 1.6.2**
   **(b) Refer to 1.6.3- point 3**
   **(c) Refer to 1.6.3-point 6**

**ANSWERS TO CHECK YOUR PROGRESS 4**

1. Refer to 1.7.1- Under Termination of Lien.
2. Right of Lien and Right of Stoppage in Transit.
3. Damages for non-acceptance of delivery of goods.
4. Refer to 1.7.2- point 3.

## 6.8 TEST YOUR KNOWLEDGE
### SHORT ANSWER QUESTIONS
1. What do you understand by ‗Transfer of Ownership'?
2. Risk ‗Prima facie' passes with the ownership. Comment
3. What are the rules as to passing of property in case of unascertained goods?
4. What is the rule as to place of delivery of goods?
5. Who must bear the expenses of delivery of goods.
6. Define unpaid seller.

### LONG ANSWER QUESTIONS

1. Discuss in brief the rules regarding the passing of property in
(a) Ascertained goods
(b) Unascertained goods
(c) Goods sold on approval or on sale or return
2. What are the effects of Part delivery, Installment delivery and delivery of Wrong quantity?
3. What are the rights of unpaid seller against goods and buyer personally?
4. How stoppage in transit is effected? Differentiate between Right of Lien and Right of Stoppage in Transit?
5. ‗No seller of goods can pass a better title than what he himself has'. Explain what are exceptions to this rule?

**SUGGESTED READING:**

Garg K.C., Chawla, R.C., Sareen, V.K. and Sharma, M., Mercantile Law, 2015. Kalyani Publishers, Ludhiana
Kapoor, N.D. 1988. Mercantile law, Sultan Chand & Sons, New Delhi
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**WEB LINKS**

**https://www.taxmann.com/bookstore/bookshop/bookfiles/Business%20Lawschapter12.pdf**

**https://www.pbookshop.com/media/filetype/s/p/1377178142.pdf**

**https://www.toppr.com/guides/business-laws/the-sale-of-goods-act-1930/transfer-of-title/**

**https://blog.ipleaders.in/performance-contract-sale/**

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**https://wbconsumers.gov.in/writereaddata/ACT%20&%20RULES/Relevant%20Act%20&%20Rules/Sales%20of%20Goods%20Act.%201930.pdf**

## UNIT 7 – NATURE OF PARTNERSHIP, REGISTRATION OF FIRM AND TYPES OF PARTNERS

## STRUCTURE

## 7.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the Meaning of Partnership.
- Describe Characteristics of a Partnership Firm.
- Explain key differences between Partnership and other forms of business.
- Find various types of Partners and various types of Partnership
- Appraise themselves about need of registration of the firm and consequences of non-registration.
- Understand the position of Minor as a partner in the partnership firm.

## 7.1 INTRODUCTION:

The need for partnership form of business arose from the limitations of sole-proprietorship. In sole-proprietorship, financial resources and managerial skills were limited and only one man could not supervise or manage all the business activities personally. Also risk bearing capacity of an individual was limited. Therefore, this results into Partnership.

A partnership is a kind of business where a formal agreement between two or more persons is made who agree to be the co-owners, distribute responsibilities for running a business organization and share the profits or losses that the business generates.

The Indian Partnership Act, 1932 governs all aspects and purposes of partnerships in India. The laws relating to partnerships were previously found in Chapter XI of the Indian Contract Act, 1872, which consisted of Sections 239 to 266. The need for new legislation on partnership was felt strongly. This Act is largely based on the English Partnership Act of 1890, with slight changes made to account for Indian conditions.

**APPLICABILITY:**
This Act applicable to Whole of India.

**EFFECTIVE:**
The provisions of this Act came with effect from 01.10.1932 except Section 69 which deals with the effect of non-registration. Section 69 of the Act came into effect with effect from 01.10.1933.

## 7.2 MEANING AND NATURE OF PARTNERSHIP:

As the name suggest, Partnership is a situation where two or more person they join hand to carry out some business together for their mutual benefit. The relation between these persons is of mutual faith as each person act as agent of other person. All the persons in the firm are bound by the act of other persons in the firm. So, It is not necessary that business is to be carried all the persons jointly even any or few persons can manage the business as all persons are acting on behalf of each other, but whosoever will be managing the business, that will be doing on behalf of all the persons. The definition of the Partnership is given in the Section 4 of the Indian Partnership Act.

According to the **Section 4 of the Partnership Act**, ‒Partnership is the relation between persons who have agreed to share the profits of a business carried on by all or any of them acting for all.‖

So from the definition it is very much  clear that all the persons are jointly carrying out some business activity for the mutual profits and business can be managed by all of the persons or few of them on behalf of all the persons. The persons joining the business as owners are known as ‗Partners‘ and the business that they are carrying is known as ‗Firm‘**.**

## 7.3 FEATURES OF PARTNERSHIP

On analysis of the above definition given under section 4 of the act, we can analyze some important characteristics of the partnership which are as follows:

1. **TWO OR MORE PERSONS:** There always contain minimum two persons who are capable of being entering into a contract. One can‘t form a partnership relation with himself. The number of partners in the partnership firm does not exceed 50.  If the number of partners exceeds the specified limit then in such case, it becomes an unlawful association of individuals.
2. **AGREEMENT**: Mere presence of two persons is not enough. Partnership is a sought of relation between the persons. However, this is not the natural relation  like Father and Son or Mother and Daughter, rather it is contractual relation. So, whenever two or more persons enter into a contract for jointly carrying out a business activity, the Partnership is formed. However, it is necessary to mention here that it is not necessary that such agreement between the persons must be in writing only, even if two persons enters into an oral agreement, even than partnership is formed. But it is better to have written agreement as it avoids any future conflict. Mere sharing the profit is not enough proof of the partnership there must be joint ownership of the business. For example if a person is giving commission to manager out of profit, manager will not become partner just by sharing profit.
3. **LAWFUL BUSINESS**: A partnership will come into existence only for the purpose of running some lawful business with the motive of  earning profits. Mere joint ownership of property is not partnership if some business activity is not there. So, joint ownership of land from which we are earning rent is not. The business must  be lawful, if the purpose of the business is to do any Illegal acts such as theft, smuggling, dacoity, etc., the in such case it cannot be called as partnership.
4. **SHARING OF PROFITS:** Another important feature of the Partnership is Profit Motive. If any activity is carried without the profit motive, we may not treat such activity as Partnership. For example few persons join their hand to do some social work. We may not treat them as Partnership as profit motive is missing. Here it is important to mention that profit motive doesn‘t mean that partner always earn profits only, there could be losses also, but their objective must be to earn the profits.
5. **MUTUAL AGENCY:** The most important feature that give shape to the partnership is mutual agency. All persons in a partnership are principal and agent at the same time.

Each person is agent of other person in the partnership. All the persons in the firm are bound by the act of other persons in the firm. So, It is not necessary that business is to be carried all the persons jointly even any or few persons can manage the business as all persons are acting on behalf of each other, but whosoever will be managing the business, that will be doing on behalf of all the persons.

6. **UTMOST GOOD FAITH:** As in the partnership each person is working on behalf of the other there must be utmost good faith among them. In case the mutual faith and confidence is missing among them, the partnership cannot exist. So, every partner must act in manner most beneficial for the firm as a whole. He must not knowingly carry out any activity that could harm the interest of the firm. Moreover, he must present the true account of all the activities carried on by him without hiding any activity.

7. **UNLIMITED LIABILITY:** The members of the partnership have unlimited liability. It means if there is loss to the firm and assets of the firm are not sufficient to meet such loss, in that case the members need to contribute their personal assets to make such loss good. Here they have joint as well as individual liability. It means every member will contribute his share of loss, but in case personal assets of some member are not sufficient to meet his share of loss than other members should contribute for such loss.

8. **RESTRICTION ON TRANSFER OF INTEREST:** As partnership is mutual relation and trust between the partners, no partner is allowed to transfer his share to some other person unless the consent of all (not majority) is obtained.

9. **JOINT RISK BEARING**: In Partnership, not only the profits but also the losses are shared by the partners jointly. So, it results into minimization of risk as risk is divided among the partners.

10. **LIFE SPAN OF PARTNERSHIP:** The life span of a partnership is not fixed and it depends upon the will of the partners. Whenever a partner wants to leave the business he can do so after doing the formalities required. Further if there is death, insolvency or incapacity of one partner, other partners may continue to run business as per their will by having a new agreement. This situation is called dissolution of Partnership. However, this is not Dissolution of Firm as business is still continuing.

## 7.4 DIFFERENT TYPES OF PARTNERS:

The different types of partners are as discussed as follows:
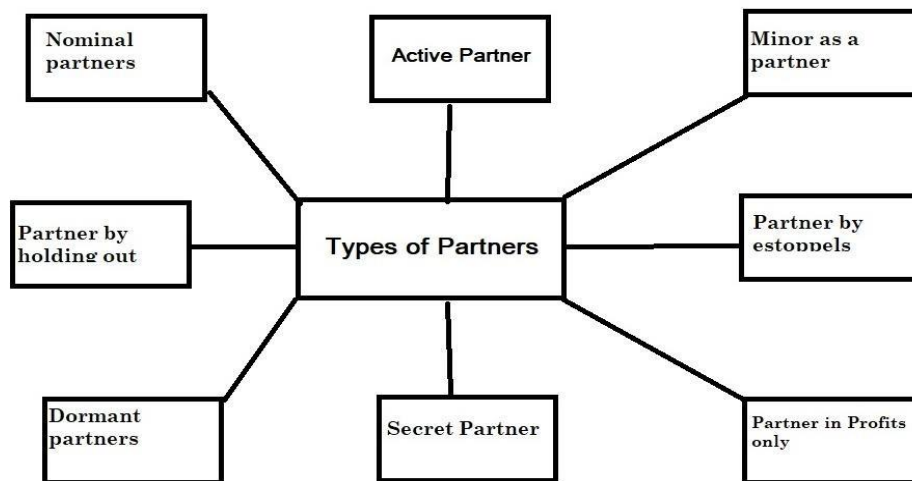
1. **ACTIVE PARTNERS:** The partners who actively engaged or participate in the day-to-day operations or activities of the business are called as working or active partners. They contribute capital and are also entitled to share the profits along with liability for the debts of the firm.
   - A partner who is actively engaged in the day to day activities of the business of the partnership firm is known as ‗active partner'.
   - When an active partner retires from the partnership firm, he has to give a public notice. Otherwise, in such case he will be held liable on the principle of ‗holding out'.
2. **DORMANT PARTNERS:** Those partners who are not involved in to the day-to-day activities of the business firm are called as sleeping or dormant partners. They only contribute money in the business and take the share in the profits or contribute losses (if any) of the business.
   - A ‗Sleeping partner' is one who is not participating day to day activities of the business o.
   - Such partner joins the firm by an agreement and invests capital and shares in the profit of the firm business like the other partners.
   - Dormant partners are not liable for any act if, he/she don‗t give public notice of his retirement from the firm.
3. **NOMINAL PARTNERS:** As the name suggest, these partners only allow the firm to use their name in the business as a partner. However, they don‗t put any money in the business and are not directly involved in the business. They even don‗t participate in day to day activities of the business. They don‗t get any share in profit. However, they are liable to third parties for any act done by other partners as they allowed the firm to use their name and in the eyes of public they are partner of the business.
   - A partner who only lends his name to the business firm but otherwise has no direct interest in the business.
   - He does not contribute to the capital of the firm and is also not getting any profit in the business.

- He is liable to third parties for any act done by other partners as they allowed the firm to use their name and in the eyes of public they are partner of the business.

   **DIFFERENCE BETWEEN SLEEPING/DORMANT AND NOMINAL PARTNER:** A nominal partner is known to the public as partner as firm is using his name as partner, though he has not contribute in the business and also not getting any profit out of the business. On the other hand, a dormant partner though invested funds in the business, getting the profits out of business but is not known to the public as partner.

4. **MINOR AS A PARTNER:** Any person under the age of 18 years is not eligible to become a partner. However, in some circumstances, a minor can be admitted as a partner with certain conditions that:
   - A Minor can be admitted to an existing firm only.
   - Minor can only share in the profit of the firm and doesn't share any losses.
   - There must be minimum two major partners in the firm.
   - In case of loss, his liability is limited to the extent of his capital contribution to the business.

5. **PARTNER BY ESTOPPELS:** When a person is not a partner in reality but by his words or by his conduct he shows that he is the partner in the business, such person is called partner by estoppels. represents Here he behaves in such a way that somebody can have an impression that such person is a partner and based on this impression transacts with that firm then that person is held liable to the third party/outsider, then the person who falsely represents himself as a partner is known as partner by estoppels.
   - Person knowingly act in a way that third party gets impression that the person is a partner in the firm.
   - Such representation must occur either by his words or by his conduct.
   - Believing on his representation, the third party dealt with firm or gave credit to the firm.
   - In such case this person though not partner in reality but is liable to the third party.

6. **PARTNER BY HOLDING OUT:** When a person is not a partner in reality but as a partner and he does not deny this even after becoming aware of it, then in such case he becomes liable to the third party who lent money or credit to the firm on the basis of such a declaration. Suppose Mr. A tells Mr. B in the presence of Mr. C that Mr. C is a partner in the firm _Mr. A Enterprises'. Mr. C is not a partner and does not deny Mr. A's statement. Mr. B grants a loan of Rs 60,000 to Mr. A's Enterprises on the impression that Mr. C is a partner. Later on the firm is unable to repay the loan. Mr. C becomes liable to Mr. B and here Mr. C is a partner by holding out.
   - A person who is not actually a partner of a firm but knowingly allows himself or herself to be represented as a partner of the firm is known as partner by

holding out.
- Such partner does not take part in the management and other operation/activities of the business.
- Such partner can be held liable for the repayment of the amount of debt extended to the firm due to such representation.

7. **PARTNER IN PROFITS ONLY:** As the name suggest this person is a partner who is like every other normal partner doing all th activities of the business, shares the profits of the business but is not contributing to the losses of the business. Sometime the agreement of the firm provide that person will share profit but will not contribute to the losses of the business, such person is called partner in profits only . However, if any partner who is in ‒partner in profits only‖ deals with any of the third parties/outsiders then he/she will be e liable for the acts of profit only and not any of the liability.
   - He is not allowed to take part in management or any other business activities of the firm.
   - Such kinds of partners are associated with the firm for their goodwill and money.

8. **SECRET PARTNER:** In a partnership, the position of secret partner lies between the active and sleeping/dormant partner. The membership of the firm of a secret partner is to be kept secret from the third parties/outsiders.
   - His liability is unlimited since he holds a share in profit and also shares liabilities for any losses (if any) in the business.
   - He can even take part in business activities or operations.

## 7.5 TYPES OF PARTNERSHIPS:

According to the nature of the agreement among partners, the following are the different types of partnerships:

**7.5.1 ACCORDING TO NATURE:** According to the nature of the partnership, we can divide it into two categories:

a. **GENERAL PARTNERSHIP:** In the absence of an agreement, the provisions given in the Partnership Act 1932 are applicable for general partnerships in which the liability of each partner is unlimited.
   - In this partnership, the liability of all partners is unlimited jointly and individually.
   - The Registration of the partnership firm is not compulsory.
   - All partners can participate in the day to day activities and operations of the business firm.
   - Their acts are binding on each other as well as on the partnership firm.
   - The partnership ends with the lunacy, death, insolvency, or retirement of the partner.

b. **PARTNERSHIP AT WILL:** Such partnership exists on the will of the partners,

i.e., it can be brought to an end whenever any of the partners gives notice of his intention to do so. This kind of partnership is formed to run a lawful business for an indefinite period of time.

- This type of partnership exists only at the will of the partners.
- It can continue as long as the partners want to do so. It is terminated when any partner gives notice of dissolution.

**7.5.2 ACCORDING TO TERM:** On the basis of term for which a partnership is formed we can divide it into two categories:

a. **PARTICULAR PARTNERSHIP:** Sometime a partnership is formed with the objective of carrying out a particular task, such partnership is known as Particular partnership. This type of partnership is automatically dissolved once the objective for which it is formed comes to an end.
   - It is formed for a particular or any specific task.
   - Firm remains till the task continues.
   - Firm dissolves automatically after completion of that particular task.

b. **PARTNERSHIP FOR FIXED TERM:** Such a partnership is for a fixed period of time say 3 years, 6 years, or any other duration. It comes to an end automatically at the expiry of the period.

**3. ACCORDING TO LEGALITY OF THE BUSINESS:** On the basis of legality of the business carried on by the partners, we can divide the partnership in two categories:

a. **LEGAL PARTNERSHIP-** If the partnership is constituted as per the rules laid down in the Partnership Act of 1932 and it is not violating any rules of the country, it is called legal partnership.

b. Illegal Partnership: If the partnership is not constituted as per the rules laid down in the Partnership Act of 1932 or it ist violating any rules of the country, it is called illegal partnership.

**4. ON THE BASIS OF LIABILITY:**

a. **UNLIMITED LIABILITY PARTNERSHIP:** A partnership in which the liability of the partners is not limited upto amount of capital contributed by them is called unlimited liability partnership. In such case ever the personal assets of the partners will be liable for meeting any loss incurred by the firm. All the partnership firms covered under Indian Partnership Act, 1932 have unlimited liability in India.

b. **LIMITED LIABILITY PARTNERSHIP:** As the name suggest unlimited liability partnership is a partnership in which the liability of the partners is limited upto amount of capital contributed by them. In case of insolvency of firm, partners need not to contribute their personal assets to the firm. In India such firms are covered under the Limited Liability Partnership Act, 2008.

## 7.6 MINOR AS A PARTNER (SECTION 30)

   i.   Partnership is based on mutual contract between two or more persons and, therefore, only those persons who possess the capacity to contract can be partners in a partnership firm.
  ii.   According to the Indian Contract Act, 1872 an agreement by a minor is void ab-initio but he can enter into contract for the benefit only. It means that a minor can be admitted to the partnership only for the profits.
 iii.   So, a minor cannot become a full fledge or normal partner like any other adult partner; but he can be admitted as a partner in the business firm to the benefits of a partnership. He could have only share in the profits of the firm without contributing to losses.
  iv.   According to Section 30 of the Act a minor can't become a partner in a firm as he is not capable of entering into a contract, but, with the permission of all other partners, he may be admitted to the benefits of partnership.


### 7.6.1 RIGHTS OF MINOR PARTNER (SECTION 30):
The following are the rights of a minor partners given under section 30 of the act as under:
   1. A minor partner can claim his share in the profits of the business as  per agreement..
   2. In case he does not get his share, he can sue the other members for payment of his share but in such case he cannot continue as partner he has to severe his relation with the firm.
   3. He can have access to, inspect and copy the books of accounts of the firm.
   4. On attaining the majority, within 6 months he must decide whether he wants to become a full fledged partner or not. In case he decide to become a partner, then he is entitled to get the share in the profits as entitled as a minor. But in case he does not want to become full fledged member, then he   is not liable for any acts of the firm but he must give public notice for the fact that he is discontinuing as partner of the business.

### 7.6.2 LIABILITIES OF MINOR PARTNER (SECTION 30):
The following are the liabilities of the minor partner before and after attaining majority:

### (i) BEFORE ATTAINING MAJORITY:
   a) Until the minor partner attains majority, his liability will be confined to the extent of his share in the business only.
   b) Its only Minor's capital that is liable for losses, he personally does not have nay liability for the debts of the firm which firm has raised during his minority.
   c) A Minor partner cannot be declared insolvent as his risk is limited to his capital only not to his personal estate, however if the firm is been declared insolvent then share invested by him in the firm also vests in the Official Receiver.

## (ii) AFTER ATTAINING MAJORITY:

   i. Once the minor partner attains majority or he comes to know that he has attained the majority, within 6 months he has to decide whether he want to leave the firm or he wants to continue as a partner.

  ii. Where he has decided to leave the frim, then he may give public notice regarding the fact of his leaving the firm. This notice is must and it will decide his relation with the firm and public.

 iii. In case he fails to give public notice within 6 months of attaining the majority or getting the knowledge of attaining the majority, he shall be treated as partner and his rights and duties will be same as of full fledge partner.

 iv. Such minor partner must also inform the Registrar about his decision of becoming or not becoming the partner.

### (a) WHEN HE BECOMES PARTNER:

- Once he decide to become partner, he will be personally liable to outsiders for any act done by the firm or other partner starting from the date when he was admitted as partner for the benefits of partnership.

- Any amount contributed by him as capital and his share of profits will remain intact. That means there will be no change in his capital or profit ration unless some fresh agreement is entered upon.

### (b) WHEN HE ELECTS NOT TO BECOME A PARTNER:

- He will enjoy same rights and liabilities that he enjoyed as minor until the date of giving public notice. But such notice can be given maximum within six month. After that he will be assumed as normal partner.

- He will not be liable for any acts done by the other partners or the firm once he gives such notice.

- He has right to sue the other partners or the business firm in case he is not allowed his share of profit or capital in the business.

## 7.7 DISTINCTION BETWEEN PARTNERSHIP FIRM AND JOINT STOCK COMPANY

| Basis | Partnership | Joint Stock Company |
|---|---|---|
| Governing Act | The provision of Partnership are covered in the ‒Indian Partnership Act, 1932.‖ | The provision of Comapny are covered in the ‒Indian Companies Act, 2013.‖ |
| Agency | In a firm, there is the clause of mutual agency of the partners, that is every partner is responsible for the acts of others. | In a company, there is no mutual agency, members are not bound by acts of other members. |
| Distribution of profits | Any profit earned by the firm is distributed among the members in agreed ratio given in the partnership | Profit is distributed in ratio of their holding. |

| | | |
|---|---|---|
| | deed or in case of no deed, than equally. | |
| **Extent of liability** | All partners in a firm has unlimited liability except minor partner. | In a company, the liability of the members in not unlimited rather it is limited upto the amount contributed by them. |
| **Property** | Any property owned by the firm is –joint estate‖ of all the partners. | The property of the company is not joint estate of members, there is separation between company and its members. |
| **Transfer of shares** | The partners cannot transfer their share to others in a partnership firm without the consent of the other partners. | No consent is required, shares are transferable. |
| **Management** | Business is managed jointly by partners. | Members of a company cannot take direct part in the management of the business operations they participate through voting right by selecting the directors. |
| **Registration** | Registration is partnership firm is not mandatory, it depends upon will of the partners. | A company cannot be formed without having a valid registration under the Companies Act. |
| **Winding up** | A Partnership firm can be dissolved at any time whenever the partners agree. | A company have separate legal entity so it cannot be wound up just by agreement of the members rather it is wound up by the National Company Law Tribunal(NCLT) when its name is struck off from the Register of Companies. |
| **Number of membership** | According to Companies (Miscellaneous) Rules, 2014 the number of partners in a firm cannot exceed 50. | There is no restriction on maximum number of members in a public company but in a private company there may be maximum 200 members. |
| **Duration of existence** | Normally duration of firm is less and may be dissolved due to contract between partners, death, insolvency, retirement etc. | Normally company exists for long time and enjoys perpetual succession. |

## 7.8 TEST YOUR UNDERSTANDING (A)

1. State whether following are True or False
   a. Partnership can be formed with a Minor.

b. Business must be carried on by majority of Partners.

c. All partners are liable for any act carried by other partners.

d. There is no restriction on maximum number of partners.

2. Write five differences between Firm and a company :

|  | Partnership Firm | Company |
|---|---|---|
| **1.** |  |  |
| **2.** |  |  |
| **3.** |  |  |
| **4.** |  |  |
| **5.** |  |  |

3. Recognize the type of Partner by reading the statement given below:

| Statement | Type of Partners |
|---|---|
| a. A has invested money is business getting profit but he is not taking in routine activities of the business. |  |
| b. Z has entered into an existing firm at the age of 17 years. |  |
| c. Z requested his friend A to allow him to use his name as partner in the firm though A will not invest anything in the business and will not be eligible for any profit. |  |
| d. M has invested money in business. Getting profits and also looking after routine business. |  |
| e. W is not a partner with A, but he himself said to X that he is partner with A. On base of W's assertion X lend money to A. |  |
| f. A in the presence of W said to X that W is his partner, though he is not and W does not denied the fact. |  |
| g. W said to A that he is ready to invest money in business and will take part in business also provided that in case of any loss in the business, he will not be responsible. What type of partner W is. |  |

## 7.9 REGISTRATION OF PARTNERSHIP

As per provision given in the Partnership Act, 1932 it is not compulsory to register a partnership firm. The firm does not have a separate legal identity and registration will not alter this fact. However, registration is the definite proof of the existence of the firm and its legality. Non-registration of a partnership firm has some real life legal consequences for the partners and the firm itself and it may face some number of disabilities also. So, it is always advisable to draw up a written partnership deed and register the firm with the Registrar of

Firms.

### 7.9.1 REGISTRATION OF FIRMS (OPTIONAL):

The partnership Act provides for registration of the firm, but it does not make it mandatory for the firm. In simple words there is provision of registration for the firm but it is not compulsory that every firm get itself registered. Though registration is not compulsory under the act but the consequences of not getting registered are very severe which almost makes it compulsory for every firm to get registered without putting any legal compulsion for registration.         .

### 7.9.2 PROCEDURE OF REGISTRATION (SECTION 58):

Registration of a firm may be done at any time i.e., before starting a business or anytime during the continuation of partnership firm. It is always advisable to register the firm since a registered firm enjoys some special rights which are not available to an unregistered firms. The procedure for such a registrations is given as follows:

1.  **APPLICATION FOR REGISTRATION**: A Partnership firm can be registered by sending an application in Form No. 1. Along with the form, an amount of requisite fee and a true copy of the partnership deed also needs to be sent to the Registrar. The application must mention about:
    *   Name under which firms wants to operate.
    *   Nature of business firm wants to carry.
    *   Place at which business will be carried.
    *   Any other places where business can be undertaken.
    *   Date on which each partner joined the business.
    *   Full names of all the partners.
    *   Address of the partners who joined the business.
    *   Duration if any decided by the firm.
    The application for registration must bear signs of all the partners, or it may be signed by authorized agents of the partners..

2.  **DOCUMENTS TO BE ATTACHED**: The following documents along with the prescribed fee must be submitted to the Registrar. It includes:
    *   Duly filed affidavit
    *   Certified and true copy of Partnership Deed
    *   Rental or Lease Agreement or proof of ownership of the place of firm business

3.  **NAMING A PARTNERSHIP FIRM:** The name of the firm should consider the rules, while choosing a name for the firm. The firm so registered must use brackets and the word (Registered) after its name. However, there is a restriction on selecting the names like:- Crown', Emperor', _Prime Minister', _Government', or any other words which gives impression to the public that firm is associated to the government of enjoys some patronage of Government unless Government itself gives its consent

in writing to the use of such words as part of the name of he firm.

4. **FEE FOR REGISTRATION:** According to Section 71 of the Act, the State government is free to make any such rules regarding the fees to be given to the Registrar along with the other documents for registration of the firm.

5. **VERIFICATION OF APPLICATION FOR REGISTRATION:** Registrar will verify all the particulars mentioned in the application form.

6. **ENTRY OF STATEMENT IN A REGISTER:** After the verification is done by Registrar, he makes an entry of the name of the firm in a register maintained by him called the register of firms. This is undertaken after the Registrar is satisfied that all the particulars of the application of registration complies with all the necessary provisions. The date on which the Registrar records and files the Statement is considered as the date of registration of the Partnership firm.

7. **ISSUE OF CERTIFICATE:** After all the above formalities are complete and entry is done in the register, the Registrar will issue a Certificate of Registration.

## 7.9.3 CHANGE OF PARTICULARS

With a view to keep the Registrar of Firms posted with up-to-date information regarding the particulars of the partnership firm, if any change takes place in any of the particulars given, then it should be notified to the Registrar, who shall thereupon incorporate the necessary change in the Register of Firms.

Further, the Registrar should also be informed when any partner ceases to be a partner by retirement, insolvency or death, or when a new partner is admitted or a minor having been admitted, elects to become or not to become a partner, or when the partnership firm is dissolved.

## 7.9.4 TIME OF REGISTRATION

The Registration of the firm may take place at any time during the continuance.

## 7.9.5 CONSEQUENCES OF NON-REGISTRATION (SECTION 69)

The partnership Act provides for registration of the firm, but it does not make it mandatory for the firm. In simple words there is provision of registration for the firm but it is not compulsory that every firm get itself registered. Though registration is not compulsory under the act but the consequences of not getting registered are very severe. Following are the consequences on non-registration.

1. **NO SUIT IN A CIVIL COURT AGAINST THE FIRM OR CO-PARTNERS:** If there is any dispute or any conflict arises among the partners or between a partner and the firm or between a partner and former partners, and the dispute i.e., based upon the rights arising from contract (i.e., partnership deed) or upon the rights conferred by the provision given under the Partnership Act 1932, then partner cannot file a suit for settlement of such disputes if the firm is unregistered. However,

criminal proceedings can be brought by one partner against the other(s). Thus, if a partner steal the assets or any other property of the firm or puts fire to the buildings of the firm, then in such case any partner can prosecute him for the same.

2. **NO SUIT IN A CIVIL COURT AGAINST THIRD PARTY:** In case the third party has breached any contract with the firm or has some dispute with the firm, an unregistered firm cannot bring any suit in the civil court against such defaulting firm. But this provision is not applicable on third party. Their right of suit is not affected by the registration of the firm. So, a third party can bring suit against the unregistered firm.

3. **NO RELIEF TO PARTNERS FOR SET-OFF OF CLAIM:** If a third party sues the firm to recover a sum of money, then the firm cannot claim a set-off, i.e. the firm cannot say that the third party also owes money to the firm and the same should be adjusted against the claim in question. But this provision is not applicable on third party. Their right of set off is not affected by the registration of the firm. So, a third party can claim set off against the unregistered firm.

## 7.9.6 EXCEPTIONS:

There are certain exception which do not effect whether a firm is registered or not:

1. The third parties has right to sue the firm or any of its partner whether firm is registered or not.

2. The partners can file a suit for the dissolution of the firm or in case dissolution is already done than for the settlement of the accounts, or for realization of the assets when firm is dissolved.

3. Even if the firm is unregistered, the Official Receiver/Assignee or the Court, has the power to realise the property of an insolvent partner or partners and if need arise they can file the suit for the same.

4. Even if the firm is unregistered, suit for a set-off can be filed provided that the value of such suit must not exceed Rs.100 in value.

## 7.9.7 CONCLUSION:

Registration of a firm is never made compulsory, but it is extremely important part of the Partnership Act, 1932 as it has devoted an entire chapter to it. If a firm does not get itself registered, it may face certain disabilities like it loses the right to sue a third person or its partners in case of any violation of contractual rights. Hence, it is imperative to get the firm registered along with all its partners.

## 7.10 TEST YOUR UNDERSTANDING (B)

State the consequences in case of unregistered Firm.

1. M/s ABC wants to carry business as partnership firm without registration. W friend of A suggested that they cannot carry business without registration. Is W right.

2. M/s ABC sold goods to Mr. Z who failed to pay money when it becomes due, can M/s ABC file suit against Z.

3. M/s ABC was registered firm. C died and D was admitted in his place but same was not informed to registrar. They sold goods to Mr. Z who failed to pay money when it becomes due, can M/s ABD file suit against Z.

4. M/s ABC sold goods to Mr. Z for Rs. 50,000 who failed to pay money when it becomes due, on other hand Z sold goods for 30,000 to M/s ABC. Can ABC adjust the amount due to Mr. Z against amount due from him.

5. Partner A of M/s ABC got insolvent, can official receiver realise his property.

6. Mr. Z sold goods to M/s ABC who failed to pay money when it becomes due, can Mr. Z file suit against the unregistered firm.

7. M/s ABC sold goods to Mr. Z for Rs. 500 who failed to pay money when it becomes due, on other hand Z sold goods for 100 to M/s ABC. Can ABC adjust the amount due to Mr. Z against amount due from him.

8. Partners A and B are having some dispute. A wants to file suit against B. Is suit maintainable in the court of law.

## 7.11 LET US SUM UP

- Partnership in India is covered under Indian Partnership Act, 1932.
- Partnership is agreement between two or more persons.
- There is mutual agency of partners in a firm.
- Partners have unlimited liability.
- Partnership can be managed by all the partners collectively or few of them who will manage it on behalf of all the partners.
- There are different types of partners like active partner, sleeping partner, nominal partner, partner in profits only etc.
- Partnership may be general partnership or particular partnership.
- In case of Partnership at will, partner may leave anytime after giving notice to other partners.
- Even a minor can become partner in a existing firm.
- Minor can be partner in the benefits of the firm.
- In case of losses his loss is limited upto capital contributed by him in the firm.
- Registration of the firm is not compulsory, a firm may carry business even without registration.
- However, the consequences of non-registration are very serious.

## 7.12 KEY TERMS

- **PARTNERSHIP**: Partnership is the relation between persons who have agreed to share the profits of a business carried on by all or any of them acting for all.
- **ACTIVE PARTNERS:** The partners who actively engaged or participate in the day-to-day operations or activities of the business are called as working or active partners.
- **DORMANT PARTNERS:** Those partners who are not involved in to the day-to-day activities of the business firm are called as sleeping or dormant partners. They only

contribute money in the business and take the share in the profits or contribute losses (if any) of the business.

- **NOMINAL PARTNERS:** As the name suggest, these partners only allow the firm to use their name in the business as a partner. However, they don't put any money in the business and are not directly involved in the business. They even don't participate in day to day activities of the business. They don't get any share in profit. However, they are liable to third parties for any act done by other partners as they allowed the firm to use their name and in the eyes of public they are partner of the business.

- **PARTNER BY ESTOPPELS:** When a person is not a partner in reality but by his words or by his conduct he shows that he is the partner in the business, such person is called partner by estoppels. represents Here he behaves in such a way that somebody can have an impression that such person is a partner and based on this impression transacts with that firm then that person is held liable to the third party/outsider, then the person who falsely represents himself as a partner is known as partner by estoppels.

- **SECRET PARTNER:** In a partnership, the position of secret partner lies between the active and sleeping/dormant partner. The membership of the firm of a secret partner is to be kept secret from the third parties/outsiders.

- **LLP AGREEMENT:** Whenever any LLP is formed, the partners of LLP enters into agreement with each other, that agreement is called LLP agreement. Limited Liability Partnership (LLP) Agreement is very important and in a way we can say it is charter of the LLP. The rights and duties of the partners of LLP are decided by this agreement.

- **PARTNERS AND THEIR RELATIONS:** The partners of the LLP are not the mutual agent of each other and are responsible for own acts only.

## 7.13 REVIEW QUESTIONS

1. What is Partnership? Give its merits and limitations.
2. Give salient features of Partnership
3. Distinguish between Partnership and a Joint Stock Company.
4. Who is a Partner. Give different types of Partners.
5. Explain different types of Partnership.
6. Write about position of Minor as a partner in a firm.
7. Explain the rules applicable once Minor got the majority in partnership firm.
8. What is Registration of firm. Give procedure of Registration.
9. Is registration compulsory for a firm? Give consequences of non registration of the firm.

## 7.14 ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

1 (a) False, Minor cannot form a partnership, he can be admitted to existing firm only

1 (b) False, any partners can manage business on behalf of all partners.

1 (c) True.

1 (d) True.

1 (e) False, as per Companies (Miscellaneous) Rules, 2014 maximum number of partners could be 50.


3 (a) Sleeping or Dormant Partner

3 (b) Minor Partner

3 (c) Nominal Partner

3 (d) Active Partner.

3(e) Partner by Estoppel

3 (f) Partner by Holding Out

3 (g) Partner in Profits only


## TEST YOUR UNDERSTANDING -B

1. W is wrong, unregistered firm can carry on business.
2. M/s ABC cannot file suit against Z as unregistered firm cannot file suit against third party.
3. After death of C with admission of D there is change in partnership and as new partnership is not registered with the registrar, they cannot file suit against Z.
4. Unregistered firm cannot adjust claim against third party exceeding Rs. 100. As in this case amount is Rs. 30,000 M/s ABC cannot adjust the same without consent of Z.
5. Official Receiver has right to realize assets of partner of unregistered firm.
6. Third party has right to file suit against unregistered firm. So, Z can file suit against the firm.
7. Unregistered firm cannot adjust claim against third party exceeding Rs. 100. As in this case amount is Rs. 100 M/s ABC can adjust the same without consent of Z.
8. Partners of unregistered firm cannot file suit against each other.


## 7.15  FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
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3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
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**UNIT 8 – RIGHTS AND DUTIES OF PARTNERS, DISSOLUTION OF PARTNERSHIP FIRM**

# STRUCTURE

## 7.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand Rights available to partners in a firm.
- Describe various liabilities of the Partners.
- Find out various authorities of partners that are implied under the act..
- Define the meaning of Partnership Deed.
- Make out a partnership Deed of Partnership firm.
- Appraise themselves about rights and duties of incoming and outgoing partner.
- Understand the meaning and reasons of dissolution of partnership firm.
- Know the consequences of Dissolution of firm.

## 8.1 RIGHTS OF PARTNERS:

The rights of the partners depend upon the provisions given in the partnership deed. However, subject to an agreement between the partners; the law also confers the following rights upon all the partners:

1. **RIGHT TO TAKE PART IN MANAGEMENT [SECTION 12(A)]**: It is the right of every partner to take part in the management and day-to-day business activities of the firm business. This right is available to all partners unless they may provide by a contract, that this right shall not be available to some partners.

2. **RIGHT TO BE CONSULTED [SECTION-12(C)]**: Every partner enjoys the right of being consulted in all matters related to the business that could have effect on the business firm. However, every partner also has the right to express his/her opinion before any decision is taken by other partners. In case of any difference of opinion, then such matter will be settled by the majority of partners in case of an ordinary matter. But in case of fundamental matter, then it is to be settled by the consent of all of partners the partners i.e. unanimous consent.

3. **RIGHT TO HAVE ACCESS TO BOOKS [SECTION 12(D)]:** Every partner has the right to examine all the records, books of accounts of the partnership firm. Moreover, he/she can also have the copy of such records, books of accounts etc. However, this right is subject to a contract between the partners i.e., the partner may agree, by a contract that this right shall not be available to some of the partners.

4. **RIGHT TO SHARE PROFITS [SECTION 13(B)]**: Profits are shared in agreed ration but in absence of agreement every partner enjoys the right to have equal share in the profits of the business. Even if there are losses in the business the rule will remain same. So, if there is no agreement to the contrary, then in such case the profits and losses are shared equally.

5. **RIGHT TO INTEREST ON CAPITAL AND ON ADVANCES [SECTION 13(C) & 13(D)]:** Ordinarily, the partners have no right to receive any interest on their contribution towards their capital. However, the partnership agreement or partnership deed may contain such provision that the partners shall be entitled to

interest on capital at a certain rate. It may, however, be noted that where such interest is to be paid, it shall be paid out of profits only. Where in addition to the contribution towards the capital, a partner also advances a sum of money to the business of the firm then he can charge interest @ 6% per annum on such advance given by him. Such interest on advance is payable even if the firm suffers loss.

6. **RIGHT TO BE INDEMNIFIED [SECTION 13(E)]**: The partner of a firm has a right to be indemnified i.e., the right to recover all such expenses incurred and payments made by him in the following two circumstances.

   - A partner has a right to recover from the business if he has incurred any expense that are related to ordinary course of firm business.
   - Further he can recover from the firm all expenses which he incurred in order to protect the property of the firm from a loss arising in an emergency. No agreement can restrict this right to recover the expenses.

7. **RIGHT TO USE THE PARTNERSHIP PROPERTY [SECTION 15]**: It is the right of every partner to use the firm property. It may, however, it may be noted that the partnership firm property should be used exclusively for the purpose of the firm business.

8. **RIGHT TO BE CONSULTED AT THE TIME OF ADMISSION OF A NEW PARTNER**: It is the right of every partner to be consulted at the time of admitting a new partner in the partnership firm.

9. **RIGHT TO RETIRE FROM THE FIRM**: It is the right of every partner to retire from the partnership firm, if he/she finds it difficult to adjust with the other partners.

10. **Rights of retiring partner**: A partner can retire either by consent of all the partners or as the terms of contract states or by giving any such notice in case of partnership at will.

11. **Right not to be expelled [Section 33(1)]**: A partner enjoys the right to continue in the business as partner, he cannot be expelled from the firm by other partners. However, the partners may enter into a contract providing for the expulsion of a partner by majority of the partners.

13. **RIGHT TO DISSOLVE THE FIRM**: A partner firm can be dissolved by consent of all the partners. So, the partners has jointly right to dissolve the firm anytime. Normally they need not to get any legal permission for the same. In case of the partnership at, the firm may get dissolved even if one partner give notice in writing to the other partners that he wants to dissolve the firm.

## 8.2 DUTIES OF PARTNERS

Along with rights, the partners also have some duties which are as follows :

1. **DUTY OF GOOD FAITH:** It is the foremost and important duty of all the partners. Every partner should act in good faith, and he should be just and faithful in his dealings with the other partners.

2. **DUTY TO CARRY ON THE BUSINESS TO THE GREATEST COMMON ADVANTAGE:** Partners are mutual agents and enjoys utmost good faith of other partners, so it is responsibility of every partner to carry on the business for the maximum common benefit of all the partners. Partner must use his capability, skill, knowledge and experience for the common benefit and must not try to make any personal profits.

3. **DUTY TO RENDER TRUE ACCOUNTS:** It is duty of every partner that he should keep proper books of accounts, and render correct and true accounts of partnership firm.

4. **DUTY TO GIVE FULL INFORMATION:** It is also the duty of every partner that he should give full information of all things which are affecting the firm and to his co-partners. Thus, if a partner is in possession of more information about the affairs and property or assets of the firm, then he should not conceal the same from other members.

5. **DUTY TO INDEMNIFY ANY LOSS DUE TO FRAUD:** It is the duty of every partner to make good the loss suffered by the firm due to his fraud. Thus, if some amount of loss is caused to the firm due to the fraud of a particular partner, then in such case the firm has the right to recover the amount of loss from the same partner. It is an absolute duty and can't be excluded by an agreement to the contrary. However, the firm shall remain liable to the third parties/outsiders for fraud of its partners.

6. **DUTY TO ATTEND DILIGENTLY:** It is the duty of every partner that he should diligently (i.e., carefully) attend to the affairs of the business of the partnership firm. If a partner doesn't attend diligently the business of the firm, and due to this, the firm suffers any amount of loss due to his ‗willful neglect‗, then that partner is bound to make compensation to the firm.

7. **DUTY TO SHARE LOSSES:** It is the duty of every partner to share equally the losses (if any) suffered by the firm. However, the partners may also agree to share the losses in different proportions through a mutual agreement.

8. **DUTY TO ACCOUNT FOR PERSONAL PROFITS:** This duty is based on the principle of good faith, which requires that a partner shall not make personal or private profits at the expense of the firm. If any partner makes any such personal profits, he must give account of those profits and pay back the same to the firm.

9. **DUTY TO USE FIRM PROPERTY EXCLUSIVELY FOR FIRM:** It is the duty of every partner to use the firm property exclusively for the business of the partnership firm. Thus, the partners should use the partnership property for the firm's business only. This duty is also subject to an agreement to the contrary.

10. **DUTY TO ACT WITHIN AUTHORITY:** It is the duty of every partner that he should act within the scope of actual or implied authority.

## 8.3 IMPLIED AUTHORITY OF PARTNERS

Indian Partnership act provide some implied authority to all the members. Such authority is not subject to any agreement rather such authority is given by the act itself. This implied authority can bind the firm and the other members of the firm. Following acts are covered in the implied authority of the partner.

a.  To buy, sell and pledge goods or services on behalf of the firm.
b.  To raise loans or advances on the security of the assets.
c.  To receive amount of payment from debts due to the firm.
d.  To accept, make an issue bills of exchange, promissory notes, etc., on behalf of the firm.
e.  To engage servants or employees for the firm's business.
f.  To take on lease any property or premises on behalf of the firm.

However, a partner has no implied authority, unless otherwise given in the provisions of the partnership deed, in the following matters:

a.  He cannot submit any dispute for arbitration without obtaining consent of other partenres..
b.  He cannot compromise any claim made by the firm against the third party. He cannot relinquish any part of such claim.
c.  He cannot withdraw any suit filed by him or other members on behalf of the firm. For this consent of all the partners is required.
d.  He alone cannot admit any liability in a suit that is filed by any person against the firm.
e.  He alone cannot open a bank account in the name of the firm.
f.  He cannot acquire or purchase immovable property for the firm without having consent of the other partners.
g.  He cannot sell immovable property of the firm.
h.  He alone cannot enter into partnership on behalf of the firm.

## 8.4 PARTNERSHIP DEED

### 8.4.1 MEANING OF PARTNERSHIP DEED

Partnership firm can be formed with an agreement between the partners. This agreement may be written or spoken. An oral or spoken agreement may be the cause of dispute in future. So, it's better to have a written agreement in order to avoid future disputes. The written agreement was duly signed by all the partners is to be called as partnership deed or agreement. It is the written contract between the partners. It contains the term and conditions of the partnership.

Deed of partnership or partnership deed can be defined as a document that is drawn up by all the partners of a business which contains all the provision, rules and regulations guiding the business. It is also known as a document which clarifies the different positions and duties of the partners in the firm business. Partnership deed is also knows as **Partnership Agreement**'.

### 8.4.2 MAIN CONTENT OF PARTNERSHIP DEED:

Some of the important clauses which are to be included in a partnership deed are as follows:

1. **NAME OF THE FIRM AND ITS ADDRESS**: The partnership deed should contain of the name of the firm and its place of business.

2. **NAME AND ADDRESS OF PARTNERS**: The deed should also contain the name and address of all partners.
3. **NATURE OF FIRM"S BUSINESS**: The nature of the business proposed to be carried and its limitation should be included in it.
4. **DURATION OF PARTNERSHIP**: If partnership is established for a fixed duration or for a particular task, then it should be stated in it.
5. **PARTNERS" CAPITALS**: The partnership deed should contain the total amount of capital and contributions by each partner.
6. **INTEREST ON CAPITAL**: If the partners decide interest on their capitals, then the rate should be given in the deed.
7. **DRAWING AND INTEREST ON THEM**: The deed should mention the limit of drawings by every partner and the rate of interest which is to be charged.
8. **DIVISION OF PROFIT**: Profit or Loss (if any) to be shared in an agreed ratio which is to be given in the deed. If it is not mentioned then the partners are authorized to share equally according to the provision of the Partnership Act.
9. **PARTNERS" SALARY AND COMMISSION**: If the partners decide to pay salary and commission to the partners, then the deed should mention the amount of salary or commission payable to such partner.
10. **RIGHTS AND DUTIES OF PARTNERS**: If any partner has some special rights and duties regarding to conducts the affairs of business or if the liability of any partner is limited to the capital invested by him/her, then these facts should also be given in it.
11. **ADMISSION AND RETIREMENT OF PARTNERS:** After the establishment of partnership, some new partners may be admitted and some partners may retire from the business.
12. **DEATH OF A PARTNER**: The procedure of calculating the amount due to a deceased partner and the method of its payment to the successors or legal heirs should also be decided and mentioned in the deed.
13. **VALUATION OF GOODWILL:** Normally the deed also describe that how to value the goodwill in case of any admission, retirement or death of a partner.
14. **REVALUATION OF ASSETS AND LIABILITIES**: The method of revaluation of assets and liabilities of the firm should also be clearly mentioned in the deed.
15. **ACCOUNTS AND AUDIT**: The procedure of keeping books of accounts and its audit should also be mentioned in the deed.
16. **DISSOLUTION OF PARTNERSHIP**: The partnership deed should contain the firm and the method of the final settlement of accounts on account of dissolution of partnership.

17. **ARBITRATION CLAUSE:** In case of disputes or any conflict among partners, the method of appointing arbitrators and their rights should be clearly mentioned.

### 8.4.3 IMPORTANCE OF PARTNERSHIP DEED:

The partnership deed is important because of the following reasons:

1. It provides permanent records of terms and conditions of the firm business.
2. In case of death of a partner, the deed will serve as a basis for settling the accounts.
3. It regulates the rights, duties, and liabilities of each and every partner.
4. It helps to avoid any misunderstanding or any conflict between the partners because all the terms and conditions of the partnership have been laid down beforehand in the deed.
5. It clears confusion as to what should be the profit and loss sharing ratio between partners.
6. It clearly mentions Individual partner's roles.
7. The Partnership deed can also contain clauses which clarifies what should be remuneration or salary given to the partners.
8. Sometime preparing Partnership Deed is a legal requirement also e.g. Registration of Firm, getting income tax or any other related benefits available to firm.

### 8.4.4 RULES TO BE FOLLOWED IN THE ABSENCE OF A PARTNERSHIP DEED:

In the absence of a partnership deed, the following rules have to be followed:

1. The partners are entitled to share the profits or losses equally as per the provisions given in the Partnership Act.
2. Partners are not entitled to any interest on capital.
3. No partner will be allowed salary, or any other remuneration.
4. No interest will be charged on partners' drawings.
5. Interest at 6% per annum will be allowed to partners on any loan or advances given to the firm by them.
6. If there is no agreement all the partners enjoys the right to take part in conduct of business, they can give their advice also.
7. In case all the partner did not give their consent, no person can be admitted as a new partner in the partnership firm.

### 8.5 INCOMING PARTNER

According to Section 31 of Indian Partnership Act 1932, a new partner can be admitted to the already existing partnership firm. Such partner is known as incoming partner. However, a new partner can be admitted only with the consent of all the existing partner. But this rule is applicable only if there is no provision regarding admission of a partner in the partnership deed. In case the partnership deed contains the provision regarding admission of the partner, then such provisions will applicable on admission. For example if partnership deed provide that any existing partner can admit a new partner, than

new partner need not to get consent from other partners. Even a third party can admit in new partner if such is provided in the partnership deed. The new partner is eligible for all the benefits of firm from the date of his admission.

### 8.5.1 LIABILITY OF INCOMING PARTNER

1. Any incoming partner is only liable from the date of his admission. He is not liable for any existing liabilities.
2. In case the new partner himself agrees to share existing liabilities, he will be liable for existing liabilities also.
3. However, the liability of new partner for existing obligations is towards other partners only and not for the third party. In other words, we can say that the third party cannot sue a new partner for liabilities that were existing before his admission.
4. If new partner has assumed existing liabilities and the creditors have also accepted this fact, in such case, new partner will be liable towards the third party also.

## 8.6 OUTGOING PARTNER (SECTION 32)

An outgoing partner is a person who ceases to be member of the partnership firm. So, any person who was earlier a partner of the firm but now he is not the partner in the firm, is known as an outgoing partner. Following are the ways in which a person may cease to be member of the partnership firm.

Retirement by consent: Any partner could retire from partnership firm at any time provided there is consent of all other partners regarding his retirement. So, if all existing partners give their consent, a partner may retire at any time.

1. **RETIREMENT BY AGREEMENT:** If the partnership deed provide the procedure for retirement of a partner, a partner may retire from the firm by following the procedure laid in the partnership deed.
2. **RETIREMENT BY NOTICE:** Sometime the partnership is ‗Partnership at Will'. In such case, a partner may retire at any time by just giving notice to other partners regarding his retirement. In case of partnership at will, a partner may retire even if there are some pending contracts that are yet to be completed.
3. **BY INSOLVENCY:** if any partner is declared insolvent, his partnership will be ceased immediately when he is declared insolvent. However, partnership firm may continue the business after insolvency of a particular partner, but in such case insolvent partner's assets are not liable for any act done by the firm after he was declared insolvent.
4. **BY DEATH:** In case of death of a partner, his partnership will be over immediately and his legal Heirs have no right to claim a place in partnership in his place. His legal Heirs are eligible for amount contributed by him and his share of profit Till death.
5. **EXPULSION OF PARTNER**: According to section 35 of Indian Partnership Act, a partner may be expelled from partnership by majority of partners. This expansion is valid only if the other partners act in a bonafide manner and in good faith. Partner who is going to be expelled must be given an opportunity of being heard before his

expulsion.

## 8.6.1 LIABILITY OF RETIRING PARTNER

**1. LIABILITY FOR ACTS DONE BEFORE RETIREMENT SECTION 32 ( 2):**
Following are the provisions regarding any act done by partner before his retirement:
   a. A partner will remain liable for any act done by the firm or other partners before his retirement.
   b. His liability for the acts before his retirement will remain towards the third party also.
   c. In case other partners agreed to discharge him from the liability for acts done before retirement, he will not be liable for such acts.
   d. However, this agreement is between partners only, third party has rifgt to make a retiring partner liable for acts done before his retirement.
   e. If Third party accepts the agreement between partners to discharge a retiring partner, then it will lose its right to make a retiring partner liable for acts done before his retirement.

**2. LIABILITY FOR ACTS DONE AFTER THE RETIREMENT SECTION 32(3)**
   a. A partner will continue to be liable fof Acts done after his retirement towards the Third party unless he gives a public notice for his retirement.
   b. In case of sleeping partner there is no need of giving such public notice.
   c. The public notice may be given by a retiring partner himself or the remaining partners.
   d. If public notice is not given, the retiring partner will be liable for all the acts done by firm or other partners after his retirement.
   e. In absence of public notice, the firm will also be liable for the acts done by retiring partner after his retirement.

## 8.6.2 RIGHTS OF A RETIRING PARTNER

**1. RIGHT TO COMPETE SECTION 36:** Following are the provisions of Indian Partnership Act in this regard:
   a. A partner may compete with his old firm after his retirement.
   b. If there is any agreement at time of retirement which restrict the partner from competing with existing business, in case partner may note complete with his old firm.
   c. If the retiring partner is competing with his old firm,he cannot use the name of the Firm or he cannot represent himself as carrying on the business of the old Firm.

**2. RIGHT TO SHARE SUBSEQUENT PROFITS SECTION 37:** Following are the provisions in this regard
   a. An outgoing partner is eligible for refund of the amount invested by him in the business along with profit he ceased to be member of the firm.

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b. If the amount is kept by the firm without any agreement for the same, outgoing partner may claim profits earned by the firm after he ceased to be member in proportion of the amount invested by him in the firm.

c. If he does not want to get proportionate profits, he could also claim interest at the rate of 6% per annum on the amount due to him by the firm.

## 8.7 DISSOLUTION OF FIRM

According to Section 39 of the Partnership Act, ―The dissolution of partnership between all the partners of a firm is called the Dissolution of the Firm.‖ If the firm has closed down routing operation it does not necessarily means dissolution of the firm, still the firm may continue with the objective of realizing the assets belonging to the firm.

According to the Partnership Act, dissolution is of 2 types:

a. **DISSOLUTION OF PARTNERSHIP:** The term ‗dissolution of partnership' may be defined as a change in the relations of partners, and not the extinction of partners relationship. In this case, the firm as a whole is not closed down. But only the relations between some of the partners come to an end, and the remaining partners continue to carry on the business activities of the firm. Thus, the ‗dissolution of firm' is different from ‗dissolution of partnership.' Example: X, Y and Z were partners in a firm. X retires. Only the partnership between X, Y and Z is dissolved and a new partnership between Y and Z comes into existence. The new firm is called the ‗reconstituted firm'. Thus, only the relations between the partners are changed on X's retirement.

b. **DISSOLUTION OF FIRM:** Dissolution for firm take place when business ceases to exist, in other words it is complete closure of the business. As on one hand dissolution of partnership is only closure of relation between the partner which may take place even if firm is continuing like one partner left the business, this will change the relation among the partners. On the other hand dissolution of firm take place when firm is altogether closed. So, with dissolution of firm the partnership automatically comes to an end. Following are the difference between dissolution of the firm and the dissolution of the partnership.

| Points to difference | Dissolution of Firm | Dissolution of Partnership |
|---|---|---|
| 1.Continuation of business | It is complete closure of the business. Business cannot continue the operations. | Firm is continuing, this will change the relation among the partners |
| 2. Winding up | It involves complete winding up of the operations of the so all the assets will be sold and liabilities will be settlemed. | No need of sale of or payment of the liabilities of the firm. |
| 3. Order of court | It may take place on the order of the court. | It is not ordered by the court. |

| | | |
|---|---|---|
| 4. Scope | With dissolution of firm the partnership automatically comes to an end | Dissolution of parthership may or may not cover dissolution of firm. |
| 5. Final closure of books of accounts | It need final closure of books of as operations are discontinued. | It does not need final closure as operations are continued. |

## 8.8 MODES OF DISSOLUTION

### 8.8.1 DISSOLUTION WITHOUT THE INTERVENTION OF COURT

A firm may be dissolved without the intervention of the court i.e. without going to the Court of Law. It may takes place in any of the following ways:

**1. COMPULSORY DISSOLUTION:**
In the following cases, the firm is compulsorily dissolved even if there is a contrary contract between the partners i.e. even if the partners agree that the firm shall not be dissolved in such cases.

   a. **INSOLVENCY/DEATH OF ALL THE PARTNERS:** Where all the partners of the firm become insolvent/death, then in such case the firm is dissolved. The firm is also dissolved when all the partners except one have become insolvent/died.

   b. **BUSINESS OF THE FIRM BECOMING UNLAWFUL OR ILLEGAL:** Where an event happens which makes the business of the firm illegal or unlawful, then the firm is also dissolved. This includes the cases where the business of the firm is rendered unlawful by the outbreak of war, or when the object for which it was formed becomes unlawful or illegal.

**2. OPTIONAL DISSOLUTION:**
   e. **DISSOLUTION BY AN AGREEMENT BETWEEN THE PARTNERS:** A firm may also be dissolved in accordance with a contract between the partners in the same way as a firm is established with the contract between the partners. There may be a separate contract for the dissolution of the partnership firm, or it may also be contained in the deed itself.

   f. **DISSOLUTION BY GIVING A NOTICE:** A firm can also be dissolved by any partner by giving a notice of dissolution to the other partners where the partnership firm is _at will „.

   g. **DISSOLUTION ON THE HAPPENING OF CERTAIN CONTINGENCIES:** Sometime firm is dissolved on happening of certain contingency. If any of the following event take place firm it will results in automatic dissolution.

   • **EXPIRY OF FIXED PERIOD:** Sometime a firm is constituted for a fixed period of time, in such case the firm is dissolved automatically when period is expired. However, if the contract provides that the firm opt to continue, then it will not be dissolved.

- **COMPLETION OF THE UNDERTAKING:** Sometime a firm is constituted to carry out a particular task or adventure, in such case the firm is automatically dissolved on the completion of such task or adventure. However, if the contract provides that the firm opt to continue, then it will not be dissolved.
- **DEATH OF A PARTNER:** In case one or more partner dies, the firm will be dissolved on the death of the partner. However, the other partners if wish they can continue the operations.
- **INSOLVENCY OF A PARTNER:** When one of the partners is declared as insolvent by the court. In such cases, the firm is dissolved from the date of the order of insolvency. This is also subject to a contract to the contrary.

## 8.8.2 DISSOLUTION WITH THE INTERVENTION OF COURT

When a partner wants that the partnership firm should be dissolved but the other partners may not agree to the dissolution. In such cases, he can go to Court of Law, and file a suit for dissolution of the firm. A partner may like to have the firm dissolved for different reasons. It may, however, be noted that the court has the discretion to pass an order of dissolution of the firm i.e. the court may or may not allow the dissolution. A partner may file a suit for dissolution of the firm on the following grounds, and the court may dissolve the firm if it is satisfied about the same:

1. **INSANITY OF A PARTNER:** When one of the partner becomes of unsound mind. In such cases, the court may allow the dissolution. In this case the suit for dissolution of the firm may be filed any partner who are of the sound mind. Even the suit may also be filed by legal representative of the partner who became unsound mind.
2. **MISCONDUCT OF A PARTNER**: In case a partner is found guilty of misconduct, then court may order the dissolution of firm. In such case the suit can be filed by any partner other than the partner who is guilty of misconduct.
3. **PERMANENT INCAPACITY OF A PARTNER:** Sometimes a partner becomes permanently incapable of performing his responsibilities towards the firm. In such cases also, the court has the right to order dissolution of the firm. In such case the suit may be filed by any partner other than that partner who has become incapable and cannot perform his duties.
4. **PERSISTENT BREACH OF AGREEMENT:** Sometimes, a partner wilfully and persistently breach the partnership agreement and wilfully neglect his duties towards the business operations of the firm. Sometime he behaves in a way that it becomes difficult for other member to carry on the business with him. In such cases, the court may allow the dissolution of that firm. In such case the suit may be filed by any partner other than than the partner who commits the breach of agreements.
5. **PERPETUAL LOSSES IN BUSINESS:** Sometime the nature of business becomes such that there are continuous losses to the business and even in future there is no hope of earning the profits in the business. In such cases if the court is satisfied that the business of a firm cannot be carried on without incurring the loss, it may allow

dissolution of the firm. However, partners other than partner submitting application to the court for dissolution have right to appeal against the order of the court.

6. **TRANSFER OF INTEREST:** In a firm a partner cannot sell his share without the consent of all other partners. If one or more partner have transferred the whole of his interest or part of the share to a third party, then in such case the court may allow the dissolution of the firm.

7. **OTHER JUST AND EQUITABLE GROUNDS:** If some just and equitable ground ground is available which court thinks fit for dissolution of the firm, court has right to order the closure of the firm. A _just and equitable ground' means any reason which court thinks appropriate and in the benefit of society or partners.

## 8.9 CONSEQUENCES OF DISSOLUTION

Section 45-55 of the Act deals with the effects/consequences which results in the dissolution of the firm. These are as follows:

1. **LIABILITIES FOR THE ACTS DONE AFTER DISSOLUTION:** On the dissolution of a partnership firm, partners have to give a public notice of the dissolution. If it is not given, then the partners shall remain liable to the third party/outsiders for their acts done even after the dissolution of the firm.

2. **CONTINUING AUTHORITY FOR WINDING UP:** Even if dissolution take place, partners have authority that they can bind the firm for the acts done by them. However, this authority is limited for following tasks:
   (a) If it is necessary to wind up the business affairs of the firm.
   (b) If it is necessary to complete the transactions started but not completed at the time of dissolution.

3. **PARTNER"S RIGHT FOR UTILISATION OF ASSETS/PROPERTY:** Even if dissolution take place, partners have following rights:
   (a) Partners can use the property or assets of the business for making the payment of debts of the business.
   (b) In case any surplus is left after making the payments of the debts, that will be distributed among all the partners.

4. **MODE OF SETTLEMENT OF ACCOUNTS:** When the firm is dissolved, the accounts of that firm are settled as per the terms of partnership. If there are no specific terms or an agreement, then the accounts are settled according to the following provisions contained in the Indian Partnership Act.
   a) First of all, the assets shall be utilized in paying the **debts of the firm to the third parties/outsiders.**
   b) If there is any surplus, then the same shall be utilized in paying each partner the **amount of loan advanced** to the firm.
   c) If there is still any surplus, the same shall be utilized in paying each partner towards the **amount of his capital**.

**d)** If there is still any surplus, then the same shall be **divided among all the partners** in proportion to their share in the profits.

5. **PAYMENT OF FIRM"S DEBTS AND PARTNER"S PRIVATE DEBTS:** The Firm's property/assets shall be utilised first in payment of firm's debts then the surplus, if any, shall be used for payment of partner's private debts to the extent in which the concerned partner is entitled to the surplus.

6. **RETURN ON PREMIUM OF PARTNERSHIP"S PREMATURE DISSOLUTION:** Sometimes when a new partner is admitted to the firm he pays some premium for such admission. But if the dissolution of partnership take place earlier than the period fixed for it, then the partner who has paid the premium is entitled to get reasonable part of his amount of premium back . However if partnership is dissolved due to following reasons, this rule will not be applicable:

   (i)     In case of death of one of the partners;

   (ii)    If dissolution take place due to the misconduct of the partner who paid premium.

   (iii)   Where the dissolution take place with consent of all the partners and it was decided that no amount of premium will be paid back..

7. **TREATMENT OF LOSS ARISING DUE TO INSOLVENCY OF A PARTNER:** Unless otherwise agreed it requires that:

   (i) The solvent partners should bring in cash equal to their shares of the loss on realization

   (ii) The solvent partners should bear the loss arising due to such insolvency of a partner in the ratio of their Last Agreed Capitals.

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## 8.10  TEST YOUR UNDERSTANDING (B)

1. Settle the following claims of partners as per law in the absence of deed.

 (a) Raja and Rani invested ` 5,00,000 and ` 2,50,000 as capital in the business. They want the profits to be distributed in the ratio of capital.

 (b) Rani' carried out business alone for six month due to illness of Raja , She demanded salary 10,000 per month.

 (c) Raja paid 8,000 as train fare for going on business tours. He claims reimbursement of this amount.

 (d) Rani's advanced a loan of Rs. 1,00,000 to firm and wants interest on such loan at market rate which is 11%.

 (e) Raja wants interest on drawing to be charged at market rate which is 11%.

2. Mr. A is a partner in a firm and he want to following acts for the firm, state whether these are in his implied authority  as per Partnership Act or not.

| Act | Implied Authority |
|---|---|
| 1.  He wants to engage Z as servant. | Yes / No |
| 2.  He has opportunity to buy a piece of land at very reasonable price. | Yes / No |
| 3.  Firm has some dispute with Mr. X, he wants to make | Yes / No |

| | settlement of the dispute. | |
|---|---|---|
| 4. | Some goods are available at reasonable price, he wants to buy such goods. | Yes / No |
| 5. | Some amount is due from W and he is not making the payment. A wants to file a suit against W. | Yes / No |

3. Write three difference between Dissolution of Firm and Dissolution of Partnership

| Points to difference | Dissolution of Firm | Dissolution of Partnership |
|---|---|---|
| 1. | | |
| 2. | | |
| 3. | | |

4. A, B, C, D and E are partners in a firm. A, B and C passed a resolution for dissolution of firm. State whether firm can be dissolved in following cases:
   a. Deed does not contain any provision related to dissolution.
   b. Deed provide that dissolution can be carried by mutual consent of the partners.
   c. Deed provide that majority of partners can take dissolution decision.

## 8.11  LET US SUM UP

- Partners have right to take part in business and have right to be consulted.
- Partnership have right to get share of profits of a business.
- Partners must work diligently for the business and must produce true account of the business.
- Partner have implied authority to buy movable goods, make or receive payment, engage servant or make suit against third party.
- Partner cannot buy immovable property or cannot produce suit for settlement.
- The written agreement between partners is known as Partnership Deed.
- In absence of provision in partnership deed, profits are divided equally between the partners.
- The rate of interest of partner's loan in absence of partnership deed is 6 p.a.
- In absence of agreement, a new partner can be admitted with consent of all the partners.
- New partner is liable for obligation of firm after his admission.
- A partner may be ceasing his membership due to retirement, death or expulsion.
- Once ceases to be member, he will still be liable for obligations of firm if he does not give public notice.
- Firm may be dissolved with or without intervention of the court.

## 8.12  KEY TERMS

- **IMPLIED AUTHORITY OF PARTNER**: Indian Partnership act provide some implied authority to all the members. Such authority is not subject to any agreement rather such authority is given by the act itself. This implied authority can bind the firm and the other members of the firm.

- **PARTNERSHIP DEED:** Partnership firm can be formed with an agreement between the partners. This agreement may be written or spoken. An oral or spoken agreement may be the cause of dispute in future. So, it's better to have a written agreement in order to avoid future disputes. The written agreement was duly signed by all the partners is to be called as partnership deed or agreement.

- **INCOMING PARTNER:** According to Section 31 of Indian Partnership Act 1932, a new partner can be admitted to the already existing partnership firm. Such partner is known as incoming partner.

- **OUTGOING PARTNER:** An outgoing partner is a person who ceases to be member of the partnership firm. So, any person who was earlier a partner of the firm but now he is not the partner in the firm, is known as an outgoing partner.

- **DISSOLUTION OF FIRM:** According to Section 39 of the Partnership Act, ‒The dissolution of partnership between all the partners of a firm is called the Dissolution of the Firm.

- **DISSOLUTION OF PARTNERSHIP:** The term ‗dissolution of partnership' may be defined as a change in the relations of partners, and not the extinction of partners relationship. In this case, the firm as a whole is not closed down. But only the relations between some of the partners come to an end, and the remaining partners continue to carry on the business activities of the firm.

## 8.13 REVIEW QUESTIONS

1. What are rights of a partner.
2. Give various duties of partners towards partnership firm.
3. What is implied authority of partner. What acts are covered in implied authority of the partner.
4. What acts are not covered in implied authority of the partner.
5. Write is Partnership deed? Give its significance.
6. Give the contents of Partnership Deed. What rules are applicable in absence of Partnership Deed.
7. Who is incoming partner. Give the liability of incoming partner.
8. Who is outgoing partner. Give the liability and rights of outgoing partner.
9. What is dissolution of partnership and dissolution of firm. Give difference between both.
10. Give various modes of dissolution.
11. What are consequences of dissolution of firm.

## 8.14 ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

1. In the absence of deed, following provisions of Partnership Act, 1932 will apply to solve the disputes :

(a)  Profit between Raja and Rani can not be shared in capital ratio. In the absence of partnership deed the profits will be shared in equal ratio.

(b) Rani can not claim salary in the absence of deed.

(c)  Expenses incurred by Raja on behalf of firm are reimbursable as the reimbursement  of  reasonable expenses have nothing to do with partnership deed.

(d) Interest payable on Partner Loan in absence of deed is 6% p.a.

(e) No interest is chargeable on drawings.


2.  (a) Yes, he can engage servant.
   (b) No, he cannot buy immovable property without consent of other partners.
   (c) No, he alone cannot make settlement of the dispute.
   (d) Yes, he can buy movable goods.
   (e) Yes, he can file a suit against third party.


4. (a) Firm cannot be dissolved by majority in absence of clause in partnership deed.
   (b) Firm cannot be dissolved by majority if partnership deed provide dissolution my mutual consent.
   (c) Firm can be dissolved by majority if partnership deed provide so.


## 8.15  FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.
3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
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5. Sharma, J.P. and Sunaina Kanojia, *Business Laws*, Ane Books Pvt. Ltd., New Delhi.

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

## UNIT 9 – LIMITED LIABILITY PARTNERSHIP ACT, 2008

**STRUCTURE**

**9.0 Objectives**

**9.1 Introduction**

**9.2 History of Limited Liability Partnership**

**9.3 Concept  and Meaning of LLP**

**9.4 Salient Features of LLP**

**9.5 Advantages of LLP**

**9.6 Distinction between LLP and Partnership Firm**

**9.7 Distinction between LLP and Joint Stock Company.**

**9.8 Incorporation of LLP**

**9.9 Incorporation Process**

       **9.9.1 Partners**

       **9.9.2 Capital Contribution**

       **9.9.3 Designated Partners**

       **9.9.4 Designated Partner Identification Number (DPIN)**

       **9.9.5 Hons. Signature Certificate**

       **9.9.6 Checking the name availability**

       **9.9.7 Incorporation Application**

       **9.9.8 Registration Fee**

       **9.9.9 LLP Agreement.**

       **9.9.10 Incorporation by Registration**

       **9.9.11 Partners and their relationship**

**9.10 Demerits of LLP**

**9.11 Test Your Understanding.**

**9.12 Let us Sum UP**

**9.13 Key Terms**

**9.14 Review Questions**

**9.15 Answers to  Test Your Understanding**

**9.16 Further Readings.**

## 9.0  OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the Meaning of Limited Liability Partnership.
- Describe Characteristics of LLP.
- Explain key differences between LLP and other forms of business.
- Find various steps involved in incorporation of LLP
- Appraise yourself about various documents required for incorporation of LLP.
- Understand various limitations of LLP form of Business.

## 9. 1  INTRODUCTION:

Partnership Act was implemented in India in the year 1932.   The main objective of this act was to give pace to economic acceleration in India. As a result of this act in number of partnership work formed in the country and this set not only formalized the formation of partnership but also so decided the various rules and regulations to control and manage the partnership. However, with the passage of time it was felt that the basic structure of partnership suffers from some limitations. Following are the  limitations of partnership.

- The biggest limitation of traditional form of partnership is its limited liability. In case of business loss partner need to make this loss Good even by contributing personal assets.
- In traditional form of partnership, partners have mutual agency in which one partner is legally bound by any act done by the other partner.
- Another problem with traditional form of partnership is that a partner cannot transfer their share to any other person. Some time this result into dissolution of the firm also.
- The number of partners is also limited so a partnership cannot expand its business beyond a particular limit.

All the above discussed limitation can be removed if a person opts for company form of business. But the problem with company form of business is that it needs a lot of formalities to start a company and then to manage a company. For  a small or medium business it is very difficult to carry out all the formalities. So, the need was felt fjor a new type of form of business which have the benefits of both forms of business that  are partnership firm and Company. As a result a new form of business was suggested by the government, that is limited liability partnership.

## 9.2  HISTORY OF LIMITED LIABILITY PARTNERSHIP.

The United States of America was first country to introduce the Limited Liability Partnership (LLP) in the year 1991. After that in number of companies adopted this form of business which includes Australia, United Kingdom, Singapore and many Gulf

countries. Indian government also felt the need to introduce such form of business in India. As a result, an expert panel was formed to suggest introduction of LLP in India. On the recommendations of the panel, Government of India published the LLP Act in the year 2008 in the official gazette. This act was based on United Kingdom LLP Act 2000 and Singapore LLP Act 2005. After completing the formalities, this act was implemented in India in the year 2009 and first LLP was formed under this act in the first week of April 2009. This Act is applicable to the whole of the country.

The Provisions of the LLP act are contained in in 14 chapters which have 81 sections and 4 schedule. Following is the brief detail of these four schedules.

• **FIRST SCHEDULE** – This Schedule decide the rights and duties of the partners of LLP. This schedule define that how partners will behave in the partnership. This schedule also gives the rules that can be applied if there is no agreement on particular item in the partnership deed.

• **SECOND SCHEDULE** – Second schedule deals with the rules how to convert an existing partnership firm into a limited liability partnership. LLP act allows the conversion of existing partnership into limited liability partnership.

• **THIRD SCHEDULE** – LLP act also allows to convert any existing private limited company into Limited Liability Partnership. These rules are contained in third schedule of the LLP act..

• **FOURTH SCHEDULE** – Even any existing unlisted public company can also be transferred to limited Liability Partnership. Schedule four of the Act provides the rules regarding conversion of unlisted public company into limited liability partnership.

## 9.3  CONCEPT AND MEANING OF LLP

Limited Liability Partnership (LLP) is a form of business that is combination of both partnership form of business and company form of business. On one hand it provides the benefit of company form like limited liability and separate legal entity, on the other hand it has flexibility of partnership for and is easy to form.  Section 2 of the LLP act gives the definition of Limited Liability Partnership.

*According to Section 2(1)(n) of the LLP Act, 2008 'limited liability partnership' as a partnership formed and registered under LLP Act.*

However, this definition of Limited Liability Partnership is only a legal definition and does not explain anything about the LLP. So we need some comprehensive definition that could explain various aspects of the LLP. In simple words we can define LLP as:

*'A limited liability partnership(LLP) is a body corporate, an artificial person which have separate legal entity than its owners perpetual succession having a common seal and the liability of the business is limited'.*

## 9.4  SALIENT FEATURES OF LLP

1. **BODY CORPORATE:** Like any company, Limited Liability Partnership also needs corporation. Like company is incorporated under the companies act, similarly LLP is

incorporated under the Limited Liability Partnership Act, 2001. It is not possible to form LLP without incorporation.

2.  **SEPARATE LEGAL ENTITY**: LLP has separate legal entity and has all the rights that are available to any artificial legal person under the law. Its entity is separate from the person who own it. A LLP can own any property in its own name and is also capable of entering into contract in its own name.

3.  **PERPETUAL SUCCESSION:** The LLP **perpetual** succession. The term **perpetual** means continuous and the term succession means existence. So the LLP is  not affected by entry or Leaving of the partners. Even if there is admission, retirement or death of any partner, still LLP can continue its business.

4.  **NO MUTUAL AGENCY**: The major difference between partnership and LLP is that in LLP, there is no mutual agency of the partners. In traditional partnership form of business, every partner is bound by act of the other partners. However this is not the case in LLP.  A partner cannot bind another partner with his acts in LLP.

5.  **LLP AGREEMENT**: In LLP also partners are supposed to enter into an agreement known as partnership deed. the rights and duties of the partners are decided by this partnership agreement.

6.  **COMMON SEAL:** Is LLP is an artificial person it cannot act by itself. LLP works through its partners. Under the LLP Act 2008, it is allowed to have a common seal. However it is not necessary that every LLP should have a common seal, LLP could operate without having the common seal also.

7.  **LIMITED LIABILITY**: Biggest feature of LLP is its limited liability. In case of business losses, the partner of  LLP have limited liability which is limited only upto the amount contributed by them as capital in the business.

8.  **MANAGEMENT OF BUSINESS**: LLP operates through its partners. There is a misconception that only designated partner can operate the LLP. It   can be operated by any partner but as far as legal compliance is concerned, designated partners are responsible for the same..

9.  **MINIMUM AND MAXIMUM NUMBER OF PARTNERS**: Any LLP can be started with minimum 2 members. It is not necessary that these two members should be individual, even a body corporate can become partner in the LLP.  However, there is a condition that every LLP should have minimum to individual that are declared designated partner. Every LLP should have at least one designated partner that is resident of India.

10. **BUSINESS FOR PROFIT ONLY:** Like any traditional partnership, LLP can also be formed only for the profit motive.   If profit motive is not there, LLP cannot be formed. So in simple words we can say that LLP cannot be formed for any charitable purpose. .

11. **INVESTIGATION**: LLP Act 2008 gives the central government power to carry out any investigation against the business affairs of LLP..

12. **COMPROMISE OR ARRANGEMENT**: LLP wants to bring any type of compromise like amalgamation and Merger it can be carried out only as per the provisions of the act..

13. **CONVERSION INTO LLP:** AsLLP Act was enacted in the country in 2008, government does not want to deprive the existing Partnership Firms, Private Limited companies or Unlisted Public companies from the benefits of LLP. So, the government allowed existing Partnership Firms, Private Limited companies or Unlisted Public companies to convert their business into LLP form of organisation.

14. **E-FILLING OF DOCUMENTS**: In LLP form they are under obligation to file certain documents with the government. However, they need not to submit these documents in physical form rather e filing of the document is allowed. Documents may be filed on website www.mca.gov.in. LLP must file documents related to designated partners and use of digital signature by the partners..

15. **FOREIGN LLPS:** Section 2(1)(m) defines foreign limited liability partnership ‒as a limited liability partnership formed, incorporated, or registered outside India which established a place of business within India‖. In India there is no restriction foreign LLP becoming member in Indian LLP..

16. **NON-APPLICABILITY OF THE INDIAN PARTNERSHIP ACT, 1932-** there is a misconception in the mind of people that LLP is just extended form of partnership firm and rules of Indian Partnership Act, 1932 are applicable on LLP. The rules of Indian Partnership Act 1932 are not applicable on LLP as it has its own act.

17. **WINDING UP:** Winding up of the LLP can take place only after following rules laid out in the Act. This winding up may be voluntary winding up for winding up by the Tribunal..

18. **DESIGNATED PARTNERS**: Each LLP should have minimum two designated partner that are responsible for carrying out all the legal compliances required under the act.

19. **SCOPE OF LLP:** It is a misconception among the people that LLP can be formed only for carrying out professional services. LLP can be formed for any type of business.

20. **TRANSFER OF SHARE**: In LLP partners are allowed to transfer their share to some other person without getting the consent of the other partners.

21. **DESIGNATED PARTNER IDENTIFICATION NUMBER:** Lke in company form of business, in LLP also every designated partner is supposed to have a separate identification number which is known as Designated Partner Identification Number (DPIN) whcich is allotted by the central government.

## 9.5  ADVANTAGES OF LLP

The following are the advantages of the LLP:
1. **EASY TO FORM**: LLP is comparatively easy to form then company.  It does not have the long list of formalities as are there in company form of organisation.
2. **LIMITED LIABILITY:** The biggest advantage of LLP is its limited liability. LLP can own the property in its own name and the debts of the LLP are met out of those properties.

3. **PERPETUAL SUCCESSION:** Like company LLP also has perpetual succession which is not affected with the entry or exit of partner.
4. **NO MANDATORY AUDIT**: There is a compulsion of audit in company form of organization but this is not compulsory in case of LLP.
5. **EASY TRANSFER OF OWNERSHIP**: In LLP form of business it is easy to transfer ownership from one person to another. This is done as per the provisions of the partnership deed.
6. **NO DIVIDEND DISTRIBUTION TAX**: In case of LLP there is no burden to pay dividend distribution tax:
7. **MORE FLEXIBILITY TO MANAGE**: The management of company form of business is subject to very strict rules under the Companies Act. As far as LLP is concerned the rules of Management are not that strict.
8. **EASY FINANCE**: LLP form of business is regulated as per the provisions of the act, so it is easy for them to raise finance from the market.
9. **CAPACITY TO SUE:** LLP can you sue any third party in its own name.
10. **SEPARATE PROPERTY:** LLP can own separate property in its own name.

## 9.6 DISTINCTION BETWEEN LLP AND PARTNERSHIP FIRM

| | **Basis** | **LLP** | **Partnership Firm** |
|---|---|---|---|
| 1. | Controlling Act | LLP is controlled by Limited Liability Partnership Act, 2008. | Partnership is controlled by Indian Partnership Act, 1932. |
| 2. | Body corporate | LLP is a separate body corporate. | Partnership is not a separate body corporate. |
| 3. | Separate legal entity | LLP has separate legal entity that is distinct from its members. | Firm does not enjoy the benefit of separate legal entity. |
| 4. | Name | As per provisions of Limited Liability Partnership Act, 2008 every LLP must use the word _LLP' after its name. For example the name of business is M/s ABC, so it must write _M/s ABC LLP'. | There is no restriction on selection of name by the partnership firm. |
| 5. | Creation | LLP is artificial person hence it is created under the Limited Liability Partnership Act, 2008. | Partnership is the result of agreement between the partners. Such agreement can be oral agreement or the written agreement. |
| 6. | Perpetual succession | Like in company, LLP also enjoys perpetual succession. The existence of LLP is not affected by admission, death, retirement or other ineligibility of the member. | Firm does not enjoy perpetual succession. The existence of Firm is affected by admission, death, retirement or other ineligibility of the partner. |

| 7. | Liability | In LLP members enjoy limited liability that is limited upto the contribution made by the members. However, in case of any fraud etc, their liability is unlimited. | In Partnership firm, the liability of partners is unlimited. Even their personal assets are liable for any loss incurred in the business. |
|---|---|---|---|
| 8. | Registration | LLP cannot be formed without registration. | In firm registration is not compulsory and it can be formed without registration also. However, if a firm is not registered, it has to beard certain consequences. |
| 9. | Designated partners | Every LLP must have minimum two designated partners. | Under the Indian partnership Act, 1932 there is no such concept of designated Partners. |
| 10. | Mutual agency | In LLP, one partner is not bound by the conduct of other partner. In other words there is no mutual agency of the members in case of LLP. | In firm every member is treated as the agent of other person. So, any act done in the business by one partner has binding effect on the other partner. |
| 11. | Legal compliance | In LLP it is the responsibility of the Designated partner to ensure compliance to all the rules and regulations. | In partnership legal compliance is the joint liability of all the partners. |
| 12. | Common seal | A LLP could have a common seal. However, it is not necessary to have common seal. LLP can also carry business without common seal. | Firm could not have common seal. |
| 13. | Foreign partnership | There is no restriction on foreign national becoming the member of LLP. | A Foreign national is not allowed to become partner in a partnership firm. |
| 14. | Annual filing of documents | Every LLP must file some document on the yearly basis with the registrar. Following are some of the prominent documents that need to be filed :<br>(i) Annual statement of accounts.<br>(ii) Annual return with the registration of LLP.<br>(iii) Statement of solvency. | There is no obligation on behalf of the firm to file any document with the registrar of firms. |
| 15. | Transfer of Interest | In LLP a partner can transfer his interest in favour of some other person. | In partnership a partner cannot transfer his interest to any other person, even if he transfer his interest to some other person |

| | | | | with consent of all other persons, it will be treated as a new partnership. |
|---|---|---|---|---|
| 16. | Minor as partner | In a LLP, a minor cannot become a member. | | A minor can become partner in a partnership firm in the benefits of the firm, however for this purpose consent of all the partners (not majority) is required. |
| 17. | Maximum number of members | There is no restriction on maximum number of members in a LLP. | | As per rules 10 of Companies (Misc.) Rules, 2014, the number of partners in a firm cannot exceed 50. |
| 18. | Voting Right | In a LLP, every member enjoys one vote irrespective of capital contributed by him. | | No concept of voting right in the firm. |
| 19. | Recording of Minutes | Every LLP is supposed to record minutes of the meetings within 30 days of the meeting. | | There is no binding for recording of minutes. |
| 20. | Audit of Accounts. | It is compulsory for every LLP to get accounts audited in case their turnover exceeds Rs. 40 Lac or if there is capital contribution exceeding Rs. 25 Lakh. | | No audit is compulsory under the Partnership Act. However, some audit rules are there under the income tax act. |
| 22. | Digital Signature | As most of the forms of LLP are filed online. There is compulsion that atleast on designated partner must have digital signature. | | There is no need of digital signature. |

## 9.7 DISTINCTION BETWEEN LLP AND JOINT STOCK COMPANY

| | Basis | LLP | Company |
|---|---|---|---|
| 1. | Regulating Act | LLP is controlled by Limited Liability Partnership Act, 2008. | A company is controlled as per provisions of Companies Act, 2013. |
| 2. | Internal governance structure | The management of LLP, rights and duties of partners, emoluments of the partners is decided by agreement between the partners. | Any company is governed as per provisions of the Company Act, 2013. |
| 3. | Designated Partners | Every LLP must have minimum two designated partners. | Under the Companies Act 2013 there is no such concept of designated Partners. |

| | | | |
|---|---|---|---|
| 4. | Name | As per provisions of Limited Liability Partnership Act, 2008 every LLP must use the word _LLP' after its name. For example the name of business is M/s ABC, so it must write _M/s ABC LLP'. | As per Companies Act every Private Limited company must write the word _Private Limited' or _Pvt. Ltd' after its name, whereas public company must write word _Limited' after its name. |
| 5. | Members/Partners | LLP is formed with minimum two partners and there is no restriction on maximum number of members in a LLP. | A private company is formed with minimum two members and maximum 50 members. A public company needs minimum 7 members for formation and there is no restriction on maximum number of members. |
| 6. | Management | Operations of the LLP are managed by partners of the LLP who are owner of the business. | Company is not managed by the shareholders who are the true owners of the company, rather it is managed by the directors that are elected by the shareholders. |
| 5. | Minimum number of directors/ designated partners | Every LLP must have minimum two designated partners. | Company form does not have concept of Designated Partners. Company is managed by Directors. For private company there should be minimum two directors whereas in public company there should be minimum three directors. |
| 7. | Voting Right | Every partner of the LLP enjoys one vote irrespective of the capital contributed by him. | In company each equity share carries one vote. So, the voting rights of person depends upon the number of shares held by him. |
| 8. | Liability of members/partners | In LLP members enjoy limited liability that is limited upto the contribution made by the members. However, in case of any fraud etc, their liability is unlimited. | The liability of members is always limited upto the amount of share capital subscribed by them. |

| 9. | Minimum Capital | No minimum capital is prescribed by LLP act for any LLP. | In private limited company the minimum capital prescribed is Rs. One Lac whereas for Public Company minimum capital prescribed is Rs. Five Lac. |
|----|----|----|----|
| 10. | Accounting System | LLP could follow Cash System or Accrual System for maintaining accounts. | Company can follow only Accrual system of accounting. |
| 11. | Memorandum and Article of Associations | No need to prepare Memorandum and Article of Associations in case of LLP. | Memorandum and Article of Associations is compulsory for every company. |
| 12. | Public Subscription | LLP cannot invite public for subscription of capital. | Public company can invite public for subscription of capital. |
| 13. | Transfer of Share | In case of death of any partner his legal heir can demand capital back or could demand share of profit to the date of death. But he automatically does not become partner of the LLP. | In company on death of member, his legal heir automatically becomes member of the company. |
| 14. | Admission | A new partner can be admitted only if there is consent of all the existing partners. | No consent of other members is required for admission of new member. |

## 9.8  INCORPORATION OF LLP

Following are some of the mandatory requirement under the LLP, Act 2008, without complying with following requirements, no LLP can be formed in India.

1. The registration of LLP is compulsory and for that the application form is submitted with the registrar. Under the LLP act only electronic submission of the form is possible. show any person desirous of applying for LLP must submit the form electronically.

2. As per LLP act, there must be minimum two partners in any LLP. So, for forming the LLP minimum two members should join their hands. However, it is important to mention here that members of LLP should not necessarily be individuals, rather even a body corporate can become a member in the LLP.  Any person of unsound mind or a person against whom insolvency proceedings are pending cannot become member of LLP.

3. LLP has unique concept of designated partner. We should not confuse a designated partner with the working partner. Even a non designated partner could be a working

partner in the LLP. The main responsibilitys of designated partner is to ensure that all the statutory and legal requirements are met by the LLP. He is the person, who is responsible for complying with all the legal formalities related to LLP

4. LLP should have minimum two designated partners. Is important to mention here that only individuals can be appointed as designated partners. So, if any body corporate is member of the LLP, they can nominate any individual as the designated partner. Further out of the designated partners at least one designated partner should be resident of India.

5. Like in company every director should have director identification number, Any designated partner should have Designated Partner Identification Number. this number is allotted by Ministry of Corporate Affairs.

6. Like in partnership firm, LLP should also have agreement between the partners. This agreement between the partners will decide their rights and duties. In case there is no partnership agreement between the partners in a LLP, he LLP will be governed as per rules given in First schedule of LLP act

7. Any LLP should have a unique name. This name is approved by government before incorporation of the LLP. There are certain rules related to selection of names in the LLP.

## 9.9 INCORPORATION PROCESS (SECTION 11 TO 21)

The process of incorporation of LLP is given in the Limited Liability Partnership Act, 2008. There are some similarities in incorporation of LLP and a company. But the process of incorporation of LLP is not that cumbersome as that of a company. Following diagram shows the process of incorporation of LLP.
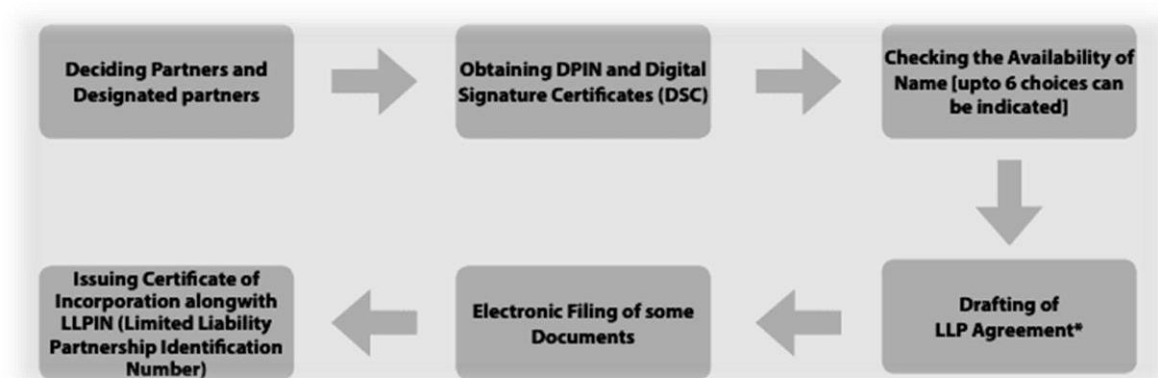


**9.9.1 PARTNER:** For formation of any LLP, first requirement is that there should be minimum two members. There is no restriction on a body corporate on becoming member of the LLP. In case a body corporate becomes the member of LLP, they need to appoint any natural person to look after the affairs of LLP. Following persons can become member of the LLP .

1. Any company can become member of LLP whether that company is incorporated in India or outside India.

2. A LLP could also become member in another LLP in India. That LLP may be incorporated in India or outside India.

3. Any individual whether resident of India not resident of India, can become member of LLP, provided he is not declared ineligible under the LLP act. Any person of unsound Mind or undischarged insolvent are not eligible to become member of LLP.

It is important to mention here that any LLP should have minimum 2 members. In case the number of members is reduced less than two and firm carries business with less than two persons for more than 6 months, the person who carried out all the activities, alone will be personally liable for the obligations that are incurred by LLP during such period of continuance.

**9.9.2 CAPITAL CONTRIBUTION**: Like any company has share capital, there is no share capital in LLP form of the business. However, the partner are required to make contribution to the LLP as per the provisions of the agreement between the partner. Such contribution may be in the form of cash, any property which may include movable property, immovable property, intangible assets etc. Even any contract by partner to perform some service may also be considered as capital contribution. Capital so contributed by the partners, is recorded in the monetary terms in the books of accounts of LLP.

**9.9.3 DESIGNATED PARTNERS**: A LLP should have minimum 2 designated partners. Normally a layman thinks that designated partner is a working partner. However this is not the reality. Even a person who is not a designated partner could be a working partner in the LLP. The designated partner is appointed with the objective of meeting statutory and legal compliances under the LLP Act. He is the person who is responsible for meeting all the legal formalities and other compliances as per the rules. Only in natural person can be appointed as designated partner. If a body corporate become the member of LLP, they can appoint any individual on their behalf as designated partner. LLP should have minimum 2 designated partner and out of such partners at least one partner should be a resident of India. The term resident here means that person should reside in India for at least 182 days during one year in the preceding year.

**FOLLOWING ARE SOME OF THE IMPORTANT RESPONSIBILITIES PERFORMED BY A DESIGNATED PARTNER :**

1. If there is any change in the partnership agreement it is responsibility of the designated partner to inform the registrar about such change.

2. If there is any change in the constitution of the firm, any partner is admitted or retired or there is change in the address of the partner, it is responsibility of designated partner to inform the registrar about such change.

3. According to LLP Act every LLP should have a registered office. In case of any change in the address of registered office, the same must be informed to Registrar by the Designated Partner.

4. It is responsibility of the designated partner to file annual returns, statement of account or other notified document as per the provisions of the act with the registrar.

5. Statement of Accounts and the Statement of solvency of LLP are issued under the signature of designated officer.

6. Designated partner must preserve the books of accounts of the firm and whenever these are asked by any authority he must produce such books of accounts before such authority.

7. Designated partner will sign all the requisite forms that LLP is forced to submit with the registrar. For this purpose, every designated partner must get digital signature authority from the government.

if any designated partner fails to perform any of the above mentioned up he is liable to pay a financial penalty as per rules of the LLP act.

| Meaning | A Designated Partner means any partner designated as such as per provision given in Section 7 of the LLP Act. |
|---|---|
| Minimum Number | Every LLP must have minimum 2 individuals as designated partners and at least 1 of them must be a resident in India. The term "resident in India" means a person who has stayed in India for a period of a minimum 182 days during the immediately preceding 1 year. Note: Only Nominated individuals of body corporate partners of LLP can act as designated partners. |
| Who will be a Designated Partner? (Section 7) | As per Section 7 (1), if the Incorporation Document-specifies who are to be designated partners, then such persons shall be designated partners on incorporation or if it states that each of the partners from time to time of LLP is to be designated partner, then every partner shall be a designated partner in LLP. |
| Cease to be a Designated Partner | Once a person is declared as designated partner it does not mean that he will remain designated partner for all of his life. if a person desires he could cease to be Designated partner as per provision LLP act. |
| Prior Consent Section 7(3) | Every person who is declared as designated partner, must give his prior consent before becoming the designated partner. A person cannot be declared as designated partner without the prior consent. |
| Information with Registrar Section 7(4) | It is responsibility of LLP to file full particulars of the person who gave his consent for becoming designated partner with the registrar. Such information must be provided to the registrar within 30 days of the appointment of the person as designated partner. |
| Satisfy Conditions Section 7(4) | A person can be appointed as designated partner only if satisfy all the conditions that are prescribed under the LLP act. |

| Liabilities of Designated Patner (Section 8) | As discussed earlier, the main liability of designated partner is to ensure legal compliance of all the rules by the the LLP. every LLP is post to file certain documents and reports with the authorities and it is the duty of designated partner to file such documents anf reports. |
|---|---|
| Changes in Designated Partners (Section 9) | In case there is any vacancy of designated partner and the number of designated partners are reduced to less than 2, such vacancy must be filled within 30 days. In case LLP fails to fill such within prescribed time vacancy all the partners of the LLP shall be treated as designated partner till such vacancy is filled. |
| Punishment for contravention of Sections 7, 8 and 9 | If any LLP does not follow the provisions given in the section 7, 8 or 9 of the LLP act, then every member of the LLP is liable to pay a financial penalty as per rules of the act. The minimum amount of penalty is Rs, 10,000 but this may go up to Rs. 5,00,000 also. |

**9.8.4 DESIGNATED PARTNER IDENTIFICATION NUMBER (DPIN):** Every Designated partner is supposed to have a Unique Identification number that is known as Designated Partner Identification Number (DPIN). DPIN is a 8 digit number that is allotted by the central government and is valid throughout the country. Fo rgetting DPIN a person must apply online by filling the form number 7 and submitting the application along with necessary proof of identity and address. Person must also deposit the prescribed fees. Every designated partner of LLP is supposed to have separate DPIN. Some time it may be possible that a person is already having Director Identification Number (DIN) in such case the same number is allotted as DPIN and for this while making the application person must quote his present b DPIN in the application form. Once a person gets the DPIN, he can use same number in all the LLP in which he is the partner.

**9.8.5 DIGITAL SIGNATURE CERTIFICATE (DSC):** Every LLP is supposed to file certain documents and information with the authorities, and most of such information and documents are filed electronically online. However, there is a problem of authentication when such documents are filed electronically. When any document is submitted in the physical form, it is signed by the concerned partner. But in case of electronic filing such signature is not possible. Therefore, the LLP act provide that at least one of the designated partner must have Digital Signature Certificate. This certificate is allotted by the central government and is very important in authentication of documents.

**9.8.6 CHECKING THE NAME AVAILABILITY**: Name of the LLP it is very important as it is the identity of the business, but partners of LLP cannot decide any name of their choice for their LLP, the name that they intend to opt, must be e approved by the registrar. For this purpose they must apply to the Registrar on the prescribed form along with prescribed fees. Normally they can propose up to 6 names to the registrar in order of their preference. Upon receiving the application, Registrar will check that whether name proposed by LLP is available and it is not having resemblance to the name of any existing entity.

Further, he will check that name does not contain any prohibited word like government or state etc. Once he is satisfied that name is is unique and does not contain any prohibited word, he will reserve the name for the LLP for 3 months. If any LLP subsequently wants to change their name, they can do so by following prescribed procedure that is filing the prescribed Form and requisite fee. Every LLP is required to add words LLP behind its name . According to Section 17 if any name is allotted to the LLP and subsequently Registrar or Government finds that the name of LLP resembles to any existing entity, they can direct the LLP to change its name. In such case the LLP will carry out the required formalities within three months from getting the directions from the government.

Further Section 18 of the act provide that if any existing entity finds that it the name of newly formed entity resembles to their name they can put their request before the registrar. In such case the registrar will check the merit of the application and if it is found that really there is resemblance in the name, he can issue directions to the newly formed entity to change its name. However, existing entity can give such application only within 24 months of formation of new entity. In case the period of 24 months is already over, then such application cannot be given.

**9.8.7 INCORPORATION APPLICATION:** LLP is an artificial legal person and can be formed only by incorporation. For this purpose partners are required to submit necessary application in form 2 to the Registrar in whose jurisdiction the registered office of proposed LLP falls. Following are some of the rules in this regard.

| 1. Minimum two Subscribers | Every LLP must have two partners who are eligible to make contract and are not barred by any law. So, the application of the incorporation must be signed by atleast two persons who are ready to become partner of the proposed LLP. |
|---|---|
| 2. Contents | Following are some of the formalities of incorporation application <br> • Application must be in a prescribed form. <br> • It must give the name of LLP which is already approved by the concerned Registrar. <br> • Application must give the proposed business which LLP intend to carry. <br> • It must contain the address of registered office of the LLP. <br> • Application must contain the name and address of each person who give consent to become partner of the LLP. <br> • It must also give the name and address of each person who give consent to become designated partners of LLP. |

| | |
|---|---|
| 3. Required Documents | Following are required documents which must be attached to the incorporation application:<br>• PAN Card of the Partners.<br>• Any proof of identity of the partners.<br>• Valid Proof of Address of the partners<br>• Passport of the partner if partner is not resident of India.<br>• Photograph of the partners.<br>• Proof of Address of Registered Office<br>• Digital Signature Certificate |
| 4.Compliance Statement | Every application of the incorporation must be accompanied by the compliance certificate in the prescribed form. Such certificate can be issued by the Lawyer of the business, Chartered Accountant (CA), Company Secretary (CS) or a Cost Accountant (CMA. This certificate declared that all the required formalities have been fulfilled by the proposed LLP. |
| 5. Filing of Application | Once the application form is filled, all the necessary documents and compliance certificate are attached the same must be filed with Registrar office along with prescribed fee under whose jurisdiction the registered office of the proposed LLP is situated. |

**9.8.8 REGISTRATION FEE:** Every application of incorporation of LLP must be deposited along with requisite fee. This fee is not only applicable for new LLP but also if any existing partnership firm is changing its business to LLP or any existing private or unlisted company is changing it business to LLP. Following are the amount that business is supposed to deposit:

| | |
|---|---|
| a) LLP where capital contribution does not exceeds Rs. 1 lakh | Rs.500/- |
| (b) LLP where capital contribution is more than Rs. 1 lakh but less than Rs. 5 lakhs | Rs. 2000/- |
| (c) LLP where capital contribution is more than Rs. 5 lakhs but is not more than Rs. 10 lakhs | Rs. 4000/- |
| (d) LLP where capital contribution is more than Rs. 10 lakh | Rs 5000/ |

### 7.8.9 LLP AGREEMENT:

 ➢ **MEANING:** Whenever any LLP is formed, the partners of LLP enters into agreement with each other, that agreement is called LLP agreement.
 ➢ **SIGNIFICANCE:** Limited Liability Partnership (LLP) Agreement is very important and in a way we can say it is charter of the LLP. The rights and duties of the partners of LLP are decided by this agreement. Normally this agreement is prepared when the registration of the LLP is done. In case this agreement was prepared before the registration of the LLP, in such case the partners must ratify the same at the time of incorporation of the LLP.
 ➢ **FIRST SCHEDULE:** Sometimes, partners fails to enter into LLP agreement at time of incorporation of the LLP. In such case the provisions of First Schedule of LLP act will decide the all the matters of LLP. However, later if

partners decide to enter into an agreement they can do so but they have to inform Registrar about their new agreement.

> **DRAFTING OF AGREEMENT**

There is no prescribed performa of the LLP agreement. Further there is no compulsion on the contents of the agreement also. Normally any agreement contains the information about the nature of business, rights and duties of the partners, their capital contribution, profits sharing ratio etc. Following are some of the important contents that are generally covered in any LLP agreement.

- ❖ Name of LLP
- ❖ Name and address of all Partners including Designated Partners.
- ❖ Capital contribution of the partners.
- ❖ Partner's Remuneration.
- ❖ Rights and Duties of Partners
- ❖ Profit sharing ratio
- ❖ Address of registered office.
- ❖ Arbitration clause if any.
- ❖ Rules for governing LLP.

> **FILING OF AGREEMENT:** Every LLP must file the LLP agreement within 30 days of incorporation of the LLP with the Registrar. Such filing must be done in the and Form 3.

> **AMENDMENT TO THE AGREEMENT:** In case there is any change in the LLP agreement the same must be informed to the Registrar in Form 3 within 30 days of such change in the agreement.

**9.8.10 INCORPORATION BY REGISTRATION (SECTION 12):** .Once all the formalities of registration are done by the LLP and verified by the registrar, certificate of Registration is issued to the LLP. The very moment such certificate is issued, LLP comes into existence. Following are some of the rules in this respect.

| 1. Certificate of Registration | After the application of registration is filed with the registrar, he will check that all the formalities laid in the section 11 of the act are cmplied by the LLP. After such checking certificate of registration will be issued ot the LLP within 14 days from completion of all formalities. |
|---|---|
| 2. Signature | The certificate issued to the LLP must be signed by the Registrar. |
| 3. Official Seal | Every certificate of registration must be issued to the LLP must bear the official seal of the registrar. |
| 4. Conclusive Evidence | The certificate of incorporation is very important as it is the conclusive proof that the LLP is formed and the name mentioned in the certificate is the authentic name of the LLP. |

After incorporation of the LLP is done, it is authorised to :

- ✓ Purchase, acquire and own any type of property whether movable or immovable, tangible or intangible.
- ✓ It is now legal entity and can sue any third party.
- ✓ LLP could have common seal but it is not compulsory that LLP should have common seal. It can be managed without common seal also.

**9.8.11 PARTNERS AND THEIR RELATIONS:** The partners of the LLP are not the mutual agent of each other and are responsible for own acts only. Following are some the provisions of LLP act regarding Partners and their relations.

| 1. Eligibility of Partner (Section 22) | According to this section a partner is a person who subscribe to the incorporation document of the LLP or a person who later become partner with consent of all the partners as per rules laid in the partnership agreement. |
|---|---|
| 2. Mutual relations of the partners (Section 23) | • The rights and duties of the partners and their mutual relations are decided by the LLP agreement.<br>• In case of any change in their rights and duties, it must be informed to Registrar with prescribed fee and in prescribed form.<br>• In case the agreement was agreed before incorporation, it must be ratified by the partners after incorporation.<br>• In case there is no agreement between partners, LLP will be governed as per the rules given in First schedule of LLP act. |
| 3. Cessation of partnership interest(Section 24) | • If any partner wants to cease his partnership from LLP, it can be done as per provisions of the LLP agreement. In case of no provision in LLP agreement, he can cease to be member by giving minimum 30 days notice.<br>• A person will cease his membership from the LLP in following cases<br>    - Death of the partner.<br>    - He became person of unsound mind.<br>    - He is declared insolvent.<br>• Even if a person is ceased to be partner of the firm, he will still be liable in the LLP unless<br>    - He has given notice to his former partners.<br>    - He has given notice to the Registrar.<br>• Even if any person cease to be member, still he will be liable for the obligations that were created when he was the partner of the LLP.<br>• After a person cease to be member, he or his legal heir are eligible to the amount contributed by him and the share of profit to the date of cessation of membership.<br>• A person is not having any right to interfere in the management of the Business after he ceases to be partner. |

| 4. Change in Registration (Section 25) | • If there is change in name or address of any partner, he must inform the same to LLP within 15 days of such change.<br>• LLP must inform Registrar about any change in name address of the partners.<br>• The change must be informed in prescribed form along with prescribed fee. |
|---|---|

## 9.10 DEMERITS of LLP

There are certain procedure to be followed by the LLP such as filing of Annual Returns, Solvency statements and accounts, etc. which might be difficult for a family run business. There are also certain demerits of LLP form of business given as follows:

a. LLP is regulated by provisions of LLP Act and is subject to some rules like annual filing of return, solvency statement etc, which are difficult to comply with.
b. In most of the cases, LLP is liable for audit of accounts.
c. The process of closing down of LLP is quite long and need lot of formalities.
d. LLP is new form of business and still not much popular in India.
e. The responsibility of Designated partners is more than other partners. They have to comply with all the legal formalities.
f. In case of mismanagement in the LLP, creditors don't have any remedy.
g. Transfer of interest by one partner to other is not easy.

## 9.11 TEST YOUR UNDERSTANDING

1. State whether following are True of False
   a. A minor can become partner is a LLP
   b. LLP could have maximum 50 members.
   c. Rules of Indian Partnership Act are also applicable on LLP.
   d. In LLP partner can transfer his interest.
   e. Partners are mutual agents of each other in LLP.

## 2. FILL IN THE BLANKS

a. _____ partner is liable to ensure legal compliance.

b. LLP must have minimum _____ partners.

c. An Individual as well as _____ can become member of LLP.

d. Online submitted documents of LLP are authenticated by _____.

e. If LLP agreement is not there, LLP is governed by provisions of _____.

3. Write five differences between LLP and Firm:

|  | LLP | Partnership Firm |
|---|---|---|
| 1. |  |  |
| 2. |  |  |
| 3. |  |  |
| 4. |  |  |
| 5. |  |  |

## 9.12 LET US SUM UP

- LLP is a new form of business in India.
- LLP is governed by provisions of Limited Liability Partnership Act, 2008.
- LLP act provide that existing partnership, Limited company or unlisted company can also be converted into LLP.
- LLP must have minimum two partners and there is no restriction on maximum number of Partners.
- Any individual or body corporate can become member of LLP.
- Liability of partners is limited upto their capital contribution.
- Minor cannot become partner in LLP.
- LLP must have atleast two individuals as Designated Parnters.
- LLP is formed by incorporation.
- The rights and duties of LLP are decided by LLP agreement.

## 9.13 KEY TERMS

- **LIMITED LIABILITY PARTNERSHIP (LLP)**: A limited liability partnership(LLP) is a body corporate, an artificial person which have separate legal entity than its owners perpetual succession having a common seal and the liability of the business is limited.
- **DESIGNATED PARTNERS**: A LLP should have minimum 2 designated partners. The designated partner is liable to ensure that all meeting statutory and legal compliances under the LLP Act are met on time. He is the person who is responsible for meeting all the legal formalities and other compliances as per the rules. Only in natural person can be appointed as designated partner. If a body corporate become the member of LLP, they can appoint any individual on their behalf as designated partner.
- **DESIGNATED PARTNER IDENTIFICATION NUMBER (DPIN):** Every Designated partner is supposed to have a Unique Identification number that is known as Designated Partner Identification Number (DPIN). DPIN is a 8 digit number that is allotted by the central government and is valid throughout the country. For getting DPIN a person must apply online by filling the form number 7 and submitting the application along with necessary proof of identity and address.

- **DIGITAL SIGNATURE CERTIFICATE (DSC):** Every LLP is supposed to file certain documents and information with the authorities, and most of such information and documents are filed electronically online. Therefore, the LLP act provide that at least one of the designated partner must have Digital Signature Certificate. This certificate is allotted by the central government and is very important in authentication of documents.

- **INCORPORATION APPLICATION:** LLP is an artificial legal person and can be formed only by incorporation. For this purpose partners are required to submit necessary application in form 2 to the Registrar in whose jurisdiction the registered office of proposed LLP falls.

- **INCORPORATION BY REGISTRATION (SECTION 12):** .Once all the formalities of registration are done by the LLP and verified by the registrar, certificate of Registration is issued to the LLP. The very moment such certificate is issued, LLP comes into existence.

- **LLP AGREEMENT:** Whenever any LLP is formed, the partners of LLP enters into agreement with each other, that agreement is called LLP agreement. Limited Liability Partnership (LLP) Agreement is very important and in a way we can say it is charter of the LLP. The rights and duties of the partners of LLP are decided by this agreement.

- **PARTNERS AND THEIR RELATIONS:** The partners of the LLP are not the mutual agent of each other and are responsible for own acts only.

## 9.14 REVIEW QUESTIONS

1. What is Limited Liability Partnership (LLP)? Give its merits and limitations.
2. Give salient features of Limited Liability Partnership (LLP).
3. How a Limited Liability Partnership (LLP) is different from Partnership Firm.
4. Distinguish between Limited Liability Partnership (LLP) and a Joint Stock Company.
5. What is Designated Partner. Give rules regarding appointment and responsibilities of Designated Partner.
6. What is LLP agreement. What is its significance. Give its contents.
7. Write in detail procedure of incorporation of LLP.
8. What is Incorporation by registration? Give its rules.
9. Write a note on relation among the partners in LLP.

## 9.15 ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

1 (a) False,

1 (b) False

1 (c) False,

1 (d) True.

1 (e) False.


2 (a) Designated

2 (b) Two

2 (c) Body Corporate

2 (d) Digital Signature

2 (e) First Schedule


## 9.16  FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.
3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
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# B. COM (HONS.)
# (Accounting and Taxation)

## SEMESTER II

## COURSE: BUSINESS LAW

## UNIT 10 – NEGOTIABLE INSTRUMENT: MEANING, BILLS OF EXCHANGE AND PROMISSORY NOTES

**STRUCTURE**

## 10.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the Meaning of Negotiable Instruments.

- Describe Characteristics of Negotiable Instruments.
- Explain presumptions available to Holder of Negotiable Instruments.
- Understand various Negotiable Instruments recognized by Law.
- Describe Meaning and Features of Promissory Notes
- Explain the Meaning and Features of Bills of Exchange.
- Distinguish Between Bills of Exchange and Promissory Note

## 10. 1 INTRODUCTION:

In India, use of Negotiable instruments is not new and it was prevalent during the time of kings also. We can see the use of ‗Hundi' in old time also which is almost similar to present time Bills of Exchange. The word ‗hundi', came from the Sanskrit word ‗hund', which means ‗to collect' , so it was an instrument which gave power to one person to collect money from other person. However, when British came to India, the number of commercial activities increased due to which there was more demand of money and other instruments. So, came the term Negotiable Instrument in use. The transactions related to Negotiable Instruments in India are regulated by a seprate law which is known as ‗The Negotiable Instruments Act'. This act was designed during the British rule in our country in the year 1881. Before 1881 all the matters related to Negotiable Instruments were covered under the ‗Indian Contract Act 1872'.

## 10.2 MEANING OF NEGOTIABLE INSTRUMENTS (SECTION 13):

The term ‗Negotiable Instrument' forms of two parts, ‗Negotiable' and ‗Instrument'. The word ‗negotiable' means any thing capable of free transfer by one person to any other person without much difficulty, and the word ‗instrument' here means ‗any written document' that creates legal right of one person over the other person. So, we can say the term ‗Negotiable Instrument' means any ‗ written document, through which a person gets the right over the other person and such right is easily transferable by him to other person.

**Section 13 of the Negotiable Instruments Act, 1881 states**, ‒A negotiable instrument means a promissory note, bill of exchange or cheque payable either to order or to bearer.‖ A negotiable instrument may be made payable to two or more payees jointly, or it may be made payable in the alternative to one of two, or one or some of several payees.

**In the words of Justice, Willis,** ‒A negotiable instrument is one, the property in which is acquired by anyone who takes it bonafide and for value notwithstanding any defects of the title in the person from whom he took it‖. So, from the definition following points becomes clear:

1. The instrument must be capable of free transfer (by delivery or by endorsement. and delivery) by one person to another; and
2. The person who gets the delivery of Negotiable Instrument in good faith by paying some consideration, gets valid title of the instrument free from all defects, and gets the right to recover the money in his own name.

Though in different parts of world, different types of Negotiable Instruments are in practice such as, share warrants that are payable to bearer, Debentures of the company payable to bearer and warrants of dividend etc. But, in India the Act treats only three instruments as Negotiable Instruments which include promissory note, a bill of exchange and cheque.

The Negotiable instrument Act works under the rules fixed by the Sections 31 and 32 of the Reserve Bank of India Act, 1934. According to Section 31 of the RBI Act, except Bank or the person having authority of RBI, no person in the country, shall issue, draw, make acceptance of any bill of exchange or promissory note payable to bearer on demand. The rules further provides that no person other than RBI or the Central Government of the country can issue any promissory note that is payable on demand. Under given are the effect of these section 31 and 32 of RBI Act:

- A promissory note that is payable to the bearer cannot be issued in the country, no matter whether it is demand promissory note or term promissory note.
- A bill of exchange that is payable to the bearer can be issued provided if this is a term bill. However a demand Bill that is payable to bearer cannot be issued.
- But a cheque can be made payable to bearer or demand as it is withdrawn on Bank.

## 10.3 CHARACTERISTICS OF NEGOTIABLE INSTRUMENTS:

a) **IN WITTING**: As per Negotiable Instrument Act, any negotiable instrument cannot be made by oral commitment and it must be in writing. Any oral promise to make payment by one party to another is covered under the Indian Contract Act and not under the Negotiable Instrument Act.

b) **SIGNED BY THE PARTIES:** Any negotiable instrument must be signed by the concerned party. In case signature on Negotiable Instrument are missing, it is not valid. So if A gives cheque to B without making any sign on it, this cheque is not valid.

c) **PAYABLE IN MONEY:** Negotiable Instruments are valid if it is payable in money only. If any instruments gives right to other person to supply something except money it is covered under the Indian Contract Act and not under the Negotiable Instrument Act. Further it must be payable in legal tender money only.

d) **UNCONDITIONAL PROMISE:** For any Negotiable Instrument to be valid, it must be unconditional. In case of a promissory note, it is valid it it contain an unconditional promise to make payment. Similarly in case of bill or cheque, it must be an unconditional order to make payment.

e) **FREELY TRANSFERABLE:** The most important feature of Negotiable Instrument is that it is freely transferable. The instrument must be freely transferable, i.e. the title to the ownership of the instrument could be transferred, from one person to any other person, without any restrictions. Such transfer of ownership can be done by way of mere delivery, in case the instrument is a bearer instrument, and by endorsement and after that delivery, if the instrument is an order instrument.

f) **ACQUISITION OF PROPERTY:** Any person, who is in possession a negotiable instruments in his own name, becomes the owner and is entitled to the money, mentioned in the instrument. If any instrument is payable to bearer, the title of the instrument passes

from one person to another person by just delivery of the instrument. However, If it is payable to order, the title passes by endorsement of the instrument, i.e. by putting signature of its holder on its back and than making the delivery.

g) **ACQUISITION OF GOOD TITLE:** In case of Negotiable  Instruments, Holder's Title is Free from  all Defects if he fulfills certain conditions. In case a person is _holder in due course' of a instrument, he gets good title. A _holder in due course' is a person who gets the ownership to the instrument, for some consideration and in good faith, without any information in regard to any defect in the title of the person who hands over instrument to him. So, the _holder in due course' will get the good title of the instrument even if there has been some defect in the title of the person who transfers such instrument if such defect in not in the knowledge of _holder in due course'. This feature is not there in other acts like Sale of Goods Act etc. In that case if the title of transferor is defective, the title of transferee also becomes defective. So, in case of Negotiable Instrument if a person steals instrument of other and transfers it to other person for some value in good faith, other person will get good title of instrument.

h) **NO NEED OF GIVING NOTICE:** In case of transfer for Negotiable Instrument by one party to another, there is no need of serving the notice of transfer to the prior parties that are liable to pay the money.

i) **HOLDER IN DUE COURSE CAN SUE IN HIS OWN NAME:** The holder in due course of Negotiable Instruments is having the right to sue all the prior parties in his own name as regard to the instrument,

j) **TRANSFERRED ANY NUMBER OF TIMES:** A negotiable instrument is capable of being transferred innumerable number of times (i.e. any number of times, also referred to as infinitum) before it gets expired.

k) **CERTAIN PRESUMPTIONS:** Presumption are some suppositions that  are made by law. In case of Negotiable Instruments unless contrary is proved, certain presumptions are made by the law. Consideration, Date of instrument, signature of persone, are some example, presumed in the case of Negotiable instruments. The presumptions are given in section 118 to 119.

## 10.4  EXAMPLES OF NEGOTIABLE INSTRUMENTS:

**A. NEGOTIABLE INSTRUMENTS COVERED UNDER THE LAW :**
1. Promissory Note
2. Bill of Exchange
3. Cheque

**B. NEGOTIABLE INSTRUMENTS COVERED UNDER USAGE/CUSTOM:**
1. Hundi
2. Dividend Warrant
3. Warrant of Shares
4. Bearer Debenture
5. Banker's Note
6. Draft issued by bank.

## C. NON NEGOTIABLE INSTRUMENTS

1. Money Order
2. Postal Order issued by Post office
3. Deposit Receipt issued by any person or bank
4. Shares of a company

**D. QUASI NEGOTIABLE INSTRUMENTS:** Quasi Negotiable Instruments are the Instruments that are capable of being transferred by endorsement and delivery but in such case the transferee does not get a better title than a person who makes the transfer. So, we cannot term these instruments as Negotiable Instrument as the rules and regulations of the Negotiable Instruments Act are not applicable in case of these instruments. For example government promissory notes, railway receipts, bill of lading, Dividend warrants of a company or the share warrants issued by company.

1. Bill of Lading
2. Carriers Receipt
3. Dividend Warrant
4. Letters of Credit
5. Railway Receipt
6. Lorry Receipt
7. Dock Warrant

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## 10.5 PRESUMPTIONS OF NEGOTIABLE INSTRUMENTS (SECTION 118)

A negotiable instrument is dealt with certain presumptions. These presumptions are given under the Negotiable Instrument Act under Sections 118 and 119. Presumptions are those presuppositions that are made by law in case of instruments. These are listed below::

1. **CONSIDERATION:** Unless contrary is proved, It is presumed in case of negotiable instrument that every instrument ismade or endorsed, or transferred against some consideration. In this case the holder need not prove that he made consideration. However, this presumption is not valid if it is proved that the instrument was obtained by a person under any offence, fraud, or for some unlawful consideration. However, one must be clearly understood that consideration is automatically presumed in all the cases. In simple words, the presumption regarding the presence of consideration in negotiable instruments also challengeable. This rule is based on the decsion made by the honorable judge of the Kerala High Court in the case of **Marimuthu Kounder vs Radhakrishnan** In such case that consideration is missing, the onus of proof, lies on the

2. **DATE:** It is presumed that every negotiable instrument is made on the date is written on the instrument. However, this presumption is not valid if contrary is proved.

3. **TIME OF ACCEPTANCE:** Under Negotiable Instruments Act is is assumed that every instrument is accepted within a reasonable time after its presentation and and before its became due for payment. Further, if the instrument is payable particular number of days or months after its date, its date of maturity is calculated from the

date appearing on the instrument. But, if it is payable certain days after its acceptance, it's date of maturity is calculated from the date of its acceptance.

4. **TIME OF TRANSFER:** In case of Negotiable Instruments, it is presumed that every transfer is made before the bill became due for payment. This presumption is applicable only in case of Time Bill, as in case of demand bill, there is no time limit, there is no time limit, there is no need of such presumption.

5. **ORDER OF ENDORSEMENTS:** In order to decide the liability of the various parties, the order of endorsement of instrument is very important. It is presumed that he endorsements are made in the similar order that appears on the instrument. However, if some evidence of contrary endorsements exist, than this presumption is not there.

6. **STAMP:** In case any negotiable instrument is lost, presumption will be made that instrument was duly stamped and the stamp was duly cancelled as per the rules of the Act.

7. **EVERY HOLDER IS A HOLDER IN DUE COURSE**: In absence of the contrary proof, it is always presumed that the holder of the negotiable instrument is a person in capacity of holder in due course. It is assumed that the holder gets negotiable against some consideration and has taken the instrument in good faith. But in case any instrument is taken from its lawful owner by using some offence or fraud, the holder has to prove that he has taken it in good faith.

8. **DISHONOUR OF INSTRUMENT:** In case a suit of dishonor of instrument is filed the in court along with the proof of Protest of the instrument, it will be assumed that the instrument was dishonoured.

## 10.6  TYPES OF NEGOTIABLE INSTRUMENTS:

There are many instruments that can be regarded as Negotiable Instruments. We can divide these instruments broadly in two categories, one instruments treated as Negotiable under the Act and second those instruments that are regarded Negotiable due to usage or custom of trade. According to Section 13 of the Negotiable Instruments Act only three instruments that is Cheque, Promissory Note and Bill of Exchange are considered as Negotiable instruments. However, there are some instruments that are considered Negotiable due to usage or custom of business, that included Hundi, Share warrants, Bankers draft Dividend Warrant and Railway receipts etc. However, our discussion in this section will be limited to Negotiable Instruments that are considered Negotiable under the Act.

**Types of Negotiable Instruments**
- Promissory Notes (Section 4)
- Bills of Exchange (Section 5)
- Cheque (Section 6)
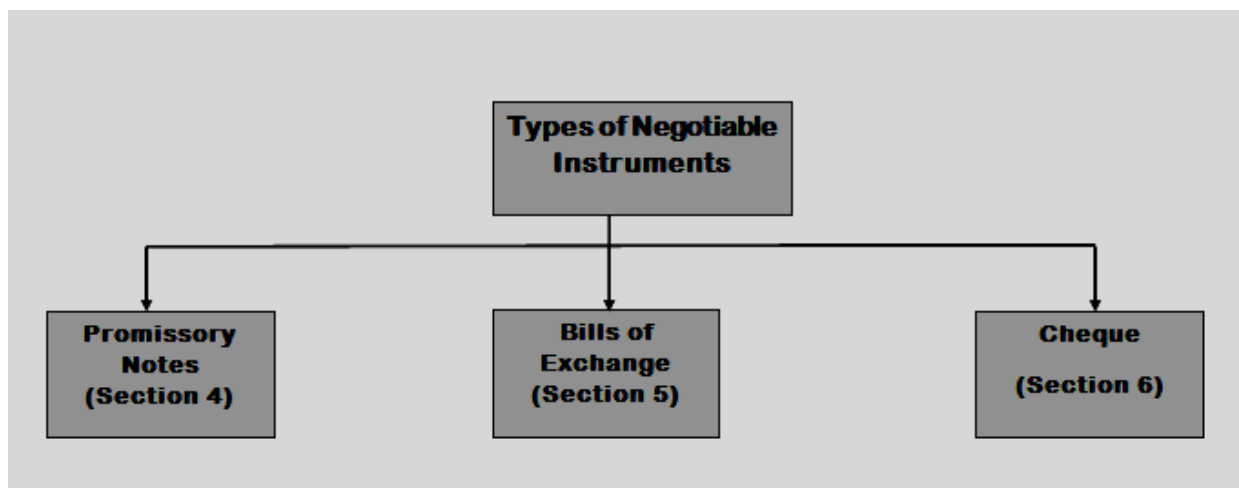
## 10.7 MEANING OF PROMISSORY NOTES (SECTION 4)

Promissory note is one important Negotiable Instrument and is in practice since long may be in one form or other. Under the Negotiable Instruments Act, Promissory Note is a written document containing an unconditionaln promise by a person who writes such document (called the maker) to pay some other person (called the payee) a particular sum of money either on demand made by the person on a particular or ascertainable future date. Such instrument may be payable to the person bearing the instrument or to a person named in the instrument, or to the order of the person whose name is mentioned in the instrument.

**According to the Section 4** of the Negotiable Instrument Act, 1881 ‒A Promissory Note is an instrument in writing not being a bank note or a current note containing an unconditional undertaking, signed by the maker, to pay a certain sum of money only to, or do the order of, a certain person, or to the bearer of the instrument.‖

On the basis of above definition, following points emerge related to Promissory Notes:

      (a)    It is an instrument in writing.
      (b)    It is not Bank note or currency note.
      (c)    It is always Unconditional.
      (d)    It is Promise to pay
      (e)    It is signed by maker.
      (f)    It is to pay money only

Though there are many things or conditions to make an Instrument a Promissory Note, but there is no hard or fast performa of Promissory note. It can be in any        format.

Negotiable instruments act does not provide any legal performa for making Promissory Note. It can be written in any language or in any format. However, the conditions laid out by the act must be met to make it a valid Promissory Note. An Instrument signed by maker in any of the following terms is regarded as Negotiable Instrument:

(a) "I promise to Pay Gopala or his order Rs. 80,000".

(b) ‒I promise to pay Simran Rs. 6,500/- on 08-11-2020.

( c) "I acknowledge myself that I am indebted to Mahesh Kumar for a sum or Rs. 7,000, to be paid to him or order on demand, for the value that has already been received‖.



## 10.8 PARTIES TO THE PROMISSORY NOTE

Generally there are two parties involved in any Promissory Note.

- **MAKER:** Maker is a principal party in the Negotiable Instrument. He is also known as the promisor, as he is the person who makes the promise to make the payment and draws the promissory note to pay the specified the amount as mentioned in the promissory note for such promise made.
- **PAYEE:** Payee is another important person in Negotiable Instrument. He is also known as the promisee, as he is the person to whom promise is made to pay the certain amount of money. Payee is the person who receives the payment under the Negotiable instruments act.

Though two important parties involved in Promissory note are Maker and Payee but still there are some persons who are involved in Negotiable Instrument. As any Negotiable Instrument can be transferred by a person to another any number of times, following are some of the parties involved in Negotiable Instrument.

(a) **THE HOLDER:** Holder is the original payee of the instrument. He is the person who holds the instrument in his own name and is authorized to get money mentioned in the instrument.

(b) **THE ENDORSER**: He is the person who transfers the instrument to another person. For example if Mr. A issues promissory note to Mr. B and Mr. B transfers this instrument to Mr. C, than Mr. B is the endorser of the Instrument.

(c) **THE ENDORSEE:** He is the person to whom the instrument is transferred. For example if Mr. A issues promissory note to Mr. B and Mr. B transfers this instrument to Mr. C, than Mr. C is the endorsee of the Instrument.

## 10.9 COMPONENTS OF A PROMISSORY NOTES

- **PRINCIPAL AMOUNT:** Principal amount is the amount due by maker to the promise. It is the amount for which either some value is received by maker or it is the amount borrowed by him.
- **INTEREST RATE:** Promissory note can be interest bearing promissory note or non interest bearing promissory note. In interest bearing promissory note some interest is charged on the principal amount. In such case this rate of interest is also mentioned in the instrument.
- **INTEREST:** Some time instead of mention of rate of interest, some fix amount of interest is mentioned in the instrument.
- **MATURITY DATE OR DUE DATE:** Promissory note can be demand promissory note or the term promissory note. In case of term promissory note it is payable on certain date. Such date is also mentioned in the instrument.
- **MATURITY VALUE:** Maturity value is the amount payable on the due date. In case of non interest bearing promissory note, principal amount and maturity amount is same. However, in case of interest bearing promissory note it is calculated by adding amount of interest in the principal amount.
- **PLACE OF ISSUE:** The place of issue of promissory note is also very important. It is also mentioned in the instrument.
- **DATE OF ISSUE:** It is the date on which promissory note is issued.

## 10.10 FEATURES/ ESSENTIALS OF A PROMISSORY NOTES

The essentials of a valid Promissory note
1) **MUST BE IN WRITING**: The most important feature of Promissory note is that it must be in writing. In case of a verbal promises to make a payment, it does not form a promissory note. The promise by the maker of the note should be made in writing clear words on the face of instrument itself. Maker must undertakes to pay a specified sum of money to the promisee or order or to the bearer.
2) **EXPRESS PROMISE TO PAY:** The promise to pay must not be vague and promise to pay must be express. Just acknowledgment of indebtness is not a promissory note. In the following cases, instrument is not considered as Promissory Notes even if it is in writing.
    (a) ‒Mr.Ganesh I owe you a sum of Rs. 700‖
    (b) ‒I am liable to pay you a sum of Rs. 1,100‖.
    (c) ‒I have borrowed from you Rs. 1,000, which I will pay in future‖
3) **THE PROMISE MUST BE UNCONDITIONAL:** The promise to pay money mentioned in the instrument must be unconditional. In case the promise to pay is after fulfilling some condition, it is not a valid promissory note. Such promise must not be dependent upon taking place of some event, or happening or certain event which is not sure etc. For example Ajay promises to pay a sum or Rs. 50,000 to Mahesh two month after his marriage with Poonam. It is not a valid promissory note because it is not necessary that Mahesh will marry the Poonam or not.

4) **THE MAKER OF THE PRO-NOTE MUST BE CERTAIN:** The instrument must clearly mention the name of the maker of the instrument. In order to avoid any confusion it must give further identification details like father's name or husband's name etc. For example Mahesh Kumar s/o Hari Parshad will pay a sum of Rs. 6,000 to Ravi one month after the date is a clear instrument. It is not necessary that name of the person is mentioned. It can be the designation of the person also. For example Chief Manager, Bank of Baroda, Model Town Branch, Ludhiana is a valid promissory note. Further it is important to note that no promissory note can be issued by any maker that is payable to himself. This types of promissory is not valid. However, in case such note is endorsed the maker to some other person, it will become a valid promissory note.

5) **IT SHOULD BE SIGNED BY THE MAKER:** One of the important condition of valid note is that it is signed by the maker of the note. Without the maker's signs on the note, it is incomplete and has no legal value. The signature is must even if the instrument is written by maker in his own handwriting. The term _signature' means that the maker puts his name or initial on the body of the note at particular place, with a objective to authenticating the note.

6) **THE AMOUNT MUST BE CERTAIN:** Promissory note is valid if the amount mentioned in it is certain. The amount should not be vague. For example the promise to pay money at market rate of interest is not valid as market rate of interest is not certain. However, promise to pay at the Prime Lending Rate of RBI is valid as prime lending rate of RBI is certain.

7) **THE PROMISE SHOULD BE TO PAY MONEY:** The note should undertake to pay money and money only. Any promise to make payments in the form goods, Assets, bonds, etc. is not valid. For example Ajay promise to Bina to pay a sum of Rs. 10,000 in cash plus a mobile phone is not a valid promissory note.

8) **THE PAYEE MUST BE CERTAIN:** According to RBI Act, in India it is not possible to issue a promissory note payable to bearer on demand. So promissory note must payable to a specified person or his order. However, the payee can be determined by his name or by his designation.

9) **MUST BEAR THE REQUIRED STAMP**: In order to make a promissory note valid, it must bear the necessary stamp as required by the Indian Stamp Act, 1889. The amount of stamp depends upon the amount for which the promissory note is drawn.

10) **IT SHOULD BE DATED:** Though it in not necessary that the note must bear the date on which it is drawn. However, some time it becomes important to mention the date of instrument. The date of promissory note is not important it the amount is payable on a particular date. However, in order to calculate the amount of interest if rate of interest is given or deciding the date of maturity if instrument is payable after a particular period the date of instrument becomes important. Further a note may be issued postdated.

11) **THE RATE OF INTEREST:** The mention of rate of interest in the instrument is not necessary. In csae the instrument specifies a particular rate of interest, instrument must paid along with the rate.

12) **PAYABLE IN INSTALMENTS:** A promissory note is not necessarily payable in one installment. It may be payable in any number of instalments, as provided under Section 5 of the Act.

## 10.11 TEST YOUR UNDERSTANDING (A)

**Q STATE WITH REASON WHETHER FOLLOWING INSTRUMENTS CAN BE CATEGORIZED AS PROMISSORY NOTE OR NOT:**

1. Raj make promise to pay Simran Rs. 10,000 through phone.

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2. Pranav writes to Sandeep that he has received Rs. 3,000 from him.

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3. Ranveer promise to pay Deepika Rs. 7,000 in writing on their Marriage.

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4. Radhey promises ot pay Madhav Rs. 6,000 in writing in December 2022.

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5. Harshit writes to Dhanumita, I owe you Rs. 4,500.

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6. I promise to pay an amount of Rs. 6,000 along with interest @ 10% p.a.

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7. I promise to pay an amount of Rs. 6,000 along with interest.

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8. I promise to pay an amount of Rs. 6,000 to Managing Director of Neelima Limited.

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9. Raja promise to pay Rani Rs. 7,000 in writing on death of her father.

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## 10.12  BILLS OF EXCHANGE (SECTION 5)

Bill of exchange is one of the important document in business. It is an instrument that gives right to one person to recover some amount from other person.  It is a written order which give the drawer right to recover money from drawee. It is an unconditional written order issued by a person   known as drawer to another person known as drawee to pay a fixed sum of money to him or a third party on some future date as mentioned in the instrument. A bill of exchange is always in writing and is signed by the concerned person. Bills of exchange are not only used in national trade but in international trade as well.

Bill of Exchange is an instrument that legally binds a person to pay money within a specified time frame or on the demand by the bearer bill of exchange. **As per Section 5** a ‒bill of exchange‖ is ‒an instrument in writing containing an unconditional order, signed by the maker, directing a certain person to pay a certain sum of money only to, or to the order of, a certain person or to the bearer of the instrument.‖

On the basis of above definition, following points emerge related to Bill of Exchange:

> (a) It is an instrument in writing.
> (b) It is always Unconditional.
> (c) It is order to pay
> (d) It is signed by drawee.
> (e) It is to pay money only
> (f) The order to pay must be certain and not vague.
> (g) It may be payable to order or beared.
> (h) It may be payable after certain period or payable on demand.

T.P Mukherjee law Dictionary with pronunciation defines Bill of Exchange as under: ‒A bill of exchange is an unconditional order in writing, addressed by one person to another, signed by the person giving it, requiring the person to whom it is addressed to pay, on demand or at a fixed or determinable future time, a sum certain in money to or the order of a specified person or to bearer.‖

| ₹ 10,000.00 P | | 126, Chandni Chowk, Delhi-110 006 5th May, 2012. |
|---|---|---|

Three months after date, pay to us or our order a sum of Rupees Ten Thousand Only, for value received.

Stamp

Accepted
For M/s Aggarwal Stores
(Signed) Nakul Gupta
5.5.2012
Partner

To
M/s Aggarwal Stores,
216, Malka Ganj,
Delhi-11007

For M/s Lakhmi Chand & Sons.
(Signed) Lakhmi Chand
(Lakhmi Chand)
Partner

## 10.13 PARTIES INVOLVED IN BILL OF EXCHANGE

1. **DRAWER:** The drawer is a creditor who has to take some money from the other person and he is the person who writes the bill of exchange and is having right of receiving the sum mentioned in the instrument.
2. **DRAWEE:** The drawee is the Debtor or a person who has to pay the money to the creditor. He is the person on whom the bill is written. He is the primary person liable to make the payment of the instrument.
3. **PAYEE:** Payee is the person who is authorized to receive the amount as mentioned in the bill of exchange. In case of Bill of Exchange the drawer can also be the payee of the instrument in case it is not endorsed by him to anybody else.
4. **OTHER PARTIES**: Besides the above mentioned three parties, some more persons are also involved in the bill of exchange. These includes:
   - **ENDORSER:** The person who transfers the bill of exchange to some other person, thus making him the owner of the instrument is known as endorser.
   - **ENDORSEE:** The person to whom the bill of exchange is transferred by the endorser is known as endorsee. After the endorsement of the bill, endorsee becomes the owner of the instrument.

## 10.14 ESSENTIALS OF A BILLS OF EXCHANGE

1) **NUMBER OF PARTIES**:  There are main 3 parties involved in a bill of exchange:
   - the drawer, who draws the bill of exchange
   - the drawee, who has to make the payment
   - the payee, who is entitled to the payment.
   Many times the drawer and the payee are the one and the same person.
2) **IT MUST BE IN WRITING**: The most important feature of Bill is that it must be in writing. In case of a verbal order to make a payment, it does not form a valid Bill. The order by the drawer of the note should be made in writing clear words on the face of

instrument itself. The term _in writing' here means that it can be printed, typewritten, handwritten etc. Further, the bill of exchange can be written using a pencil or a pen. It is not necessary that it must be written using the ink. However, in order to ensure the safety of bill it is better to write it using the ink.

3) **EXPRESS ORDER TO PAY**: Order to pay is the most important condition of a bill of exchange. Bill must contain an _order by the drawer to the drawee to pay a certain sum of money to the order or bearer of the instrument either on a particular date or on demand by the person'. The order written must be a command to pay the money and not a request to pay the money. So, any wording like _Please pay Rs 50,000 to Anil on May 1 and oblige', written on the bill is a request to pay the money and not an order to pay. So, in this case it is not a valid Bill of Exchange.

4) **ORDER MUST BE UNCONDITIONAL**: The order to pay money mentioned in the instrument must be unconditional. In case the order to pay is subject to fulfilling some condition, it is not a valid Bill. Such order to pay must not be dependent upon taking place of some event, or happening or certain event which is not sure etc. For example A promises to pay a sum or Rs. 70,000 to Z three month after his marriage with Y. It is not a Bill because it is not sure that whether such marriage will take place in future or not.

5) **ORDER TO PAY MONEY ONLY:** The Bill should order to pay money and money only. Any order to make payments in the form goods, Assets, bonds, etc. is not valid. For example Meena promise to Bina to pay a sum of Rs. 20,000 in cash plus a piece of land is not a valid Bill.

6) **SUM PAYABLE TO BE CERTAIN:** The amount payable in the Bill of exchange must be certain. Though it is not necessary that such amount must be a fixed amount, but it must be certain amount. For example an order to pay Rs. 60,000 is a certain amount. Even an order to pay Rs. 50,000 along with interest of 10% is certain amount. But an order to pay adequate amount is not a bill as the amount is not certain.

7) **MUST BE SIGNED:** The Bill of exchange is complete only when it is signed by the drawee. In case the sign of drawee are missing, the bill of exchange is not valid. The signs of drawee authenticates the bill of exchange and makes him liable to make the payment of the bill.

8) **MUST BEAR THE STAMP:** A Bill of Exchange is only valid, if it bears the necessary stame as required by the Indian Stamp Act, 1889. The amount of stamp depends upon the amount for which the Bill is drawn. The stamp must also be properly cancelled. Following table shows the amount of stamp duty payable on a bill of exchange. This table is for the reference only need not to remember by the students.

| Description of the Instrument | Proper Stamp-Duty |
|---|---|
| **Bill of Exchange** as defined by section 2(2) not being a BOND, bank-note or currency note-<br>(a) repealed.<br>(b) where payable otherwise than on demand –<br>(i) where payable not more than three months after date or sight – | |

| | |
|---|---|
| if the amount of the bill or note does not exceed Rs.500; | One Rupee Twenty Five Paise |
| if it exceeds Rs.500 but does not exceed Rs.1,000; | Two Rupees And Fifty Naye Paise |
| and for every additional Rs.1,000 or part thereof in excess of Rs.1,000; | Two Rupees And Fifty Naye Paise |
| (ii) where payable more than three months but not more than six months after date or sight – if the amount of the bill or note does not exceed Rs.500; | Two Rupees And FiftyNaye Paise |
| if it exceeds Rs.500 but does not exceed Rs.1,000; | Five Rupees, |
| and for every additional Rs.1,000 or part thereof in excess of Rs.1,000; | Five Rupees |
| (iii) where payable more than six months but not more than nine months after date or sight – if the amount of the bill or note does not exceed Rs.500; | Three Rupees and Seventy Five NayePaise |
| if it exceeds Rs.500 but does not exceed Rs.1,000; | Seven Rupees and FiftyNaye Paise |
| and for every additional Rs.1,000 or part thereof in excess of Rs.1,000; | Seven Rupees and Fifty Naye Paise |
| (iv) where payable more than nine months but not more than one year after date or sight - if the amount of the bill or note does not exceed Rs.500; | Five Rupees |
| if it exceeds Rs.500 but does not exceed Rs.1,000; | Ten Rupees |
| and for every additional Rs.1,000 or part thereof in excess of Rs.1,000; | Ten Rupees |
| (c) where payable at more than one year after date or sight- if the amount of the bill or note does not exceed Rs.500; | Ten Rupees |
| if it exceeds Rs.500 but does not exceed Rs.1,000; | Twenty Rupees |
| and for every additional Rs.1,000 or part thereof in excess of Rs.1,000. | Twenty Rupees |

9) **OTHER FORMALITIES:** There are some other formalities in the bill of exchange. These formalities are related to date of instrument, place at which instrument is drawn, presence of consideration in the instrument, etc. These formalities must also be fulfilled.

10) **REQUISITES OF A VALID CONTRACT:** Law of contract certain requisite to make a valid contract like free consent to the contract, legality of the object etc. As bill of exchange is also a contract between two parties, the various requisites of a valid contract must also be met in bill of exchange also.

## 10.15 DIFFERENCE BETWEEN BILLS OF EXCHANGE AND PROMISSORY NOTES

| Particulars | Bill of Exchange | Promissory Note |
|---|---|---|
| **Meaning** | A bill of exchange is an order given by drawer of the instrument to the drawee to pay a certain amount to Drawer himself, person named in the instrument, order or bearer of the instrument. | A promissory note is an instrument bearing unconditional promise by the person who owes monty to the creditor to pay a certain sum of money to creditor or his order. |
| **Negotiable Instrument Act** | The definition of Bill of Exchange is given under section 5 of Negotiable Instrument Act. | The definition of Promissory Note is given under section 4 of Negotiable Instrument Act. |
| **Parties** | In case of bill of exchange there are three parties involved i.e. the drawer, the acceptor and the payee. | In Promissory Note there are two parties involved i.e. Maker and Payee |
| **Drawn by** | It is drawn by the drawer who is creditor. | It is drawn by the maker who is Debtor. |
| **Liability** | The liability of a drawer under the bill of exchange is not primary, he is liable to make the payment only if drawee fails to make the payment. | The liability of the maker of a promissory note is primary and he is liable to make the payment. |
| **Acceptance** | Bill of Exchange needs the acceptance by the drawee. | Promissory Note does not need any acceptance by the drawee. |
| **Copies** | In case of Bill of Exchange, generally a single copy is prepared. However in in case of foreign bills mostly 3 copies are prepared. | In case of Promissory note always only one copy is prepared. |
| **Notice in case of dishonour** | If the bill of exchange is dishonoured due to any reason, the holder must issue notice to all person to whom he wants to make liable to pay. | In case of dishonour of promissory note, there is no need of issue of notice to the maker of the instrument. |
| **Stamps** | In case of Bill of exchange stamping is necessary. However, no need of stamping for ‒bills payable on demand‖. | Stamping is necessary for promissory notes and there is no exceptions. |
| **Payable to bearer** | A bill of exchange can be drawn on order or bearer. | A promissory note cannot be payable to a bearer. |
| **Payable to maker** | In the case of bill of exchange, the drawer himself can be payee also. | In case of a promissory note, the maker himself cannot become the payee. |

## 10.16  TEST YOUR UNDERSTANDING (B)

1.  Write the three parties involved in Bill of Exchange.

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2. Write five characteristics of Bills of Exchange.

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3. Give three difference between Bills of Exchange and Promissory Note.

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4. State whether following are true or false.

    a. Bill of Exchange can be oral or written.

    b. Bill of Exchange is a promise to pay certain Sum.

    c. Bill of Exchange is an order to pay money.

    d. The amount of Bill of exchange need note to be certain.

    e. The drawer writes the Bills of Exchange.

## 10.17 LET US SUM UP

- For dealing with Negotiable Instruments in India, we have a separate Act called Negotiable Instruments Act.
- Negotiable Instruments are the instruments that can be easily transferred by one person to another.
- If a person gets the possession of Negotiable Instruments in good faith, his title will be free from any defect even if the person who gives the possession is having bad title.
- In India there are only three Negotiable instruments allowed under the Act these are Cheque, Promissory Note and Bills of Exchange.
- There are many other Negotiable Instruments in the county which are popular in market but not under the act.
- Law gives some presumptions and benefit in case of the Negotiable Instrument.
- Promissory note is an unconditional promise by one person to another person to pay particular amount.
- It is always written.

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- In Promissory note two parties are involved, that are Maker and the Payee.
- Bill of Exchange is an unconditional order by one person to another to make payment of a particular amount.
- In Bill of Exchange three parties are involved, that are Drawee, Drawer and the Payee.

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## 10.18 KEY TERMS

- **„NEGOTIABLE INSTRUMENT‟**: ‗Negotiable Instrument' means any ‗ written document, through which a person gets the right over the other person and such right is easily transferable by him to other person.
- **QUASI NEGOTIABLE INSTRUMENTS:** Quasi Negotiable Instruments are the Instruments that are capable of being transferred by endorsement and delivery but in such case the transferee does not get a better title than a person who makes the transfer.
- **PROMISSORY NOTE:** Promissory Note is a written document containing an unconditionaln promise by a person who writes such document (called the maker) to pay some other person (called the payee) a particular sum of money either on demand made by the person on a particular or ascertainable future date.
- **MAKER:** Maker is a principal party in the Negotiable Instrument. He is also known as the promisor, as he is the person who makes the promise to make the payment and draws the promissory note to pay the specified the amount as mentioned in the promissory note for such promise made.
- **PAYEE:** Payee is another important person in Negotiable Instrument. He is also known as the promisee, as he is the person to whom promise is made to pay the certain amount of money. Payee is the person who receives the payment under the Negotiable instruments act.
- **BILL OF EXCHANGE:** It is an unconditional written order issued by a person known as drawer to another person known as drawee to pay a fixed sum of money to him or a third party on some future date as mentioned in the instrument.
- **DRAWER:** The drawer is a creditor who has to take some money from the other person and he is the person who writes the bill of exchange and is having right of receiving the sum mentioned in the instrument.
- **DRAWEE:** The drawee is the Debtor or a person who has to pay the money to the creditor. He is the person on whom the bill is written. He is the primary person liable to make the payment of the instrument.
- **PAYEE:** Payee is the person who is authorized to receive the amount as mentioned in the bill of exchange. In case of Bill of Exchange the drawer can also be the payee of the instrument in case it is not endorsed by him to anybody else.

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## 10.19 REVIEW QUESTIONS

1. What are Negotiable Instruments? Give characteristics of Negotiable Instruments.
2. What presumptions are available to Negotiable Instruments.
3. Give different types of Negotiable Instruments.

4. What are Promissory notes? Give essentials of valid Promissory Note.
5. Give various parties involved in Promissory Note.
6. What are Bills of Exchange? Give essentials of valid Promissory Note.
7. Give various parties involved in Bills of Exchange.
8. Distinguish between Bills of Exchange and Promissory Note.

## 10.20  ANSWERS TO TEST YOUR UNDERSTANDING.

### TEST YOUR UNDERSTANDING A

1. No, as promise is oral.
2. No, Promise to pay is not express.
3. No, marriage is not certain to take place.
4. Yes
5. No, it is mere acknowledgement of Debt.
6. Yes
7. No, amount is uncertain as interest rate is not given.
8. Yes as M. D is a certain person.
9. Yes, Death is certain to take place.

### TEST YOUR UNDERSTANDING B

4 (a) False, it cannot be oral.

4(b) False, it is order not promise.

4 (c) True

4 (d) False, amount should be certain.

4(e) True.

## 10.21  FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.
3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
4. P C Tulsian and Bharat Tulsian, *Business Law*, McGraw Hill Education
5. Sharma, J.P. and Sunaina Kanojia, *Business Laws*, Ane Books Pvt. Ltd., New Delhi

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

## UNIT 11 – CHEQUES-MEANING AND CROSSING, PARTIES TO THE NEGOTIABLE INSTRUMENTS

**STRUCTURE**

11.0 Objectives

11.1 Meaning of Cheque

11.2 Parties to the Cheque

11.3 Features of Cheque

11.4 Types of Negotiable Instruments

11.5 Crossing of Cheque

11.6 Benefits of Crossing the Cheque

11.7 Who can Cross the Cheque

11.8 Types of Crossing

11.9 Test your Understanding - A

11.10 Holder of the Negotiable Instruments

11.11 Holder in Due Course

11.12 Conditions of Holder in Due Course

11.13 Privileges of Holder in Due Course

11.14 Difference between Holder and Holder in Due Course

10.15 Test Your Understanding - B

10.16 Let us Sum UP

10.17 Key Terms

10.18 Review Questions

10.19 Answers to  Test Your Understanding

10.20 Further Readings.

## 11.0  OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the Meaning of Cheque.
- Describe various Characteristics of Cheques.
- Recognise various types of Negotiable Instruments in practice.

- Understand the meaning and benefit of Crossing of Cheque.
- Exhibit how to various types of Crossing.
- Explain the meaning of Holder and Holder in Due Course.
- Describe what are various Privileges available to Holder in Due Course.
- Distinguish between Holder and Holder in Due Course.

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## 11.1 MEANING OF CHEQUE (SECTION 6):

Cheque is an instrument the use of which is very common in business. Rather it is the most common form of negotiable instrument. If a persons is having a savings or current account in any bank, bank issues a cheque book in the name of the person and such person can use such cheques for making the payment to the others. A cheque is an instrument drawn by the person on a specified banker and directing the bank to make payment to the person mentioned in the cheque or the bearer of the cheque. In other words cheque is lika a bill of exchange; but it is distinguished from Bill of Exchange due to the fcact that cheque is always drawn on a bank. The person issuing the cheque to other person is called the ‚drawer', and the person who is getting cheque for payment is known as ‚Payee'. The bank who is making the payment in this case is known as ‚Drawee'.

**Section 6 of The Negotiable Instruments Act, 1881 defines a cheque „as a bill of exchange drawn on a specified banker and not expressed to be payable otherwise than on demand".**

On the basis of above definition, following points emerge related to Cheque:
- It is an instrument in writing.
- It is always Unconditional.
- It is order to pay
- It is signed by drawer.
- It is to pay money only
- It is always drawn on the Bank.
- It may be payable to order or bearer.
- It is always payable after the date mentioned on the cheque.

## 11.2 PARTIES TO THE CHEQUE

Generally there are three parties involved in Cheque:
 **(i) THE DRAWER:** The person issuing the cheque to other person is called the ‗drawer'.
**(ii) THE DRAWEE:** The bank that is making the payment of the cheque is known as ‗Drawee'.
**(iii) THE PAYEE:** the person who is getting cheque for payment is known as ‗Payee'.

## 11.3  FEATURES OF CHEQUES

The essentials or features of a Cheque are:

1. **IN WRITING:** A cheque is always in writing. However, It is not necessary to write the cheque using a pen, it can be printed also.
2. **UNCONDITIONAL ORDER:** Every cheque is an unconditional order to the bank to make certain payment to the payee. A cheque containing conditional orders is not valid and the bank will dishonoured such cheque.
3. **CHEQUE IS DRAWN BANK:** A cheque is a negotiable that is always drawn on a particular bank which is mentioned in the cheque itself. When a person opens the saving or current account in the bank, bank provides him Cheque book facility. Customer can issue the cheque on the bank.
4. **SIGNED BY CUSTOMER:** Every cheque must be signed by customer who is issuing the cheque. Any cheque not signed by the customer is of no use and this cheque in not valid.
5. **PAYABLE ON DEMAND:** A cheque is always payable on demand. A cheque is presented by the payee to the banker for payment and upon receiving the cheque for the payment, bank makes the payment. Any cheque payable after the expiry of certain time period is not valid.
6. **EXACT AMOUNT TO BE PAID:** Cheques is always drawn for particular amount and that amount is mentioned in the Cheque itself. In case the certain amount is not mentioned in the cheque, cheque is not valid. Further cheque is payable in money only. Any cheque that is not payable in money is not valild. Such cheque cannot be drawn. Normally the amount of cheque is written in figures as well as words.
7. **PAYEE MUST BE CERTAIN:** Another important condition of the cheque is that the payee should be certain. However, it is not necessary that payee is a natural person. Even an artificial person like company can also be payee.
8. **CHEQUE MUST BE DULY DATED:** It is very important that the date of issue must be mentioned on the cheque. In case cheque doesn't bear any date, it is not valid. However, a person can issue post dated cheque also. In such case cheque cannot be presented to the bank till that date is approached. Normally the validity of a cheque three months starting from the date mentioned on the face of the cheque.
9. **CHEQUE HAS 3 PARTIES:** Drawer, Drawee & Payee:
   - Drawer: A drawer is a person, who draws a cheque.
   - Drawee: A drawee is a bank on whom a cheque is drawn.

- Payee : A payee is a person in whose favour a cheque is drawn

10. **DELIVERIES:** Delivery of the Cheque is Essential condition. Suppose a person issues the cheque but fails to make the delivery of the cheque to the other person, it is of no use. For example Mr. A issued a cheque but he does not delivered the cheque to the concerned party. Rather he kept the cheque in his almirah. This cheque is not valid.

## 11.4 TYPES OF NEGOTIABLE INSTRUMENTS

1. **TIME INSTRUMENT (SECTION 19)** – A bill of exchange or Promissory note is treated as time instrument, it the time for payment of the instrument is mentioned in the instrument itself. In such case it is mentioned that when the payment of the instrument is becoming due. So in the following examples the instrument shall be regarded as time instrument:
   a. Payable after specified period.
   b. Any instrument payable on particular date.
   c. Any instrument payable after happening of certain event.
      For example
      - Pay Murti  Rs. 56,500 4 months after the date.
      - Pay Raj  Rs. 8,000 10 days after death of Ravinder.
      - I promise to Pay Krishna Rs. 20,000 on August 1, 2021

2. **DEMAND BILL (SECTION 21) -**   A Demand bill is one in which no specific date of payment or period of payment is mentioned. This type of instrument is payable on demand by the Payee. In other words whenever payee demands for the payment, payment of the instrument is done.
   a. This type of instrument can be presented anytime.
   b. Person making the payment does not get any grace period for making the payment.
   c. Cheque is an instrument that is always payable on demand.
      For Example
      - I promise to Pay Murti Rs. 56,500.

      - I promise to Pay Murti Rs. 56,500 on demand.
      - I promise to Pay Murti Rs. 56,500 on presentment of instrument.
      - I promise to Pay Murti Rs. 56,500 at sight of the bill.

3. **BEARER INSTRUMENT (SECTION 13)** – Any Negotiable instrument can be order instrument or bearer instrument. A negotiable instrument becomes Bearer Instrument when it is payable either to Bearer of the instrument or on its last endorsement it is endorsed in Blank. Any bearer instrument can be transferred by mere delivery. Holder of the instrument can ask for payment of such instrument.
   a. In India it is not allowed to issue Bearer Promissory Note.
   b. It is allowed to issue Bearer Bill of Exchange but such bill should be time bill not demand bill.

c.  Bearer cheque can be issued in India.
    For Example
    - Pay to Mr. A or Bearer Rs. 13,000, is an Bearer instrument.
    - Pay to Bearer Rs. 10,000.

4. **ORDER INSTRUMENT (SECTION 13)** – A Negotiable instrument is treated as order instrument when it is payable to the person mentioned in the instrument or on order of the person mentioned in the instrument. It is a common misconception that order instrument cannot be transferred, the reality is that order instrument can also be transferred but it is transferrable by endorsement and delivery.

a.  It is payable to person mentioned in the instrument.
b.  It is payable on the order of person mentioned in the instrument.
    For example
    - Pay to Ajay Rs. 9,500
    - Pay to the order of Ajay Rs. 9,500
    - Pay to Ajay or his order Rs. 9,500

5. **INLAND INSTRUMENT (SECTION 11)** – A negotiable instrument can be inland instrument or foreign instrument. A negotiable instrument is considered as inland instrument if either it is drawn in India or it is payable in India. Any instrument if it is drawn or payable in India is Inland instrument even if it is endorsed outside India.
Ecample
    - A Bill Drawn in Jalandhar payable in Tokyo is an Inland Negotiable Instrument.
    - A Bill drawn in Tokyo but payable in Jalandhar is an Inland Negotiable Instrument.
    - A Bill Drawn in Jalandhar payable in Amritsar is an Inland Negotiable Instrument.

6. **FOREIGN INSTRUMENT (SECTION 12)** – Any instrument is treated as foreign instrument if it is both drawn and payable outside India. If it is drawn in India and payable outside than it is inland instrument. Similarly if it is drawn outside but payable in India, still it is inland bill. For foreign instrument, it must be both drawn any payable outside India.
Example:
    - Bill drawn in Tokyo and payable in London.

7. **INCHOATE INSTRUMENT (SECTION 20)** – Inchoate means incomplete. When due to some reason the instrument is not complete, it is treated as inchoate instrument. In following cases the instrument shall be treated as inchoate:
a.  If the instrument is either wholly or partially blank.
b.  If it is not adequately stamped.
c.  If it is not duly signed.
    In case of inchoate instrument, the person holding the instrument has the authority to complete the instrument upto his authority. For example if A give blank cheque to B and authorize him to fill any amount upto Rs. 10,000. B cannot write amount exceeding Rs. 10,000. However, if this cheque is endorsed by B to C, than C has

the authority to write any amount even more than Rs. 10,000. The instrument will remain valid.

8. **ACCOMMODATION BILL –** A bill of exchange or Promissory note is treated as accommodation instrument, when it is issued without any consideration with a view of helping the other person. In such case the party issuing the instrument cannot recover amount of the instrument from the other party once the amount is paid by him.

9. **DOCUMENTARY BILL –** It is a negotiable instrument with which some document is attached. For example Railway Receipt or Bill of Lading is attached with the Bill. Sometime the documents related to title of goods are attached to the Bill. Objective of this is that the drawee gets ownership of goods and he is able to sell the goods before making the payment.

10. **CLEAN BILL -** The clean bill is not accompanied by any document of title of goods.

11. **ANTE DATED CHEQUE –** Whenever any cheque is issued but the date on the cheques is not the present date but some previous date is written on the cheque, it is called Ante Dated cheque. For example a cheque is issued on 20$^{th}$ June 2021 but the date on cheque is mentioned as 5$^{th}$ June 2021, it is ante dated cheque. Normally the validity of a cheque three months starting from the date mentioned on the face of the cheque.

12. **POST DATED CHEQUE -** Whenever any cheque is issued for some future date, it is called post dated cheque. For example cheque is issued on June 20 but the date mentioned on the cheque is June 28, it is post dated cheque. Any such cheque cannot be presented to bank for payment till the date mentioned on the cheque is approached. Such cheque is valid for three months from the date mentioned on the cheque.

13. **STALE CHEQUE –** Any cheque is valid for 3 months from the date mentioned on the cheque. If any cheque becomes older than 3 months from the date, it is called Stale cheque. For example if a cheque is issued on June 20$^{th}$, it will become stale on September 20$^{th}$.

## 11.5 CROSSING OF CHEQUE

There are many risks associated with payments of a cheque to the wrong person. However, we can avoid this risks giving the instructions to the paying regarding the person to whom the cheque can be paid. This can be done by specifying certain instruction on the cheque. One such method is crossing of Cheque. A crossed cheque is a cheque that has been marked with some instructions about the method of its payment. With crossing of cheque, a cheque is no more payable on the counter of the bank rather amount is paid through the bank account of the payee. In this way one could later found that who was the person who got the payment of the cheque. So, crossing the cheque makes the cheque more safe. Though there is no fix method of crossing the cheque. The format and wording of crossing change between countries, but mostly two parallel lines are placed top left hand corner of the cheque to make it crossed.

Under Section 123, crossing has been defined as _Where a cheque bears across its face an addition of the words _and Company' or any abbreviation thereof (like _& Co.') between two parallel transverse lines, or two parallel transverse lines simply, either with or without the words _not negotiable', that addition shall be deemed a crossing and the cheque shall be deemed to be crossed generally.'

## 11.6 BENEFITS OF CROSSING THE CHEQUE?

1. **MINIMIZING THE RISK**: With the crossing of the cheque paying banker can pay the amount only through the banker of the payee and counter payment of the cheque cannot be done. It is an effective way to minimize the risk of payment to the wrong party as it easy to identify the payee.
2. **NO PAYMENT TO WRONG PERSON:** There are few type of crossing that makes the cheques non transferable. So even if the cheque is lost, wrong person cannot get the payment of the cheque.
3. **NOT NEGOTIABLE:** Some type of crossing makes the cheque non negotiable. So, it makes the cheque safe.

## 11.7  WHO CAN CROSS A CHEQUE?

According with the Sec. 125 of the Negotiable Instruments Act, the following persons are capable of crossing the cheque:
1. **THE DRAWER:** Drawer may cross the cheque generally or specially.
2. **THE HOLDER:** The holder of a cheque is the first person that is authorized to cross a cheque. He can make any type of crossing whether General of Special. In case a cheque is already having General Crossing, holder can make it Special Crossing. He can also add the the words ‒non- negotiable‖ to cheque that is already crossed to make it non negotiable.
3. **THE BANKER**: The banker where cheque is deposited can also cross the cheque in favour of some other banker for the purpose of collection. Such a crossing is  known as Double-crossing.

## 11.8  TYPES OF CROSSING:

Crossing is of the following types:
(1) General crossing;
(2) Special crossing;
(3) Restrictive crossing:
(4) Not negotiable crossing.

**1. GENERAL CROSSING**: In general crossing, normally we put two parallel transverse lines, in the top left hand corner of the cheque. These lines may be put simply without

writing and words or the words like ‗& Co. ‗ or ‗and Company' may be added to the crossing. The effect of general crossing is that after the crossing the cheque will not be paid at the counter, rather it can be paid only through the account in a bank.
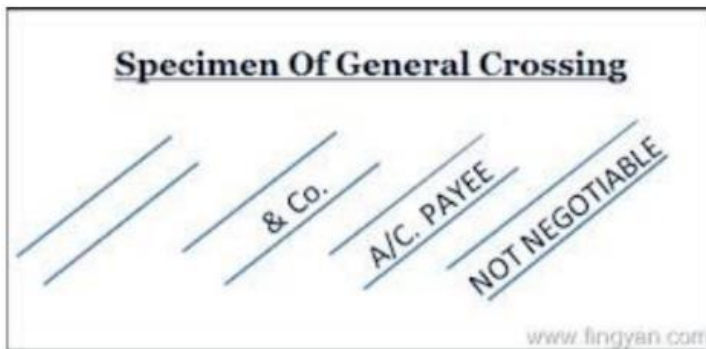


2. **SPECIAL CROSSING** – In general crossing cheque can be paid through any bank. However, some time drawer wants that the payment is to be made through a particular bank. In such case a cheque may be crossed specially. In a special crossing, we add the name of the bank also in the transverse lines through which we wants to make the payment. This can be done with or without the words 'not negotiable'. Further it should be noted that it is not necessary to put two transverse parallel lines for special crossing, however general crossing cannot be done without putting two transverse lines. The effect to special crossing is that the paying banker cannot make the payment through any bank bank named in the cheque.



3. **RESTRICTIVE CROSSING**: Besides the two crossing given in the negotiable instruments act and already discussed above, there is some more type of crossing that are in practice for example, restrictive crossing. In a restrictive crossing beside putting two transverse lines on the corner of the cheque, the words 'Account Payee' or  Account Payee Only' are also added in the transverse lines. The effect of  restrictive crossing is that once the restrictive crossing is done, the payment of the cheque can only be made by the bank to the collecting banker of the person whose name is mentioned in the cheque. In other words we can say that only the person whose name has been mentioned in the cheque is authorized to collect the payment. Now the payment cannot be done to any other person whose name in not mentioned in the cheque.

It should be further noted that it is the duty of the paying banker to ensure that the payment is made to the bank account of person named. In case the collecting banker

collects the cheque for any other person other than the person whose name is written in the cheque, the collecting banker will be responsible to the true owner of the cheque.

Specimen of Special or Restrictive Crossing
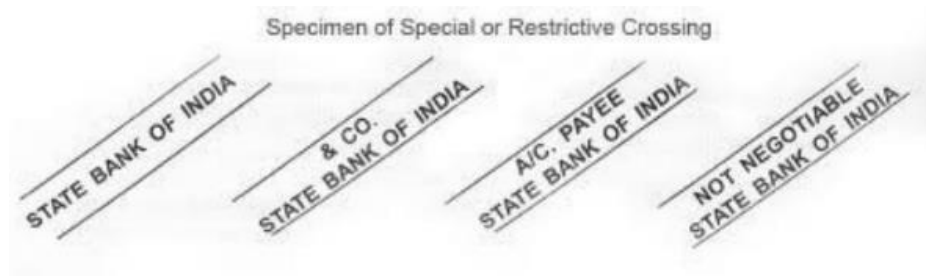
4. **NOT NEGOTIABLE CROSSING (SEC. 130):** It is the misconception that once the cheque is crossed, it became non transferable or not negotiable. Even if a cheque is crossed, it remain transferable and negotiable also unless the restrictive crossing is done. Some time we want to make the cheque not negotiable. It means once the cheque became not negotiable it will remain transferable but the transferee will not get better title than the transferor. This can be done by adding the words _not negotiable' in the transverse lines. A person taking is cheque containing the words 'not negotiable' will not get a better title than that of the transferor. In other words the cheque is no more eligible for essential feature of negotiability. For Example: A cheque was drawn by Ajay in favour of a Vijay. The cheque was crossed 'not negotiable'; a person obtains the cheque by fraud from Vihay and endorsed the same to Mahesh in good faith. In such case Mahesh will not get better title of the cheque as the cheque is already marked not negotiable.([Fisher v. Roberst).

## 11.9     TEST YOUR UNDERSTANDING (A)

5. Write the three Features of Cheque.

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6. What is Time Bill.

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**7.** What is Restrictive Crossing.

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**8.** State whether in following cases Bill is Bearer or order.

    **f.** Bill payable to Shyam or order. ………………………….

    **g.** Bill endorsed in blank by Radhey. ………………………….

    **h.** Bill payable to Mahant only. ………………………….

    **i.** Bill payable to Hema or Bearer. ………………………….

    **j.** Bill payable to Anuj. ………………………….

**9.** State whether following are true or False

    a. Cheque is always payable on Demand.

    b. Law presumes that every Negotiable instrument is drawn for consideration.

    c. Crossing of Cheque is Material Alteration.

    d. Crossed Cheque can be paid on counter.

    e. In Cheque drawer is always a Bank.

## 11.10 HOLDER OF NEGOTIABLE INSTRUMENT (SECTION 8)

A Negotiable instrument includes Bill of Exchange, Promissory Note cheque. According to the provisions of Negotiable Instrument Act, in every instrument there will be minimum two parties. It is not possible that instrument is having just one party. Holder of the instrument is one such party to the negotiable instrument. As per section 8 of the Negotiable Instruments Act, "the holder" means any person who legally keeps the instrument in his own name and is

eligible for the amount payable under the instrument. He a person who can cover the amount in his own name. In case the instrument is lost or destroyed, 'Holder' is the person who was in its possession at the time of such loss or destruction. " For becoming the holder under section 8, following two conditions are necessary.

1. The holder is the person who can have the possession of the instrument in his own name. Suppose any instrument is lost and some person finds the instrument, such person may not be treated as holder of the instrument as he has possession of the instrument, but he cannot have such possession in his own name. For example, a Bill of Exchange belonging to A is lost and B finds Bill, B cannot be treated as holder of the bill .

2. The second condition for becoming the Holder is that person must have the right to claim the amount mentioned in the instrument in his own name. Mere possession of instrument is not enough. For example, an agent holding the instrument cannot be treated as holder as he cannot recover the amount in his own name.

The position of Holder is important due to following reasons:

- He is the person who can sue the prior parties in case of dishonour of the instrument.
- Holder has the right to negotiate the instrument.
- He is the main person to whom all the prior parties are liable for the instrument.
- He is the only person who can give valid discharge of the instrument.
- Unless contrary is proved, every holder of the Negotiable Instrument will be presumed as holder in due course of the instrument.

## 11.11 HOLDER IN DUE COURSE (SECTION 9)

The concept of ‗Holder in Due Course' is very important in the Negotiable Instrument Act. Section 9 of the Negotiable Instruments Act define the term ‗Holder in Due Course'. According to Section 9 ‖Holder in due course‖ means any person who for consideration became the possessor of a promissory note, bill of exchange or cheque if payable to bearer, or the payee or indorsee thereof, if payable to order, before the amount mentioned in it became payable, and without having sufficient cause to believe that any defect existed in the title of the person from whom he derived his title. In other words, holder in due course is a person who

(a) by giving some valuable consideration,
(b) gets the possession of the instrument that is payable to the bearer or order of the bearer,
(c) before the date when such amount becomes due for payment
(d) without having knowledge of the fact that the person who is giving him possess is having some defect in the title of the instrument.

Following examples will make this point clear:

A cheque was sent by one person to another person through ordinary mail, before the instrument reaches, a Robber stole the cheque and handed it over to another person, who get it for some valuable consideration without having any knowledge of defect in the routine

course of the business.In the court of law it was held that person is Holder in Due Course. *Miller Vs. Race (1758)*

A person lost his cheque and a woman get the possession of the cheque. Five days after the cheque became due, woman presented the cheque to a shopkeeper in lieu of the payment for purchase of certain item. Next day, shopkeeper presented the cheque to Bank for payment and got the payment. A suit was brought in the court of law by the owner for recovery of amount of cheque from the shopkeeper. It was held that shopekeeper must return the amount to owner as he was not the Holder in Due Course as he got the possession of the cheque after it became due for payment. ***Down Vs. Halling (1825).***

## 11.12  CONDITIONS FOR HOLDER IN DUE COURSE:

1. **HOLDER:**   For becoming the Holder in Due Course a person must be holder of the instrument. A person who does not fulfill the conditions of Holder cannot become Holder in Due Course.

2. **PERSON MUST BE HOLDER FOR VALUABLE CONSIDERATION:** A person can be treated as Holder in Due Course of the instrument if he gets the Possession for some valuable consideration. Consideration so paid should be legal and it should not be void or illegal. However, there is no condition that consideration paid must be adequate, even inadequate consideration is valid consideration. But if a person gets the possession of instrument as gift, he will not be treated as holder in due course as consideration is missing in this case..

3. **BEFORE THE DATE OF MATURITY:** For becoming theHolder in Due Course a person must get possession of the instrument befoer such instrument becomes due for payment. A person who gets the   possession of instrument after the instrument became due, does not get rights of Holder in Due Course.

4. **GOOD FAITH:** Themost important condition of becomingHolder in Due Course is that person must get the possession of instrument in good faith without any knowledge of defect in the title of person who is transferring the instrument..If it is proved that person having possession of instrument was in knowledge of defect of instrument, he will not be treated as Holder in Due Course.

5. **COMPLETE AND REGULAR ON THE FACE:** A person becomes Holder in due course if instrument appears to be complete and regular on its face. for example, a promissory note was issued describing _F and F.N and Company' as Payee. But in this case endorser endorsed the instrument by writing _F and F.N' and forget to write _and Company' in the endorsement. It was held that person does not get the rights of _F and F.N as the payee and the endorser in this case seems to be two different persons and such instrument was not complete and regular on its face. Arab Bank Ltd Vs. Ross (1952).

## 11.13  PRIVILEGES OF A HOLDER IN DUE COURSE:

The position of The concept of _Holder in Due Course' is very important in the Negotiable Instrument Act. Once the negotiable instrument reaches in the hands of the Holder in Due

Course, it is cured from all the defects in the instrument. The Holder in Due Course enjoys certain privileges under the Negotiable Instruments Act. following are such privileges:

1. **PRESUMPTION (SECTION 118):** Negotiable Instruments Act every holder is presumed as holder in due course. The burden of proving that person is not the Holder in Due Course lies on the opposite party. In case party fails to prove this, the person will be treated as holder in due course.

2. **INCHOATE STAMPED INSTRUMENT (SECTION 20)**: The term _Inchoate' means incomplete. As per the conditions of Negotiable Instruments Act, appropriate stamp must be affixed on the instrument depending upon the amount covered in the instrument. Holder in Due Course has right to recover any amount mentioned in the instrument that is covered by the stamp affixed on the instrument. The person delivering the instrument can not claim that the amount filled in the instrument is beyond the authority given by him. So, theHolder in Due Course can claim whole amount even if if the amount filled in the instrument is more than the amount due towards him.

   For example, Amit gives a blank instrument duly stamped in favour of Vijay with authority to fill any amount uptoRs.10,000. However, Vijay fills rupees 25000 in the instrument and hands over the instrument to Radhey for value received. The stamp affixed on the instrument was sufficient to cover Rs. 25000. it was held that Radhey could claim full amount of the instrument.

3. **LIABILITY OF PRIOR PARTIES (SECTION 36):** All the prior parties whose name appears on the instrument are liable towards the Holder in Due Course. The Holder in Due Course have right to sue all the prior parties or any of the prior parties of the instrument.

4. **FICTITIOUS DRAWER OR PAYEE**: If a bill is drawn in favour of a fictitious drawer, acceptor of the Bill can not deny his liability for payment of the bill, if it is proved that the handwriting in which endorser put his signature and handwriting of the Drawer is same.

   Example: B accepted a Bill of exchange that was drawn in the name of A and later on it was found that A is a fictitious person. The same bill was endorsed to C. On due date B refused the payment on the context that Drawer is a fictitious person. It was held that C is eligible to get the payment as the handwriting of the endorser and drawer was same.

5. **CONDITIONAL DELIVERY OF THE INSTRUMENT (SECTION 46):** If an instrument is given by one party to other party on some condition and later such instrument reaches in the hands ofHolder in Due Course, the party issuing the instrument cannot deny the liability of the instrument on the context that the ondition under which instrument was issued is not fulfilled.

Example: Mr. X issued a promissory note to Mr Y on the condition that Mr Y will demand the payment only on the marriage of his son. The promissory note was endorsed by Mr. Y to Mr. Z, who is Holder in Due Course. Mr. X cannot deny the payment of the instrument on the context that condition on which such instrument was given is not fulfilled.

6. **INSTRUMENT CURED FROM ALL DEFECTS (SECTION 53):** Any instrument when reaches in the hands of Holder in Due Course is cured from all the defects. In such case, all the prior parties of the instrument are liable for payment of the instrument and cannot refuse payment on the context that instrument contained some defect prior to it reaches in the hands of Holder in Due Course. Further it is important to note that any instrument cured from the defects once is always free from the defects.

7. **UNLAWFUL MEANS FOR UNLAWFUL CONSIDERATION (SECTION 58):** Any person liable for the instrument cannot deny the payment of the instrument, due to the fact that the instrument was obtained through unlawful means or against unlawful consideration once such instrument reaches in the hands of Holder in Due Course.

Example: Mr. X obtained a promissory note from Mr. Y through some fraud. Later he endorsed such promissory note to Mr. Z against some consideration before it became due for payment. It was held that Z is Holder in Due Course and can recover the amount from Mr. y.

8. **ESTOPPELS AGAINST DENYING ORIGINAL VALIDITY OF INSTRUMENT (SECTION 120):** When a suit it is filed by the Holder in Due Course against the maker of the Promissory Note or drawer of the Bill of Exchange or cheque, they cannot deny the liability of the instrument on basis of original validity of the instrument. In other words, the person cannot deny payment due to the fact that originally instrument was not valid. For example Mr X makes a promissory note without putting sufficient stamp and hands over the same to Mr Y. Mr Y endorsed the promissory note to Mr. Z who is Holder in Due Course after putting sufficient stamp on it. In such case Mr X cannot deny the payment of the instrument. However, it is important to mention here that this condition is applicable only if instrument is complete on its face. In case instrument is not complete on its face, such condition is not applicable.

9. **ESTOPPELS AGAINST DENYING CAPACITY OF THE PAYEE (SECTION 121):** When the holder in due course file any suit for recovery of amount due on some instrument, the Drawer of the Bill of Exchange/Cheque or Acceptor of the Note cannot deny the capacity of Payee to endorse such instrument like Payee was either minor or Insane so cannot endorse the instrument.

10. **ESTOPPEL AGAINST DENYING SIGNATURE OR CAPACITY OF PRIOR PARTIES (SECTION 122):** When the holder in due course file any suit for recovery of amount due on some instrument, the Drawer of the Bill of Exchange/Cheque or Acceptor of the Note cannot deny the validity of signature of the prior parties.

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## 11.14  DISTINCTION BETWEEN HOLDER AND HOLDER IN DUE COURSE

| Basis | Holder | Holder in Due Course |
|---|---|---|
| 1. Definition | Holder is a person who has right to possess the instrument in his own name and can recover the amount due in it in his own name.[Sec. 8] | Holder in due course is a person who gets the possession of the instrument in good faith against some lawful consideration before the instrument is due for payment. [Sec. 9] |
| 2.Consideration | Person can become holder without paying any consideration | Person cannot become holder in due course without paying the consideration |
| 3. Before maturity | A person can become holder by getting possession of instrument before or after the date of maturity. | For becoming holder in due course, it is must that person must get the possession before the instrument is due for payment. |
| 4. Good faith | For becoming holder, it is not necessary that person gets the possession of the instrument in good faith. | a person becomes holder in due course only if he acquires the possession of the instrument in good faith without having any knowledge of defect in the instrument. |
| 5. Inchoate Instrument | A holder can claim only the amount which was due for payment. | A holder in due course can claim any amount written in the instrument provided that it is covered by the stamp affixed on the instrument. |
| 6. Right against prior parties | Holder get the right only against Person who endorsed the instrument or against the person who originally signed the instrument. | Holder in due course get right against all the prior parties whose name appears on the instrument. |

| 7. Better Title | Holder of the instrument cannot get better title than the person who is transferring the instrument. | Holder in due course can get better title than the person who is transferring the instrument. |
|---|---|---|
| 8. Negotiation | A person may become holder through negotiation or through assignment. | A person can become holder in due course only through negotiation. |

## 11.15 TEST YOUR UNDERSTANDING (B)

1. Who is Holder?

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2. Two Conditions of Holder in due course.

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3. Three privileges of Holder in due course.

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4. State whether following are true or False

   a. Holder can get instrument after due date.

   b. Holder can get instrument without any consideration.

   c. Holder in due course can get instrument after the due date.

   d. Once cheque reaches Holder in due course it is free from all defects.

   e. All prior parties are liable to Holder in due course.

## 11.16 LET US SUM UP

- Cheque is the most used Negotiable instrument in the country.
- Cheque is like a bill of exchange which is drawn on the Bank. Person issuing the cheque is called Drawer and the person getting payment is called Drawee.

- Demand instrument is one that is payable whenever holder of the instrument demands the payment.
- Time instrument is payable on when time mentioned on the instrument is there.
- In case of Bearer instrument, person possessing the instrument can ask for the payment.
- In Case of order instrument, person whose name is mentioned or his order could get the payment.
- Holder is the person who is in possession of the negotiable instrument and who is eligible to get payment in his own name.
- Holder in due course is the person who gets the negotiable instrument before its due date against some consideration without having knowledge that some person who is giving him instrument, has bad title..
- Law provides some privileges to Holder in due course.
- Once instrument reaches in the hands of Holder in Due Course, it become free from all bad effects.

## 11.17 KEY TERMS

- **Cheque** : A cheque is an instrument drawn by the person on a specified banker and directing the bank to make payment to the person mentioned in the cheque or the bearer of the cheque.
- **Time Instruments:** A bill of exchange or Promissory note is treated as time instrument, it the time for payment of the instrument is mentioned in the instrument itself..
- **Demand Bill (Section 21) -** A Demand bill is one in which no specific date of payment or period of payment is mentioned. This type of instrument is payable on demand by the Payee.
- **Order Instrument**– A Negotiable instrument is treated as order instrument when it is payable to the person mentioned in the instrument or on order of the person mentioned in the instrument..
- **Bearer Instrument (Section 13) –** Any Negotiable instrument can be order instrument or bearer instrument.
- **Ante Dated Cheque –** Whenever any cheque is issued but the date on the cheques is not the present date but some previous date is written on the cheque, it is called Ante Dated cheque.
- **Post Dated Cheque -** Whenever any cheque is issued for some future date, it is called post dated cheque.
- **Crossing of Cheque:** A crossed cheque is a cheque that has been marked with some instructions about the method of its payment. With crossing of cheque, a cheque is no more payable on the counter of the bank rather amount is paid through the bank account of the payee.
- **Holder:** The holder is the person who can have the possession of the instrument in his own name. He can recover the money in his own name.
- **Holder in due course**: Holder in due course is a person who by giving some valuable consideration, gets the possession of the instrument that is payable to the bearer or

order of the bearer, before the date when such amount becomes due for payment without having knowledge of the fact that the person who is giving him possess is having some defect in the title of the instrument.

## 11.18  REVIEW QUESTIONS

1. What are Cheques. Give features of valid Cheque.
2. What is Crossing of Cheque. Who can cross the cheque. What are benefits of crossing the cheque.
3. Explain various types of Crossing of the Cheque.
4. Explain different types of Bills of Exchange and Promissory Notes.
5. Explain different types of Cheques.
6. Who is Holder of the Negotiable Instrument. How he is different from Holder in Due Course.
7. Who is Holder in Due Course? What Privileges are available to Holder in Due Course.
8. What are condition on satisfaction of which person becomes Holder in Due Course.

## 11.19  ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

4 (a) Order.

4(b) Bearer.

4 (c) Order

4 (d) Bearer.

4(e) Order

5 (a) False

5(b)  Truer

5 (c) False

5 (d) False .

5 (e) False

.

**TEST YOUR UNDERSTANDING  B**

4 (a) True.

4 (b) Truee.

4 (c) False

4 (d) True.

4 (e) True.

## 11.20  FURTHER READINGS

1.  M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.
3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
4. P C Tulsian and Bharat Tulsian, *Business Law*, McGraw Hill Education
5. Sharma, J.P. and Sunaina Kanojia, *Business Laws*, Ane Books Pvt. Ltd., New Delhi.

# B. COM (HONS.)
## (Accounting and Taxation)

### SEMESTER II

### COURSE: BUSINESS LAW

## UNIT 12 – TRANSFER AND DISHONOUR OF NEGOTIABLE INSTRUMENT

**STRUCTURE**

## 12.0 OBJECTIVES

**AFTER STUDYING THE UNIT, STUDENTS WILL BE ABLE TO**
- Understand the transfer of Negotiable Instruments can be done.
- Explain the process of Negotiation
- Distinguish between Negotiation and Assignment.
- Carry out endorsement of Negotiable instrument.
- Know the meaning dishonor and its types
- Apply process of Noting.
- Describe the meaning of Protesting.

## 12.1 TRANSFER OF NEGOTIABLE INSTRUMENT

Negotiable instruments are those instruments which can be freely transferred from one person to another and there is no restriction on transfer of such instrument. The person who gets the possession of negotiable instrument in good faith become bona-fide owner of the instrument. bBy transfer of instruments we mean giving title of the instrument to some other person. There are two methods through which a negotiable instrument can be transferred from one person to another. These methods are:
- Transfer by negotiation
- Transfer by assignment

## 12.2 TRANSFER BY NEGOTIATION (SECTION 14)

Negotiation of instrument is one of the most common way of transfer of Negotiable Instrument from one person to another person under Negotiable Instruments Act. Section14 of the act deals with Transfer by Negotiation. Negotiation is a process through which possession of instrument is transferred from one person to another in the manner that person get the title of the instrument and becomes Holder thereof. The Negotiable Instruments Act define the term 'Negotiation' as " when a Promissory Note, Bill of Exchange or Cheque is transferred to any person so as to constitute that person the holder thereof, the instrument is said to be negotiated." So, we can say that negotiation is not just transfer of possession of instrument by one person to another rather it is transfer of title of the instrument by one

person to another. A negotiation is assumed as valid negotiation if following two conditions are satisfied:

1. Negotiation must include transfer of possession of the instrument by one person to another person.
2. The transfer instrument must be in such a way the person getting the possession must also get the title of the instrument. He must become Hoder of the instrument.

The term holder here means to get right to recover the money due in the instrument in his own name. For example, if Mr X give a cheque of Rs. 10,000 payable to bearer to keep it in safe custody, it is not transfer by negotiation. it is mere transfer of possession.

## 12.3 WHO MAY NEGOTIATE ( SECTION 51)

Now a question arise that who can negotiate the instrument. An instrument can be negotiated by maker, drawer, endorsee or payee. However, negotiation will be valid only if the right of negotiation is not restricted. In case instrument bears any direction that restrict the right of negotiation, then negotiation will not be valid. Further, above mentioned persons can make negotiation only if they are holder of the instrument. Following are two modes of negotiation:

## 12.4 NEGOTIATION BY DELIVERY ONLY ( SECTION 47)

When any instrument is payable to the bearer, it may be negotiated by mere delivery from one person to another. The person getting the delivery will become holder of such instrument. Such delivery of the instrument may be actual deliver y or constructive delivery. For example if Mr A give some instrument to agent of Mr B on B's behalf, it is constructive delivery. In case of negotiation by delivery the person making endorsement need not to put his sign on the instrument. It will be valid negotiation. However, in such case person making endorsement will not be liable in case of dishonour of the instrument as he has not put his credit to the instrument by adding his signature.

## 12.5 NEGOTIATION BY ENDORSEMENT AND DELIVERY (SECTION 48)

If some instrument is payable to order, it cannot be negotiated by just making the delivery. In such case negotiation can be done by Endorsement and Delivery. If any of these characteristics that is 'Endorsement' or 'Delivery' is missing, then such negotiation will not be valid. Therefore valid negotiation needs followed two formalities:

1. The holder must endorse the instrument by putting his signature on the instrument.
2. After the endorsement instrument must be delivered to the endorsee. If any instrument is endorsed but it is not delivered then negotiation will not be complete.

Following are the effects of negotiation by endorsement and delivery

1. The title of the instrument is transferred from endorser to the endorsee.
2. The endorsee will gets all the rights vested in the instrument.
3. In case of dishonour of instrument, endorsee can sue all the parties who have endorsed the instrument.

## 12.6 TRANSFER BY ASSIGNMENT:

Negotiation of the instrument is one method through which instrument can be transferred from one person to another under the negotiable instruments act. However, there is another method of transfer of instrument that is transfer by assignment. Any transfer by assignment is not done under negotiable instruments act rather it is done under transfer of property act. Transfer by assignment is a situation when a person transfer negotiable instrument to another person without making on the instrument. Here the person the sells the right of the instrument to another person by not making endorsement on the instrument rather by a separate deed in writing according to the provisions of transfer of property act. As assignment is not done under the negotiable instruments act, the transferee of the instrument does not get better title of the instrument than the title of the transferor. In other words, we can say that transferee does not become holder in due course the instrument.

## 12.7 DISTINCTION BETWEEN NEGOTIATION AND ASSIGNMENT

| Basis | Negotiation | Assignment |
|-------|-------------|------------|
| 1. Meaning | Negotiation is a process of transferring negotiable instrument by delivery in case of bearer instrument, transfer and delivery in case of order instrument. | Assignment is a process selling the right of the instrument to other person by separate deed in writing. |
| 2. Formalities | It can be done by mere delivery or endorsement and delivery. | It need written agreement signed by the persons. |
| 3. Notice | There is no need to give any notice to the debtor. | Assignee of the instrument must give notice to debtor otherwise assignment will not be complete. |
| 4. Consideration | In case of negotiation consideration is presumed | In case of assignment consideration is not presumed whether it is to be proved |
| 5. Scope | Negotiation can be done only for negotiable instrument. | It can be done for any document. |
| 6. Title | Transferee of the document can get better title than the transferor. | Transferee of the document cannot get better title than the transferor. |

| 7. Right to sue | In negotiation transferee can you even a third party in his own name. | In assignment transferee can you only the transferor. |
| --- | --- | --- |
| 8. Stamp duty | No stamp duty is required. | Stamp duty need to be paid as per rules. |
| 9. Act | It is covered under negotiable instruments act. | It is covered under transfer of property act. |

## 12.8 ENDORSEMENT (SECTION 15)

In general life, the term _Endorsement' means writing something on the back of the instrument. However, this term has different meaning under the negotiable instruments act. Endorsement is a way of negotiation of negotiable instrument. When the holder of the instrument writes the name of the person to whom he is going to transfer the instrument either on the face of the instrument or at the back of the instrument along with his signature, it is called endorsement. There is no prescribed format or special words required to make the endorsement. Even endorsement can be done by mere putting the signature by transferee either on face of instrument or at the back of the instrument. Sometimes space is not available on the instrument in such case a separate slip of paper may be attached to the instrument and endorsement can be made on such slip. This slip of paper attached to the instrument is known as _Allonge'. For valid endorsement it must be made by writing in ink only. Further, if a person is illiterate he can make endorsement by putting his thumb impression.

## 12.9 ESSENTIALS OF VALID ENDORSEMENT:

1. Endorsement is valid if it is made either on the face of the instrument or at the back of the instrument. However, if no space is available it can be made on the slip of paper attached to the instrument.
2. Endorsement can be made either by the payee of the instrument or by the holder of the instrument. A stranger cannot make any valid endorsement.
3. The person making the endorsement must put his signature on the instrument. However, an illiterate person can make endorsement by putting his thumb impression.
4. Endorsement can be made only for the instrument as a whole, endorsement for part of the instrument is not valid.
5. There are no specific words for making the endorsement.
6. Endorsement can be made by writing with ink only. Writing with the pencil or putting a rubber stamp does not make valid endorsement.
7. After making the endorsement holder must deliver the instrument to endorsee.

## 12.10 DIFFERENT TYPES OF ENDORSEMENT
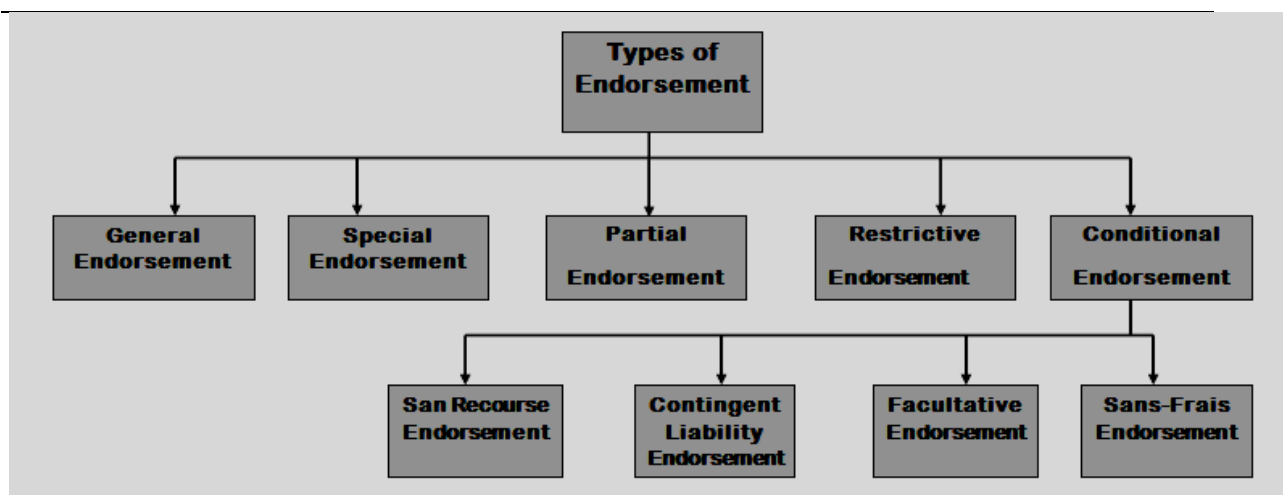


1. **BLANK OR GENERAL ENDORSEMENT:** When the endorser while making the endorsement just put his signature on the back of the instrument, it is called Blank or General endorsement. In this type of endorsement the name of the endorser does not appear anywhere in the instrument. The benefit of general endorsement is that it converts the order instrument into the bearer instrument. Once the blank endorsement is done, endorsee of the instrument can transfer such instrument further without making any endorsement. As in this case endorsee is not putting his signature, he will not be responsible to the for other parties to whom endorsement is done.for example, Mr. X holds an order instrument and he endorsed such instrument to Mr Y by just putting his signature. Now the instrument has become bearer instrument and Mr. Y can further negotiate it without putting his signature.

2. **SPECIAL OR FULL ENDORSEMENT**: Sometime if a person wants to make endorsement in the name of particular person or his order. In case he can make special or full endorsement. It is a situation in which while making the endorsement name of the person to whom endorsement is made is also written on the instrument. For example

   _ Pay to Ajay or his order'

   Sd/- Rohit

   After special endorsement now the instrument is payable only to Ajay or his order. In case he wants to make further endorsement, he cannot do so by just making the delivery. He has to endorse the document in favour of endorsee. If an instrument is endorsed in blank, it may be converted into full endorsement by writing the name of the person above the signature of the endorsee. For example, an instrument is endorsed by Mr A to Mr B in blank. Mr B added the words _ pay to Mr C order', above the signature of Mr A and endorsed the same to Mr C. Now the blank endorsement is converted into full endorsement and Mr B will not be responsible for payment as he did not put his endorsement anywhere on the instrument.

3. **PARTIAL ENDORSEMENT (SECTION 56):** Sometime endorsement is not made for the full amount mentioned in the instrument, rather it is made only for a part of the amount, it is called Partial Endorsement. As per provisions of Negotiable Instruments Act, partial endorsement is not allowed and it will make the instrument

invalid. Example Mr A has an instrument of Rs. 20,000 and he endorsed the same to Mr B by writing the words ‗pay Rs. 5000 to Mr B for his order'. This is called partial endorsement.

4. **RESTRICTIVE ENDORSEMENT (SECTION 50):** Restrictive endorsement is a situation in which endorsement is made by one person to another but he puts the restriction on further endorsement of the instrument. If restrictive endorsement is made, the person to whom endorsement is done has right to receive the payment but he cannot make any further endorsement of the instrument. For example, following are the Restrictive endorsement;

  ‗ pay to Lal Bihari only;.
  ‗pay to Lal Bihari for my use'.

However, following endorsement cannot be treated as restrictive endorsement:

  ‗ pay to Lal Bihari'
  ‗pay to Lal Bihari in State Bank of India account'.

5. **CONDITIONAL ENDORSEMENT:** Conditional endorsement is one, which does not put restriction on the endorsement of the instrument, rather it put some condition or limit on the endorsement of the instrument. If the person making the endorsement put any condition in the endorsement, it is called conditional endorsement. Further, if person making the endorsement, limit his liability of the endorsement it is also called conditional endorsement. For example, following are conditional endorsement:

  ‗ Pay to Ajay on his divorcing Anu'.
  ‗pay to Kamat on arrival of the goods in ship'.

  In case of conditional endorsement, the liability of endorser arise only when search condition is fulfilled or such event is happened. Following are the manner in which conditional endorsement can be made:

- **„SANS RECOURSE" ENDORSEMENT**: ‗Sans Recourse' Endorsement is one in which person making the endorsement will not be liable to endorsee or any further party in case of dishonour of the instrument. In simple words once ‗Sans Recourse' endorsement is made, person making the endorsement will not be held liable for payment of any amount on dishonour of the instrument. Following are considered as ‗sans recourse' endorsements:

  ‗pay to Lal Bihari sans recourse'
  ‗pay to Lal Bihari or order without recourse on me'

- **CONTINGENT ENDORSEMENT:** When endorsement of the instrument depends upon happening of certain event it is called contingent endorsement. In such case if event mentioned in the endorsement happens, then endorsement will be valid but if the event mentioned in the endorsement does not happen, endorsement will be invalid. Following endorsements are example of contingent endorsement:

  ‗ pay to Ajay on his marriage to Anu'.
  ‗pay to Kamat on arrival of the goods in ship'.

  In the above case liability of endorser arise only on the happening of event mentioned. In case the event become impossible, and endorser liability comes

to an end. For example if the ship sinks in the above example the person making the endorsement is free from his liability. However, endorsee can sue all the prior parties who made endorsement before the contingent endorsement.

- **FACULTATIVE ENDORSEMENT**: It is called facultative endorsement if the person making the endorsement waives some of his rights available under the law. For example, as per Negotiable Instrument Act, in case of dishonour of instrument, the holder of instrument must give notice of dishonour to the prior parties to whom he wants to make liable for the instrument. In case Mr. A makes endorsement to Mr. B by writing the words _pay to Mr. B or order, notice of dishonour waived', in this case it is facultative endorsement. Now even if instrument is dishonoured B need not to give notice of dishonour to Mr A.

- **„SAIN FRAIS ENDORSEMENT"**: In case endorser does not want the endorsee to incurr any expenses on the instrument, he can make _Sain Frais' endorsement. If such endorsement is made, endorsee will not be eligible for claiming any expenses incurred on the instrument.

## 12.11  CANCELLATION OF ENDORSEMENT:

As per provisions of Negotiable Instruments Act, the holder of the instrument has power to cancel endorsement of any person on the instrument. Cancellation of endorsement will not make the instrument invalid. However, if endorsement is cancelled all the what is whose name appears after the cancelled endorsement will be discharged from liability of the instrument. For example following endorsement appears on an instrument

First endorsement    by Mr. Ajay
Second endorsement by Mr. Rohit
Third endorsement by Mr. Vinod
Fouth endorsement by Mr. Sunil

Now the holder of the instrument is Bala, who cancelled the endorsement of Mr. Vinod. Later the bill is dishonoured and Bala filedis a suit against Mr Sunil. It was held that Mr Sunil is not liable for the instrument as cancellation of endorsement of Mr Vinod hampers remedy which was available to Mr Sunil against Mr Vinod. However, the liability of Mr. Rohit and Mr. Ajay still exists.

## 12.12  NEGOTIATION BACK

Sometime it happens that the endorser of the instrument again become the Holder of the instrument. This is called 'negotiation Back'. If it happens all the intermediate parties are discharged from the liability. For example, an endorsement is made by Mr A to Mr B,  Mr B to Mr C, Mr C to Mr D and Mr D back to Mr A. This is _negotiation back'. In this case, if instrument is dishonoured all the parties B, C, D are discharged from liability as A will file suit against D, D against C, C against B and B against A, so ultimately liability will fall again

on A. However, if at first endorsement A writes the word ‗sans recourse' now B, C and D are not discharged from liability even if it is negotiated back to Mr A.

## 12.13 TEST YOUR UNDERSTANDING (A)

10. Write the meaning of .Negotiation.

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11. Give four difference between Negotiation and Assginment.

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12. What is Full Endorsement.

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13. State the type of Endorsement in following cases.

   a.  Rakesh's Sign only          .          ……………………………….

   b. Pay Madhuri on receipt of goods.       ……………………………….

   c. Pay Kumar 2,000 (Bill amount 3,000).   ……………………………….

   d. Pay Radha Sans Recourse..              ……………………………….

   e. Pay to Anil or order.                  ……………………………….

   f.  Pay to Abhinav Sans Frais.            ……………………………….

   g. Pay to Bina only.                      ……………………………….

14. State whether following are true or False

   a.  Full endorsement cheque cannot be transferred further.

   b.  Assignment of Instrument is covered under Negotiable Instruments Act.

   c.  Endorsement is only method of Negotiation.

   d.  ‗ Pay to Hari only; is a restrictive endorsement.

e. Bearer Instrument can be negotiated by Delivery only.

## 12.14 DISHONOUR OF NEGOTIABLE INSTRUMENT:

Negotiable Instruments whether Bill of Exchange, Promissory Note or Cheque are payable either by the acceptor or the drawee when these become due for payment. Sometimes an acceptor or Drawee fails to make the payment of these instruments when these become due, this is known as Dishonour of the Instrument. In other words dishonour means _failing to honour the instrument'. A Bill of Exchange may be dishonoured for non- acceptance or for non payment. However, Promissory Note or Cehque maybe dishonoured for non payment only. chapter 8, section 91 to 98 of the Negotiable Instruments Act deals with dishonour of the negotiable instrument. According to these sections, disorder may be categorised into two categories that are:
- Dishonour by Non Acceptance.
- Dishonour by Non Payment.

## 12.15 DISHONOUR BY NON ACCEPTANCE (SECTION 91)

Whenever a drawer draws a Bill of exchange on drawee, he send the same to drawee for acceptance. In case drawee fails to give his acceptance to the bill of exchange, it is known as Dishonour by non-acceptance. However, only a bill of exchange can be dishonoured by non acceptance. A promissory note or cheque may not be dishonored for own acceptance as there is no acceptance required in case of these instruments. A Bill of exchange may be dishonoured by non acceptance in following ways:
1. When drawer sends the bill to drawee for acceptance and drawee fails to give his acceptance within 48 hours of presentment of Bill.
2. When the presentment of bill is excused that is presentment of bill is not necessary and Bill remain unaccepted.
3. In case Drawee is a person who is incompetent to contract.
4. Sometime Drawee is a fictitious person
5. When it is not possible to find him after the reasonable search.
6. In case Drawee gives qualified acceptance to the instrument.
7. In case Drawee is declared insolvent by the authorities or has died.
8. When there are severalDrawees not being partner and one or more of them make default in acceptance.
9. When drawee in case of need refuses to accept the instrument.

## 12.16 DISHONOUR BY NON PAYMENT (SECTION 92)

According to Section 92 of the Negotiable Instruments Act ,any negotiable instrument whether Bill of exchange, Promissory Note or Cheque is said to be Dishonoured by non payment when the person responsible for making the payment that is drawee in case of Bill or

Cehque or maker in case of promissory note makes the default in payment when such instrument becomes due for payment. Following are the cases when it is assumed that the instrument is dishonoured by non payment:

1. When the instrument is duly presented by Holder for payment and the payment is refused or person fails to obtain the payment.
2. When the presentment of instrument is not necessary and instrument remains unpaid on the maturity.
3. In case the instrument has become overdue and it remained unpaid.

## 12.17  NOTICE OF DISHONOUR

Whenever a Negotiable Instrument is dishonoured for Non payment or for Non acceptance, a formal communication is sent to all the parties who are liable for the instrument and such formal communication is called Notice of Dishonour. The notice of dishonour must be sent immediately after the instrument is dishonoured. If the person fails to send the notice of dishonour to the concerned parties, then all the parties except the Principal Debtor  or acceptor, would get discharged from the liability. Main objective of sending the notice of dishonour is not to ask the parties for the payment or the instrument rather it is to inform them about the dishonour of the instrument.  It is information to them that Principal Debtor has defaulted the payment and now these parties are liable for the instrument.  Such notice may be given in writing or in oral. The notice must be given within reasonable time and may be served at the place of business or at the residence of the party.  In case notice is sent through the post and is lost in transit, the parties concerned are not get discharged from their liability.

### 12.17.1  REQUISITES OF VALID NOTICE:
1. Notice may be given in oral or in writing.
2. The notice must clearly contain the fact that the instrument has been dishonoured for non acceptance or for non payment
3. Notice must be issued within reasonable time.
4. Notice may be served at the place of business of the person or at the residence of the person.
5. If the notice is lost in transit, than the party to whom notice is to be served does not get discharged from the liability.

### 12.17.2  WHO  CAN GIVE THE NOTICE OF DISHONOUR?
Following is the list of persons who can serve the notice of dishonour:
1. The holder of the instrument.
2. Any party that is liable for the instrument.
3. The agent of any party that is liable for the instrument.

4. The person who received the notice of dishonour can send the same to all the prior parties.

Under the Negotiable Instruments Act, it not necessary that only the holder can send the notice of dishonour, even a person getting the notice of dishonour may send the same to all the prior parties to make them liable for the instrument. So, it is not necessary that the party should get notice of dishonour from the holder only, even a party getting the notice may send the notice to others.

### 12.17.3  TO WHOM NOTICE OF DISHONOUR MAY BE SENT?

When a negotiable instrument get dishonoured, the notice of dishonour may be sent to the following parties:
1. To all the parties to whom the holder of the negotiable instrument wants to make liable for the instrument.
2. To the legal representative of a party in case the person died.
3. To the Official Receiver of the person,when a person is declared insolvent.

### 12.17.4  WHAT IS REASONABLE TIME

According to Section 15 of the Negotiable Instruments Act when any instrument get is founded the notice of dishonour must be served within the reasonable time. the reasonable time of serving the notice depends upon the nature of instrument at the usual course of dealing with such instrument, the distance at which parties are situated and the mode of communication through which notice is sent. in case of any public holiday it is not considered while calculating the reasonable time of serving the notice.

Section 106 of Negotiable Instruments Act give the following rule for determining reasonable time for serving the notice of dishonour:
1. If the holder and the person who is entitled to receive notice, have their place of business or place of residence at different places, the notice of dishonour must be sent through next post by next day after the dishonour of the instrument.
2. If the holder of the instrument and the person entitled to receive the notice have their business and or residence at same place then notice must reach on the next day after the dishonour of the instrument.

### 12.17.5  WHEN NOTICE OF DISHONOUR IS NOT NECESSARY:

Though notice of dishonour is sent to all the parties to whom holder wants to make liable for the instrument, however in following cases there is no need of sending the notice of dishonour:
1. When the notice of dishonour is waived by the person who is entitled to get such notice.
2. When the drawer of the cheque himself has countermanded the payment of the cheque.
3. In case it is proved that party entitled for notice cannot suffer damage for want of notice.
4. When the party entitled for notice cannot be found after a reasonable search.
5. When the drawer and acceptor of the instrument is a same person.

6. In case instrument is a promissory note that is not negotiable.
7. If the party entitle to receive the notice, promises to pay the amount due for the the instrument after it get dishonoured without putting any condition.
8. Where the holder cannot send the notice due to some reason which is beyond his control.

## 12.18 NOTING OF THE INSTRUMENT

In case any negotiable instrument is dishonoured, the holder of the instrument has right to sue the concerned parties after giving proper notice of dishonour. However, in such case law wants some authenticatie proof that the negotiable instrument was presented by the holder for acceptance or for payment and it was dishounered by the third party. Noting of the dishonoured instrument is one such proof that shows that negotiable instrument is dishonoured by the concerned party. However, it is important to mention here that only bill of exchange and promissory note needs the noting on Dishnonour. in case of a cheque there is no need of noting as when cheque is dishonoured Bank gives back the cheque giving the reason of dishonour in writing, which is a sufficient proof of dishonour.

When any bill of exchange or promissory note is dishonoured, the holder of the instrument bring such document to the the Notary Public who present it again for acceptance or for payment, as the case may be. If the concerned party still refuse to honour the instrument, Notary Public record thefact of dishonour in his register and also record the fact on instrument or the paper attached to the instrument. This process is called Noting of the instrument. Once Noting is done, it is a proof that instrument was dishonored. Noting of the fact in record of Notary Public is also known as ‗Minutes‘. Noting of the instrument must be done within reasonable time. Though there is no legal effect of the Noting or it is alos not compulsory under the act, but it is beneficial to get instrument Noted after its dishonour as it authenticated the dishonour.

### CONTENTS OF NOTING
Following are the contents of Noting:
1. The fact of the dishonour.
2. Date on which instrument was dishonoured.
3. Reason of dishonour if any given by the person.
4. If there was no Express dishonour of instrument, than reason why Holder is treating the instrument as dishonored.
5. Amount paid as Noting charges.
6. Entry number of the Notary‘s register.
7. The signature and stamp of the Notary.

## 12.19 PROTESTING OF INSTRUMENT :

When any negotiable instrument is dishonoured and is noted by the notary public in his register, the holder of the instrument may ask for a separate certificate from the notary

public that authenticates the fact of dishonor. This formal certificate issued by Notary is called protesting. So, protesting is the formal certificate issued by notary public to the holder of the instrument which give the fact of dishonour of the instrument. In case of Inland bills there is no need of protesting but in case of foreign Bill the prtesting is must. So, if any foreign bill is dishonoured, the holder must get it protested. Noting and Protesting is done only for bill of exchange and promissory notes, it is not done for cheques.

## CONTENTS OF PROTESTING

1. The literal transcript of the instrument.
2. Name of the holder for whom protesting is done.
3. Name of the person against whom protesting is done,.
4. The fact of dishonour.
5. The reason of dishonour if any.
6. Date on which instrument was dishonoured.
7. The signature of the notary.

## 12.20 COMPENSATION FOR DISHONOUR (SECTION 117) :

According to Section 117 of Negotiable Instruments Act, when any bill of exchange, promissory note or cheque is dishonoured, the aggrieved party is entitled for compensation. Following are the rules in this regard.

1. **COMPENSATION TO HOLDER**: On dishonour of the instrument, the holder is entitled to receive the amount due on the instrument and any amount spent by him on noting and protesting of the instrument.
2. **COMPENSATION TO ENDORSER**: When any negotiable instrument is dishonored and endorser make the payment for the same, he is entitled for amount paid by him on the instrument, any amount spent by him on noting and protesting of the instrument and interest at the rate of 18% per annum from the date on which he made the payment to the realisation of the amount.
3. **RE-EXCHANGE:** Re Exchange is the measrue to protect against difference in exchange rate. If the person to whom amount is payable lives in different plance than the place of payment of instrument, person is eligible to claim the compensation at current rate of exchange.
4. **REDRAFT:** Party that is eligible for compensation on dishonour of the instrument, can draw a fresh instrument against the defaulting party. Such instrument is called ₋Redraft'. The new instrument can be drawn for the amount due together with all expenses chargeable from the party. Such new instrument is payable at sight or on demand. The new instrument must be accompanied by the dishonoured instrument and the proof of dishonour is any. In case new instrument is also dishonoured, the person will be eligible for compensation in the same manner as in case of original instrument

## 12.21 TEST YOUR UNDERSTANDING (B)

1. What is Dishonour by Non-Acceptance.

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2.  Who can give the Notice of Dishonour.

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3.  What is Noting of Negotiable Instrument.

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4.  Write contents of Protesting.

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5.  Varun draws a bill on Rajeev and gifted the same to Hans as gift. Later Hans endorsed the bill for consideration to Raj. Raj endorsed the same bill to Varun. Discuss the position of Varun if bill is Dishonoured on the due date.

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6.  State whether following are true or False

    a.  Cheque is never dishonoured for Non-Acceptance.

    b.  On Dishonour of instrument, notice of dishonor must be given to all parties to whom holder wants to make liable.

    c.  Noting of Instrument is legally compulsory.

    d.  Notice of dishonor can be issued anytime.

    e.  Protesting is generally done for foreign instrument.

## 12.22  LET US SUM UP

- Negotiable instruments are freely transferable.
- Negotiable instruments can be transferred by two methods, Negotiation and Assignment.
- Bearer instruments can be transferred by Delivery only.
- Order instruments can be transferred by Endorsement and Delivery.
- Blank endorsement makes the instrument Bearer instrument.
- Full endorsement will make the instrument order instrument.
- Restrictive endorsement puts some restriction on further endorsement.
- Partial endorsement is not valid.
- Negotiable instruments can be dishonoured for Non-Acceptance or for Non-Payment.
- Only bill of exchange may be dishonoured for non acceptance.
- When instrument is dishonoured, notice must be given to all parties to whom holder wants to make liable for dishonor.
- Notice must be given within reasonable time.
- Such notice may be oral or written.
- Noting of instruments is the authentication of dishonor of instrument.
- Noting is not legally compulsory but it is useful.
- Protesting is mostly done for foreign instruments only.

## 12.23  KEY TERMS

- **NEGOTIATION**: . Negotiation is a process through which possession of instrument is transferred from one person to another in the manner that person get the title of the instrument and becomes Holder thereof
- **NEGOTIATION BY DELIVERY:** When any instrument is payable to the bearer, it may be negotiated by mere delivery from one person to another..
- **ASSIGNMENT:** When person the sells the right of the instrument to another person by not making endorsement on the instrument rather by a separate deed in writing according to the provisions of transfer of property act.
- **ENDORSEMENT:** When the holder of the instrument writes the name of the person to whom he is going to transfer the instrument either on the face of the instrument or at the back of the instrument along with his signature.
- **BLANK OR GENERAL ENDORSEMENT:** When the endorser while making the endorsement just put his signature on the back of the instrument, it is called Blank or General endorsement.
- **SPECIAL OR FULL ENDORSEMENT:** It is a situation in which while making the endorsement name of the person to whom endorsement is made is also written on the instrument.
- **DISHONOUR BY NON-ACCEPTANCE -** Whenever a drawer draws a Bill of exchange on drawee, he send the same to drawee for acceptance. In case drawee fails to give his acceptance to the bill of exchange, it is known as Dishonour by non-acceptance.

- **DISHONOUR BY NON-PAYMENT:** when the person responsible for making the payment that is drawee in case of Bill or Cehque or maker in case of promissory note makes the default in payment when such instrument becomes due for payment.
- **NOTING:** When any bill of exchange or promissory note is dishonoured, the holder of the instrument bring such document to the the Notary Public who present it again for acceptance or for payment, as the case may be. If the concerned party still refuse to honour the instrument, Notary Public record thefact of dishonour in his register and also record the fact on instrument or the paper attached to the instrument. This process is called Noting of the instrument.
- **PROTESTING**: When any negotiable instrument is dishonoured and is noted by the notary public in his register, the holder of the instrument may ask for a separate certificate from the notary public that authenticates the fact of dishonor. This formal certificate issued by Notary is called protesting.

## 12.24 REVIEW QUESTIONS

1. What is Negotiation? How it is different from Assignment.
2. What is Endorsement? Give essential of valid Endorsement.
3. Give different types of Endorsement.
4. What is Dishonour of Negotiable instruments.
5. What is Dishonour for Non -Acceptance.
6. What is Notice of Dishonour. Give rules related to Notice of Dishonour.
7. What is Noting of instrument? Give its contents and importance.
8. What is Protesting. What is its need.
9. What compensation holder could claim on dishonor of instrument.

## 12.25 ANSWERS TO TEST YOUR UNDERSTANDING.

**TEST YOUR UNDERSTANDING A**

4 (a) Blank.

4(b) Conditional.

4 (c) Partial.

4 (d) Conditional.

4(e) Full.

4(f) Conditional.

4(g) Restrictive.

5 (a) False, it can be transferred further.

5(b) False, it is covered under Transfer of Property Act

5 (c) False, Bearer instrument is transferred by Delivery also.

5 (d) True.

5 (e) True.

**TEST YOUR UNDERSTANDING B**

5. Varun can sue Rajeev only. He cannot sue other parties as it will result into circularity.

6 (a) True.

6 (b) True.

6 (c) False, Not legally compulsory

6(d) False, within reasonable time only.

6 (e) True.

## 12.26  FURTHER READINGS

1. M.C. Kuchhal, and Vivek Kuchhal, *Business Law*, Vikas Publishing House, New Delhi.
2. SN Maheshwari and SK Maheshwari, *Business Law*, National Publishing House, New Delhi.
3. Aggarwal S K, *Business Law*, Galgotia Publishers Company, New Delhi.
4. P C Tulsian and Bharat Tulsian, *Business Law*, McGraw Hill Education
5. Sharma, J.P. and Sunaina Kanojia, *Business Laws*, Ane Books Pvt. Ltd., New Delhi

**The Motto of Our University**
**(SEWA)**
**S**KILL ENHANCEMENT
**E**MPLOYABILITY
**W**ISDOM
**A**CCESSIBILITY

# JAGAT GURU NANAK DEV
# PUNJAB STATE OPEN UNIVERSITY, PATIALA
### (Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

# B.COM (Hons.)
# (Accounting and Taxation)

# SEMESTER-II

## BCDB31203T
## BUSINESS MATHEMATICS AND STATISTICS

### Head Quarter: C/28, The Lower Mall, Patiala-147001
### Website: www.psou.ac.in

The Study Material has been prepared exclusively under the guidance of Jagat Guru Nanak Dev Punjab State Open University, Patiala, as per the syllabi prepared by Committee of Experts and approved by the Academic Council.

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**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA**

**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

# PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open University of the State, entrusted with the responsibility of making higher education accessible to all, especially to those sections of society who do not have the means, time or opportunity to pursue regular education.

In keeping with the nature of an Open University, this University provides a flexible education system to suit every need. The time given to complete a programme is double the duration of a regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skillbased and employability-enhancing education. The study material provided in this booklet is self-instructional, with self-assessment exercises, and recommendations for further readings. The syllabus has been divided in sections, and provided as units for simplification.

The University has a network of 10 Learner Support Centres/Study Centres, to enable students to make use of reading facilities, and for curriculum-based counselling and practicals. We, at the University, welcome you to be a part of this instituition of knowledge.

Prof. G.S. Batra
Dean Academic Affairs

# B Com (Hons.)
## (Accounting and Taxation)
## CORE COURSE (CC)

## SEMESTER II
## BCDB31203T BUSINESS MATHEMATICS AND STATISTICS

MAX. MARKS: 100
EXTERNAL: 70
INTERNAL: 30
PASS: 35%

**Objective:**      **Credits: 6**

The objective of this course is to familiarize students with the applications of mathematics and statistical techniques in business decision-making.

**Notes:**

1. Use of simple calculator is allowed.

2. Proofs of theorems / formulae are not required.

3. Trigonometric functions are not to be covered.

**INSTRUCTIONS FOR THE CANDIDATES:**

> Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

## Section A

### Business Mathematics

Matrices **:** Definition of a matrix. Types of matrices; Algebra of matrices. Calculation of values of determinants up to third order; Adjoint of a matrix; Finding inverse of a matrix through ad joint; Applications of matrices to solution of simple business and economic problems Differential Calculus **:** Mathematical functions and their types – linear, quadratic, polynomial; Concepts of limit and continuity of a function; Concept of differentiation; Rules of differentiation – simple standard forms. Applications of differentiation – elasticity of demand and supply; Maxima and Minima of functions (involving second or third order derivatives) relating to cost, revenue and profit.

Basic Mathematics of Finance **:** Simple and compound interest Rates of interest – nominal, effective and continuous – their interrelationships; Compounding and discounting of a sum using different types of rates

## Section B

### Business Statistics

Uni-variate Analysis **:** Measures of Central Tendency including arithmetic mean, geometric mean and harmonic mean : properties and applications; mode and median. Partition values - quartiles, deciles, and percentiles. Measures of Variation: absolute and relative. Range, quartile deviation and mean deviation; Variance and Standard deviation: calculation and properties. Bi-variate Analysis **:** Simple Linear Correlation Analysis: Meaning, and measurement. Karl

Pearson's co-efficient and Spearman's rank correlation. Simple Linear Regression Analysis: Regression equations and estimation. Relationship between correlation and regression coefficients

Index Numbers Analysis **:** Meaning and uses of index numbers; Construction of index numbers: Aggregative and average of relatives – simple and weighted, Tests of adequacy of index numbers, Construction of consumer price indices.

Time series analysis: Components of time series; additive and multiplicative models; Trend analysis: Finding trend by moving average method and Fitting of linear trend line using principle of least squares.

**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA**

**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

# B.COM (Hons.)
# (Accounting and Taxation)
## SEMESTER II

## BCDB31203: BUSINESS MATHEMATICS AND STATISTICS

### COURSE COORDINATOR AND EDITOR: DR. ROHIT KUMAR

### SECTION A

| UNIT NO. | UNIT NAME |
|----------|-----------|
| UNIT 1 | MATRICES |
| UNIT 2 | DETERMINANTS |
| UNIT 3 | FUNCTIONS |
| UNIT 4 | LIMIT AND CONTINUITY |
| UNIT 5 | DIFFERENTIATION |
| UNIT 6 | BASIC MATHEMATICS OF FINANCE |

**SECTION B**

| UNIT NO. | UNIT NAME |
|----------|-----------|
| UNIT 7 | MEASURES OF CENTRAL TENDENCY |
| UNIT 8 | DISPERSION |
| UNIT 9 | CORRELATION |
| UNIT 10 | REGRESSION |
| UNIT 11 | INDEX NUMBERS |
| UNIT 12 | TIME SERIES ANALYSIS |

# B. COM (Hons.)

**(Accounting and Taxation)**
**SEMESTER II**

**COURSE: BUSINESS MATHEMATICS AND STATISTICS**

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# Unit 1 – Matrices

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## STRUCTURE

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## 1.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Define the Meaning of a Matrix.
- Understand different types of Matrices.
- Apply Addition, Subtraction and Multiplication of Matrices
- Apply the concept of Matrices to Business and Economic Problems.
- Distinguish between Single and Double Entry System.
- Find out Transpose of a Matrix.
- Understand the meaning of Symmetric, Skew-Symmetric and Orthogonal Matrix.

## 1.1 INTRODUCTION

Matrices are one of the most important and powerful tools in the mathematics for business. Matrices applications are helpful to solve the linear equations and with the help of this cost estimation, sales projection etc., can be predicted. Basically a matrix consists of a rectangular presentation of numbers arranged systematically in rows and columns describing the various aspects of a phenomenon inter- related in some manner.

**For example:** Marks obtained by two students, say, Ram and Shyam, in English, Mathematics and Statistics are as follows:

|       | English | Mathematics | Statistics |
|-------|---------|-------------|------------|
| Ram   | 60      | 80          | 85         |
| Shyam | 65      | 90          | 80         |

These marks may be represented by the following rectangular array enclosed by a pair of brackets [ ],

i.e. $\begin{bmatrix} 60 & 80 & 85 \\ 65 & 90 & 80 \end{bmatrix}$ ← First Row
← Second Row

↑ ↑ ↑
First      Second Third
        Column Column Column

Each horizontal line is called a row and each vertical line is called a column. The first row indicates the marks obtained by Ram in English, Mathematics and Statistics respectively and the second by Shyam in the three respective subjects.

Such a rectangular array is called a Matrix.

## 1.2 DEFINITION OF A MATRIX

An $m \times n$ matrix is a rectangular array of $mn$ numbers (or elements) arranged in the form of an ordered set of $m$ rows and $n$ columns. A matrix $A$ having $m$ rows and $n$ columns is typically written as

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}_{m \times n}$$

The horizontal lines are called rows and the vertical lines columns.

The numbers $a_{11}, a_{12}, \cdots, a_{mn}$ belonging to the matrix are called is elements.

A matrix having $m$ rows and $n$ columns is said to be of $order\ m \times n$ (read as '$m$' by '$n$'). The order may be written on right of the matrix, as shown above.

## 1.3 NOTATIONS

Matrices are denoted by capital letters such as $A, B, C, \ldots, X, Y, Z$ and their elements by small letters $a, b, c, \ldots, a_{11}, a_{12},$ etc. There are different nations of enclosing the elements constituting a matrix in common use, $viz.$ , [ ], ( ), and { }, but we shall use the first one throughout the  chapter. The suffixes of the element $a_{ij}$ depict that the elements lies in ith row and jth column.  Note that we always write row number first and column number afterward. Also, note that, for  the sake of brevity, the matrix $A$ given above may also be written as $A = [a_{ij}]_{m \times n}$.

## 1.4 TYPES OF MATRICES

(i)  **ROW MATRIX:** If a matrix has only one row, it is called a *row matrix*. Thus, any $1 \times n$ matrix is called a row matrix, for example,

$$A = [a_1 a_2 a_3 \dots a_n]$$

is a row matrix of order $1 \times n$.

(ii)  **COLUMN MATRIX:**A matrix consisting of only one column is called a *column matrix*. In other words, any $m \times 1$ matrix is called a column matrix, for example

$$A = \begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_m \end{bmatrix}$$

is a column matrix of order $m \times 1$.

(iii)  **ZERO OR NULL MATRIX (0):** If every element of an $m \times n$ matrix is zero, the matrix is called a *zero matrix* of order $m \times n$, and is denoted by $0_{m \times n}$ or $0_{mn}$ or $0$ simply. For example,

$$0_{2\times3} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}_{2\times3}$$ is a zero matrix of order $2 \times 3$.

(iv)  **SQUARE MATRIX:**Any matrix In which the number of rows are equal to the number of columns is called a *Square matrix*. Thus any $n \times n$ matrix is a square matrix of order $n$.

Generally, we denote the order of a square matrix by a single number $n$, rather than $n \times n$.

**Remark:** The elements $a_{ij}$ for which $i = j$ in $A = [a_{ij}]_{n \times n}$ are called the *diadonal elements* and the line along which the elements $a_{11}, a_{12}, \dots, a_{nn}$ lie is called the *leading diagonal* or *principal diagonal* or *diagonal* simply. In a square matrix the pair of elements $a_{ij}$ and $a_{ji}$ are said to be conjugate elements.

(v)  **DIAGONAL MATRIX:** A square in which all elements except those in the leading diagonal are zero, is called a *diagonal matrix*. Thus, a diagonal matrix of order $n$ will be:

$$A = \begin{bmatrix} a_{11} & 0 & 0 & \cdots & 0 \\ 0 & a_{22} & 0 & \cdots & 0 \end{bmatrix}$$

$$0 \quad 0 \quad 0 \quad \cdots \quad a_{nn}$$

Sometimes a diagonal matrix of order $n$ with diagonal elements $a_{11}, a_{22}, \ldots, a_{nn}$ is denoted by $A = diag\ (a_{11}, a_{22}, \ldots, a_{nn})$.

**(vi) SCALAR MATRIX:** A diagonal matrix whose diagonal elements are all equal is called a *scalar matrix*. For example,

$$\begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

is a scalar matrix.

**(vii) Identity or Unit Matrix ( I ):** A scalar matrix in which each of its diagonal elements is unity is called an *identity* or *unit matrix*.

Thus, a square matrix $A = [a_{ij}]_{n \times n}$ is called identity matrix, if

$$a_{ij} = \begin{cases} 1, & when\ i = j, \\ 0, & when\ i \neq j. \end{cases}$$

An identity matrix of order $n$ is denoted by $I_n$. Thus, $I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is a unit matrix of order 2.

**(viii) TRACE OF A MATRIX:** The trace of any square matrix is the sum of its main diagonal elements. For example,

If $\quad A = \begin{bmatrix} 1 & -1 & 3 \\ 2 & 0 & 5 \\ 2 & 3 & -4 \end{bmatrix}$

Then $\quad$ trace (A) $= 1 + 0 + (-4)$
$$= -3$$

For a square matrix $A = [a_{ij}]_{n \times n}$

trace of $\quad A = \sum_{i=1}^{m} a_{ii}$

**(ix) Triangular Matrix:** If every element above or below the leading diagonal is zero, the matrix is called a *triangular matrix*. If the zero element is lie below the leading diagonal, the matrix is called *upper triangular matrix*; If the zero elements is lie above the leading diagonal, the matrix is called *lower triangular matrix*. The matrices $A_1$ and $A_2$ given below are the examples of upper and lower triangular matrices respectively:

$$A_1 = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} & a_{2n} \\ 0 & a_{22} & a_{23} & \cdots & a_{3n} \\ 0 & 0 & a_{33} & \cdots & \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & 0 & \cdots & a_{nn} \end{bmatrix} \text{(upper triangular matrix)}$$

$$A_2 = \begin{bmatrix} a_{11} & 0 & 0 & \cdots & 0 \\ a_{21} & a_{22} & 0 & \cdots & 0 \\ a_{31} & a_{32} & a_{33} & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nn} \end{bmatrix} \text{(lower triangular matrix)}$$

## 1.5 EQUALITY OF MATRICES

Two matrices are called comparable, if each of them consists of as many rows and columns as the other. Two matrices $A = [a_{ij}]$ and $B = [b_{ij}]$ are said to be equal, if (i) they have the same order and (iii) have equal corresponding elements throughout ($a_{ij} = b_{ij}$ for every i and j). The equality of matrices $A$ and $B$.

Thus, the matrices $\begin{bmatrix} 1 & 7 \\ 3 & 5 \end{bmatrix}$ and $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 9 \end{bmatrix}$ are not comparable while $\begin{bmatrix} 1 & 7 & 8 \\ 3 & 5 & 4 \end{bmatrix}$ and $\begin{bmatrix} 1 & 2 & 6 \\ 3 & 2 & 9 \end{bmatrix}$ are comparable but not equal.

The matrices $\begin{bmatrix} 1 & 5 & 9 \\ 3 & 4 & 12 \end{bmatrix}_{2 \times 2}$ and $\begin{bmatrix} 1 & 5 & 3 \times 3 \\ 3 & 2 \times 2 & 3 \times 4 \end{bmatrix}$ are equal.

## 1.6 SUB MATRIX OF A MATRIX

A matrix which is obtained from a given matrix by deleti called a *sub-matrix* of the given matrix.

n ny
g number
a of rows
or
columns is

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For example, the matrix $\begin{bmatrix} 2 & 3 \\ 9 & 3 \end{bmatrix}$ is a sub-matrix of $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 9 & \end{bmatrix}$. Obtained by deleting 2nd row and 1st column.

## 1.7 MULTIPLICATION OF A MATRIX BY A SCALAR 3

Let $A = [a_{ij}]$ be an $m \times n$ matrix and let $k$ be any real number (called scalar). Then the product of $k$ and $A$ denoted by $kA$ is defined to be the $m \times n$ matrix (i, j)th element is $ka_{ij}$, i.e.,

$$kA = \begin{bmatrix} ka_{11} & ka_{12} & \cdots & ka_{1n} \\ ka_{21} & ka_{22} & \cdots & ka_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ ka_{m1} & ka_{m2} & \cdots & ka_{mn} \end{bmatrix}$$

Thus, if $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, $3A = \begin{bmatrix} 6 & 9 \\ 12 & 15 \end{bmatrix}$

Thus, we notice that, to get the scalar product each element of the given matrix is multiplied by the given scalar.

### PROPERTIES OF SCALAR MULTIPLICATION:

(i) The product of a matrix with a scalar is commutative, i.e., $kA = Ak$.

(ii) If $k = -1$, $(-1)A = [-a_{ij}]$. Generally $(-1)A$ is denoted by $-A$ and is called the negative of matrix $A$, Thus, $-[a_{ij}] = [-a_{ij}]$.

(iii) If $A$ and $B$ are comparable matrices and $k$ is any scalar, we have $k(A + B) = kA + kB$.

(iv) If $k$ and $l$ are any two scalars and $A$ is any matrix, we have $(k + l)A = kA + lA$. (v) If $k$ and $l$ are any two scalars, we have $k(lA) = (kl)A$.

## 1.8 ADDITION OF MATRICES

The matrices $A$ and $B$ are conformable for addition, if they are comparable. i.e., $B$ has the same number of rows and the same number of column as $A$. Their sum, denoted by $A + B$, is defined to be the matrix obtained by adding the corresponding elements of $A$ and $B$.

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## ILLUSTRATIVE EXAMPLES

**EXAMPLE 1.**     Read the following elements $a_{21}, a_{32}, a_{22}, a_{11}$ in

$$A = \begin{bmatrix} 4 & 2 & 3 \\ 9 & 0 & 4 \\ 8 & 7 & 9 \end{bmatrix}$$

**Solution:**     $a_{21}$ denotes element in second row and first column,
$$a_{21} = 9, a_{32} = 7, a_{22} = 0, a_{11} = 4.$$

**EXAMPLE 2.**     Construct a $2 \times 3$ matrix $A = [a_{ij}]_{2\times3}$ whose general element is giving by

$$a_{ij} = (i - j)^2/2$$

**Solution:**
$$a_{11} = \frac{(1-1)^2}{2} = 0, \ a_{12} = \frac{(1-2)^2}{2} = \frac{1}{2}, \ a_{13} = \frac{(2-1)^2}{(2\cdot3)^2} = \frac{4}{2} = 2$$
$$a_{21} = \frac{(2-1)^2}{2} = \frac{1}{2}, \ a_{22} = \frac{(2\cdot2)^2}{2} = 0, \ a_{23} = \frac{(2\cdot3)^2}{2} = \frac{4}{2}$$

$$\therefore \quad A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}_{2\times3}$$

$$\Rightarrow \quad A = \begin{bmatrix} 0 & \frac{1}{2} & 2 \\ \frac{1}{2} & 0 & \frac{1}{2} \end{bmatrix}_{2\times3}$$

**EXAMPLE 3.**     If $A = \begin{bmatrix} 2 & 3 & 5 \\ 3 & -6 & 2 \end{bmatrix}$, find $-3A$.

**Solution:**   $-3A = \begin{bmatrix} -3 \times 2 & -3 \times 3 & -3 \times 5 \\ -3 \times 3 & -3 \times -6 & -3 \times 2 \end{bmatrix} = \begin{bmatrix} -6 & -9 & -15 \\ -9 & 18 & -6 \end{bmatrix}$

For example, if $A = \begin{bmatrix} 2 & 3 & 5 \\ 3 & 1 & 2 \end{bmatrix}$

and $B = \begin{bmatrix} 2 & 3 & 0 \\ 3 & 3 & 7 \end{bmatrix}$, we have

$$A + B = \begin{bmatrix} 2+3 & 3+3 & 0+5 \\ 3+3 & 3+1 & 7+2 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 6 & 5 \\ 6 & 4 & 9 \end{bmatrix}.$$

In general, if $A = [a_{ij}]_{m \times n}$ and $B = [b_{ij}]_{m \times n}$, which is a matrix obtained by adding the elements in the corresponding positions. Thus, from

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}_{m \times n} \text{ and }$$

$$B = \begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1n} \\ b_{21} & b_{22} & \cdots & b_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ b_{m1} & b_{m2} & \cdots & b_{mn} \end{bmatrix}$$

We get

$$A + B = \begin{bmatrix} a_{11} + b_{11} & a_{12} + b_{12} & \cdots \\ a_{21} + b_{21} & a_{22} + b_{22} & \cdots \\ \cdots & \cdots & \cdots \\ a_{m1} + b_{m1} & a_{m2} + b_{m2} & \cdots \end{bmatrix}$$

## [2].10 PROPERTIES OF MATRIX ADDITION

Suppose $A, B, C$ are three matrices of the same order $m \times n$. Then the matrix addition has following properties:

### [3].1. ASSOCIATIVITy

$$A + (B + C) = (A + B) + C$$

i. *e.,* the addition of matrices is associative.

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$$m \times n$$

$$a_{1n} + b_{1n}$$

$$a_{2n} + b_{2n}]$$
$$\cdots$$

$$a_{mn} + b_{mn} \ m \times n$$

## 1.9 DIFFERENCE OF MATRICES

If $A$ and $B$ are two comparable matrices, then their difference $A - B$ is matrix whose elements are obtained by subtracting the elements of $B$ from the corresponding elements of $A$.

If $\qquad A = [a_{ij}]m \times n$ and $B = [b_{ij}]m \times n$

Then $\qquad A - B = [a_{ij} - b_{ij}]m \times n.$

### 1.2. COMMUTATIVITY

$$A + B = [a_{ij}] + [b_{ij}] = [a_{ij} + b_{ij}]$$

$$= [b_{ij} + a_{ij}] = [b_{ij}] + [a_{ij}]$$

$$= B + A$$

i. $e.,$ matrix addition is commutative.

### 1.3. DISTRIBUTIVE LAW

$m(A + B) = mA + mB$ ($m$ being an arbitrary scalar), because

$$m(A + B) = m[a_{ij} + b_{ij}]$$

$$= [m \ a_{ij} + m \ b_{ij}] = m[a_{ij}] +$$

$$m[b_{ij}] = mA + mB.$$

### 1.4. EXISTENCE OF ADDITIVE IDENTITY

Let $A$ be any $m \times n$ matrix, and $0$ the $m \times n$ null matrix. Then, we have

$$A + 0 = 0 + A = A$$

i. $e.,$ the null matrix is the identity for the matrix addition.

### 1.5. Existence of additive inverse

$-A$ is the additive inverse of $A$, because

$$(-A) + A = [-a_{ij}] + [a_{ij}]$$

$$= [-a_{ij} + a_{ij}] = 0 = A + (-A)$$

Thus, for any matrix $A$, there exists a unique additive inverse $-A$.

### 1.6. Cancellation law

$$A + B = A + C \Rightarrow [a_{ij} + b_{ij}] = [a_{ij} + c_{ij}]$$

$$\Rightarrow a_{ij} + b_{ij} = a_{ij} + c_{ij}$$

$$\Rightarrow b_{ij} = c_{ij}$$

$$\Rightarrow [b_{ij}] = [c_{ij}]$$

$$\Rightarrow B = C$$

This is said to be left cancellation.

Similarly, right cancellation, namely,

$B + A = C + A \Rightarrow B = C$ can be proved.

**Example 4. If** $A = \begin{bmatrix} 1 & 5 & 6 \\ -6 & 7 & 0 \end{bmatrix}$ **and** $B = \begin{bmatrix} 1 & -5 & 7 \\ 8 & -7 & 7 \end{bmatrix}$**, find** $A + B$ **and** $A - B$.

**Solution:** Here $A + B = \begin{bmatrix} 1 & 5 & 6 \\ -6 & 7 & 0 \end{bmatrix} + \begin{bmatrix} 1 & -5 & 7 \\ 8 & -7 & 7 \end{bmatrix}$

$$= \begin{bmatrix} 1+1 & 5-5 & 6+7 \\ -6+8 & 7-7 & 0+7 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 0 & 13 \\ 2 & 0 & 7 \end{bmatrix}$$

and $A - B = \begin{bmatrix} 1 & 5 & 6 \\ -6 & 7 & 0 \end{bmatrix} - \begin{bmatrix} 1 & -5 & 7 \\ 8 & -7 & 7 \end{bmatrix}$

$$= \begin{bmatrix} 1-1 & 5-(-5) & 6-7 \\ -6-8 & 7-(-7) & 0-7 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 10 & -1 \\ -14 & 14 & -7 \end{bmatrix}$$

**Example 5. If** $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix}$ **and** $B = \begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$**, evaluate** $3A - 4B$.

**Solution:** $3A - 4B = 3\begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 5 \end{bmatrix} - 4\begin{bmatrix} 1 & 2 & -6 \\ 0 & -1 & 3 \end{bmatrix}$

$= \begin{bmatrix} 6 & 9 & 3 \\ 0 & -3 & 15 \end{bmatrix} - \begin{bmatrix} 4 & 8 & -24 \\ 0 & -4 & 12 \end{bmatrix}$

$= \begin{bmatrix} 6-4 & 9-8 & 3-(-24) \\ 0-0 & -3-(-4) & 15-12 \end{bmatrix}$

$= \begin{bmatrix} 2 & 1 & 27 \\ 0 & 1 & 3 \end{bmatrix}.$

**Example 6. If X, Y are two matrices given by the eqations**

$X + Y = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ **and** $X - Y = \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix}$ $, find$ X, Y

**Solution:** We have

$$X + Y = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix} \qquad \text{...(i)}$$

$$X - Y = \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix} \qquad \text{...(ii)}$$

By adding equations (i) and (ii),

$$2X = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix} + \begin{bmatrix} 3 & 2 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 1+3 & -2+2 \\ 3-1 & 4+0 \end{bmatrix} = \begin{bmatrix} 4 & 0 \\ 2 & 4 \end{bmatrix}.$$

$\therefore \quad X = \dfrac{1}{2}\begin{bmatrix} 4 & 0 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix},$

From equation (i),

$$Y = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix} - X = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix} - \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 1-2 & -2-0 \\ 3-1 & 4-2 \end{bmatrix} = \begin{bmatrix} -1 & -2 \\ 2 & 2 \end{bmatrix}.$$

## 1.11 TEST YOUR UNDERSTANDING (A)

1. Find the elements $a_{31}$, $a_{24}$, $a_{34}$, $a_{22}$ in each of the following matrices given below. Also give their diagonal elements.

$$A = \begin{bmatrix} 8 & 6 & -3 & 1 \\ 2 & 3 & 5 & 0 \\ 3 & 9 & 5 & -7 \\ 5 & -3 & 1 & 0 \end{bmatrix}, \qquad A = \begin{bmatrix} 1 & 7 & 3 & 5 \\ 2 & 3 & -1 & 0 \\ 3 & 5 & 6 & 8 \\ 4 & 3 & 0 & 0 \\ 2 & 1 & 9 & 8 \end{bmatrix}$$

2. Write the matrix $A = [a_{ij}]$ of order $2 \times 3$ whose general elements is given by (i) $a_{ij} = ij$
   (ii) $a_{ij} = (-1)^{ij}(i + j)$ **3.**

Find $x$ and $y$, if

$$\begin{bmatrix} x + y & z \\ 1 & x - y \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 1 & 7 \end{bmatrix}$$

4. If $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$, find the value of $2A + 3B$.

5. Given $A = \begin{bmatrix} 1 & 2 & -3 \\ 5 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \end{bmatrix}$, find the matrix $C$ such that $A + 2C = B$.

$$\begin{bmatrix} 1 & -1 & 1 \\ 2 & 0 & 5 \end{bmatrix}$$

6. Solve the following equations for $A$ and $B$:
   $$2A - B = \begin{bmatrix} 3 & -3 & 0 \\ 3 & 3 & 2 \end{bmatrix}, \quad 2B + A = \begin{bmatrix} 4 & 1 & 5 \\ -1 & 4 & -4 \end{bmatrix}$$

**ANSWERS**

1. 3, 0, -7, 3 and 3, 0, 8, 3; the diagonal elements are 8, 3, 8, 0 and 1, 3, 6, 0.

2. (i) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \end{bmatrix}$ (ii) $\begin{bmatrix} -2 & 3 & -4 \\ 3 & 4 & 5 \end{bmatrix}$

3. $x = 5, y = -2$

4. $\begin{bmatrix} 21 & 22 & 15 \\ 7 & 14 & 23 \end{bmatrix}$

**5.**
$$\begin{bmatrix} 1 & -\frac{3}{2} & \frac{5}{2} \\ -\frac{1}{2} & 1 & \frac{3}{2} \\ \frac{1}{2} & \frac{1}{2} & -2 \end{bmatrix}$$

**6.** $A = \begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & 0 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 & 2 \\ -1 & 1 & -2 \end{bmatrix}$

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## 1.12 MULTIPLICATION OF MATRICES

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The multiplication of one matrix by another is possible, if and only if the number of columns of first matrix is equal to the number of rows of the second matrix. The resulting matrix will have the number of rows equal to those in the first matrix and the number of columns equal to those in the second matrix. Thus, if matrix $A$ is of order $m \times n$ and $B$ is of order $n \times p$, the product $AB$ is possible, i. *e.*, the matrices $A$ and $B$ are conformable for multiplication in the order $A, B$. The order of the resulting matrix $AB$ will be $m \times p$. The (i, $k)th$ element (i. *e.*, the element laying ith row and $k$th column) of $AB$ is given by

$$a_{i1}b_{1k} + a_{i2}b_{2k} + \cdots + a_{in}b_n \;\; = \sum_{n\,j=1} a_{ij}b_{jk}.$$

Thus, to obtain the (i, $k$)th element of the product $AB$, we multiply the elements of the ith row of $A$ to the corresponding elements of the $k$th column of $B$ and add the products thus obtained. The resulting sum is the (i, $k$)th element of $AB$.

If $AB$ is denoted by $C = [c_{ij}]$, i. *e.* , $AB = [c_{ij}]$, we have

$$\begin{bmatrix} a_{11} & \cdots & a_{1j} & \cdots & a_{1n} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{i1} & \cdots & a_{ij} & \cdots & a_{in} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ a_{m1} & \cdots & a_{mj} & \cdots & a_{mn} \end{bmatrix} \begin{bmatrix} b_{11} & \cdots & b_{ik} & \cdots & b_{ip} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ b_{j1} & \cdots & b_{jk} & \cdots & b_{jp} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ b_{n1} & \cdots & b_{nk} & \cdots & b_{np} \end{bmatrix}$$

$$= \begin{bmatrix} c_{11} & \cdots & c_{1k} & \cdots & c_{1p} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ c_{i1} & \cdots & c_{ik} & \cdots & c_{ip} \\ \cdots & \cdots & \cdots & \cdots & \cdots \end{bmatrix}$$

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$$\begin{bmatrix} c_{m1} & \cdots & c_{mk} & \cdots & c_{mp} \end{bmatrix}$$

Where $c_{ij} = \sum_{j=1}^{n} a_{ij}b_{jk}$. Putting $i = 1, 2, \cdots, m$ and $k = 1, 2, 3, \ldots, p$, all the elements of $C$ will be found.

In the product $AB$, $A$ is said to be pre-multiplier or pre-factor while $B$ is said to be post-multiplier or post-factor. It is to be noted that in multiplying one matrix by another, unlike ordinary numbers, the placement of matrices as pre factor and post factor is very important. Thus $AB$ is not the same as $BA$.

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## 1.13 PROPERTIES OF MATRIX MULTIPLICATION

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**1. MATRIX MULTIPLICATION IS NOT COMMUTATIVE.** To verify the above statement, let us take an example. Consider the matrices.

$$A = \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}, B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}.$$

It can easily found that

$$AB = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, \text{ while } BA = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

so that $AB \neq BA$.

This shows that matrix multiplication is not commutative. Actually speaking, for a given pair of matrices $A$ and $B$, the products $AB$ and $BA$ may not be even comparable. For example, if $A$ is an $m \times n$ matrix and $B$ is an $n \times m$ matrix, $AB$ would be an $m \times m$ matrix and $BA$ would be an $n \times n$ matrix.

It may also happen that for a pair of matrices $A$ and $B$ the product $AB$ may be defined but the product $BA$ may not be defined. For example, it $A$ is an $m \times n$ matrix and $B$ is an $n \times p$ matrix, $AB$ would be an $m \times p$ matrix, but it is not meaningful to talk of $BA$ unless $m = p$.

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**Note 1.**It is worthwhile to note that the statement 'matrix multiplication is not commutative' does not mean that there are no matrices $A$ and $B$ such that $AB = BA$. It simply means that generally $AB \neq BA$. Thus, we wish to convey that there do exist some pairs of matrices $A$ and $B$ for which $AB = BA$.

**Note 2.** It is also to be noted that in matrices, $AB = 0$ need not always imply that either $A = 0$ or $B = 0$, This will be clear, if we consider the matrices,

$$A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 \\ -1 & 0 \end{bmatrix}.$$

For these matrices, $A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, but none of $A$ and $B$ is zero matrix.

**Note 3.** The familiar cancellation law of multiplication for numbers fails to be true for matrix multiplication. Below we give the properties which hold good for matrices.

2. **ASSOCIATIVE LAW:**Let $A, B$ and $C$ be the matrices of suitable size for the products $A(BC)$ and $(AB)C$ to exist. Then, $A(BC) = (AB)C$.

3. **DISTRIBUTIVE LAW:** $A(B + C) = AB + AC$, (left distributive) and $(B + C)D = BD + CD$ (right distributive), provided that the matrices $A, B, C$ and are of the sizes that they are conformable for the operations involved so that the above relations are meaningful.

4. **MULTIPLICATION OF A MATRIX BY A UNIT MATRIX:** If $A$ is square matrix of order $n \times n$ and $I$ is the unit matrix of the same order, we get

$$I = A = IA.$$

5. **MULTIPLICATION OF A MATRIX BY ITSELF:** The product $A, A$ is defined, if the number of column is equal to the number of rows of $A$, i. e., if $A$ is a square matrix and in that case $A.A = A^2$ will also be a square matrix of the same type. Also,

$$A. A. A = A^2A = A^3.$$

Similarly, $A. A. A \ldots . n$ times$= A^n$.

**Note:** If $I$ is a unit matrix, we have $I = I^2 = I^3 = \cdots = I^n$.

**Example 7.** If $A = \begin{bmatrix} 2 & 2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \\ 0 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ and $B = [0\ 1\ 2]$,

Obtain the product $AB$ and $BA$ and show than $AB \neq BA$.

**Solution:**

$$AB = \begin{bmatrix} 2 & 2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \end{bmatrix}_{3\times3} \begin{bmatrix} 0 & 0 \\ 2 & 2 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 0 \end{bmatrix}_{3\times3}$$

Number of columns of $A =$ Number of rows of $B$

$\therefore$ $AB$ is defined

$$AB = \begin{bmatrix} 0+0+3 & 0+2+6 & 4+4+0 \\ 0+0-1 & 0+3-2 & 4+6+0 \\ 0+0+2 & 0+1+4 & -6+2+0 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 8 & 8 \\ -1 & 1 & 10 \\ 2 & 5 & -4 \end{bmatrix}$$

$$BA = \begin{bmatrix} 0 & 0 & 2 \\ 0 & 1 & 2 \\ -1 \end{bmatrix} \begin{bmatrix} 2 & 2 & 3 \\ 2 & 3 \\ 1 & 2 & 0 \end{bmatrix}_{3\times3} \begin{bmatrix} -3 & 1 & 2 \end{bmatrix}_{3\times3}$$

$$= \begin{bmatrix} 0+0-6 & 0+0+2 & 0+0+4 \\ 0+2-6 & 0+3+2 & 0-1+4 \\ 2+4+0 & 2+6+0 & 3-2+0 \end{bmatrix}_{3\times3}$$

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$$= \begin{bmatrix} -6 & 2 & 4 \\ -4 & 5 & 3 \\ 6 & 8 & 1 \end{bmatrix}$$

Hence $AB \neq BA$.

**Example 8. Write down the products $AB$ and $BA$ of the two matrices $A$ and $B$, where**

$$A = [1 \quad 2 \quad 3 \quad 4] \text{ and } B = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}.$$

**Solution:** Since $A$ is a $1 \times 4$ matrix and $B$ is a $4 \times 1$ matrix. $AB$ will be a $1 \times 1$ matrix.

$$AB = [1 \quad 2 \quad 3 \quad 4] \times \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$$

$$= [1.1 + 2.2 + 3.3 + 4.4] = [30]$$

$BA$ will be a $4 \times 4$ matrix.

$$BA = [\,] \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} [1 \quad 2 \quad 3 \quad 4]$$

$$= \begin{bmatrix} 1 \times 1 & 2 \times 1 & 3 \times 1 & 4 \times 1 \\ 1 \times 2 & 2 \times 2 & 3 \times 2 & 4 \times 2 \\ 1 \times 3 & 2 \times 3 & 3 \times 3 & 4 \times 3 \\ 1 \times 4 & 2 \times 4 & 3 \times 4 & 4 \times 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \\ 4 & 8 & 12 & 16 \end{bmatrix}$$

**Example 9.** *Evaluate $A^2 - 4A - 5I$, where*

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \text{ and } I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

**Solution:** We have

$$A^2 = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1+4+4 & 2+2+4 & 2+4+2 \\ 2+2+4 & 4+1+4 & 4+2+2 \\ 2+4+2 & 4+2+2 & 4+4+1 \end{bmatrix} = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$$

$$A^2 - 4A - 5I = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix} - 4 \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} - 5 \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 9-4-5 & 8-8+0 & 8-8+0 \\ 8-8+0 & 9-4-5 & 8-8+0 \\ 8-8+0 & 8-8+0 & 9-4-5 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} = 0.$$

Where $O$ is the null matrix.

**Example 10.** If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, show that

$$A^2 - (a+d)A = (bc - ad)I.$$

**Solution:** $A^2 = A.A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \times \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

$$= \begin{bmatrix} a^2 + bc & ab + bd \\ ac + cd & bc + d^2 \end{bmatrix}$$

$$A^2 - (a+d)A = \begin{bmatrix} a^2 + bc & ab + bd \\ ac + cd & bc + d^2 \end{bmatrix} - (a+d)\begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$= \begin{bmatrix} a^2 + bc & ab + bd \\ ac + cd & bc + d^2 \end{bmatrix} - \begin{bmatrix} a^2 + ad & ab + bd \\ ac + cd & ad + d^2 \end{bmatrix}$$

$$= \begin{bmatrix} bc - ad & 0 \\ 0 & bc - ad \end{bmatrix} = (bc - ad)\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$= (bc - ad)I.$$

**Example 11.** If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$, show that $A(B + C) = AB + AC.$

**Solution:** We have

$$B + C = \begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix} + \begin{bmatrix} -1 & 1 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1+1 & 0-1 \\ 2+0 & -3+1 \end{bmatrix} = \begin{bmatrix} 2 & -1 \\ 2 & -2 \end{bmatrix}.$$

$$A(B + C) = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 2 & -1 \\ 2 & -2 \end{bmatrix}$$

$$= \begin{bmatrix} 2+4 & -1-4 \\ 6+8 & -3-8 \end{bmatrix} = \begin{bmatrix} 6 & -5 \\ 14 & -11 \end{bmatrix}, \qquad \ldots(i)$$

Again,

$$AB = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$$

$$= \begin{bmatrix} 1+4 & 0-6 \\ 3+8 & 0-12 \end{bmatrix} = \begin{bmatrix} 5 & -6 \\ 11 & -12 \end{bmatrix}$$

and

$$AC = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1+0 & -1+2 \\ 3+0 & -3+4 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 3 & 1 \end{bmatrix},$$

$$\therefore \quad AB + C = \begin{bmatrix} 5 & -6 \\ 11 & -12 \end{bmatrix} + \begin{bmatrix} 1 & 1 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 6 & -5 \\ 14 & -11 \end{bmatrix} \qquad \ldots(ii)$$

From (i) and (ii), we have

$$A(B + C) = AB + AC.$$

**Example 12. If** $\begin{bmatrix} 1 & 1 & x \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix} = 0$ **find** $x$

**Solution:** $\begin{bmatrix} 1 & 1 & x \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix}$

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$$= [1 \times 1 + 1 \times 0 + x \times 2 \quad 1 \times 0 + 1 \times 2 + x \times 1 \quad 1 \times 2 + 1 \times 1 + x \times 0]$$
$$= [1 + 0 + 2x \quad 0 + 2 + x \quad 2 + 1 + 0]$$

$$= [2x + 1 \quad 2 + x \quad 3]$$

Now, $[2x + 1 \quad 2 + x \quad 3] \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = 0$

$\Rightarrow \quad 2x + 1 + 2 + x + 3 = 0$

$\Rightarrow \quad 3x + 6 = 0$ \hfill or

$x = \dfrac{-6}{3} = -2$

**13.** $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$ **and** $(A + B)^2 = A^2 + B^2$

**Example find $a$ and $b$.**

**Solution:** We have

$$A^2 = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} \times \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} = \begin{bmatrix} 1 - 2 & -1 + 1 \\ 2 - 2 & -2 + 1 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$$

and $\quad B^2 = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix} \times \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix} = \begin{bmatrix} a^2 + b & a - 1 \\ ab - b & b + 1 \end{bmatrix}$

$A^2 + B^2 = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} + \begin{bmatrix} a^2 + b & a - 1 \\ ab - b & b + 1 \end{bmatrix} = \begin{bmatrix} a^2 + b - 1 & a - 1 \\ ab - b & b \end{bmatrix}$

$A + B = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix} + \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix} = \begin{bmatrix} 1 + a & -1 + 1 \\ 2 + b & -1 - 1 \end{bmatrix} = \begin{bmatrix} 1 + a & 0 \\ 2 + b & -2 \end{bmatrix}$

$+ B)^2 = \begin{bmatrix} 1 + a & 0 \\ 2 + b & -2 \end{bmatrix} \times \begin{bmatrix} 1 + a & 0 \\ 2 + b & -2 \end{bmatrix} = \begin{bmatrix} (1 + a)^2 + 0 & 0 + 0 \\ (2 + b)(1 + a) - 2(2 + b) & 0 + 4 \end{bmatrix}$

$\therefore \quad \dots(1)$

Also

$\therefore \quad (A$

$$= \begin{bmatrix} (1 + a)^2 & 0 \\ (2 + b)(a - 1) & 4 \end{bmatrix}. \quad \dots(2)$$

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Now given that $(A + B)^2 = A^2 + B^2$.

Hence from (1) and (2), we get

$$\begin{bmatrix} (1+a)^2 & 0 \\ (2+b)(a-1) & 4 \end{bmatrix} = \begin{bmatrix} a^2+b-1 & a-1 \\ ab-b & b \end{bmatrix}$$

or             $a - 1 = 0$    and    $b = 4$.

Hence            $a = 1, b = 4$.

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## 1.14 APPLICATIONS OF MATRICES TO BUSINESS AND ECONOMIC PROBLEMS

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**Example 14. A manufacturer produces three items $P$, $O$ and $R$ and sells them in two markets $I$ and $II$. Annual sales are given below:**

|     | P | O | R |
|-----|-------|-------|-------|
| I   | 6,000 | 2,000 | 3,000 |
| II  | 8,000 | 4,000 | 2,000 |

*If sales price of each unit of P, Q, R is Rs. 4, Rs. 3, Rs. 2 respectively, then find the total revenue of each market using matrix.*

**Solution:** Let $A = \begin{matrix} I \\ II \end{matrix} \begin{bmatrix} 6{,}000 & 2{,}000 & 3{,}000 \\ 8{,}000 & 4{,}000 & 2{,}000 \end{bmatrix}$ is the sales matrix and

$B = \begin{matrix} P \\ Q \\ R \end{matrix} \begin{bmatrix} 4 \\ 3 \\ 2 \end{bmatrix}$ is the price matrix

$\therefore$ Revenue matrix $AB = \begin{bmatrix} 6{,}000 & 2{,}000 & 3{,}000 \\ 8{,}000 & 4{,}000 & 2{,}000 \end{bmatrix} \begin{bmatrix} 4 \\ 3 \\ 2 \end{bmatrix}$

$= \begin{bmatrix} 6{,}000 \times 4 & + & 2{,}000 \times 3 & + & 3{,}000 \times 2 \\ 8{,}000 \times 4 & + & 4{,}000 \times 3 & + & 2{,}000 \times 2 \end{bmatrix} = \begin{bmatrix} 36{,}000 \\ 48{,}000 \end{bmatrix}$

Hence

Total Revenue of Market I = Rs. 36,000

Total Revenue of Market II = Rs. 48,000

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# 1.15 TEST YOUR UNDERSTANDING (B)

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**1.** If $A = [3 \quad 6 \quad -5]$ and $B = \begin{bmatrix} 7 \\ 2 \end{bmatrix}$, find $AB$ and $BA$.

**2.** If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ -3 & 2 \end{bmatrix}$, find $AB$ and $BA$. Is $AB = BA$?

**3.** If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 5 \\ 2 & 1 \end{bmatrix}$, find $AB$ and show that $AB = BA$.

**4.** When $A = \begin{bmatrix} 1 & i \\ -i & 1 \end{bmatrix}$ and $B = \begin{bmatrix} i & -1 \\ -1 & -i \end{bmatrix}$ and $i = \sqrt{(-1)}$, determine $AB$. Also compute $BA$.

**5.** If $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -2 & -1 \\ 6 & 12 & 6 \\ 5 & 10 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} -1 & -1 & 1 \\ 2 & 2 & -1 \\ -3 & 3 & 3 \end{bmatrix}$,

Show that $AB$ and $CA$ are the null matrices but $BA$ and $AC$ are not the null matrices.

**6.** If $A = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} a & b \\ 3 & 5 \end{bmatrix}$,

Find $a$ and $b$ such that $AB = BA$. Also compute $3A + 5B$.

**7.** If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 5 & 1 \\ 7 & 4 \end{bmatrix}$, show that $A(B + C) = AB + AC$.

**8.** If $A = \begin{bmatrix} 1 & a \\ 0 & 1 \end{bmatrix}$, prove by mathematical induction that $A^n = \begin{bmatrix} 1 & na \\ 0 & 1 \end{bmatrix}$

**9.** Given $A = \begin{bmatrix} 1 & 2 & 10 & -13 \\ 3 & -1 & 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 10 & 32 \end{bmatrix}$ and $C = \begin{bmatrix} 12 & 20 & -23 & -41 \\ & & & 4 \end{bmatrix}$,

Show that $(AB)C = A(BC)$.

**10.** If $A = \begin{bmatrix} -5 & -2 & 1 \\ 4 & 3 & 3 \\ -6 & 6 & -2 \end{bmatrix}$

Find the matrix $B$ such that $A + B =$ unit matrix.

**11.** There are two families $A$ and $B$. In family $A$, there are 4 men, 6 women and 2 children; and in family $B$ there are 2 men, 2 women and 4 children. The recommended daily requirement for calories is:

Calories:       Man 2,400;    Woman 1,900;      Child 1,800

Protein: Man 55 gm;   Woman 45 gm;     Child 33 gm

Calculate the total requirements of calories and proteins for each of the two families using matrix method.

**12.** The co-operative store of a particular school has 10 dozen books of physics, 8 dozen of chemistry books and 5 dozen of mathematics books. Their selling price are Rs. 65.70, Rs. 43.20 and Rs. 76.50 respectively. Find by matrix method the total amount, the store will receive from selling all three items.

## Answers

1.  $AB = [44], BA = \begin{bmatrix} 12 & 24 & -20 \\ 21 & 42 & -35 \end{bmatrix}$, 
**2.** $AB = \begin{bmatrix} -13 & 8 & 1 & 2 \\ -8 & & 5 \end{bmatrix}, BA = [\,4 \ \ -9\,]$,

3.  $AB = \begin{bmatrix} 0 & -4 \\ 10 & 3 \end{bmatrix} \begin{bmatrix} 6 & 12 & -10 \\ 0 & -2 & -2i \end{bmatrix}$ 
**4.** $AB = \begin{bmatrix} 0 & 0 \end{bmatrix}, BA = [\,2i \ \ -2\,]$,

**6.** $a = 65, b = 15, \begin{bmatrix} 41.5 & 13.5 \\ 27 & 28 \end{bmatrix}$

**10.** $\begin{bmatrix} 6 & 2 & -1 \\ -4 & -2 & -3 \\ 6 & -6 & -1 \end{bmatrix}$

**11.** Calories for family A and B are 24,600 and 15,800 and proteins are 556 gms and 332 gms respectively.

**12.** Rs. 16,621.20

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### 1.16 TRANSPOSE OF A MATRIX

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A matrix obtained by interchanging the corresponding rows and columns of a given matrix $A$ is called the **transpose matrix** of $A$. The transpose of a matrix is denoted by $A^T$ or $A'$.

For example,

If $A = [1\ 5]$, then
$$A' = \begin{bmatrix} 1 \\ 5 \end{bmatrix}$$

If $A = \begin{bmatrix} 2 \\ -3 \end{bmatrix}$, then
$$A' = \begin{bmatrix} 2 & -3 \end{bmatrix}$$

If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then
$$A' = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$$

**Properties of the transpose matrix**

**(i)** $(A')' = A$

**(ii)** $(A + B)' = A' + B'$

**(iii)** $(\lambda A)' = \lambda A'$

**(iv)** If $A$ and $B$ are two matrices which are conformable for multiplication, then
$$(AB)' = B'A'$$ This

is called '*Reversal Law*'.

**Example 15.**

If $A = \begin{bmatrix} 1 & 2 & -3 \\ 3 & 0 & 2 \\ 4 & 5 & 0 \end{bmatrix}$

and $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

Then, verify that $(AB)^T = B^T A^T$

**Solution.**

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$$

$$AB = \begin{bmatrix} 3 & 0 & 2 \end{bmatrix} \begin{matrix} 4 & 5 & 0 \\ 1 & 2 & -3 \\ 4 & 5 & 0 \end{matrix}$$

$$= \begin{bmatrix} (1 + 4 + 0) \\ (3 + 0 + 0) \\ (4 + 10 + \end{bmatrix}$$

$$= \begin{bmatrix} 5 & -1 \\ 3 & 2 \\ 14 & 5 \end{bmatrix}$$

$$(AB)^T = \begin{bmatrix} 5 & 3 & 14 \\ -1 & 2 & 5 \\ -9 & 6 & 0 \end{bmatrix}$$

$$A^T = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 0 & 5 \\ -3 & 2 & 0 \end{bmatrix}$$

$$B^T A^T = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 3 \end{bmatrix} \begin{bmatrix} \\ \\ \end{bmatrix}$$

$$= \begin{bmatrix} (1 + 4 - 0) \\ (0 + 2 - 3) \\ (0 + 0 - 9) \end{bmatrix}$$

$$= \begin{bmatrix} 5 & 3 & 14 \\ -1 & 2 & 5 \\ -9 & 6 & 0 \end{bmatrix}$$

$-3$
$2 ]$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}_{3 \times 3}$

$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

$$\begin{bmatrix} (0 + 2 - 3) & (0 + 0 - 9) \\ (0 + 0 + 2) & (0 + 0 + 6) \\ (0 + 5 + 0) & (0 + 0 + 0) \end{bmatrix}$$

$0)$

$-9$
$6 ]$
$0$

$]$ …(i)

$, B^T = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & \end{bmatrix}_{3 \times 3}$

$\begin{matrix} 1 & 3 & 4 \\ 2 & 0 & 5] \\ -3 & 2 & 0 \end{matrix}$

$$\begin{bmatrix} (3 + 0 + 0) & (4 + 10 + 0) \\ (0 + 0 + 2) & (0 + 5 + 0) \\ (0 + 0 + 6) & (0 + 0 + 0) \end{bmatrix}$$

$]$ …(ii)

From (i) and (ii),

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$$(AB)^T = B^T A^T$$

## 1.17 SYMMETRIC MATRIX

A square matrix $A$ such that $A' = A$ is called symmetric matrix, i. $e.$, matrix $[a_{ij}]$ is symmetric provided $a_{ij} = a_{ji}$ for all values of i and j.

For example:

$$A = \begin{bmatrix} a & h & g \\ h & b & \mathfrak{f} \\ g & \mathfrak{f} & c \end{bmatrix} \text{ is a symmetric matrix.}$$

## 1.18 SKEW-SYMMETRIC MATRIX

A square matrix $A$ such that $A' = -A$ is called skew-symmetric matrix, i. $e.$, matrix $[a_{ij}]$ is skew-symmetric provided $a_{ij} = -a_{ji}$ for all values ofi and j.

For example:

$$A = \begin{bmatrix} 0 & 1 & -3 \\ -1 & 0 & 5 \\ 3 & -5 & 0 \end{bmatrix} \text{ is a skew-symmetric matrix.}$$

**Remarks.** In a skew-symmetric matrix, we have $a_{ij} = -a_{ji}$. For diagonal elements $a_{ij} = -a_{ji}$, i. $e.$, $2a_{ij} = 0$, or $a_{ij} = 0$.

Thus every diagonal element of a skew-symmetric matrix is zero.

**Example 16.**

*Show that every matrix can be unequally expressed as the sum of a symmetric and a skew-symmetric matrix.*

**Solution:** Let $A$ be any square matrix.

Now, we have

$$A = \frac{1}{2}A + \frac{1}{2}A = \frac{1}{2}(A + A') + \frac{1}{2}(A - A') \dots \text{(i)}$$

$$(A + A')' = A' + (A')' = A' + A = A + A'$$

Now,

(since matrix addition is commutative)

and $(A - A')' = A' - (A')' = A' - A = -(A - A')$ Hence $(A + A')$ is symmetric and $(A - A')$ is skew-symmetric.

Consequently $\frac{1}{2}(A + A') = P$ (say) is a symmetric matrix and $\frac{1}{2}(A - A') = Q$ (say) is a skew-symmetric matrix.

Hence $\quad A = P + Q.$

Thus, any square matrix, can be expressed as the sum of symmetric and skew-symmetric matrix.
**Uniqueness.** To show that this representation is unique, let us suppose that another representation $A = R + S$ is possible, where $R$ is symmetric and $S$ is skew-symmetric, i. e. $R = R'$ and $= S'$.

Now $\qquad\qquad\qquad A' = (R + S)' = R' + S' = R - S$

Also, $\qquad\qquad\quad A + A' = (R + S) + (R - S) = 2R$

and $\quad A - A' = (R + S) - (R - S) = 2S$

or $\qquad R = \frac{1}{2}(A + A')$ and $S = \frac{1}{2}(A - A')$

Hence $\quad A = \frac{1}{2}(A - A') + \frac{1}{2}(A - A')$, is a unique representation.

**Example 17. Express** $\begin{bmatrix} 2 & 6 & -8 \\ 4 & 2 & 1 \\ -8 & 6 & 13 \end{bmatrix}$ **as a sum of a symmetric and skew-symmetric matrix.**

**Solution:** Let

$$A = \begin{bmatrix} 2 & 6 & -8 \\ 4 & 2 & 1 \\ -8 & 6 & 13 \end{bmatrix}$$

$$\therefore \qquad A' = \begin{bmatrix} 2 & 4 & -8 \\ 6 & 2 & 6 \\ -8 & 1 & 13 \end{bmatrix}$$

$$A + A' = \begin{bmatrix} 4 & 10 & -16 \\ 10 & 4 & 7 \\ -16 & 7 & 26 \end{bmatrix}$$

$$\frac{1}{2}(A + A') = \frac{1}{2}\begin{bmatrix} 4 & 10 & -16 \\ 10 & 4 & 7 \\ -16 & 7 & 26 \end{bmatrix}$$

$\therefore$

$\therefore$

Which is a symmetric matrix.

$$\frac{1}{2}(A - A') = \frac{1}{2}\begin{bmatrix} 0 & 2 & 0 \\ -2 & 0 & -5 \\ 0 & 5 & 0 \end{bmatrix}$$

Again

Which is a skew-symmetric matrix. Now

$$A = \frac{1}{2}(A + A') + \frac{1}{2}(A - A')$$

$$A = \frac{1}{2}\begin{bmatrix} 4 & 10 & -16 \\ 10 & 4 & 7 \\ -16 & 7 & 26 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & 2 & 0 \\ -2 & 0 & -5 \\ 0 & 5 & 0 \end{bmatrix}$$

i. *e.,*

**Example 18.** *If A and B are both symmetric then, show that AB is symmetric iff A and B commute.*

**Solution:** Since $A$ and $B$ are symmetric, we have

$$A' = A \text{ and } B' = B$$

Then $(AB)' = B'A'$ (reversal law)

$$= BA = AB, \text{ iff } A \text{ and } B \text{ commute Thus}$$

$AB$ is symmetric iff $A$ and $B$ commute.

## 1.19 ORTHOGONAL MATRIX

A square matrix $A$ is said to be orthogonal if $A'A = AA' = I$
Now, we know that

$$|A'| = |A|$$

Also $|A'A| = |A'||A|$ or $|I| = |A|^2$ or $|A|^2 = 1$

This shows that the matrix $A$ should be non_singular and invertible, if it is orthogonal matrix. Hence the condition

$A'A = I$ Implies that $A^{-1} = A'$ **Example**

**19.** *Verify that*

$$A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$

*is orthogonal.*          **Solution:**

We have

$$A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$

$$A' = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$

Then

We have

$$AA' = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix} \times \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$

$$= \frac{1}{9}\begin{bmatrix} 1+4+4 & 2+2-4 & -2+4-2 \\ 2+2-4 & 4+1+4 & -4+2+2 \\ -2+4-2 & -4+2+2 & 4+4+1 \end{bmatrix}$$

$$= \frac{1}{9}\begin{bmatrix} 9 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 9 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= I$$

Hence, by definition, matrix $A$ is orthogonal.

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## 1.20 TEST YOUR UNDERSTANDING(C)

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**1.**   If $A$ and $B$ are symmetric, then show that $A + B$ is symmetric.

**2.**   If $A = \begin{bmatrix} 5 & 3 \\ 2 & 4 \end{bmatrix}$, verify that $(6A)' = 6A'$.

**3.**   Given : $A = \begin{bmatrix} 2 & 3 \\ 1 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix}$ obtain the matrix $2A' + 3B'$.

**4.**   Express $\begin{bmatrix} 2 & 1 & -11 \\ 6 & 13 & 7 \\ -4 & -2 & 1 \end{bmatrix}$ as a sum of a symmetric and skew-symmetric matrix.

**Answers**

3. $\begin{bmatrix} 10 & 5 \\ -3 & 10 \end{bmatrix}$

4. $\frac{1}{2}\begin{bmatrix} 4 & 7 & -15 \\ 7 & 26 & 5 \\ -15 & 5 & 2 \end{bmatrix} + \frac{1}{2}\begin{bmatrix} 0 & -5 & -7 \\ 5 & 0 & 9 \\ 7 & -9 & 0 \end{bmatrix}$

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## 1.21 LET US SUM UP

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- A Matrix is a particular type of arrangement of m n numbers which are arranged in the form of an ordered set of m rows and n columns.

- There are different types of Matrices like Row, Column, Square, Rectangular, Null, Diagonal, Scalar, Unit, Triangular matrix etc.

- Matrix algebra includes addition of matrices, difference of matrices, multiplication of a matrix by a scalar and matrix multiplication.

- We can obtain the Transpose of a Matrix by interchanging the corresponding rows and columns of a given matrix.

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## 1.22 KEY TERMS

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- **ROW MATRIX:** If a matrix has only one row, it is called a $row\ matrix$.
- **COLUMN MATRIX:** A matrix consisting of only one column is called a $column\ matrix$.
- **ZERO OR NULL MATRIX (0):** If every element of an $m \times n$ matrix is zero, the matrix is called a $zero\ matrix$.
- **SQUARE MATRIX:** Any matrix In which the number of rows are equal to the number of columns is called a $Square\ matrix$.
- **DIAGONAL MATRIX:** A square in which all elements except those in the leading diagonal are zero, is called a $diagonal\ matrix$.

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- **SCALAR MATRIX:** A diagonal matrix whose diagonal elements are all equal is called a *scalar matrix*.

- **IDENTITY OR UNIT MATRIX ( I ):** A scalar matrix in which each of its diagonal elements is unity is called an i*dentity* or *unit matrix*.

- **TRACE OF A MATRIX:** The trace of any square matrix is the sum of its main diagonal elements.
- **TRIANGULAR MATRIX:** If every element above or below the leading diagonal is zero, the matrix is called a *triangular matrix*.
- **TRANSPOSE OF A MATRIX**: A matrix obtained by interchanging the corresponding rows and columns of a given matrix.
- **SYMMETRIC MATRIX:** A matrix which is equal to its own transpose.
- **SKEW SYMMETRIC MATRIX:** A matrix which is equal to negative of its own transpose.

## 1.23 FURTHER READINGS

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   3. J.K. Thukral, Mathematics for Business Studies, Mayur Publications
4. J. K. Singh, Business Mathematics, Himalaya Publishing House.
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B. COM (Hons.)

(Accounting and Taxation)

SEMESTER II

COURSE: BUSINESS MATHEMATICS AND STATISTICS

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# Unit 2 – Determinants

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## STRUCTURE

## 2.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Define the Meaning Determinant.
- Calculate the Determinant of a Square Matrix.
- Implement the properties of Determinants.
- Understand the difference between Minors and Co-Factors.
- Find the Inverse of a Matrix.
- Solve the Linear Equations with help of Matrices.
- Solve the Linear Equations with help of Determinants

## 2.1 DETERMINANT

To every square matrix $A = [a_{ij}]_{m \times m}$, we associate a number called determinant of the matrix $A$. It is denoted by determinant $A$ or $|A|$. The matrix which is not square does not possess determinant.

**FINDING VALUE OF A DETERMINANT**

1) **Determinant of order 1,** i.e. of $1 \times 1$ matrix

   The value of the determinant of order one is the number of which the determinant is formed.

   Thus, $|a_{11}| = a_{11}$

   **For example** $|-2| = -2$

2) **Determinant of order 2,** i.e. of $2 \times 2$ matrix

   The value of the determinant of order two is found as under :

$$a \quad a$$

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$$\begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} = (a_{11}a_{22} - a_{12}a_{21})$$

$$\begin{vmatrix} 2 & 3 \\ 0 & -1 \end{vmatrix}$$

$$= (2)(-1) - 3 \times 0$$

$$= -2 - 0 = -2$$

**For example**

3) **Determinant of order 3,** i.e. of $3 \times 3$ matrix

The value of the determinant of order three is found by expanding the determinant by any row or any column.

**For example** $|A| = \Delta = \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$ ... $a_{23}$ $a_{21}$ $a_{22}$ $+ a_{13}$

**Expanding** it by 1st row, we get

$$\Delta = a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$$

$$= a_{11}(a_{22}a_{33} - a_{23}a_{32}) - a_{12}(a_{21}a_{33} - a_{23}a_{31}) + a_{13}(a_{21}a_{32} - a_{22}a_{31})$$

**Similarly** we can expand it by any other row or any column, taking care of the fact the signs meddler for adding the terms will follow the following pattern

$$\begin{vmatrix} + & - & + \\ - & + & - \\ + & - & + \end{vmatrix}$$

Thus, by expanding the determinant by, say, second column, we have

$$\Delta = -a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{22} \begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix} - a_{32} \begin{vmatrix} a_{11} & a_{13} \\ a_{21} & a_{23} \end{vmatrix}$$

$$= -a_{12}(a_{21}a_{33} - a_{23}a_{31}) + a_{22}(a_{11}a_{33} - a_{13}a_{31}) - a_{32}(a_{11}a_{23} - a_{13}a_{21})$$

Thus if we have

$$A = \begin{vmatrix} 2 & -1 & 0 \\ -1 & 5 & 2 \\ 4 & -3 & 1 \end{vmatrix}$$

then

$$|A| = \begin{vmatrix} 2 & -1 & 0 \\ -1 & 5 & 2 \\ 4 & -3 & 1 \end{vmatrix}$$

**Expanding** it by '$R_1$', we get

$$2\begin{vmatrix} 5 & 2 \\ -3 & 1 \end{vmatrix} - (-1)\begin{vmatrix} -1 & 2 \\ 4 & 1 \end{vmatrix} + 0\begin{vmatrix} -1 & 5 \\ 4 & -3 \end{vmatrix}$$

$$= 2(5+6) + 1(-1-8) + 0(3-20)$$

$$= 2(11) + 1(-9) + 0(-17)$$

$$= 22 - 9 + 0 = 13$$

**Example 1. Find the value of determinant**

$$\begin{vmatrix} 3 & -5 & 8 \\ 6 & -4 & -3 \\ 4 & 2 & 0 \end{vmatrix} \text{ by expanding it by}$$

(i) *second row and* (ii) *third column.*

**Solution:** (i) Expanding by the second row,

$$\begin{vmatrix} 3 & -5 & 8 \\ 6 & -4 & -3 \\ 4 & 2 & 0 \end{vmatrix} = -6\begin{vmatrix} -5 & 8 \\ 2 & 0 \end{vmatrix} + (-4)\begin{vmatrix} 3 & 8 \\ 4 & 0 \end{vmatrix} - (-3)\begin{vmatrix} 3 & -5 \\ 4 & 2 \end{vmatrix}$$

$$= -6(-16) - 4(-32) + 3(26) =$$
$$96 + 128 + 78 = 302$$

(ii) Expanding by the third column,

$$\begin{vmatrix} 3 & -5 & 8 \\ 6 & -4 & -3 \\ 4 & 2 & 0 \end{vmatrix} = 8\begin{vmatrix} 6 & -4 \\ 4 & 2 \end{vmatrix} - (-3)\begin{vmatrix} 3 & -5 \\ 4 & 2 \end{vmatrix} + 0\begin{vmatrix} 3 & -5 \\ 6 & -4 \end{vmatrix}$$

$$= 8(28) - 3(26) + 0$$
$$= 224 + 78 = 302, \text{ same as before.}$$

## 2.2 PROPERTIES OF DETERMINANTS

The following are the important properties of determinants. The students are advised to verify these properties on their own.

**(i)** If any two rows (or columns) of a determinant are interchanged, the sign of the determinant is changed, the absolute value remaining unaltered, For example,

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = - \begin{vmatrix} a_1 & a_3 & a_2 \\ b_1 & b_3 & b_2 \\ c_1 & c_3 & c_2 \end{vmatrix}$$

In this example the second and third columns have been interchanged.

**(ii)** If every element in any row (or column) of a determinant is multiplied by the same scalar $c$, the determinant thus obtained is $c$ times the original determinant. Thus,

$$\begin{vmatrix} a_1 & ca_2 & a_3 \\ b_1 & cb_2 & b_3 \\ c_1 & cc_2 & c_3 \end{vmatrix} = c \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}.$$

**(iii)** If a determinant rows are changed into columns of columns into rows, the value of the determinant remains unchanged. Thus,

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = c \begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}.$$

**(iv)** If any two rows (or columns) of a determinant are identical, the value of the determinant is zero. Thus,

$$\begin{vmatrix} a_1 & b_2 & c_3 \\ a_1 & b_1 & b_1 \\ a_2 & b_2 & c_2 \end{vmatrix} = 0, \begin{vmatrix} 3 & 9 & 5 \\ 2 & 4 & 7 \\ 1 & 3 & 6 \end{vmatrix} = 3 \begin{vmatrix} 3 & 3 & 5 \\ 2 & 2 & 7 \\ 1 & 1 & 6 \end{vmatrix} = 3 \times 0 = 0.$$

**(v)** If each element of any row or any column is the sum (or difference) of two quantities, the determinant can be expressed as the sum (or difference) of two determinants of the same order, as given below :

$$\begin{vmatrix} a_1 & a_2 + \alpha & a_3 \\ b_1 & b_2 + \beta & b_3 \\ c_1 & c_2 + \gamma & c_3 \end{vmatrix} = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} + \begin{vmatrix} a_1 & \alpha & a_3 \\ b_1 & \beta & b_3 \\ c_1 & \gamma & c_3 \end{vmatrix}.$$

**(vi)** If any row (or column) or a multiple thereof is added to or subtracted from any other row (or column), the value of the determinant remain unchanged. Thus,

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} = \begin{vmatrix} a_1 & a_2 & a_3 + ka_1 \\ b_1 & b_2 & b_3 + kb_2 \\ c_1 & c_2 & c_3 + kc_2 \end{vmatrix}$$

**Example 2. Without expanding prove that**

$$\begin{vmatrix} 6 & 2 & 7 \\ 15 & 5 & 5 \\ 21 & 7 & 3 \end{vmatrix} = 0$$

**Solution:** Let

$$\Delta = \begin{vmatrix} 6 & 2 & 7 \\ 15 & 5 & 5 \\ 21 & 7 & 3 \end{vmatrix}$$

Taking '3' common from $C_1$, we have

$$\Delta = 3 \begin{vmatrix} 2 & 2 & 7 \\ 5 & 5 & 5 \\ 7 & 7 & 3 \end{vmatrix} = 3(0) = 0 \quad (\because C_1 \text{ and } C_2 \text{ are iden ical})$$

**Example 3. Withoutexpanding evaluate the determinant**

$$\begin{vmatrix} 42 & 2 & 5 \\ 80 & 8 & 9 \\ 30 & 6 & 3 \end{vmatrix}$$

**Solution:** Let

$$\Delta = \begin{vmatrix} 42 & 2 & 5 \\ 80 & 8 & 9 \\ 30 & 6 & 3 \end{vmatrix}$$

Applying $C_1 = C_1 + (-8)C_3$, we get

$$\Delta = \begin{vmatrix} 2 & 2 & 5 \\ 8 & 8 & 9 \\ 6 & 6 & 3 \end{vmatrix}$$

$\Rightarrow \quad \Delta = 0$ $(\because C_1 \text{ and } C_2 \text{ are ident cal})$

**Example 4. Prove that**

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \end{vmatrix} = 0$$

$$b+c \quad a+c \quad a+b$$

**Solution:**

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ b+c & a+c & a+b \end{vmatrix}$$

Applying $R_1 = R_1 + R_2$, we get

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ a+b+c & b+a+c & c+a+b \\ b+c & a+c & a+b \end{vmatrix}$$

$$= (a+b+c) \begin{vmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ b+c & a+c & a+b \end{vmatrix} \quad \{\text{taking } (a+b+c) \text{ common from } R_2$$

$$= (a+b+c) \times (0) \qquad\qquad (\because R_1 \text{ and } R_2 \text{ } are \text{ } identical)$$

$$= 0$$

Hence proved.

**Example 5. Prove that**

$$\begin{vmatrix} bc & a & a_2 \\ ca & b & b_2 \\ ab & c & c_2 \end{vmatrix} = \begin{vmatrix} 1 & a_2 & a_3 \\ 1 & b_2 & b_3 \\ 1 & c_2 & c_3 \end{vmatrix}$$

**Solution:**

$$L.H.S. = \begin{vmatrix} bc & a & a_2 \\ ca & b & b_2 \\ ab & c & c_2 \end{vmatrix} = \frac{1}{abc} \begin{vmatrix} abc & a_2 & a_3 \\ abc & b_2 & b_3 \\ abc & c_2 & c_3 \end{vmatrix}$$

(by multiplying $R_1, R_2, R_3$ by $abc$ respectively)

$$= \frac{abc}{abc} \begin{vmatrix} 1 & a_2 & a_3 \\ 1 & b_2 & b_3 \\ 1 & c_2 & c_3 \end{vmatrix} \quad (\text{taking } abc \text{ common from } C_2 )$$

$$= \begin{vmatrix} 1 & a_2 & a_3 \\ 1 & b_2 & b_3 \\ 1 & c_2 & c_3 \end{vmatrix} = R.\,H.\,S.$$

**Example 6. Without expansion, prove that**

$$\begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ -c & 0 & 0 \end{vmatrix} = 0 \ b$$

**Solution:** Let

$$\Delta = \begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{vmatrix}$$

$$= (-1)^3 \begin{vmatrix} 0 & -a & -b \\ -a & 0 & c \\ b & -c & 0 \end{vmatrix} \text{ (by taking } (-1) \text{ common from each of 3 rows)}$$
$$\text{(Interchanging rows and columns)}$$

$$= - \begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{vmatrix}$$

$$= -\Delta$$

$$\Delta = -\Delta$$

$\Rightarrow$ $\qquad 2\Delta = 0$

$\Rightarrow$ $\qquad \Delta = 0$

$\Rightarrow$

i. *e.* $\qquad \begin{vmatrix} 0 & a & -b \\ -a & 0 & c \\ b & -c & 0 \end{vmatrix} = 0$

**Example 7. Prove that**

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (a-b)(b-c)(c-a).$$

$$\begin{matrix} 1 & 1 & 1 & 0 \\ 0 & 1 \end{matrix}$$

**Solution:**

$$\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = \begin{vmatrix} 1 & & \\ a-b & b-c & c \\ a^2-b^2 & b^2-c^2 & c^2 \end{vmatrix} \text{ where } 1 = C_1 - C_2$$
$$C_2 = C_2 - C_3$$

$$\frac{1}{=}$$

$$a-b)(b-c) \begin{vmatrix} 1 & 1 & c \\ a+b & b+c & c^2 \end{vmatrix}$$

(

$$\begin{matrix} 1 & 1 \\ ac & bc & -c^2 \end{matrix}$$

$$= (a-b)(b-c) \begin{vmatrix} & \\ a+b & b+ \end{vmatrix}$$
**Solution:**

$$c = (a-b)(b-c)(b+c-a-$$

$$\begin{matrix} -a & b & c \\ & \text{L.H.S.} = abc \mid a \\ & -b & c \mid \\ a & b & -c \end{matrix}$$

$$b)$$

$$= (a-b)(b-c)(c-a).$$

on taking out $a$, $b$ and $c$ common

**Example 8. Prove that**

$$\left(\text{from} R_1, R_2 \text{and} R_3 \text{repectively}\right)$$

$$\begin{vmatrix} -a^2 & ab & ac \\ ba & -b^2 & bc \\ -1 & 1 & 1 \end{vmatrix} = 4a^2b^2c^2,$$

on taking out $a$, $b$ and $c$ common

$$= a^2b^2c^2 \mid \quad \mid \quad ( \quad )$$

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$$\begin{array}{ccc} 1 & -1 & 1 \\ 1 & 1 & -1 \\ 0 & 0 & 2 \end{array} \qquad \text{from } C_1,\ C_2 \text{ and } C_3 \text{ repectively}$$

$$= a^2b^2c^2 \begin{vmatrix} 1 & -1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{vmatrix} \qquad (\text{applying } R_1 = R_1 + R_2)$$

$$= a^2b^2c^2 2(1+1) = 4a^2b^2c^2,$$

**Example 9.** Show that

$$\begin{vmatrix} y+z & x & y \\ z+x & z & x \\ x+y & y & z \end{vmatrix} = (x+y+z)(x-z)^2.$$

**Solution:**

$$\begin{vmatrix} y+z & x & y \\ z+x & z & x \\ x+y & y & z \end{vmatrix} = \begin{vmatrix} (x+y+z) & x+y+z & x+y+z \\ z+x & z & x \\ x+y & y & z \end{vmatrix}$$

operating $R_1 = R_1 + R_2 + R_3$

$$= (x+y+z) \begin{vmatrix} 1 & 1 & 1 \\ z+x & z & x \\ x+y & y & z \end{vmatrix}, \ (\text{taking } (x+y+z) \text{ common from } R_1)$$

$$\left(\begin{array}{c} \text{operating } C_1 = C_1 - 2C_2 \\ \text{and } C_2 = C_2 - C_3 \end{array}\right)$$

$$= (x+y+z) \begin{vmatrix} 0 & 0 & 1 \\ x-y & y-z & z \\ x-z & z-x & x \end{vmatrix},$$

$$= (x+y+z) \begin{vmatrix} x-y & y-z \\ x-z & z-x \end{vmatrix}$$

$$= (x+y+z)(x-z) \begin{vmatrix} 1 & -1 \\ x-y & y-z \end{vmatrix}, \ (\text{taking } (x-z) \text{ common from } R_1)$$

$$= (x+y+z)(x-z)(y-z+x-y)$$

$$= (x+y+z)(x-z)^2.$$

## 2.3 TEST YOUR UNDERSTANDING (A)

1. Evaluate $\begin{vmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{vmatrix}$.

2. Evaluate $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+x & 1 \\ 1 & 1 & 1+y \end{vmatrix}$.

3. Evaluate $\begin{vmatrix} b+c & a+b & a \\ c+a & b+c & b \\ a+b & c+a & c \end{vmatrix}$.

4. Show that

   (a) $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$

   (b) $\begin{vmatrix} 1 & bc & a(b=c) \\ 1 & ca & b(c+a) \\ 1 & ab & c(a+b) \end{vmatrix} = 0$.

5. Prove that
   $$\begin{vmatrix} 1 & a^2+bc & a^3 \\ 1 & b^2+ca & b^3 \\ 1 & c^2+ab & c^3 \end{vmatrix} = -(b-c)(c-a)(a-b)(a^2+b^2+c^2).$$

6. Show that
   $$\begin{vmatrix} a & a^2 & a^3 \\ b & b^2 & b^3 \\ c & c^2 & c^3 \end{vmatrix} = abc(a-b)(b-c)(c-a)$$

7. Prove that (without expanding)
   $$\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ b & & 1+c \end{vmatrix} = 1 + a + b + c\ a$$

8. Show that
   $$\begin{vmatrix} a-b-c & 2b & 2c \\ 2a & b-c-a & 2c \\ 2a & 2b & c-a-b \end{vmatrix} = (a+b+c)^3$$

9. Prove that
   $$\begin{vmatrix} a^2 & bc & ac+c^2 \\ a^2+ab & b^2 & ac \\ ab & b^2+bc & c^2 \end{vmatrix} = 4a^2b^2c^2$$

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**10.** Show that

$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc \left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$$

**Answers**

**1.** 21,  **2.** $xy$  **3.** $a^3 + b^3 + c^3 - 3abc$

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## 2.4 MINORS

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Consider the determinant of a square matrix $A$,

$$|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}.$$

When we delete any one row and any one column of $|A|$, we get a $2 \times 2$ determinant. For example, if we strike off the row and column passing through $a_{11}$, i. $e$., the first row and first column, we get the determinant as

$$\begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}$$

This determinant is called the minor of the element $a_{11}$ in determinant $A$.

Thus, the minor of the element in the determinant of the square matrix may be defined as a determinant which is left after deleting the row and column in which the element lies. The number of minors in a determinant will be equal to the number if elements therein. The following is the list of all nine minors in $|A|$.

The minors of $a_{11}$, $a_{12}$ and $a_{13}$ are

$$\begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix}, \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} \text{ and } \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix} \text{ respectively.}$$

The minors of $a_{21}$, $a_{22}$ and $a_{23}$ are

$$\begin{vmatrix} a_{12} & a_{13} \\ a_{32} & a_{33} \end{vmatrix}, \begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix} \text{ and } \begin{vmatrix} a_{11} & a_{12} \\ a_{31} & a_{32} \end{vmatrix} \text{ respectively.}$$

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The minors of $a_{31}$, $a_{32}$ and $a_{33}$ are

$$\begin{vmatrix} a_{12} & a_{13} \\ a_{22} & a_{23} \end{vmatrix}, \begin{vmatrix} a_{11} & a_{13} \\ a_{21} & a_{23} \end{vmatrix}$$

$$\text{and } \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} \text{ respectively.}$$

In general, the determinant obtain by striking off the ith row and jth column of a matrix $A = [a_{ij}]_{n \times n}$ is called the minor of $a_{ij}$ in $|A|$. The minor of element $a_{ij}$ is determinant by $M_{ij}$.

## 2.5 CO-FACTORS OF A MATRIX

If we multiply the minor of the element in the ith row and jth column of the determinant of the matrix by $(-1)^{i+j}$ the product is called the co-factor of the element. It is usual to denote the co-factor of an element by the corresponding capital letter. Symbolically $A_{ij} = (-1)^{i+j} \times$ minor of $a_{ij}$ in $A$

$$= (-1)^{i+j} M_{ij}. \text{ If}$$

we consider a determinant

$$|A| = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$$

We get
$$A_{11} = (-1)^{1+1} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix},$$

$$A_{12} = (-1)^{1+2} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix},$$

$$A_{23} = (-1)^{2+3} \begin{vmatrix} a_{11} & a_{12} \\ a_{31} & a_{32} \end{vmatrix},$$

$$A_{31} = (-1)^{3+1} \begin{vmatrix} a_{12} & a_{13} \\ a_{22} & a_{23} \end{vmatrix}, \text{ and so on.}$$

**Note :**

**1.** The sum of the products of the elements of any row (column) of a determinant with the corresponding co-factors is equal to the value of the determinant, i. *e.*,

$$|A| = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13},$$

$$= a_{12}A_{12} + a_{22}A_{22} + a_{32}A_{32}, \text{ etc.}$$

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**2.** The sum of the products of the elements of any row (column) with the co-factors of the corresponding elements of any other row (column) is zero, i. *e.,*

$$0 = a_{11}A_{12} + a_{12}A_{22} + a_{13}A_{23},$$
$$= a_{13}A_{11} + a_{23}A_{21} + a_{33}A_{31}, \text{ etc.}$$

**Example 10.** *Find the minors and co-factors of matrix A and use it to evaluate the determinant of the matrix*

$$A = \begin{bmatrix} 3 & 1 & -4 \\ 2 & 5 & \\ 1 & 4 & 8 \end{bmatrix}$$

**Solution:** The minors are calculated as follows:

As $M_{ij}$ = minor of $a_{ij}$

$\therefore$ $M_{11} = \begin{vmatrix} 5 & 6 \\ 4 & 8 \end{vmatrix} = 40 - 24 = 16$

$M_{12} = \begin{vmatrix} 2 & 6 \\ 1 & 8 \end{vmatrix} = 16 - 6 = 10$

$M_{13} = \begin{vmatrix} 2 & 5 \\ 1 & 4 \end{vmatrix} = 8 - 5 = 3$

$M_{21} = \begin{vmatrix} 1 & -4 \\ 4 & 8 \end{vmatrix} = 8 + 16 = 24$

$M_{22} = \begin{vmatrix} 3 & -4 \\ 1 & 8 \end{vmatrix} = 24 + 4 = 28$

$M_{23} = \begin{vmatrix} 3 & 1 \\ 1 & 4 \end{vmatrix} = 12 - 1 = 11$

$M_{31} = \begin{vmatrix} 1 & -4 \\ 5 & 6 \end{vmatrix} = 6 + 20 = 26$

$M_{32} = \begin{vmatrix} 3 & -4 \\ 2 & 6 \end{vmatrix} = 18 + 8 = 26$

$M_{33} = \begin{vmatrix} 3 & 1 \\ 2 & 5 \end{vmatrix} = 15 - 2 = 13$

Now as co-factor $A_{ij}$ of element $a_{ij} = (-1)^{i+j}M_{ij}$ $\therefore$

Co-factors

$$A_{11} = (-1)^2 M_{11} = +(16) = 16$$

$$A_{12} = (-1)^3 M_{12} = -(10) = -10 \ A_{13}$$
$$= (-1)^4 M_{13} = +(3) = 3$$

$$A_{21} = (-1)^3 M_{21} = -(24) = -24$$

$$A_{22} = (-1)^4 M_{22} = +(28) = 28$$

$$A_{23} = (-1)^5 M_{23} = -(11) = -11$$

$$A_{31} = (-1)^4 M_{31} = +(26) = 26$$

$$A_{32} = (-1)^3 M_{32} = -(26) = -26$$
$$A_{33} = (-1)^6 M_{33} = +(13) = 13$$

Also $|A| = a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13}$

$$= 3(16) + 1(-10) - 4(3) \cdot$$

$$= 48 - 10 - 12 = 26$$

## 2.6 ADJOINT OF A MATRIX

Let $A = [a_{ij}]$ be a square matrix of order $n$ and let $A_{ij}$ denote the co-factor of $a_{ij}$ in $|A|$. Then the adjoint of matrix $A$ is defined as the transpose of the matrix $[A_{ij}]$ and is expressed by writing $adj\, A$.

Thus, in order to find the adjoint of a matrix, replace each element of this matrix by the co-factor of that element and then transpose this matrix of co-factors. The two operations may also be performed in reverse order, i. $e.,$ first find the transpose of the given matrix and then replace each element by its co-factor.

Hence, if
$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix},$$

we have

$$adj\, A = \begin{bmatrix} A_{11} & A_{12} & \cdots & A_{1n} \\ A_{21} & A_{22} & \cdots & A_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ \cdots & \cdots & \cdots & \cdots \\ A_{n1} & A_{n2} & \cdots & A_{nn} \end{bmatrix}$$

where capital letters denote the co-factors of small letters in $|A|$.

i. $e.,$ $A_{ij} =$ co-factor of $a_{ij}$ in $|A|$.

**Some Properties**

(i) If $A$ is a square matrix,

$$A.(adjA) = (adjA).A$$

$$= |A|I$$

Where $I$ is the matrix of the same order as $A$.

(ii) If $A = [a_{ij}]$ is a square matrix of order $n$, we have

$$|adj\ A| = |A|^{n-1}, \text{provided } |A| \neq 0.$$

(iii) If $A$ and $B$ are two square matrices of $n \times n$ order each, we have
$$adj(AB) = (adj\ B).(adj\ A).$$

---

## 2.7 INVERSE OF A MATRIX

---

If, for a given square matrix $A$ of order $\times\ n$ , there exists of matrix $B$ such that $AB = BA = I_n$ (where $I_n$ is a unit matrix of order $n$), the square matrix $B$ is said to be an inverse of $A$. We write $B$ as $A^{-1}$, read as '$A$ inverse'. A matrix having an inverse is called an inverse matrix.

From the definition given above, we see that we can talk of an inverse of a square matrix only. Also, we find that, if $B$ be an inverse of a square matrix only. Also, we find that, if $B$ be an inverse of $A$, $A$ is also an inverse of $B$.

We already know that

$$A.(adj\ A) = |A|I$$

or $A\left(\frac{adj\ A}{|A|}\right) = I$, provided $|A| \neq 0$.

Hence, $A^{-1}\left(\frac{adj\ A}{|A|}\right)$, if $|A| \neq 0$.

Thus, we find another from the inverse or reciprocal of the matrix $A$, which is quite suggestive of the procedure for finding an inverse.

$A^{-1}$ is said to be the inverse of $A$ because it possesses the property $AA^{-1} = A^{-1}A = I$.

**Theorem 1.** *The inverse of a matrix is unique.*

**Proof.** If possible, let $B$ and $C$ be two inverse of a square matrix $A$. Since $B$ is an inverse of $A$, we have

$$AB = BA = I \quad …(i)$$

Again, since $C$ is an inverse of $A$, we have

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$$AC = CA = I \quad \text{…(ii)}$$

From (i), we have

$$C(\ B) = CI = C \qquad \text{…(iii) Also, from (ii), we have}$$

$$(CA)B = IB = B \qquad \text{…(iv)}$$

We know that $\quad C(AB) = (CA)B.$

Therefore, from (iii) and (iv) it follows that

$$B = C$$

i. *e.,* the inverse is unique.

**Theorem 2.** *A square matrix A has an inverse, if and only if $|A| \neq 0$.*

*OR*

*A square matrix Ais invertible, if and only if A is non-singular.*

**Proof.** The condition is necessary Let $B$

be the inverse of the matrix $A,$ then

$$AB = I.$$

Therefore, $\qquad |A||B| = |I| = 1.$

Hence, $\qquad |A| \neq 0.$

*The condition is sufficient.* Suppose $|A| \neq 0.$ Let us assume that

$B = \dfrac{adj\ A}{|A|}$

$AB = A. \left(\dfrac{adj\ A}{|A|}\right)$

$\quad = \dfrac{1}{|A|}(A.\,adj\ A) = \dfrac{|A|I}{|A|} = I$

$BA = I$

$AB = BA = I.$

$\therefore$

Similarly,

$\therefore$

Hence, $A$has an inverse.

**Theorem 3. Reversal Law :** *If Aand B are invertible square matrices of the same order, then AB is also invertible and*

$$(AB)_{-1} = B_{-1}A_{-1}$$

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Given $A, B$ are invertible matrices of same order, hence

$\quad |A| \neq 0, \quad$ and $\quad |B| \neq 0.$

$\Rightarrow |A||B| \neq 0 \Rightarrow |AB| \neq 0 \Rightarrow AB$ is invertible.

Let $(AB)^{-1} = C$, then $(AB)C = I = C(AB)$

Now, $\quad\quad\quad (AB)C = I \quad \Rightarrow \quad\quad\quad A(BC) = I$

$\Rightarrow \quad\quad A^{-1}[A(BC)] = A^{-1}$

$\Rightarrow \quad\quad (A^{-1}A)(BC) = A^{-1} \quad \Rightarrow \quad I(BC) = A^{-1}$

$\Rightarrow \quad\quad\quad BC = A^{-1} \quad\quad \Rightarrow \quad B_{-1}(BC) = B_{-1}A_{-1}$

$\Rightarrow \quad\quad (B^{-1}B)C = B^{-1}A^{-1} \quad \Rightarrow \quad IC = B^{-1}A^{-1}$

$\Rightarrow \quad\quad\quad C = B_{-1}A_{-1}$

Hence, $\quad\quad (AB)_{-1} = B_{-1}A_{-1}.$

**Example 11.** *Find the adjoint of the matrix* $A = \begin{bmatrix} -2 & 3 \\ -5 & 4 \end{bmatrix}$

**Solution :** $\quad\quad\quad\quad A = \begin{bmatrix} -2 & 3 \\ -5 & 4 \end{bmatrix}$

Here, co-factor of $a_{11} = (-1)^{1+1} 4 = 4$

Co-factor of $a_{12} = (-1)^{1+2}(-5) = -(-5) = 5$

Co-factor of $a_{21} = (-1)^{2+1} 3 = -3$

Co-factor of $a_{22} = (-1)^{2+2}(-2) = -2$

$A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -3 & -2 \end{bmatrix}' = \begin{bmatrix} 4 & -3 \\ 5 & -2 \end{bmatrix}$ Adjoint of

**Example 12.** *Find adjoint of* $A = \begin{bmatrix} 2 & 1 & 4 \\ 3 & 1 & 3 \\ 4 & 1 & 5 \end{bmatrix}$

**Solution :** $\quad\quad A = \begin{bmatrix} 2 & 1 & 4 \\ 3 & 1 & 3 \\ 4 & 1 & 5 \end{bmatrix}$

Now, If $A_{ij}$ = co-factor of $a_{ij}$

Then $Adj\ A = \begin{bmatrix} a_{11} & a_{21} & a_{31} \\ a_{12} & a_{22} & a_{32} \end{bmatrix}$

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$$Adj\, A = \begin{bmatrix} (-1)^{1+1}\begin{vmatrix} a_{13} & a_{23} \\ 1 & 3 \\ F & 1 \end{vmatrix} & (-1)^{1+2}\begin{vmatrix} 3 & 3 \\ 4 & 5 \end{vmatrix} & (-1)^{1+3}\begin{vmatrix} 3 & 1 \\ 4 & 1 \end{vmatrix} \\ (-1)^{2+1}\begin{vmatrix} 1 & 5 \\ 1 & 4 \end{vmatrix} & (-1)^{2+2}\begin{vmatrix} 2 & 5 \\ 2 & 4 \end{vmatrix} & (-1)^{2+3}\begin{vmatrix} 2 & 1 \\ 2 & 1 \end{vmatrix} \\ (-1)^{3+1}\begin{vmatrix} 1 & 5 \\ 1 & 4 \end{vmatrix} & (-1)^{3+2}\begin{vmatrix} 2 & 5 \\ 2 & 4 \end{vmatrix} & (-1)^{3+3}\begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} \\ 1 & 3 & 3 & 3 & 3 & 1 \end{bmatrix}'$$

$$Adj\, A = \begin{bmatrix} (5-3) & -(15-12) & (3-4) \\ -(5-4) & (10-16) & -(2-4) \\ (3-4) & -(6-12) & (2-3) \end{bmatrix}$$

$$Adj\, A = \begin{bmatrix} 2 & -3 & -1 \\ -1 & -6 & 2 \\ -1 & 6 & -1 \end{bmatrix}' = \begin{bmatrix} 2 & -1 & -1 \\ -3 & -6 & 6 \\ -1 & 2 & -1 \end{bmatrix}$$

**Example 13.** *Find $A^{-1}$ for $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$.*

**Solution :** $\quad A^{-1} = \dfrac{adj\, A}{|A|}$

The adjoint of $A$, as calculated in example 1 of the proceeding section, is as under :

$$adj\, A = \begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{vmatrix} = 1(1) + 2(1), \text{ expanding by the first row}$$

$$= 3$$

$$\therefore \quad A^{-1} = \frac{1}{3}\begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix} = \begin{bmatrix} \dfrac{1}{3} & \dfrac{4}{3} & -\dfrac{2}{3} \\ -\dfrac{2}{3} & -\dfrac{5}{3} & \dfrac{4}{3} \\ \dfrac{1}{3} & -\dfrac{2}{3} & \dfrac{1}{3} \end{bmatrix}.$$

**Note.** The answer can be verified from the fact that $A^{-1}A = I$, as shown below.

$$A^{-1}A = \begin{bmatrix} \frac{1}{3} & \frac{4}{3} & -\frac{2}{3} \\ -\frac{2}{3} & -\frac{5}{3} & \frac{4}{3} \\ \frac{1}{3} & -\frac{2}{3} & \frac{1}{3} \end{bmatrix} \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{1}{3}+\frac{8}{3}-1 & \frac{4}{3}-\frac{4}{3} & \frac{2}{3}-\frac{2}{3} \\ -\frac{2}{3}-\frac{10}{3}+4 & -\frac{5}{3}+\frac{8}{3} & -\frac{4}{3}+\frac{4}{3} \\ \frac{1}{3}-\frac{4}{3}+1 & -\frac{2}{3}+\frac{2}{3} & \frac{2}{3}+\frac{1}{3} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$

.

**Example 14.** *Calculate the inverse of the matrix*

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}.$$

**Solution :**  Here $|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc$.

Now,        $|A| = 0$, if $ad - bc = 0$.

Let us assume that $ad - bc \neq 0$ so that $A^{-1}$ exists.

But   $A^{-1} = \frac{adj\ A}{|A|}$.

Now, we have

$$A_{11} = d, A_{12} = -c, A_{21} = -b \text{ and } A_{22} = a.$$

$$adj\ A = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

$$A^{-1} = \frac{1}{(ad-bc)}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

∴

And

**Example 15.** *Find the inverse of the matrix :*

$$\begin{bmatrix} 3 & -10 & -1 \\ -2 & 8 & 2 \\ 2 & -4 & -2 \end{bmatrix}$$

**Solution :** Let   $A = \begin{bmatrix} 3 & -10 & -1 \\ -2 & 8 & 2 \\ 2 & -4 & -2 \end{bmatrix}$

$$|A| = 3(-16 + 8) + 10(4 - 4) - 1(8 - 16)$$

$$= -24 + 0 + 8 = -16 \neq 0 \quad \therefore A^{-1} \text{ exists}$$

The co-factors are

$$A_{11} = -16 + 8 = -8,$$

$$A_{12} = -(4 - 4) = 0'$$

$$A_{13} = 8 - 16 = -8,$$

$$A_{21} = -(20 - 4) = -16'$$

$$A_{22} = -(6 + 2) = -4,$$

$$A_{23} = -(-12 + 20) = -8'$$

$$A_{31} = -20 + 8 = -12$$

$$A_{32} = -(6 - 2) = -4$$

$$A_{33} = 24 - 20 = 4$$

$$\therefore \text{Matrix of co-factors} = \begin{bmatrix} -8 & 0 & -8 \\ -16 & -4 & -8 \\ -12 & -4 & 4 \end{bmatrix}$$

$$\therefore adj\, A = \begin{bmatrix} -8 & -16 & -12 \\ 0 & -4 & -4 \\ -8 & -8 & 4 \end{bmatrix} = -4 \begin{bmatrix} 2 & 4 & 3 \\ 0 & 1 & 1 \\ 2 & 2 & -1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|}(adj\, A) = \frac{4}{16} \begin{bmatrix} 2 & 4 & 3 \\ 0 & 1 & 1 \\ 2 & 2 & -1 \end{bmatrix} = \frac{1}{4} \begin{bmatrix} 2 & 4 & 3 \\ 0 & 1 & 1 \\ 2 & 2 & -1 \end{bmatrix}$$

Then

**Example 16.** *Given the matrix*

$$X = \begin{bmatrix} 1 & 4 & 2 \\ -1 & 2 & 1 \\ 1 & 3 & 2 \end{bmatrix}, \qquad show\ that X X^{-1} = I_3.$$

**Solution :** We know that
$$X^{-1} = \frac{Adj}{|X|}.$$

We have $|X| = 1(4 - 3) - 4(-2 - 1) + 2(-3 - 2) = 3$

Let us find adjoint of X

$$A_{11} = (-1)^{1+1} \begin{vmatrix} 2 & 1 \\ 3 & 2 \end{vmatrix} = 1,$$

$$A_{12} = (-1)^{1+2} \begin{vmatrix} 3 & 2 \\ -1 & 1 \end{vmatrix} = 3,$$

$$A_{13} = (-1) \begin{vmatrix} 1 & 2 \\ 2 & 3 \end{vmatrix} = -5 \qquad , \qquad {}^{1+3}\begin{matrix} -1 & 2 \end{matrix}$$

$$A_{21} = (-1)^{2+1} \begin{vmatrix} 4 & 2 \\ 3 & 2 \end{vmatrix} = -2 \quad ,$$

$$A_{22} = (-1)^{2+2} \begin{vmatrix} 1 & 2 \\ 1 & 2 \end{vmatrix} = 0 \quad ,$$

$$A_{23} = (-1)^{2+3} \begin{vmatrix} 1 & 4 \\ 1 & 3 \end{vmatrix} = 1 \quad ,$$

$$A_{31} = (-1)^{3+1} \begin{vmatrix} 4 & 2 \\ 2 & 1 \end{vmatrix} = 0 \quad , \qquad \begin{vmatrix} -1 & 1 \\ 1 & 4 \end{vmatrix} = 6 \qquad {}^{3+3}$$

$$A_{33} = (-1) \begin{matrix} -1 & 2 \\ 1 & 3 \end{matrix}$$

$$A_{32} = (-1)^{3+2} \begin{vmatrix} 1 & 2 \\ 1 & 1 \end{vmatrix} = -3,$$

Hence, co-factor matrix $= \begin{bmatrix} -5 & -2 & 0 & 1 \\ 0 & -3 & 6 \end{bmatrix}$

$$\therefore \qquad Adj\, X = \begin{bmatrix} 1 & -2 & 0 \\ 3 & 0 & -3 \\ -5 & 1 & 6 \end{bmatrix}$$

$$\therefore \qquad X^{-1} = \frac{1}{3}\begin{bmatrix} 1 & -2 & 0 \\ 3 & 0 & -3 \\ -5 & 1 & 6 \end{bmatrix}$$

$$\therefore \qquad XX^{-1} = \frac{1}{3}\begin{bmatrix} 1 & 4 & 2 \\ -1 & 2 & 1 \\ 1 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 & -2 & 0 \\ 3 & 0 & -3 \\ -5 & 1 & 6 \end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix} 1\times1+4\times3+2\times-5 & 1\times-2+4\times0+2\times1 & 1\times0+4\times-3+2\times6 \\ -1\times1+2\times3+1\times-5 & -1\times-2+2\times0+1\times1 & -1\times0+2\times-3+1\times6 \\ 1\times1+3\times3+3\times-5 & 1\times-2+3\times0+2\times1 & 1\times0+3\times-3+2\times6 \end{bmatrix}$$

$$= \frac{1}{3}\begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$

3.

$$\begin{matrix} 1 & 2 & 2 \end{matrix}$$

**Example 17.** *Show that* $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ *satisfies the equation* $A^2 - 4A - 5I = 0$ *where I is identity matrix and* $0$ *denotes the zero matrix. Hence find the inverse of A.*

**Solution :** Here,

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} \times$$

$$= \begin{bmatrix} 1+4+4 \\ 2+2+4 \\ 2+4+2 \end{bmatrix}$$

$$4A = \begin{bmatrix} 4 & 8 & 8 \\ 8 & 4 & 8 \\ 8 & 8 & 4 \end{bmatrix}$$

$$5I = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

$$4A - 5I = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix} -$$

$$= \begin{bmatrix} 9-4-5 \\ 8-8 \\ 8-8 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} =$$

$$\begin{vmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix} = 1(1-4) -$$

$$\begin{bmatrix} 1 & 2 & 2 \\ 2 & & \\ 2 & & \end{bmatrix}$$

2 +
+
+

$$\begin{bmatrix} 4 & & \\ 8 & & \\ 8 & & \\ 8 - & & \\ 9 - & & \\ 8 & & \end{bmatrix}$$

0 =

2(2

$\therefore \quad 1 \qquad 2]$

$$\begin{bmatrix} 2 & 1 \\ 2+4 & 2+4+2 \\ 4 & 1+4 & 4+2+2 \\ 4 & 2+2 & 4+4+1 \end{bmatrix} = \begin{bmatrix} 9 & 8 & 8 \\ 8 & 9 & 8 \\ 8 & 8 & 9 \end{bmatrix}$$

Also,

and

$$\therefore \quad A^2 - 4 \begin{bmatrix} 8 & 8 & 5 \\ 8 & & \\ 8 & 4 & \end{bmatrix} - \begin{bmatrix} 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

$$\begin{bmatrix} 8 & 8-8 \\ 4-5 & 8-8 \\ -8 & 9-4 & -5 \end{bmatrix}$$

*R. H. S.*

To find $A^{-1}$.

$$|A| = -2) + 2(4 - 2) = 5 \neq 0$$

Hence, $A^{-1}$ exists.
Multiplying the both sides of the equation

$$A^2 - 4A - 5I = 0$$

by $A^{-1}$, we have

$$A^{-1}A^2 - 4A^{-1}A - 5A^{-1}I = 0$$

or  $A - 4I - 5A^{-1} = 0$                                        or $\therefore$

$$5A^{-1} = A - 4I$$

$$= \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix} - \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix} = \begin{bmatrix} -3 & 2 & 2 \\ 2 & -3 & 2 \\ 2 & 2 & -3 \end{bmatrix}$$

$$A^{-1} = \frac{1}{5}\begin{bmatrix} -3 & 2 & 2 \\ 2 & -3 & 2 \\ 2 & 2 & -3 \end{bmatrix}.$$

## 2.8 TEST YOUR UNDERSTANDING (B)

5.  For the matrices $A = \begin{bmatrix} 1 & -2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 \\ -3 & 2 \\ 3 & 3 \end{bmatrix}$ prove that $(AB)^{-1} = B^{-1}A^{-1}$.

6.  If  $A = \begin{bmatrix} -1 & 0 & -1 \\ -4 & -4 & -3 \end{bmatrix}$,
    Find $adj\ A$, and hence, find the inverse of $A$.

7.  Verify the theorem $A.\,(adj\ A) = (adj\ A).\,A = |A|I_3$ for the matrix,
    $$A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 4 \\ 1 & 4 & 3 \end{bmatrix}.$$

8.  If $A = \begin{bmatrix} 3 & 4 & 6 \\ 1 & 2 & 3 \\ 8 & 5 & 10 \end{bmatrix}$, verify that $A^{-1}A = I.$

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9. If $A = \begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$, $B^{-1} = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & -1 \\ 1 & 0 & 2 \end{bmatrix}$, find $(AB)^{-1}$.

10. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, show that $A^3 - 23A - 40I = 0$, where $I$ is a unit matrix of order 3 and 0 is null matrix of order 3. Hence (not otherwise), compute $A^{-1}$.

11. Verify $A^2 + 3A + 4I = 0$ for the matrix
$$A = \begin{bmatrix} -1 & -1 \\ 2 & -2 \end{bmatrix}.$$
Hence, obtain the inverse of $A$.

12. Show that the matrix
$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$
Satisfies the equation $A^3 - 6A^2 + 9A - 4I = 0$, and hence, deduce $A^{-1}$.

**Answers**

1. $adj\ A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & -3 \end{bmatrix}$, $A^{-1} = \begin{bmatrix} 4 & 3 & 3 \\ -1 & 0 & -1 \\ -4 & -4 & 3 \end{bmatrix}$;

5. $\frac{1}{19} \begin{bmatrix} 16 & 12 & 1 \\ 21 & 11 & -7 \\ 10 & -2 & 3 \end{bmatrix}$

$A^{-1} = \frac{1}{40} \begin{bmatrix} -4 & 4 & 8 \\ 1 & 11 & 8 \\ 14 & 6 & 8 \end{bmatrix}$

6.

8. $\frac{1}{4} \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$

**2.9 SOLVING LINEAR EQUATIONS BY MATRIX INVERSE METHOD**

With the help of matrices a set of linear equations can be solved to find unknown values. Suppose we have the following set of linear equations:

$$a_{11}x_1 + a_{12}x_2 + \ldots + a_{1n}x_n = b_1 \quad a_{21}x_1$$

$$+ a_{22}x_2 + \ldots + a_{2n}x_n = b_2$$

$$\vdots$$
$$\vdots$$

$$a_{n1}x_1 + a_{n2}x_2 + \ldots + a_{nm}x_n = b_n.$$

These equations may be written in the following way:

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & & & \\ a_{n1} & a_{n2} & \cdots & \\ a_{nm} \end{bmatrix}; \quad \begin{bmatrix} x_1 \, x_2 \\ [:] \\ x_n \end{bmatrix} \quad \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{bmatrix} X$$

If $A$ is a non-singular matrix then

$$X = A^{-1}B, \quad A^{-1} = \frac{Adj.\ A}{|A|}$$

or $\quad X = \frac{Adj.\ A \cdot B}{|A|}$

**Criterion of Consistency:**

Let $AX = B$ be a system of $n$-linear equations in $n$ unknowns
**Case I :** If $|A| \neq 0$, then the system is consistent and has a unique solution given by $X = A^{-1} B$.

**Case II :** If $|A| = 0$ and $(adj\ A).\ B = 0$, then the system is consistent and has infinite many solutions. **Case III :** If $|A| = 0$ and $(adj\ A).B \neq 0$, then the system is consistent.

**Note : If** $|A| = 0$, then system will have infinite numbers of solutions.

**Example 18.** *Solve the system of equations*

$$x + y + z = 6$$
$$x - y + z = 2$$
$$2x + y - z =$$

**Solution:** The system of equations in matrix from is $AX = B$, where

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ 2 & 1 & -1 \end{bmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, B = \begin{bmatrix} 6 \\ 2 \\ 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{6} \begin{bmatrix} 0 & 2 & 2 \\ 3 & -3 & 0 \\ 3 & 1 & -2 \end{bmatrix}$$

$$X = \frac{1}{6} \begin{bmatrix} 0 & 2 & 2 \\ 3 & -3 & 0 \\ 3 & 1 & -2 \end{bmatrix} \begin{bmatrix} 6 \\ 2 \\ 1 \end{bmatrix} = \frac{1}{6} \begin{bmatrix} 6 \\ 12 \\ 18 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

Now

$\therefore$

$\therefore \quad x = 1, y = 2, z = 3$

**Example 19.** *Solve the following equations by matrix inverse method*

$$x_1 + 2x_2 = 10$$
$$2x_1 - x_2 = 15$$

**Solution:** $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}, X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}, B = \begin{bmatrix} 10 \\ 15 \end{bmatrix}$

$$AX = B$$

$$|A| = \begin{vmatrix} 1 & 2 \\ 2 & -1 \end{vmatrix} = -1 - 4 = -5$$

$\therefore \quad |A| = -5$

Co-factor of $1 = -1$,

Co-factor of $2 = -2$

61

$$\text{Co-factor of } 2 = -2$$

$$\text{Co-factor of } 1 = -1$$

$$\therefore \quad \text{Matrix of co-factors} = \begin{bmatrix} -1 & -2 \\ -2 & -1 \end{bmatrix}$$

$$Adj. = \begin{bmatrix} -1 & -2 \\ -2 & -1 \end{bmatrix}$$

$$A^{-1} = \frac{-1}{-5} \begin{bmatrix} -1 & -2 \\ -2 & -1 \end{bmatrix} \text{ or } A^{-1}B = -\frac{1}{-5} \begin{bmatrix} -1 & -2 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} 10 \\ 15 \end{bmatrix}$$

$$= \frac{-1}{5} \begin{bmatrix} -10 & +(-30) \\ -20 & +(-15) \end{bmatrix} = -\frac{1}{5} \begin{bmatrix} -40 \\ -35 \end{bmatrix} = \begin{bmatrix} 8 \\ 7 \end{bmatrix}$$

$$\therefore \qquad\qquad x_1 = 8, \ x_2 = 7$$

## 2.10 TEST YOUR UNDERSTANDING (C)

**1.** Solve the following equations by matrix method :

$$x - y = 5; \ 3x + 4y = 7 \ \mathbf{2.}$$

Solve the following equations by Matrix method :

$$x + 3y + z = 16; \qquad 2x + y + 3z = 19; \quad x + 2y + 4z = 25 \ \mathbf{3.}$$

Solve the following equations by using matrix method :

$$x + y + z = 6; \ x + 2y + 3z = 14; \quad x + y + 7z = 24 \ \mathbf{4.} \quad \text{Solve}$$

the following system of linear equations by using matrix method :

$$x - 2y = 3; \quad 6x - 3y = 5$$

**5.** Solve the following equations by matrix method

$$x_1 + 5x_2 = 11; \qquad 4x_1 - 3x_2 = 9$$

**6.** Solve the following equations by inverse method

$$x_1 + x_2 + x_3 = 1; \qquad 2x_1 + 2x_2 + 3x_3 = 6; \ x_1 + 4x_2 + 9x_3 = 3$$

**7.** Solve the following equations by inverse method

$$x_1 - 2x_2 + 5x_3 = 1; \quad 2x_1 - 4x_2 + 8x_3 = 2; \ -3x_1 + 6x_2 + 7x_3 = 1$$

**8.** A salesman has following record of sales during three months for three items $A$, $B$ and $C$

which have different rates of commission.

| Months Sale of Units | | | | Total Commission Drawn (in Rs.) |
|---|---|---|---|---|
| | A | B | C | |
| January | 90 | 100 | 120 | 800 |
| February | 130 | 50 | 40 | 900 |
| March 60 | | 100 | 30 | 850 |

Find out rates of commission per item on $A$, $B$ and $C$ by matrix method.

**Answers**

**1.** $\frac{27}{11}, \frac{-1}{11}$    **2.** 1, 2, 5    **3.** 1, 2, 3    **4.** Inconsistent

**5.** $x_1 = 3, x_2 = 1$    **6.** $x_1 = 7, x_2 = -10, x_3 = 4$

**7.** $x_1 = \frac{-14}{19}, x_2 = \frac{-7}{38}, x_3 = \frac{4}{19}$    **8.** $x = 2, y = 4, z = 11$

## 2.11 SOLVING THE EQUATIONS BY CRAMER RULE

It is a method that adopts determinants therefore it is also known as solving equations by the method of determinant. By using this method, in a set of three (say) linear equations, the unknown values $x$, $y$ and $z$ can be obtained. To solve the equations, 4 determinants are to be computed. They are :

$|D|$ = For the information given in the matrix i.e. determinants of coefficient of $x, y, z$.

$|D_1|$ = Determinant obtained from $|D|$ by replacing its first column by the values of $B$.

$|D_2|$ = Determinant obtained from $|D|$ by replacing its second column by the values of $B$. $|D_3|$

= Determinant obtained from $|D|$ by replacing its third column by the values of $B$.

(i)    If $|D| \neq 0$, then the values of unknowns are given by : $x = \frac{|D_1|}{|D|}, y = \frac{|D_2|}{|D|}$    and

$z = \frac{|D_3|}{|D|}$

(ii)   If $|D| = |D_1| = |D_2| = |D_3| = 0$ then the given set of equations is consistent having infinite solutions.

(iii)  If $|D| = 0$ and at least one of the determinants $|D_1|, |D_2|$ and $|D_3|$ is non-zero, then the system is inconsistent.

**Example 20.** *Solve the following equations by Cramer's Rule :*

$$2x - y = 5$$
$$x - 4y = -1$$

**Solution:** The above equations can be presented in the form of matrices :

$$\begin{vmatrix} 2 & -1 \\ 1 & -4 \end{vmatrix} \begin{vmatrix} x \\ y \end{vmatrix} = \begin{vmatrix} 5 \\ -1 \end{vmatrix}$$

$$AX = B$$

Consider
$$|D| = \begin{vmatrix} 2 & -1 \\ 1 & -4 \end{vmatrix} = (-8 + 1) = -7$$

$$|D_1| = \begin{vmatrix} 5 & -1 \\ -1 & -4 \end{vmatrix} = (-20 - 1) = -21$$

$$|D_2| = \begin{vmatrix} 2 & 5 \\ 1 & -1 \end{vmatrix} = -2 - 5 = -7$$

$$x = \frac{|D_1|}{|D|} = \frac{-21}{-7} = 3, \; y = \frac{|D_2|}{|D|} = \frac{-7}{-7} = 1$$

$\therefore$

$\therefore \quad x = 3, y = 1.$

**Example 21.** *Solve the following equations*

$$6x + y - 3z = 5 \; x$$
$$+ \; 3y - 2z = 5$$
$$2x + y + 4z = 8$$

**Solution:** The above equations can be presented in the form of matrix

$$\begin{bmatrix} 6 & 1 & -3 \\ 1 & 3 & -2 \\ 2 & 1 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 5 \\ 8 \end{bmatrix}$$

$$AX = B$$

To solve the equations, consider the determinant

$$|D| = \begin{vmatrix} 6 & 1 & -3 \\ 1 & 3 & -2 \\ 2 & 1 & 4 \end{vmatrix} = 6(12 + 2) - 1(4 + 4) - 3(1 - 6)$$

$$= 6 \times 14 - 8 \times 1 + 5 \times 3 = 84 - 8 + 15 = 91$$

$$|D_1| = \begin{vmatrix} 5 & 1 & -3 \\ 5 & 3 & -2 \\ 8 & 1 & 4 \end{vmatrix} = 5(12 + 2) - 1(20 + 16) + 3(5 - 24)$$

$$= 70 - 36 + 57 = 91$$

$$|D_2| = \begin{vmatrix} 6 & 5 & -3 \\ 1 & 5 & -2 \\ 2 & 8 & 4 \end{vmatrix} = 6(20 + 16) - 5(4 + 4) - 3(8 - 10)$$

$$= 216 - 40 + 6 = 182$$

$$|D_3| = \begin{vmatrix} 6 & 1 & 5 \\ 1 & 3 & 5 \\ 2 & 1 & 8 \end{vmatrix} = 6(24 - 5) - 1(8 - 10) + 5(1 - 6)$$

$$= 114 + 2 - 25 = 91$$

$$\therefore \quad x = \frac{|D_1|}{|D|} = \frac{91}{91} = 1$$

$$y = \frac{|D_2|}{|D|} = \frac{182}{91} = 2$$

$$z = \frac{|D_3|}{|D|} = \frac{91}{91} = 1$$

$$\therefore \qquad\qquad x = 1, y = 2, z = 1.$$

**Example 22.** *The sum three numbers is 20. If we multiply first by 2 and add the second number and subtract the third, we get 23. If we multiply the first by 3 and add second and third to it, we get 46. Find the numbers.*

**Solution:** Let the number be $x$, $y$ and $z$ repectively. According, the question we have

$$x + y + z = 20 \qquad \text{(First Condition)}$$
$$2x + y - z = 23 \qquad \text{(Second Condition)}$$
$$3x + y + z = 46 \qquad \text{(Third Condition)}$$

The above equations can be presented in the form of a matrix.

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 20 \\ 23 \\ 46 \end{bmatrix}$$

$$AX = B$$

To solve the equations, consider the determinant

$$|D| = \begin{vmatrix} 1 & 1 & 1 \\ 2 & 1 & -1 \\ 3 & 1 & 1 \end{vmatrix} = 1(1+1) - 1(2+3) + 1(2-3)$$

$$= 2 - 5 - 1 = 2 - 6 = -4$$

$$20 \; |D_1| = \begin{vmatrix} 1 & 1 \\ 23 & 1 & -1 \\ 46 & 1 & 1 \end{vmatrix} = 20(1+1) - 1(23+46) + 1(23-46)$$

$$= 40 - 69 - 23 = 40 - 92 = -52$$

$$|D_2| = \begin{vmatrix} 1 & 20 & 1 \\ 2 & 23 & -1 \\ 3 & 46 & 1 \end{vmatrix} = 1(23+46) - 20(2+3) + 1(92-69)$$

$$= 69 - 100 + 23 = 92 - 100 = -8$$

$$|D_3| = \begin{vmatrix} 1 & 1 & 20 \\ 2 & 1 & 23 \\ 3 & 1 & 46 \end{vmatrix} = 1(46-23) - 1(92-69) + 20(2-3)$$

$$= 23 - 23 - 20 = 0 - 20 = -20$$

$$\therefore \quad x = \frac{|D_1|}{|D|} = \frac{-52}{-4} = 13$$

$$y = \frac{|D_2|}{|D|} = \frac{-8}{-4} = 2$$

$$z = \frac{|D_3|}{|D|} = \frac{-20}{-4} = 5$$

Thus, $x = 13, y = 2$ and $z = 5$.

**Example 23.** *Solve the following system of equations*

$$x + 3y + 4z = 8$$
$$2x + y + 2z = 5$$
$$5x + 2z = 7$$

**Solution:** $A = \begin{vmatrix} 1 & 3 & 4 \\ 2 & 1 & 2 \\ 5 & 0 & 2 \end{vmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, B = \begin{bmatrix} 8 \\ 5 \\ 7 \end{bmatrix}$

$$AX = B$$

$$|D| = 1(2 - 0) - 3(4 - 10) + 4(0 - 5) = 2 + 18 - 20 = 0$$

Since $|D| = 0$, the system may have infinite number of solutions

Now solve any two of the given equations. Solving the last two equations i. $e.$ equation (ii) and (iii), we get

$$2x + y + 2k = 5, 5x + 2k = 7$$
$$\Rightarrow \quad x = \frac{7-2k}{5}$$

Putting this values of $x$ in equation (ii) we get

$$y = 5 - 2x - 2k = 5 - 2 \left(\frac{7-2k}{5}\right) - 2k$$

$$\Rightarrow \quad y = \frac{11-6k}{5}$$

Thus all the infinite solutions of the given system are given by

$$x = \frac{7-2k}{5}, y = \frac{11-6k}{5}, z = k$$

Where $k$ is arbitrary real number. By putting different values of $k$, we can get different solutions. For example, putting $k = 1$, we get a particular solution $x = 1, y = 1, z = 1$.

## 2.12 TEST YOUR UNDERSTANDING (D)

1.  Solve the following equations using Cramer's rule :
$$2x - y = 1; \quad 7x - 2y = -7$$

2.  By Cramer's rule, solve the following equations :
$$2x - y + z = 4; \quad x + 3y + z = 12; \quad 3x + 2y + z = 5$$

3.  Solve the following linear equations by Cramer's rule :
$$x + y + z = 1; \quad x + 2y + z = 1; \quad 3x - y - 2z = 6$$

4.  Solve the following equations by Cramer's rule :
$$x + y + z = 9; \quad 2x + 6y + 7z = 55; \quad 2x + y - z = 0$$

5.  Solve the following equations by Cramer's rule
$$2x - y + 3z = 9$$
$$x + 3y - z = 4$$
$$3x + 2y + z = 10$$

6.  Solve the following system of equations

(a) $5x - 6y + 4z = 15$;　　$7x + 4y - 3z = 49$; $2x + y + 6z = 46$

(b) $x + y + z = 9$;　　$2x + 6y + 7z = 55$; $2x + y - z = 0$

7.　Solve the following equations using Cramer's rule :

$$x - y + z = 4; \quad x + 3y + 2z = 12; \quad 3x + 2y + 3z = 10$$

8.　Using determinants, show that the following system of equations has infinite number of solutions.

$$x + 3y + 4z = 8; \quad 2x + y + 2z = 5; \quad 5x + 2z = 7$$

9.　Solve the following set of equations

$$x + y + z = 1$$
$$x + 2y + 3z = 4$$
$$x + 3y + 5z = 7$$

10.　A manufacturer is manufacturing two types of products $A$ and $B$. $L_1$ and $L_2$ are two machines which are used for manufacturing these two types of products. The time taken by both $A$ and $B$ on machines is given below:

| | Machine $L_1$ | Machine $L_2$ |
|---|---|---|
| Product $A$ | 20 hrs. | 10 hrs. |
| Product $B$ | 10 hrs. | 20 hrs. |

If 60 hours is the time available on each machine. Calculate the number of units of each type manufactured using matrix method.

**Hint :**　　$20x + 10y = 600$　$10x + 20y = 600$

**Answers**

1.　$x = -3, y = -7$

2.　$x = -\dfrac{20}{7}, y = \dfrac{9}{7}, z = 11$

3.　$x = \dfrac{8}{14}, y = \dfrac{24}{14}, z = -\dfrac{42}{14}$

　　$x = 1, y = 3, z = 5$

4.

5.　$x = 1, y = 2, z = 3$

6.　(a)$x = 3, y = 4, z = 6$;　(b)$x = 1, y = 3, z = 5$

7.　System is inconsistent since $|D| = 0$ and $|D_1| \neq 0$

8.　For $k = 1, y = 1, z = 1$

9.　Infinite solutions, $x = k - 2, y = 3 - 2k, z = k$

10.　$x = 20, y = 20$.

## 2.13 LET US SUM UP

- To every square matrix, we associate a single number that gives us an important information about that matrix. That number is called determinant of the matrix.

- The matrix which is not square does not possess determinant.
- Determinant is used to know whether the matrix is invertible or not.
- Determinant of any square matrix can be easily calculated by applying its various properties.

- Matrices and Determinants can be used to solve a system of linear equations.

- There are two methods to solve linear equations i.e. Method of Determinants (Crammer's Rule) and Matrix Inverse Method.

## 2.14 KEY TERMS

- **Determinant:** To every square matrix, we associate a single number that gives us an important information about that matrix. That number is called determinant of the matrix.

- **Minor:** The minor of the element in the determinant of the square matrix may be defined as a determinant which is left after deleting the row and column in which the element lies.

- **Adjoint of a Matrix:** A matrix obtained by interchanging the rows and columns of the co-factor matrix of the given square matrix.
- **Inverse of a Matrix**: The inverse of any square matrix 'A' is another square matrix 'B' such that AB = BA = I.

## 2.15 FURTHER READINGS

1. Mizrahi and John Sullivan. Mathematics for Business and Social Sciences. Wiley and Sons.

2. N. D. Vohra, Business Mathematics and Statistics, McGraw Hill Education (India) Pvt Ltd
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# B. COM (Hons.)

### (Accounting and Taxation)
**SEMESTER II**

### COURSE: BUSINESS MATHEMATICS AND STATISTICS

# Unit–3: Functions

## STRUCTURE
   **3.0 Objectives**
   **3.1Functions**
   **3.2Domain, Co-domain and Range of a Function**
   **3.3Algebra of Functions**
   **3.4 Kinds of Functions**
   **3.5 Test Your Understanding (A)**
   **3.6Classification of Real Functions**
   **3.7 Some special Functions related to Business and Economics**
   **3.8 Test Your Understanding (B)**
   **3.9 Let us Sum Up**
   **3.10 Key Terms**
   **3.11 Further Readings**

## 3.0 OBJECTIVES

**After studying the Unit, students will be able to**
   - Define the Meaning of a Function.
   - Understand the concept of Domain and Range of a Function.
   - Differentiate between various types of Functions.
   - Describe Algebra of Functions.
   - Apply Functions in Business and Economics

Suppose $A$ and $B$ are any two non-empty sets. Let $A = \{a, b, c, d\}, B = \{x, y, z\}$. Suppose by some rule or other, we assign to each element of $A$, a unique element of $B$. Suppose $a$ is associated to $x$, $b$ is associated to $y$, $c$ is associated to $x$ and $d$ is associated to $z$. The set of such assignment is called a '*function*' or '*mapping*' from $A$ to $B$. If we denoted this set by $f$, then we write

$$f : A \to B$$

which is read as "$f$ *is a function af $A$ to $B$*" or "$f$ *is a mapping from $A$ to $B$*". In fact a function can be thought of like a machine: when we put $x$ into the machine, it comes out with corresponding $y$.

**Definition 1.**<em>Let A and B be two given sets. Suppose they exists a rule denoted by f, which associates to each member of A, a unique member of B. Then f is called a function or a mapping of A to b. The mapping of A to B is denoted by</em> $f : A \to B$ <em>or by</em> $A \to B.$
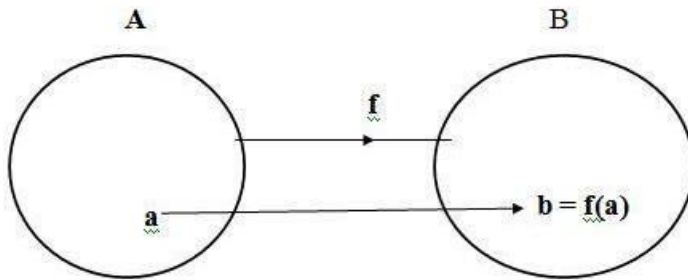


**Fig. 1**

Further, if $a \in A$, then the element in $B$ which is assigned to $a$ is called the $f$ image of $a$ or the value of the function $f$ for $a$ and is denoted by $f(a)$.

**Definition 2.**<em>Let x be some variable quantity. Then a rule that assigns a definite value to every value that x may have, is called a function of x.</em>

**Definition 3.** <em>If x and y represent members of two set A and B respectively, we say that y is a function of x and write</em> $y = f( \ )$, <em>provided we can associate, by some method or procedure, to every</em> $x \in A$, <em>a unique</em> $y \in B.$

(**Note :** The symbol '$\in$' stands for 'belongs to')

**Example.** Giving the following two sets :

$A$ = {Tony Greig, Bobby Fischer, P. Padukone, Chris Evert} $B$
= {Badminton, Tennis, Chess, Cricket, Hockey, Volley Ball}.

Set $A$ lists the players and $B$ the games. For $x \in A$, and $y \in B$, we define a procedure for assigning a member set $B$ to each member of $A$ by $x$ plays $y$. This rule thus defines a function from $A$ to $B$ that associates Tony Greig to Cricket, Bobby Fischer to Chess, P. Padukone to Badminton and Chris Evert to Tennis.

The general notation of a function is

$$y = f(x) \qquad \ldots(1)$$

It means $y$ is a function of $x$, or $f(x)$ is the value of the function at $x$, or $y$ is the image of $x$ under $f$. In this notation, $x$ is said to be the **independent variable,** since it may have any value from among the member of set $A$, while $y$ is **dependent variable,** for the values of $y$ depend upon the particular choice of $x$.

**Note : The rule $f$ should possess the characteristics that there may be some elements of the set $B$ which are not associated to any element of the set $A$ but each element of the set $A$ must be associated to one and only one element of the set $B$. Two or more elements of the set $A$ may be associated to the same element of the set $B$ but association of one element $A$ to more than one element in $B$ is not permissible.**

## 3.2 DOMAIN, CO-DOMAIN AND RANGE OF FUNCTION

Let $f$ be a mapping of $A$ into $B$. Then $A$ is called the $domain$ of the function $f$ and $B$ the $co$-$domain$ of the function $f$. It is evident from the definition that each element of $B$ need not appear as the image of an element in $A$. We define the range of $f$ to consist of all those elements in which appear as $f$ image of at least one element in $A$. There can be more than one element of $A$ which have the same image in $B$. The image set $f[A]$ is called the range of $f$.

**FUNCTIONS DEFINED AS SETS OF ORDERED PAIRS :** Let $A$ and $B$ are any two non-empty sets, then a mapping $f$ of $A$ to $B$ is a subset $f$ of $A \times B$ satisfying the following conditions :

(a) for each $a \in A$, $(a, b) \in f$, for some $b \in B$; (b) if $(a,b) \in f$ and $(a,b') \in f$, then $b = b'$.

The first condition ensures that we have a rule that assigns to each element $a \in A$ some element $b \in B$. Thus each element in $A$ will have image. The second condition guarantees that the image is unique. Accordingly, $f$ is a function from $A$ to $B$.

**Note:** If $f: A \to B$, it is important to distinguish between a function $f$ and the value $f(x)$ of $f$ for any element $x$. While $f$ is a subset of $A \times B$, $f(x)$ is an element of the set $B$.

**EQUAL FUNCTIONS :** *Two functions $f$ and $g$ are said to be equal iff :*

*(i) the domain of $f =$ domain of $g$,*

*(ii) the co-domain of $f =$ the co-domain of $g$ and (iii$f$ )$(x) = g(x)$*

*for every $x$ belonging to their common domain.*

***Example :*** *Let $A = \{1,2\}$, $B = \{3,6\}$ and $f: A \to B$ given by $f(x) = x^2 + 2$ and $g: A \to B$ given by $g(x) = 3x$. Then, we observe that $f$ and $g$ have the same domain and co-domain and also*

$$f(1) = 3 = g(1) \quad \text{and} \quad f(2) = 6 = g(2) \text{ Hence}$$

$f = g$.

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## 3.3 ALGEBRA OF FUNCTIONS

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If $f$ and $g$ are two functions, we define

(i) The **sum function** $f + g$ by
$$(f + g)(x) = f(x) + g(x),$$

(ii) The **difference function** $f - g$ by
$$(f - g)(x) = f(x) - g(x),$$

(iii) The **product function** $f. g$ by

$$(f. g)(x) = f(x). g(x), \text{(iv) The}$$

quotient function $f/g$ by where $g(x) \neq 0$, for any '$x$' $(f/g)(x)$
$= f(x)/g(x)$.

## 3.4 KINDS OF FUNCTIONS

If $f: A \to B$ is a function, then $f$ associates all elements of set $A$ to elements in set $B$ such that an element of set $A$ is associated to a unique element of set $B$. Following these two conditions we may associate :

(i) difference elements of set $A$ to different elements of set $B$, or

(ii) more than one element of set $A$ may be associated to the same element of set $B$, or

(iii) all elements in $B$ may have their pre-images in $A$.

Corresponding to each of these possibilities we define a type of a function as given below :

*(1)* **ONE-ONE FUNCTION (INJECTION) :** *A function $f$: $A \to B$ is said to be a one-one function or an injection if different elements of A have different image in $B$.*
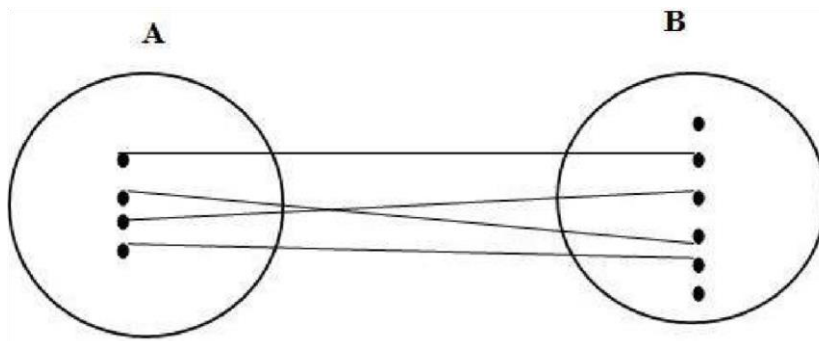


**Fig. 2**

Thus, $f: A \to B$ is one-one $\Leftrightarrow a \neq b$

$\Rightarrow \quad f(a) \neq f(b)$ for all $a, b \in A$.

$\qquad \quad - f(a) = f(b) \Rightarrow a = b$ for all $a, b \in A$.

*Examples :*

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*(i)   A function which associates to each country in the world its capital is one-one because different countries have their different capitals.*

*(ii)   Let* $X = \{1,2,3,4\}$; $Y = \{1,4,9,16\}$ *and* $f\colon X \to Y$ *s.t.* $f(x) = x^2 \; \forall \; x \in X$, *then* $f$ *is one- one mapping of X into Y, as no two distinct elements of X have the same f-image in Y.*

**(2) MANY-ONE FUNCTION :** *A function* $f\colon A \to B$ *is said to be a many-one function of two or more elements of set A have the same image in B.*

Thus, $f\colon A \to B$ is many one function if there exist $x,y \in A$ such that $x \neq y$ but $f(x) = f(y)$.

In other words, $f\colon A \to B$ is a many-one function if it is not a one-one function :
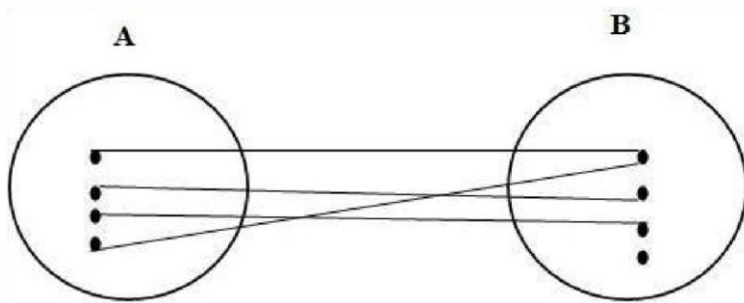


**Fig. 3**

*Examples :*

*(i)      $A = \{-1, 1, -2, 2\}$ and $B = \{1, 4, 9, 16\}$.   Consider $f\colon A \to B$   s.t.   $f(x) = x^2$. Then $f(-1) = 1, f(1) = 1, f(-2) = 4, f(2) = 4$.*

*Clearly 1 and $-1$ have the same image. Similarly, $2$ and $-2$ also have the same image. So, $f$ is a many-one function.*

*(ii)      Consider a function $f\colon Z \to Z$ given by $f(x) = |x|$.*

*Then $f$ is a many-one function because for every $a \in Z$, $a \neq 0$, $a \neq -a$ but $f(a) = f(-a)$.*

$$[\because |a| = |-a|]$$

**(3)   ONTO FUNCTION (SURJECTION):** *A function $f\colon A \to B$ is said to be an onto function or a surjection if every element of B is the f-image of some element of A, i. e., if $f(A) = B$ or range of $f$ is the co-domain of $f$ .*
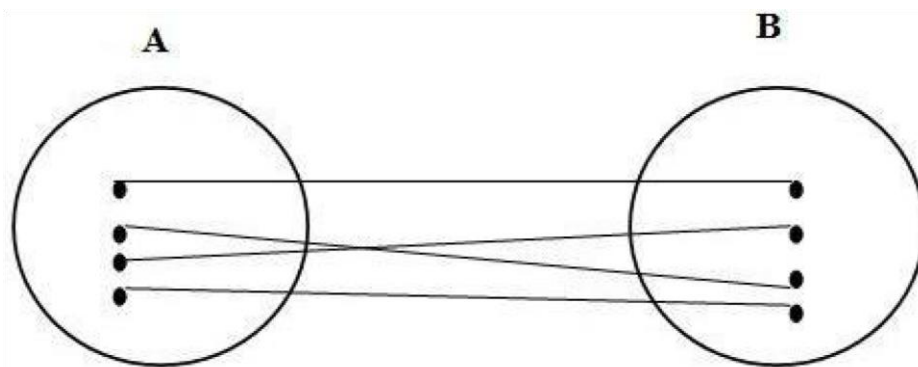
**Fig. 4**

Thus, $f: A \to B$ is a surjection iff for each $b \in B$, $\exists a \in A$ such that $f(a) = b$.

*(4)* **INTO FUNCTION:** *A function of $f: A \to B$ is an into function if there exists an element in B having no pre-image in A .*
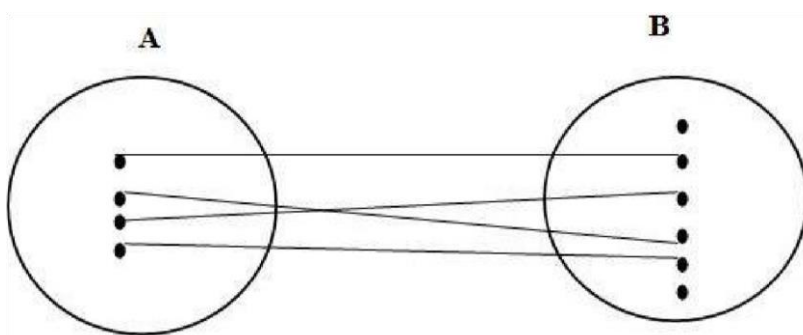


**Fig. 5**

In other words, $f: A \to B$ is into function if it is not an onto function.

*Examples :*

*(i)* Let $A = \{-1, 1, 2, -2\}$, $B = \{1, 4\}$ *and* $f: A \to B$ *be a function defined by* $f(x) = x^2$. *The $f$ is onto because* $f(A) = \{f(-1), f(2), f(-2)\} = \{1, 4\} = B$

*(ii)* *A function* $f: N \to N$ *defined by* $f(x) = 2x$ *is not an onto function, because* $f(N) = \{2, 4, 6, \ldots \ldots\} \neq N$ *(co-domain).*

*(5)* **BIJECTION (ONE-ONE ONTO FUNCTION):** *A function $f: A \to B$ is a bijection if it is one-one as well as onto.*

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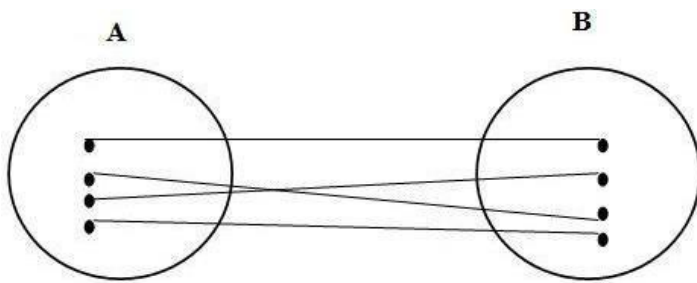
**Fig. 6** *In other words, a function* ƒ: *A* → *B* *is a bijection if*

*:*

(i)  *It is one-one,i. e.* , ƒ(x) = ƒ(y) ⇒ x = y *for all* x,y ∈ A.
(ii) *It is onto,* i. e., *for all* y ∈ B, *there exists* x ∈ A *such that* ƒ(x) = y.

*Example : Let A  be the se of even integers and B  be the set of odd integers, then the mapping* ƒ: *A* → *B given by*

$$ƒ(x) = x + 1, ∀ \, x ∈ A$$

*is one-one onto.*

*(6)* **ONE-ONE INTO MAPPING :** *Any mapping which is one-one as well as into is called one-one into mapping.*

*Example : Let* X  *be the set of integers and* Y  *be the set of all even integers, then the mapping* ƒ: X → Y. s.t. ƒ(x) = 2x, x ∈ X *is an into mapping which is also one-one.*
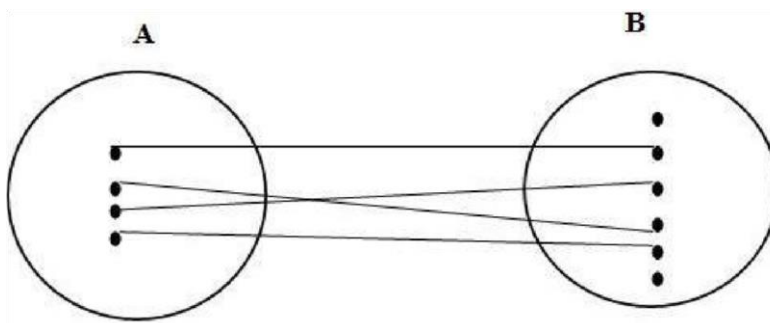


**Fig. 7**

**Example 1.** *Given* $f(x) = 2x^2 - 3x + 1; find f\ (2), f(0), f(-3).$

**Solution :** $f(2) = 2 . 2^2 - 3 . 2 + 1 = 2 . 4 - 6 + 6 = 8 - 6 + 1 = 3;$

$$f(0) = 2 . 0 - 3 .0 + 1 = 1;$$
$$f(-3) = 2(-3)^2 - 3(-3) + 1 =$$
$$18 + 9 + 1 = 28.$$

**Example 2.** *The rule defining a function$f$ is as follows :*

*(i)* $\frac{100}{x}$ *(ii)* $\frac{x}{x-1}$
*. Find the domain of definition of$f$ .*

**Solution :**

(i) $f(x) = \frac{100}{x}$, here$f\ (x)$ is undefined at $x = 0$. So the domain of definition of$f$ is the set

of real numbers except 0.

(ii) $f(x)$ is undefined for $x = 1$ only. Hence the domain of definition of $f$ is the set of all real numbers except 1.

**Example 3.** *Find the range of$f\ (x) = x^2, x \in R(real\ number).$*

**Solution :** $f(0) = 0$ and for every non-zero real values of $x$, (positive or negative) $x^2$ is always positive. So we get $0 \le$ range $< \infty$.

**Example 4.** *If $f(x) = x + |x|, find\ f(3)$ and $f(-3)$ and show also they are not equal.*

**Solution :** $f(3) = 3 + |3| = 3 + 3 = 6,$

$f(-3) = -3 + |-3| = -3 + 3 = 0$, As$6 \ne 0$, so $f(3) \ne f(-3)$. [**Note :** If$f\ (x) = f(-x)$, in this case$f\ (3) = f(-3)$, then $f(x)$ will be an even function of $x$].

**Example 5.** *Show that$f(x) = \frac{x^2-4}{x-2}$is undefined for $x = 2.$*

**Solution :**$f(x) = \frac{x^2-4}{x-2}$;putting $x = 1,$

$$f(1) = \frac{1-4}{1-2} = \frac{-3}{-1} = 3$$

$\because$ $f(1) = 3$, which is definite

Again for $x = -1, f(-1) = \frac{1-4}{-1-2} = \frac{-3}{-3} = 1$ so $f(x)$is definite at $x = 1$

∵  $f(-1) = 1$, which is definite so this define at $x = -1$

For $x = 2$, we get $f(2) = \dfrac{4-4}{2-2} = \dfrac{0}{0}$

∵  $f(z) = \dfrac{0}{0}$, which is meaningless

∴  $f(x)$ cannot be defined for $x = 2$.

**Example 6.** *Find the domain of the function* $f(x) = \dfrac{x}{x^2-9}$.

**Solution :** Here $f(x)$ has a unique value except for $x = 3, -3$.

For $x = 3$, $f(3) = \dfrac{3}{9-9} = \dfrac{3}{0}$(undefined)

$= -3$, $f(-3) = \dfrac{-3}{9-9} = \dfrac{-3}{0}$(undefined) ∴ domain of the function $f(x)$ is $-\infty$

$< x < -3; -3 < x < 3; 3 < x < \infty$.

**Example 7.** *Given the function :*

$$f(x) = 5^{-2x} - 1, \quad \textit{for} \quad -1 \le x < 0$$
$$= \dfrac{x^2-2}{x-2}, \quad \textit{for} \quad 0 \le x < 1.$$
$$= \dfrac{2x}{x^2-1}, \quad \textit{for} \quad 1 \le x \le 3.$$

*Find* $f(-1)$, $f(0)$, $f\left(\dfrac{1}{2}\right)$, $f(2)$.

**Solution :** Now $f(-1) = 5^{-2(-1)} - 1$  (since $-1$ lies in $-1 \le x < 0$)

$$= 5^2 - 1 = 25 - 1 = 24. \text{ Point}$$

$0, \dfrac{1}{2}$ lies in the second interval, so

$$f(0) = \dfrac{0-2}{\underline{\phantom{x}}} = \dfrac{-2}{\underline{\phantom{x}}} = 1 \quad f\left(\dfrac{1}{2}\right) = \dfrac{\frac{1}{4}-2}{\frac{1}{2}-2} = \dfrac{7}{6},$$

$$f(2) = \dfrac{2.2}{2^2-1} = \dfrac{4}{4-1} = \dfrac{4}{3} \quad \text{(as 2 lies in the 3rd interval)}$$

**Example 8.** *If* $f(x) = x^2 - x$, *prove that* $f(h+1) = f(-h)$

**Solution :**   $f(h+1) = (h+1)^2 - (h+1)$

$$= h^2 + 2h + 1 - h - 1 = h^2 + h$$

$$f(-h) = (-h)^2 - (-h) = h^2 + h$$

$$\therefore \quad f(h+1) = f(-h)$$

**Example 9.** *If $f(x) = \quad x^2 - 5x + 4$, for what values of $x$ is $2f(x) = f(2x)$?*

**Solution :** $f(2x) = 2(2x)^2 - 5(2x) + 4$

$$= 2.4x^2 - 10x + 4 = 8x^2 - 10x + 4$$

$$2f(x) = 2(2x^2 - 5x + 4) = 4x^2 - 10x + 8$$

By condition we have, $8x^2 - 10x + 4 = 4x^2 - 10x + 8$ or,$4\,x^2 = 4$ or,$x^2 = 1$ or, $x = \pm 1$.

**Example 10.** *If $(x) = x^3 - \frac{1}{x^3}$, then show that $f(x) + f\left(\frac{1}{x}\right) = 0$.*

**Solution :** We have :

$$f(x) = x^3 - \frac{1}{x^3}$$

$$\therefore \quad f\left(\frac{1}{x}\right) = \frac{1}{\left(\frac{1}{x}\right)^3} - \left(\frac{1}{1/x}\right)^3 = \frac{1}{x^3} - x^3$$

$$f(x) + f\left(\frac{1}{x}\right) = x^3 - \frac{1}{x^3} + \frac{1}{x^3} - x^3 = 0.$$

$$\therefore$$

**Example 11.** *If $f(x) = \log\left(\frac{1+x}{1-x}\right)$, show that $f(x) + f(y) = f\left(\frac{x+y}{1+xy}\right)$.*

**Solution :** We have

$$f(x) = \log\left(\frac{1+x}{1-x}\right)$$

$$\therefore \quad f(y) = \log\left(\frac{1+y}{1-y}\right)$$

$$f(x) + f(y) = \log\left(\frac{1+x}{1-x}\right) + \log\left(\frac{1+y}{1-y}\right)$$

$$= \log\left(\frac{1+x}{1-x}\right)\left(\frac{1+y}{1-y}\right)$$

$$= \log\left(\frac{1+x+y+xy}{1-x-y+xy}\right)$$

$$x+y \qquad 1+\left(\frac{x+y}{1+xy}\right)$$

Then,

Again,     $f\left(\frac{}{1+xy}\right) = \log\left[\frac{}{1-\left(\frac{x+y}{1+xy}\right)}\right]$

$= \log\left(\frac{1+xy+x+y}{1+xy-x-y}\right)$

From (i) and (ii) it is clear that $f(x) + f(y) = f\left(\frac{x+y}{1+xy}\right)$.

**Example 12.** *Find the domain of each of the following real valued functions*

*(i)* $f(x) = \frac{1}{x+2}$      *(ii)* $f(x) = \frac{5x-4}{x^2-3x+2}$   *(iii)* $f(x) = \sqrt{x-4}$

**Solution :**   **(i)**     We have      $f(x) = \frac{1}{x+2}$

Clearly, $f(x)$ assumes real values for all $x$ except for the values of $x$ satisfying $x + 2 = 0$, i. e. , $x = -2$.

Hence, domain of the function $f(x)$

i. e.,  Domain $(f) = R - \{-2\}$

**(ii)**   We have      $f(x) = \frac{5x-4}{x^2-3x+2}$

Clearly, $f(x)$ assumes real values for all $x$ except for the values of $x$ for which $x^2 - 3x + 2 = 0$, i. e. , $x = 1, 2$.

$\therefore$     Domain $(f) = R - \{1, 2\}$

**(iii)**  We have      $f(x) = \sqrt{x - 4}$

Clearly, $f(x)$ assumes real value, if $x - 4 \geq 0 \Rightarrow x \geq 4 \Rightarrow x \in (4, \infty)$

Hence, Domain $(f) = (4, \infty)$.

## 3.5 TEST YOUR UNDERSTANDING (A)

1. (i) If $f(x) = x^2 + 2x^4$ verify that $f(x) = f(-x)$, (ii) $f(x) = x + 2x^3$ verify that $f(-x) = -f(x)$

2. If $f(x) = (x-1)(x-2)(x-3)$ find the values of :

   (i) $f(1)$   (ii) $f(2)$       (iii) $f(3)$       (iv) $f(0)$

   [**Ans.** $0; 0; 0; -6$]

3. If $y = 5$ for every values of $x$, can $y$ be regarded as a function of $x$ ? [**Ans.** Yes]

4. $f(x) = x + |x|$, are $f(4)$ and $f(-4)$ equal ?

   [**Ans.** No]

5. If $(x) = b\frac{x-a}{b-a} + a\frac{x-b}{a-b}$, then $f(a) + f(b) = f(a+b)$.

6. Show that $\dfrac{x^2-6x+8}{x^2-8x+12}$ is undefined for $x = 2$ and also find $f(6)$.

   [**Ans.** $\infty$]

7. Let $f(x)$    $= 2^{-x}, -1 \le x < 0$

   $\qquad\qquad = 4, \qquad 0 \le x < 1$

   $\qquad\qquad = 2x - 1, 1 \le \qquad \le 3.$

   Calculate $f(-1), f(0), f(1), f(3)$.

   [**Ans.** $2; 4; 1; 5$]

8. If $f(x) = x^2 + x$ prove that $f(h+1) - f(h-2) = 6h$.

9. Find the domain of $f$ , if

$$(i)\ f(x) = \frac{1}{\sqrt{5-x}} \qquad (ii)\ f(x) = \frac{x^2+3x+5}{x^2-5x+4}$$

   [**Ans.** Domain $(f) = (-\infty, 5)$]     [**Ans.** Domain $(f) = R - \{1, 4\}$]

10. Find the domain of the function $f(x)$, defined by : $f(x) = \sqrt{4-x} + \dfrac{1}{\sqrt{x^2-1}}$

   [**Ans.** Domain $(f) = (-\infty, -1)U(1, 4)$]

## 3.6 CLASSIFICATION OF REAL FUNCTIONS

### (1) EXPLICIT AND IMPLICIT FUNCTIONS

In an explicit function, we have dependent variable on one side of the equation and the independent variable on the other. We have been dealing so far with this type of functions. Thus, an explicit function is represented by the form $y = f(x)$. In implicit functions, we have both the variables (i. $e$., dependent and independent ones) on the same side (i. $e$., left hand side or right hand side or both sides). The general form of an implicit function is $f(x, y) = C$, where $C$ is a constant.

The following are the examples of explicit functions :

$$y = x^2, y = e^2 \text{ and } y = x^3 + 4x - e^x \text{ The}$$

following are the examples of implicit functions :

$$x^2 + y^2 = 1, e^{x+y} = 2$$

and $\quad 3x^2 + 4xy = 2x^3y^2 + 10x - 8y.$

### (2) EVEN AND ODD FUNCTIONS

Ley$y = f(x)$ be a function with its domain of definition $D(f)$. If, for every $x \in D(f), -x$ also belongs to $D(f)$, the function is said to be even or odd according as :

$$f(-x) = f(x) \text{ or } f(-x) = -f(x).$$

### (3) LINEAR FUNCTION

A function of the form $f(x) = mx + c$ (where $m$ and $c$ are real numbers) is called a linear function. Its domain is set of real numbers. Replacing $f(x)$ by $y$, the function may be rewritten as

$$y = mx + c \quad \text{...(1)}$$

In this case, $y$ is a dependent variable and $x$ is an independent variable. Also, $m$ is the slope and $c$ is the intercept on $y$ −axis. For example, $y = 3x + 4$ is a linear equation with slope 3 and intercept on $y$ −axis 4. The equation (1) is also known as the equation of a straight line in slope-intercept form.
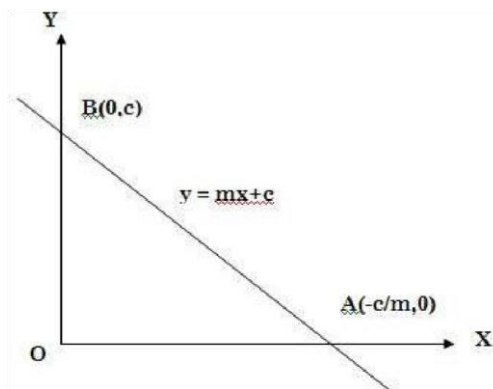
**Fig. 8**

The graph of the linear function $y = mx + c$ is a straight line. To draw a straight line, we needed to find any two points that lie on the line and then to join them by a straight line and extend the line further on both the direction.

## (4) QUADRATIC FUNCTIONS AND PARABOLAS

A function of the form

$$f(x) = ax^2 + bx + c \quad …(1)$$

(where , $b$ and $c$ are the constants and $a \neq 0$) is called a **quadratic function**. The graph of quadratic function.

(1) is a curve, called a **parabola**. Its domain is the set of all real numbers.

Putting $b = c = 0$ in (1) we get a simplest quadratic function

$$y = ax^2$$

Its graphs when $a$ is negative and when it is positive are the parabolas as shown in Fig. and Fig. respectively. The lowest point on the graph when $a > 0$ occurs at the origin, while the origin is the highest point when $a < 0$. In either case, this point is called the **vertex** of the parabola.
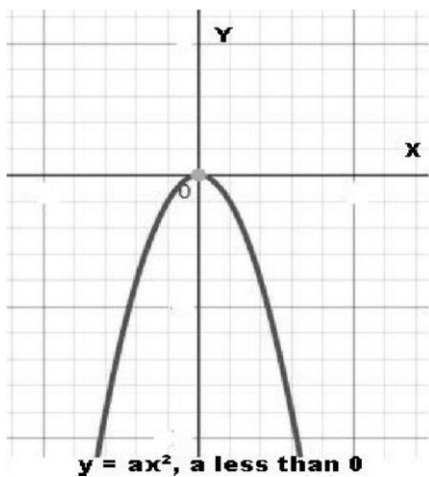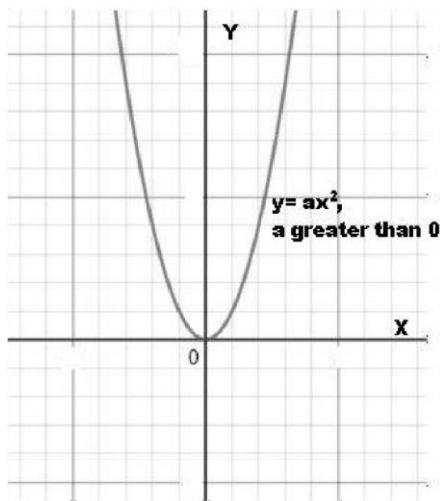
Fig. 9            Fig. 10

### (5) POLYNOMIAL FUNCTION

A function of the form $f(x) = a_0 x^4 + a_1 x^{n-1} + a_2 x^{n-2} + \ldots\ldots\ldots\ldots + a_n$, where $a_0, a_1, a_2 \ldots\ldots\ldots a_n$ are constants and $n$ is a non-negative integer, $a_0 \neq 0$, is called a polynomial function of $x$ of degree $n$.

### (6) RATIONAL FUNCTION

A function of the form $(x) = \frac{p(x)}{q(x)}$, $q(x) \neq 0$ where $p(x)$ and $q(x)$ are polynomials is

called a rational function. For example, $\frac{2x+3}{x^2+5}$ is a rational function.

### (7) EXPONENTIAL FUNCTION

A function having a variable base and a constant exponent, viz., $y = x$, $x^3$, $x^9$, etc., is called a power function while *a function having a constant base and variable exponent is called an exponential function*. For example, $y = a^x$, $(a > 0, a \neq 1)$ is an exponential function, where $a$ is the base and $x$ is a real number exponent.

### (8) LOGARITHMIC FUNCTIONS

If $a > 0$ and $a \neq 1$, the exponential function $x = a^y$ has an inverse function which is called the *logarithmic function* to the base $a$ and is denoted by $y = \log_a x$. Thus,

$$x = a^y \Rightarrow \log_a x = y \log_a a$$

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$\Rightarrow$ $\qquad$ $y = log_a\, x$, which is called logarithmic function.

Thus, if $x > 0$, the logarithmic function $log_a\, x$ is the exponent to which the base $a$ must be raised to get $x$.

**For example :**

$\qquad$ $2^3 = 8$ $\quad \therefore \quad$ $log_2\, 8 = 3$;

## (9) MONOTONIC FUNCTION

Let us consider any two numbers $x_1$ and $x_2$ in the domain of definition $[a,\ b]$ of $f(x)$, such that $x_2 > x_1$. Then $f(x)$ will be said to be *monotonic*.

(i) increasing in $[a,\ b]$ if $f(x_2) \geq f(x_1)$ (ii)
decreasing in $[a, b]$ if $f(x_2) \leq f(x_1)$.

## (10) GREATEST INTEGRAL FUNCTION

$f(x) = [x] = $ greatest integer less than or equal to $x$. i.
e., if $0 \leq x < 1$ the function value is always 0.

if $1 \leq x < 2$, the function value is always 1. if $2 \leq x < 3$, the
function value is always 2. again if $-1 \leq x < 0$, the functional
value is always $-1$ and so on.

## (11) ABSOLUTE VALUE FUNCTION OR MODULUS FUNCTION

$\qquad$ A $\qquad$ function $y = f(x) = |x|$ is called an *absolute value function (or modulus function).* It is defined as follows :

$$y = f(x) = x, \text{ for } x > 0$$

$$= 0, \text{ for } x = 0$$

$$= -x \text{ for } x < 0$$

**Example :** $\qquad$ When $x = 4$, $y = |4| = 4$

$$= 0, y = |0| = 0$$

$$= -4, y = |-4| = 4$$

## (12) IDENTITY FUNCTION

LetX be any set and the function $f: X \to X$ be defined by the formula $f(x) = x \ \forall \ x \in X$, i. e., each element of X is mapped on itself, then $f$ is called *the identity map or the identity function* on X.

We denote this function by $I_x$ usually. Thus if $I_x$ denotes the identity mapping on a set X, we have

$$I_x(x) = x, \ \forall \ x \in X.$$

**Example :** Let $A = \{a, b, c, d\}$. Then $f = \{(a, a), (b, b), (c, c), (d, d)\}$ is an identity mapping of $A$. Identity mapping is always one-one onto.

## (13) INVERSE FUNCTION

**Definition :** Let $f: X \to Y$ be a bijection. Then a function $g: Y \to X$ which associates each element $y \in Y$ to a unique element $x \in X$ such that $f(x) = y$ is called the inverse of $f$ , i. e.,
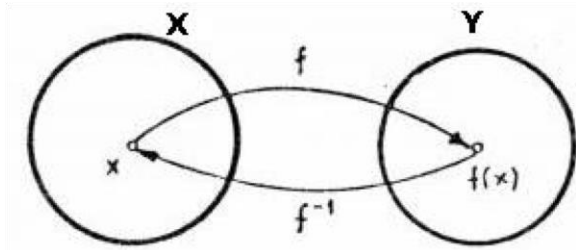


**Fig. 11**

$$f(x) = y \Leftrightarrow f^{-1}(y) = x.$$

The inverse of $f$ is generally denoted by $f^{-1}$.

Thus, if $f: X \to Y$ is a bijection, then $f^{-1}: Y \to X$ is such that

$$f(x) = \Leftrightarrow f^{-1}(y) = x.$$

**Example :** If $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$ and $f: A \to B$ is given by $f(x) = 2x$, then

$$f(1) = 2, f(2) = 4, f(3) = 6 \text{ and } f(4) = 8$$

So,     $f = \{(1, 2), (2, 4), (3, 6), (4, 8)\}$
Which is clearly a bijection.

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$$\therefore \qquad f^{-1} = \{(2, 1), (4, 2), (6, 3), (8, 4)\}$$

## (14) COMPOSITE FUNCTION

Let X, $Y$, $Z$ be three sets and $f$ be a function defined from X to $Y$ and $g$ be a function defined from $Y$ to $Z$.

i. e., $\qquad f: X \rightarrow Y \qquad$ and $\qquad g: Y \rightarrow Z.$

By $f: X \rightarrow Y$ we mean that to every element $x \in X$, there corresponds a unique element $f(x) \in Y.$Since the domain of g is Y, so by the function $g: Y \rightarrow Z$we mean to every element $f(x) \in Y$there corresponds a unique element of $g[f(x)] \in Z$. Thus we notice that to every

element $x \in X$ there corresponds a unique element $g[f(x)] \in Z$ under the mappings $f$and$g$ . This implies that there exists a mapping from X to$Z$ . This mapping is called the composite mapping or the product mapping of$f$ and $g$ and is denoted by $gof$ or $gf$.

**Definition:** Let $f: X \rightarrow Y$ and $g: Y \rightarrow Z$, then the composite of the functions $f$ and $g$ denoted by $gof$ or$g$ $f$ is mapping $gof: X \rightarrow Z$ s. t. $(gof)(x) = g[f(x)], \forall x \in X.$
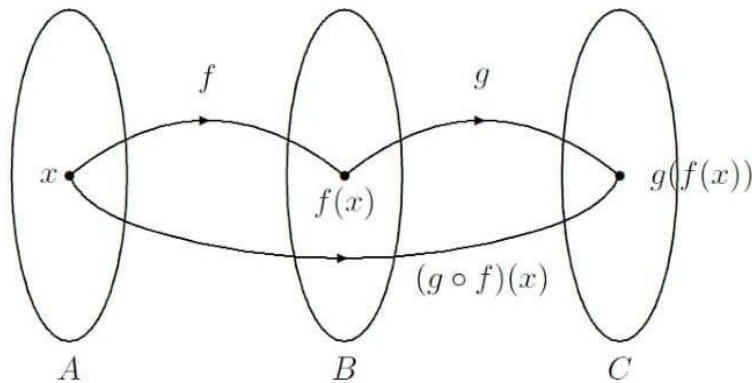


**Fig. 12**

**Example13.**Let $f$ and $g$ be two functions defined by $f(x) = \sqrt{x - 1}$ and$g(x) = \sqrt{(4 - x^2)}$,then describe the functions :

(i)$(f - 2g)(x)$ (ii)$(fog)(x)$

**Solution :** We have

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$$f(x) = \sqrt{x-1}$$
$$g(x) = \sqrt{(4-x^2)}$$
$$(f-2g)(x) = f(x) - 2g(x)$$
$$= \sqrt{(x-1)} - 2\sqrt{(4-x^2)}$$
$$(fog)(x) = f[g(x)]$$
$$= f[\sqrt{(4-x^2)}]$$
$$= \sqrt{\{\sqrt{(4-x^2)} - 1\}}$$

And

(i)

(ii)

**Example 14.**Let $f: A \to B$ *such that* $(x) = x - 1$ *and* $g: B \to C$ *such that* $g(y) = y^2$.
*Find* $fof(y)$. **Solution**

: We have

$$f: A \to B, g: B \to C \; f(x) = x - 1$$

and $\quad g(y) = y^2.$

Now $\quad fof(y) = f[f(y)]$

$$= f(y-1)$$
$$= (y-1) - 1 = y - 2.$$

**Example 15.** *Let* $f: N \to R$ *s. t.* $f(x) = 2x - 3$ *and* $: x \to R$ *s.t.* $g(x) = \frac{x-3}{2}$. *Find the*

*formula for* $gof: N \to R.$ **Solution**

: We have

$$f(x) = 2x - 3$$

and $\quad g(x) = \frac{x-3}{2}$

$$gof(x) = g[f(x)]$$
$$= g[2x - 3]$$
$$= \frac{2x-3-3}{2} = x - 3.$$

**16. If** $f(x) = \frac{1}{1-x}$ **and** $(x) = \frac{x-1}{x}$

∴

**Example**, *find the value of* $g[f(x)]$.

**Solution :** We have

$$f(x) = \frac{1}{1-x}$$
$$g(x) = \frac{x-1}{x}$$

Now $\quad g[f(x)] = g\left(\frac{1}{1-x}\right)$

$$= \frac{\frac{1}{1-x}-1}{\frac{1}{1-x}}$$

$$= \frac{1-(1-x)}{1} = x$$

.

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## 3.7 SPECIAL FUNCTIONS RELATED TO BUSINESS AND ECONOMICS

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### (1) DEMAND FUNCTION

The demand of a particular commodity depends on its price. If the price is less, the demand will be higher. Similarly, as the price increases the demand keeps on decreasing.

Thus, we can say that the demand of a commodity is a function of its price,

i. e., $\quad x = f(p)$

Where '$x$' is the demand function and '$p$' is the price of a commodity.

### (2) SUPPLY FUNCTION

As the price increases, the supply tends to be increased by the producers. So, there is a direct relationship between supply and price of a commodity and mathematically, it can given as

$$s = f(p) \quad \text{Where 's' is the supply function}$$

and '$p$' is the price of commodity.

## (3) COST FUNCTION

The total cost at any level of output of any commodity bears a relationship with its quantity. Actually, the total cost does not increase in direct proportion to the number of units manufactured, but it is the sum of the fixed cost and the variable cost at any level of output, i. e., Total Cost = Fixed Cost + Variable Cost Thus, cost function can be expressed as

$$C(x) = V(x) + F(x)$$

Where '$x$' is the number of units produced.

## (4) TOTAL REVENUE FUNCTION

It is the amount received by a firm by selling its product. Higher the sale, more would be the revenue of the firm.

So, mathematically $R = f(x)$

Where '$R$' is the revenue function and '$x$' is the number of units sold.

## (5) PROFIT FUNCTION

Profit on a commodity depends upon its cost and sale price and its a function of number of units sold. Thus, mathematically

$$P(x) = R(x) - C(x)$$

**Example 17.**For a new product, a manufacturer sets up an infrastructure such that the manufacturing unit involves fixed cost of Rs. 50,000 and the additional cost, i. $e.$ variable cost for producing each unit is Rs. 150 per unit. The selling price of each unit would be Rs. 500. Write down the cost function $C(x)$, Revenue function $R(x)$ and profit function $CP(x)$ for $x$ units of the product. Also determine the profit when 400 units are sold. **Solution :** Cost function

$$C(x) = 50{,}000 + 150x$$

Where '$x$' is the number of units sold.

Also,      Revenue function

$$R(x) = 500x$$

So,      Profit function

$$P(x) = R(x) - C(x)$$

$$= 500x - (50{,}000 + 150x)$$

$$\Rightarrow \qquad P(x) = -50{,}000 + 350x$$

Now,      for $x = 400$

$$P(400) = -50{,}000 + 350(400) =$$

$$-50{,}000 + 1{,}40{,}000$$

$$= 90{,}000.$$

## 3.8 TEST YOUR UNDERSTANDING (B)

1.    Let $f = \{(3, 1), (9, 3), (12, 4)\}$ and $g = \{(1, 3), (3, 3), (4, 9), (5, 9)\}$. Show that $fog$ and $gof$ are both defined. Also find $f\ og$ and $gof$.

   [**Ans.**$gof = \{(3, 3), (9, 3), (12, 9)\}, fog = \{(1, 1), (3, 1), (4, 3), (5, 3)\}$]

2.    Find $fog(2)$ and $gof(1)$ when $f: R \to R, f(x) = x^2 + 8$ and $g: R \to R, g(x) = 3x^3 + 1$.
   [**Ans.**$fog(2) = 633, gof(1) = 2188$]

3.    Let $R^+$ be the set of all non-negative real numbers. If $R^+ \to R^+$ and $g: R^+ \to R^+$ are define as $f(x) = x^2$ and $g(x) = +\sqrt{x}$. Find $fog$ and $gof$ are they equal functions ?

   [**Ans.**$fog(x) = x, gof(x) = x$]

4.    If $f(x) = x^2 - 2, g(x) = 4x + 1$, then describe the following
   (i) $gof$ (ii) $f\ og$ (iii) $gog$ (iv)$f\ of$ (v)$ff$ (vi) $gg$
   [**Ans.**$gof = 4x^2 - 7,\quad fog = 16x^2 + 8x - 1,\quad fof = x^4 - 4x^2 + 2,\quad gog = 16x + 5,$
   $ff = x^4 - 4x^2 + 2, gg = 16x + 5$]

5.  If $f(x) = \frac{x-1}{x+1}$, they verify that $(fof)(x) = -\frac{1}{x}$

6.  If $f(x) = 3x - 5$, find $f^{-1}(x)$.
    [**Ans.**$f^{-1}(x) = \frac{x+5}{3}$]

7.  If a company has a cost function $C(x) = 50 + 20x$ and demand function $p = 75 - 3x$, they find

    (i)     Revenue function

    (ii)    Profit function

$$\left[\begin{array}{l} \text{Ans. (i) Revenue function} \quad (x) = 75x - 3x^2 \\ \text{(ii)Pro it function } P(x) = -3x^2 + 55x - 50 \end{array}\right]$$

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## 3.9 LET US SUM UP

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*   Function is an expression or rule that defines the relationship between two variable quantities out of which one is independent and other one dependent.

*   There are various types of functions.

*   The algebra of Functions deal with addition and subtraction of functions and the evaluation of the function.

*   Functions have many applications in the real business and economics.

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## 3.10 KEY TERMS

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*   **FUNCTION:**Function is an expression, mapping or rule that defines the relationship between two variable quantities out of which one is independent and other one dependent.

*   **DOMAIN AND RANGE:** If $f$ is a mapping from $A$ to $B$, then $A$ is called the *domain* of the function $f$ and $B$ the *co-domain* of the function $f$. The image set f(A) is called the Range of the function f.

*   **ONE-ONE FUNCTION (INJECTION) :** *A function* $f: A \rightarrow B$*is said to be a one-one function or an injection if different elements of A have different image in B.*

- **MANY-ONE FUNCTION :** *A function* f: *A → B is said to be a many-one function of two or more elements of set A have the same image in B.*

- **ONTO FUNCTION (SURJECTION) :** *A function* f: *A → Bis said to be an onto function or a surjection if every element of B is the f-image of some element of A,* i. *e., if* f *(A) = B or range of* f *is the co-domain of* f *.*

- **INTO FUNCTION :** *A function of* f: *A → Bis an into function if there exists an element in B having no pre-image inA*

- **ONE-ONE INTO MAPPING :** *Any mapping which is one-one as well as into is called one-one into mapping.*

- **SCALAR MATRIX:** A diagonal matrix whose diagonal elements are all equal is called a *scalar matrix*.

- **IDENTITY OR UNIT MATRIX ( I ):** A scalar matrix in which each of its diagonal elements is unity is called an i*dentity* or *unit matrix*.

- **TRACE OF A MATRIX:** The trace of any square matrix is the sum of its main diagonal elements.
- **TRIANGULAR MATRIX:** If every element above or below the leading diagonal is zero, the matrix is called a *triangular matrix*.
- **TRANSPOSE OF A MATRIX**: A matrix obtained by interchanging the corresponding rows and columns of a given matrix.
- **SYMMETRIC MATRIX:** A matrix which is equal to its own transpose.
- **SKEW SYMMETRIC MATRIX:** A matrix which is equal to negative of its own transpose.

## 3.11 FURTHER READINGS

1. Mizrahi and John Sullivan. *Mathematics for Business and Social Sciences*. Wiley and Sons.
2. Budnick, P. *Applied Mathematics.* McGraw Hill Publishing Co.
3. N. D. Vohra, *Business Mathematics and Statistics*, McGraw Hill Education (India) Pvt Ltd 4. J.K. Thukral, *Mathematics for Business Studies,* Mayur Publications
5. J. K. Singh, *Business Mathematics,* Himalaya Publishing House.

# Unit [4] – Limit and Continuity

## STRUCTURE

## 4.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the concept of Limit.
- Describe the Rules for finding the limit of a function.
- Apply some standard results of Limits.
- Use various methods to find the Limit of a function.

## [4].1 LIMIT – CONCEPT

In case we are find the limit of a function, basically we are concerned with the manner in which a function, say $y = f(x)$, approaches a value as the independent variable '$x$' approaches a particular value, say '$a$', which may be finite or infinite.

- Understand the Continuity of a Function at a point

When this value '$a$' is finite, '$x$' can approach '$a$' either through value which are lesser than '$a$' (to be denoted as $x \to a^-$) or through values which are greater than '$a$' (to be denoted as $x \to a^+$).

Thus, we can define the limit of a function as :

**Definition.** A limit of a function is a value that the function approaches as the independent variable of the function approaches a particular value, i.e. "The limit of the function $f(x)$, as '$x$' approaches '$a$', is '$l$' written as

$$\lim_{x \to a} f(x) = l$$

Also, we can say that

$$\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x) = l$$

Here, $\lim_{x \to a^-} f(x)$ is termed as Left-Handed Limit (L.H.L.) and $\lim_{x \to a^+} f(x)$ as the Right-Handed Limit (R.H.L.) of the function.

## 4.2 RULES FOR THE LIMIT OF A FUNCTION

For two functions $f(x)$ and $g(x)$, such that $\lim_{x \to a} f(x) = l_1$ and $\lim_{x \to a} g(x) = l_2$ where $l_1$ and $l_2$ are real numbers, we have the following rules :

1.  **Sum or Difference Rule**

$$\lim_{x \to a} [f(x) \pm g(x)] = \lim_{x \to a} f(x) \pm \lim_{x \to a} g(x)$$

$$= l_1 \pm l_2$$

(**Note.** If $l_1$ and $l_2$ are infinite then $\infty + \infty = \infty$, but $\infty - \infty$ is indeterminate)

2.  **Product Rule**

$$x^{\lim} \to a[f(x) \cdot g(x)] = x^{\lim} \to a \, f(x) \cdot x^{\lim} \to a \, g(x)$$

$$= l_1 \cdot l_2$$

(**Note.** If $l_1$ and $l_2$ are infinite then $\infty \times \infty = \infty$, but one of the $l_1$ or $l_2$ is 0, then $0 \times \infty$ is indeterminate)

3. **Quotient Rule**

$$x^{\lim} \to a \frac{f(x)}{g(x)} = \frac{\lim\limits_{x \to a} f(x)}{\lim\limits_{x \to a} g(x)} = \frac{l_1}{l_2}$$

($l_1$ and $l_2$ are finite and $l_2 \neq 0$) (**Note.**

$\frac{0}{0}$ and $\frac{\infty}{\infty}$ are indeterminate)

4. **Power Rule**

If $p$ and $q$ are integers, then

$$\lim_{x \to a} [f(x)]^{p/q} = [\lim_{x \to a} f(x)]^{p/q}$$

$$= l_1^{p/q} \text{ provided } l^{p/q} \text{ is a real number.}$$

5. For any real number '$c$' i. $e.$, a constant

$$\lim_{x \to a} [c \, f(x)] = c \cdot \lim_{x \to a} f(x) = c l_1$$

6. The limit of a constant function the constant itself

i. $e.$,    If $h(x) = c$, a constant then

$$\lim_{x \to a} h(x) = \lim_{x \to a} c = c$$

## 4.3 SOME IMPORTANT RESULTS ON LIMITS

1. $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x - a} = na^{n-1}$, $n$ being a positive integer.

2. $\lim\limits_{x \to 0} (1 + x)^{1/x} = e$

3. $\lim\limits_{x \to a} \left(1 + \dfrac{1}{x}\right)^x = e$

4. $\lim\limits_{x \to a} \dfrac{a^x - 1}{x} = \log_e a \; (a > 0)$

5. $\lim\limits_{x \to a} \dfrac{e^x - 1}{x} = 1$

6. $\lim\limits_{x \to a} \dfrac{\log(1 + x)}{x} = 1$

## 4.4 METHODS FOR EVALUATION OF LIMITS

### 4.4.1 Direct Substitution

**Example 1.**   *Evaluate* $\lim\limits_{x \to 3} (7x^2 + 5)$

**Solution :** $\lim\limits_{x \to 3} (7x^2 + 5) = 7(3)^2 + 5 = 68$**Example 2.** *Find the limit of*

$f(x) = 10 - 2x - 5x$ , *when* $x$ *approaches* 2.

**Solution :** $\lim\limits_{x \to 2} (10 - 2x - 5x^2) = 10 - 2(2) - 5(2)^2$

$$= 10 - 4 - 20$$

$$= -14$$

**4.4.2 Factorisation Method:** It is a technique to find the limit of a function by cancelling out the common factors so as to convert the given function into a determinate form.

**Example 3.**   *Evaluate* $\lim\limits_{x \to 1} \dfrac{x^2 + x - 2}{x^2 + 2x - 3}$

**Solution :**   When $x = 1$, we have $\dfrac{x^2 + x - 2}{x^2 + 2x - 3} = \dfrac{0}{0}$ form

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Now, Factorise the numerator and denominator

$$\Rightarrow \quad \lim_{x \to 1} \frac{(x-1)(x+2)}{(x-1)(x+3)} = \lim_{x \to 1} \frac{(x+2)}{(x+4)} = \frac{3}{4}$$

**Example 4.** *Find* $\lim_{x \to 2} \frac{x^3-8}{x-2}$

**Solution :** When $x = 2$, we have $\frac{x^3-8}{x-2} = \frac{0}{0}$ form

So, now factorise the numerator and denominator

$$\Rightarrow \quad \lim_{x \to 2} \frac{(x-2)(x^2-2x+4)}{(x-2)} = \lim_{x \to 2} (x^2 - 2x + 4)$$

$$= 2^2 - 2(2) + 4$$

$$= 4$$

**4.4.3 RATIONALISATION METHOD:** It is a technique by which we find the limit by rationalizing the numerator or denominator that is by multiplying the numerator or denominator by their respective conjugates.

**Example 5.** *Evaluate* $\lim_{h \to 0} \frac{\sqrt{x+h}-\sqrt{x}}{h}$

**Solution :** When we put $h = 0$ in the given function, we get $\frac{0}{0}$ form

So, Rationalizing the numerator we get

$$\lim_{h \to 0} \frac{\sqrt{x+h}-\sqrt{x}}{h} \times \frac{\sqrt{x+h}+\sqrt{x}}{\sqrt{x+h}+\sqrt{x}}$$

$$= \lim_{h \to 0} \frac{x+h-x}{h(\sqrt{x+h}+\sqrt{x})} \qquad (\because (a-b)(a+b) = a^2 - b^2)$$

$$= \lim_{h \to 0} \frac{h}{h(\sqrt{x+h}+\sqrt{x})}$$

$$= \lim_{h \to 0} \frac{1}{(\sqrt{x+h}+\sqrt{x})}$$

$$= \frac{1}{\sqrt{x+h}+\sqrt{x}} = \frac{1}{2\sqrt{x}}$$

$$\lim_{x \to 4} \frac{x^2-16}{\sqrt{(x^2+9)}-5}$$

**Solution :** When $x = 4$, the expression $\frac{x^2-16}{\sqrt{(x^2+9)}-5}$ would be of the form $\frac{0}{0}$.

**Example 6.**    *Evaluate*  $\lim x2-16$

So,        Rationalise the denominator

$$\lim_{x \to 4} \frac{x^2-16}{\sqrt{(x^2+9)}-5} = \lim_{x \to 4} \frac{x^2-16}{\sqrt{(x^2+9)}-5} \times \frac{\sqrt{(x^2+9)}+5}{\sqrt{(x^2+9)}+5}$$

$$= \lim_{x \to 4} \frac{(x^2-16)(\sqrt{x^2+9}+5)}{(x^2+9)-5^2}$$

$$= \lim_{x \to 4} \frac{(x^2-16)(\sqrt{x^2+9}+5)}{(x^2+9-25)}$$

$$= \lim_{x \to 4} \frac{(x^2-16)(\sqrt{x^2+9}+5)}{(x^2-16)}$$

$$= \lim_{x \to 4}(\sqrt{x^2 + 9} + 5)$$

$$= \sqrt{4^2 + 9} + 5 = 10.$$

**Example 7.**    *Evaluate*  $\lim_{x \to 1} \frac{\sqrt{3+x}-\sqrt{5-x}}{x^2-1}$

**Solution :**        When we put $x = 1$ in the given expression, we would obtain $\frac{0}{0}$ form.

So,        Ratinalise the numerator

$$\lim_{x \to 1} \frac{\sqrt{3+x}-\sqrt{5-x}}{x^2-1} = \lim_{x \to 1} \frac{\sqrt{3+x}-\sqrt{5-x}}{x^2-1} \times \frac{\sqrt{3+x}+\sqrt{5-x}}{\sqrt{3+x}+\sqrt{5-x}}$$

$$= \lim_{x \to 1} \frac{(3+x)-(5-x)}{(x^2-1)(\sqrt{3+x}+\sqrt{5-x})}$$

$$(\because (a - b)(a + b) = a^2 - b^2)$$

$$= \lim_{x \to 1} \frac{2x-2}{(x^2-1)(\sqrt{3+x}+\sqrt{5-x})}$$

$$= \lim_{x \to 1} \frac{2(x-1)}{(x-1)(x+1)(\sqrt{3+x}+\sqrt{5-x})}$$

$$= \lim_{x \to 1} \frac{2 \times 1}{(x+1)(\sqrt{3+x}+\sqrt{5-x})}$$

$$= \frac{2}{(1+1)(\sqrt{3+1}+\sqrt{5-1})}$$

$$= \frac{2}{2(\sqrt{4}+\sqrt{4})} = \frac{1}{(2+2)} = \frac{1}{4}$$

**4.4.4  USE OF SOME STANDARD RESULTS**

**Example 8.**    *Evaluate*  $\lim_{x \to 1} \frac{x^{15}-1}{x^{10}-1}$

**Solution :**        When we put $x = 1$ in the expression we would get $\frac{0}{0}$ form.

So,        apply the result  $\lim_{x \to 1} \frac{x^{15}-1}{x^{10}-1} = na^{n-1}$

For this multiply and divide the given expression by $(x - 1)$

$$\lim_{x \to 1} \frac{\frac{x^{15}-1}{(x-1)}}{\frac{x^{10}-1}{(x-1)}}$$

$$= \frac{15(1)^{15-1}}{10(1)^{10-1}} = \frac{15 \times 1}{10 \times 1} = \frac{3}{2}$$

**Example 9.** *If* $\lim_{x \to 2} \frac{x^n - 2^n}{x-2} = 80$ *When n E N, then find 'n'*

**Solution :** $\lim_{x \to 2} \frac{x^n - 2^n}{x-2} = 80$

$\Rightarrow \quad n \cdot 2^{n-1} = 80 \quad (\because \lim_{x \to a} \frac{x^n - a^n}{x-a} = na^{n-1})$

Clearly

$\Rightarrow \quad\quad\quad 5 \cdot 2^{5-1} = 80$

$\therefore$ 'n' must be 5 i. *e.* $\quad n = 5$

**Example**

**10.** *If* $\lim_{x \to -a} \frac{x^a + a^a}{x+9} = 9$ ,

*then find 'a'.*

**Solution :** $\lim_{x \to -a} \frac{x^a + a^a}{x+9} = 9$

$\quad\quad\quad \lim_{x \to -a} \frac{x^a - (-a)^9}{x-(-a)} = 9$

$\quad\quad\quad 9a^{9-1} = 9$

$\Rightarrow$

$\Rightarrow (\because \lim_{x \to a} \frac{x^n - a^n}{x-a} = na^{n-1})$

$\Rightarrow \quad\quad\quad a^8 = 1$

$\Rightarrow \quad\quad\quad a = \pm 1$

**Example 11.** *Evaluate* $\lim_{x \to a} (1 + 5x)^{1/x}$

**Solution :** $\quad x \lim_{\to a} (1 + 5x)^{1/x}$

$\quad\quad\quad = \lim_{a} (1 + 5x)^{1/5x \times 5} \, 5x \to$

$\quad\quad\quad = [\lim_{5x \to a} (1 + 5x)^{1/5x}]^5$

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$$= e^5 \qquad (\because \lim_{x \to 0}(1+x)^{1/x} = e)$$

**Example 12.** *Evaluate* $\lim_{x \to 0} \dfrac{a^x - 1}{b^x - 1}$

$$\lim_{x \to 0} \frac{a^x - 1}{b^x - 1}$$

$$= \lim_{x \to 0} \left(\frac{a^x - 1}{x} \times \frac{1}{\frac{b^x - 1}{x}}\right)$$

$$= \lim_{x \to 0} \frac{a^x - 1}{x} \cdot \frac{1}{\lim_{x \to 0} \frac{b^x - 1}{x}}$$

**Solution :**

$$\left(\frac{0}{0}\text{ form}\right)$$

$$\left(\because \lim_{x \to a} \frac{f(x)}{g(x)} = \frac{\lim_{x \to a} f(x)}{\lim_{x \to a} g(x)}\right)$$

Taking log both sides, we get

$$= (\log_e a) \cdot \frac{1}{(\log_e b)}$$

$$= \frac{\log_e a}{\log_e b} = \frac{\log a}{\log b} \qquad \left(\text{using } \lim_{x \to a} \frac{a^x - 1}{x} = \log_e a\right)$$

**Example 13.** *Evaluate* $\lim_{x \to 0} \left[\dfrac{e^x - e^{-x}}{x}\right]$ **Solution :** $\lim_{x \to 0} \left[\dfrac{e^x - e^{-x}}{x}\right]$

$$\lim_{x \to 0} \frac{(e^x - 1) - (e^{-x} - 1)}{x}$$

$$\left(\frac{0}{0}\text{ form}\right)$$

$$\Rightarrow$$

$$\Rightarrow \qquad \lim_{x \to 0}\left(\frac{e^x - 1}{x}\right) + \lim_{x \to 0}\left(\frac{e^{-x} - 1}{-x}\right)$$

$$\left(\because \lim_{x \to a}[f(x) \pm g(x)] = \lim_{x \to a} f(x) \pm \lim_{x \to a} g(x)\right)$$

$$= \log e + \log e \qquad\qquad \left(\because \lim_{x \to a} \frac{e^x - 1}{x} = \log e = 1\right)$$

$$= 1 + 1 = 2$$

**Example 14.** *Evaluate* $\lim\limits_{x \to 0} \frac{\log(1+x)}{x}$ **Solution :** $\lim\limits_{x \to 0} \frac{\log(1+x)}{x}$

$$= \lim\limits_{x \to 0} \frac{1}{x}\log(1 + x)$$

$$= \lim\limits_{x \to 0} \log(1 + x)^{1/x}$$

$$= \log\left(\lim\limits_{x \to 0}(1 + x)^{1/x}\right)$$

$$= \log e$$

$\left(\frac{0}{0}\text{form}\right)$

$(\because \log m^n = n \log m)$

$\left(\because \lim\limits_{x \to 0}(1 + x)^{1/x} = e\right)$

$$= 1$$

### 4.4.5 EVALUATION OF ALGEBRAIC LIMITS WHEN $x \to \infty$

**Example 15.** $\lim\limits_{x \to \infty} \frac{4x^2+5x+6}{3x^2+4x+5} = ?$

**:** $\lim\limits_{\to \infty} \frac{4x^2+5x+6}{3x^2+4x+5}$

**Solution** $\left(\frac{0}{0}\text{form}\right)$

So, dividing the numerator and denominator by '$x^2$', we get

$$\lim\limits_{x \to \infty} \frac{4+\frac{5}{x}+\frac{6}{x^2}}{3+\frac{4}{x}+\frac{5}{x^2}}$$

$$= \frac{4+0+0}{3+0+0}$$

$$= \frac{4}{3}$$

$\left(\because \frac{\text{Any number}}{\infty} = 0\right)$

**Example 16.** *Find* $\lim\limits_{x \to \infty} \frac{(3 -1)(4x-2)}{(x+8)(x-1)}$

**Solution :** $\lim\limits_{x \to \infty} \frac{(3x-1)(4x-2)}{(x+8)(x-1)}$ $\left(\frac{\infty}{\infty}\text{form}\right)$

So, dividing the numerator and denominator by '$x$', we get

$$= \lim_{x \to \infty} \frac{(3-\frac{1}{x})(4-\frac{2}{x})}{(1+\frac{8}{x})(1-\frac{4}{x})}$$

$$= \frac{(3-0)(4-0)}{(1+0)(1-0)}$$

$$= 12$$

$$\left(\because \frac{\text{Any number}}{\infty} = 0\right)$$

**Example 17.** *Find the limits* $\lim_{x \to \infty} \dfrac{\sqrt{3x^2-1}-\sqrt{2x^2-1}}{4x+3}$

**Solution :** $\lim_{x \to \infty} \dfrac{\sqrt{3x^2-1}-\sqrt{2x^2-1}}{4x+3}$ $\left(\frac{\infty}{\infty}\text{form}\right)$

So, dividing each term in the numerator and denominator by '$x$', we get

$$= \lim_{x \to \infty} \frac{\sqrt{3-\frac{1}{x^2}}-\sqrt{2-\frac{1}{x^2}}}{4+\frac{3}{x}}$$

$$= \frac{\sqrt{3-0}-\sqrt{2-0}}{4+0}$$

$$= \frac{\sqrt{3}-\sqrt{2}}{4}$$

$$\left(\because \frac{\text{Any number}}{\infty} = 0\right)$$

## 4.5 CONTINUITY AT A POINT

A function $f(x)$ is said to be continuous at a point $x = a$ (of the domain of the function $f$), if

$$\lim_{x \to a^-}(x) = \lim_{x \to a^+} f(x) = f(a)$$

and $f(a)$ is finite.

If $f(x)$ is not continuous at a point $x = a$, then it is said to be discontinuous at $x = a$.

**Note.** A function is discontinuous at $x = a$ in the following cases :

(i)   $f$ is not defined at $x = a$,

   *i. e.*   $(a)$ does not exist

(ii)   $\lim_{-} f(x)$ or $\lim_{+} f(x)$ does not exist,

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$$x \to a \quad x \to a$$

        i. *e.* either of *L. H. L.* or *R. H. L.* does not exist

(iii)   Both the limits    $\lim_{-} f(x)$ and    $\lim_{+} f(x)$ exist but are not equal,

$$x \to a \quad x \to a$$

        i. *e. L. H. L.* $\neq$ *R. H. L.*

(iv)   Both the left handed and right handed limits exist, but not equal to $f(a)$. i.

    *e.* $\lim_{x \to a} f(x) \neq f(a)$

**Example 18.** *Discuss the continuity of the function* $f(x) = 3x^2 - 2$ *at* $x = 2$ **Solution :**

$f(x) = 3x^2 - 2$

$\lim_{x \to 2} f(x)$

$= \lim_{x \to 2} (3x^2 - 2)$

$= 3(2)^2 - 2$

$= 10$

$f(2) = 3(2)^2 - 2 = 10$

$\lim_{x \to 2} f(x) = f(2) = 10$

Now

$\therefore$ Hence $f$ is continuous at $x = 2$.


**Example 19.** *Show that* $f(x) = \begin{cases} 5x - 4, & \text{when } 0 < x \leq 1 \\ 4x^3 - 3x, & \text{when } 1 < x < 2 \end{cases}$

        *is continuous at* $x = 1$.

**Solution :**      We have

$(L.H.L. \text{ at } x = 1) = \displaystyle\lim_{x \to 1^-} f(x)$

$\qquad\qquad\qquad\quad = \displaystyle\lim_{x \to 1}(5x - 4)(\because f(x) = 5x - 4 \text{ when } x \leq 1)$

$\qquad\qquad\qquad\quad = 5 \times 1 - 4 = 1$

$(R.H.L. \text{ at } x = 1) = \displaystyle\lim_{x \to 1^+} f(x)$

$\qquad\qquad\qquad\quad = \displaystyle\lim_{x \to 1}(4x^3 - 3x)(\because f(x) = 4x^3 - 3x \text{ when } x > 1)$

$\qquad\qquad\qquad\quad = 4(1)^3 - 3 \times 1$

$\qquad\qquad\qquad\quad = 4 - 3 = 1$

$f(1) = 5 \times 1 - 4 \qquad\qquad\qquad\qquad (\because f(x) = 5x - 4 \text{ when } x = 1)$

$\qquad\quad = 1$

$\displaystyle\lim_{x \to 1^-} f(x) = f(1) = \displaystyle\lim_{x \to 1^+} f(x)$

And

$\therefore$ So,　　$f(x)$ is continuous at $x = 1$.

**Example 20.** *Discuss the continuity of the function* $f$ (x) *at* x $= 3.$

$$f(x) = \begin{cases} 3 - x, & x < 3 \\ 3 + x, & x \geq 3 \end{cases}$$

**Solution :** We have $(\because f(x) = 3 - x \text{ when } x <$

$$(L.\ H.\ L.\ \text{at } x = 3) = \lim_{x \to 3^-} f(x)$$

3) $$= \lim_{x \to 3} (3 - x)$$

$(\because f(x) = 3 + x \text{ when } x \geq$

$$= 0$$

$$(R.\ H.\ L.\ \text{at } x = 3) = \lim_{x \to 3^+} f(x)$$

3) $$= \lim_{x \to 3} (3 + x)$$

Clearly

Hence, $$= 6$$

$$\lim_{x \to 3^-} f(x) \neq \lim_{x \to 3^+} f(x)$$

$f(x)$ is discontinuous at $x = 3$.

**Example 21.** *For what value of k, the function*

$$f(x) = \begin{cases} \dfrac{x^4 - 16}{x - 2} & , \ x \neq 2 \\ k & , \ x \geq 2 \end{cases}$$

*is continuous at* $x = 2$

**Solution :** Since $f(x)$ is continuous at $x = 2$, therefore

$$\lim_{x \to 2} f(x) = f(2)$$

i. e.
$$\lim_{x \to 2} f(x) = k \qquad \qquad \text{...(i)}$$

$$\lim_{x \to 2} f(x) = \lim_{x \to 2} \frac{x^4 - 16}{x - 2}$$

$$= \lim_{x \to 2} \frac{(x^2 - 4)(x^2 + 4)}{(x - 2)}$$

$$= \lim_{x \to 2} \frac{(x - 2)(x + 2)(x^2 + 4)}{(x - 2)}$$

$$= \lim_{x \to 2} (x + 2)(x^2 + 4)$$

$$= (2 + 2)(2^2 + 4)$$

$$= 4 \times 8$$

$$= 32$$

Now

$$\Rightarrow \qquad \lim_{x \to 2} f(x) = 32 \qquad \text{...(ii)}$$

By (i) and (ii), we have

$$k = 32$$

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## 4.6 TEST YOUR UNDERSTANDING (A)

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1. Find the following limits

   (a) $\lim_{x \to 2} [x^4 - x^3 + x^2 - 1]$

   (b) $\lim_{x \to 1} [1 + x^1 + x^2 + \dots \dots \dots + x^{20}]$

2. Evaluate

(a) $\displaystyle \lim_{x \to 2} \frac{x^2-6x+5}{x^2-3x-10}$

(b) $\displaystyle \lim_{x \to \frac{1}{2}} \frac{(4x^2-1)}{(2x-1)}$

(c) $\displaystyle \lim_{x \to 9} \frac{(x^2-9x)}{(x^2-10x+9)}$

(d) $\displaystyle \lim_{x \to 1} (\sqrt{x+1} - x)$

(e) $\displaystyle \lim_{x \to 0} \frac{x}{\sqrt{a+x}-\sqrt{a-x}}$

3. Evaluate $\displaystyle \lim_{x \to 1} \frac{x^{17}-1}{x^3-1}$

4. Evaluate $\displaystyle \lim_{x \to a} \frac{x\sqrt{x}-a\sqrt{a}}{x-a}$

5. Evaluate the following :

(a) $\displaystyle \lim_{x \to \infty} \frac{ax^2+bx+c}{lx^2+x+n}$

(b) $\displaystyle \lim_{x \to \infty} \frac{5x^2+2x+1}{7x^2+3x+5}$

(c) $\displaystyle \lim_{x \to \infty} \frac{5x-8}{\sqrt{7x^2+9}}$

6. Find $\displaystyle \lim_{x \to 0} \frac{\sqrt{1+3x}-\sqrt{1-3x}}{x}$

7. Show that $\displaystyle \lim_{x \to 0} (1 - 4x)^{1/x} = e^{-4}$

8. Evaluate the following limits :

(a) $\displaystyle \lim_{n \to \infty} (1 + \frac{1}{n})^{an}$

(b) $\displaystyle \lim_{x \to 0} \frac{5^{6x}-1}{x}$

(c) $\displaystyle \lim_{x \to 0} \frac{e^{-x}-1}{2x}$

9. Discuss the continuity of $f(x)$, where

$$f(x) = \begin{cases} \dfrac{x^2 - 1}{x - 1}, & x \neq 1 \\ 3, & x = 1 \end{cases}$$

at $x = 1$

10. Examine the continuity of the function $f(x)$ at $x = 3$

if $f(x) = \{ \begin{matrix} \frac{x-3}{\sqrt{x^2-9}} , & x \neq 3 \\ 0 & , & x = 3 \end{matrix}$

11.

Show that $f(x) = \{ \begin{matrix} 1 - x , & x < 0 \\ 1 + x , & x \geq 0 \end{matrix}$

is continuous at $x = 0$.

12.       For what value of '$k$' is the function defined

by

$f(x) = \{ \begin{matrix} k(x^2 + 2) , & \text{if } x \leq 0 \\ 3x + 1 & , & \text{if } x > 0 \end{matrix}$

continuous at $x = 0$ ?

**Answers**

1.    (a) 11       (b) 21

2.    (a) $\frac{4}{7}$                 (b) 2   (c) $\frac{9}{8}$   (d) $\frac{1}{\sqrt{2}+1}$       (e) $\sqrt{a}$

$\frac{17}{3}$                 (b) $\frac{5}{7}$           (c) $\frac{5}{\sqrt{7}}$

3.

4. $\frac{3}{2} \sqrt{a}$

5. (a) $\frac{a}{l}$

**6.** 6

**8.** (a) $e^a$  (b) $6 \log 5$  (c) $\frac{-1}{2}$

**9.** Discontinuous at $x = 1$

**10.** Continuous

**12.** $k = \frac{1}{2}$

## 4.7 LET US SUM UP

- The concept of the Limit and Continuity of a function is very important to understand to do calculus.

- Limits basically tells us how does a function behave as we approach a particular value, regardless of the function's actual value there.

- We have different rules and some standard formula which makes it easier to find the Limit of a function as the variable approaches a particular value.

- A function is said to be continuous at a point if both Limit and Function exists at that point and are also equal at that point.

## 4.8 KEY TERMS

- **LIMIT:** A limit of a function is a value that the function approaches as the independent variable of the function approaches a particular value.

- **CONTINUITY:** A function $f(x)$ is said to be continuous at a point $x = a$ (of the domain of the function $f$ ), if $\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x) = f(\ )$ and $f(a)$ is finite.

- **INDETERMINATE FORMS**: When we cannot find the limit solely from the limits of the individual functions.

- **METHOD OF FACTORIZATION:** It is a technique to find the limit of a function by cancelling out the common factors so as to convert the given function into a determinate form.

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- **METHOD OF RATIONALIZATION**: It is a technique by which we find the limit by rationalizing the numerator or denominator that is by multiplying the numerator or denominator by their respective conjugates.

## 4.9 FURTHER READINGS

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2. Budnick, P. *Applied Mathematics*. McGraw Hill Publishing Co.
3. N. D. Vohra, *Business Mathematics and Statistics*, McGraw Hill Education (India) Pvt Ltd 4. J.K. Thukral, *Mathematics for Business Studies,* Mayur Publications
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# B. COM (DIGITAL)

## SEMESTER II

### COURSE: BUSINESS MATHEMATICS AND STATISTICS

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## Unit 5 – Differentiation

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**STRUCTURE**

5.0 Objectives

5.1Introduction

5.2Derivative of a function

5.3Finding Derivative using definition

5.4Derivative of some standard functions

5.5 Differential coefficients of sum of two functions

5.6 Test your Understanding (A)

5.7 Differential coefficients of product of two functions

5.8 Differential coefficients of quotient of two functions

5.9Test your Understanding (B)

5.10 Derivative of function of a function

5.11 Differential coefficients of $a^x$

.12Test your Understanding (C)

5.13 Finding Derivative using $\frac{dy}{dx} \times \underline{\quad} = 1^{dx}$
    $\frac{}{dy}$

5.14 Logarithmic Differentiation

5.15 Test your Understanding (D)

5.16 Differentiation of Implicit functions

5.17 Differentiation of parametric equations

5.18 Test your Understanding (E)

5.19 Successive Differentiation

.20Test your Understanding (F)

5.21 Application of Differentiation

    5.21.1 Average Cost and Marginal Cost

    5.21.2 Total Revenue, Average Revenue and Marginal Revenue

    5.4.3Elasticity of Demand and Supply

        5.22 Maxima and Minma

        5.23 Test Your Understanding (G)

        5.24 Let us Sum Up

        5.25 Key Terms

## 5.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Understand the concept of Differentiation of a fucntion.
- Find the derivative using definition.
- Differentiate various functions using different formulas.
- Find the second and third order derivatives. • Find the Maxima and Minima of a function.

## 5.1 INTRODUCTION

If $y$ is a function of only one independent variable, it is called a *univariate function.*

The rate at which a function changes with respect to its independent variable is called the *derivative* in the function. Thus, in more precise words, in case of dependency of $y$ on $x$ (means $y = f(x)$), the differentiation is a method to find the rate at which a quantity '$y$' changes with respect to the change in another quantity '$x$' upon which it depends. This rate of change is called derivative of $y$ with respect to $x$.

### (a) INCREMENT

In case $y = f(x)$, a small change in the value of variable $x$ is called increment in $x$ and is denoted by $\Delta x$ or $\delta x$ ($\Delta x$ or $\delta x \approx 0$) corresponding to this very small change in $x$, $\Delta y$ denotes the small change in variable $y$.

### (b) AVERAGE RATE OF CHANGE

In case $y = f(x)$ the average rate of change of the function $f$ when $x$ changes to $x + \Delta x$ is defined by ratio $\Delta y / \Delta x$ .

$\therefore$     Average rate of change of $y$ w.r.t. $x$

$$\frac{\Delta y}{\Delta x} = \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

### (c) INSTANTANEOUS RATE OF CHANGE

The limiting value of average rate of change of function $f(x)$ as $\Delta x \to 0$ is known as instantaneous rate of change of function $f(x)$ (i. e., $y$) w.r.t. $x$.

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## 5.2 DERIVATIVE OF A FUNCTION y = f(x) **w.r.t.** x

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The instantaneous rate of change of function $f(x) = y$ w.r.t $x$ is called derivative of $y$ w.r.t $x$ i.

e., $\quad \displaystyle\lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \frac{dy}{dx} = f'(x)$ or

$$\frac{dy}{dx} = \lim_{\Delta x \to 0} \frac{f(x+\Delta x)-f(x)}{\Delta x}, \text{ provided this limit exists.}$$

**Note 1.** $\frac{dy}{dx}$ is also called the differential coefficient of $y$ w.r.t $x$.

**Note 2.** $\frac{d}{dx}$ represents a single operator and is not to be interpreted as the ratio of two

quantities $dy$ and $dx$.

**Note 3.** $\frac{dy}{dx}$ is also written as $f'(x)$ or $y_1$ or $Dy$ $(D = \frac{d}{dx})$

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## 5.3 FINDING DERIVATIVES USING DEFINITION (FIRST PRINCIPLE)

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In this section, we shall present some example of finding the derivatives by using the above definition of the derivative. This method of finding the derivative is also called the method of finding the derivative by **first principle** or by **delta method** or by **ab-initio method.**

**Example 1.** *Find the derivative of the function* $y = x^3$ *from the first principles* **Solution**

**:** Let $y = f(x) = x^3$. Then, $f(x + h) = (x + h)^3$.

By definition, $\quad f'(x) = \displaystyle\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$, provided the limit exists.

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$\therefore \quad f'(x) = \dfrac{Lim}{h \to 0} \dfrac{(x+h)^3 - x^3}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{x^3 + 3hx^2 + 3h^2x + h^3 + x^3}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{h(3x^2 + 3hx + h^2)}{h}$

$\qquad = \dfrac{Lim}{h \to 0} (3x^2 + 3hx + h^2) = 3x^2$

**Example 2.** *Differentiate* $f(x) = x^2 + 3x$ *from definition*

**Solution :** We have, $f(x) = x^2 + 3x$

$$\therefore \quad f(x + h) = (x + h)^2 + 3(x + h)$$

From first principles, we have

$$f'(x) = \dfrac{Lim}{h \to 0} \dfrac{f(x+h) - (x)}{h}$$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{(x+h)^2 + 3(x+h) - x^2 - 3x}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{x^2 + 2hx + h^2 + 3x + 3h - x^2 - 3x}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{2hx + h^2 + 3h}{h} = \dfrac{lim}{h \to 0} (2x + h + 3) = 2x + 3.$

**Example 3.** *Differentiate from first principles :* $f(x) = \dfrac{1}{x^2} (x \neq 0)$

**Solution :** We are given $f(x) = \dfrac{1}{x^2}$ . Hence, $(x + h) = \dfrac{1}{(x+h)^2}$ .

From first principles, we have

$$f'(x) = \dfrac{Lim}{h \to 0} \dfrac{f(x+h) - f(x)}{h}$$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{x^2 - x^2 - 2hx - h^2}{h}$

$\qquad = \dfrac{Lim}{h \to 0} \dfrac{-2hx - h^2}{h(x+h)^2 \cdot x^2} = \dfrac{Lim}{h \to 0} \dfrac{-2x - h}{(x+h)^2 x^2} = \dfrac{-2x}{x^4} = -\dfrac{2}{x^3}.$

**Example 4.** *Differentiate* $(x) = \sqrt{x}, (x > 0)$, *using ab-initio method*

**Solution :** We are given $f(x) = \sqrt{x}$. Hence, $f(x + h) = \sqrt{(x + h)}$.

Hence, by definition

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$$\mathfrak{f}'(x) = \frac{Lim}{h \to 0} \frac{\mathfrak{f}(x+h)-\mathfrak{f}(x)}{h}$$

$$= \frac{Lim}{h \to 0} \frac{\sqrt{(x+h)}-\sqrt{x}}{h}$$

$$= \frac{Lim}{h \to 0} \frac{\sqrt{(x+h)}-\sqrt{x}}{h} \times \frac{\sqrt{(x+h)}+\sqrt{x}}{\sqrt{(x+h)}+\sqrt{x}}$$

$$= \frac{Lim}{h \to 0} \frac{(\sqrt{x+h})^2-(\sqrt{x})^2}{h[\sqrt{x+h}+\sqrt{x}]}$$

$$= \frac{Lim}{h \to 0} \frac{x+h-x}{h[\sqrt{(x+h)}+\sqrt{x}]} = \frac{lim}{h \to 0} \frac{1}{\sqrt{(x+h)}+\sqrt{x}} = \frac{1}{2\sqrt{x}}.$$

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## 5.4 DERIVATIVES OF SOME STANDARD FUNCTIONS

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### (i)   DIFFERENTIAL COEFFICIENT OF A CONSTANT

Let $c$ be a constant quantity. If $\mathfrak{f}(x) = c$, we have $\mathfrak{f}(x + h) = c$, as the constant remains uncharged for every value of $x$,

$$\therefore \quad \mathfrak{f}'(x) \frac{L \; m}{h \to 0} \frac{\mathfrak{f}(x+h)-\mathfrak{f}(x)}{h} = \frac{Lim}{h \to 0} \frac{c-c}{h} = 0.$$

$$\frac{d}{dx}(c) = 0$$

$\therefore$

### (ii)  DIFFERENTIAL COEFFICIENT OF $x^n$

Let $\mathfrak{f}(x) = x^n$; the, $\mathfrak{f}(x + h) = (x + h)^n$.

$$\therefore \quad \mathfrak{f}'(x) = \frac{Lim}{h \to 0} \frac{(x+h)^n-x^n}{h}$$

$$= \frac{Lim}{h \to 0} \frac{x^n(1+\frac{h}{x})^n-x^n}{h}$$

$$= \frac{Lim}{h \to 0} \frac{x^n}{h}[(1 + n \; \frac{h}{\cdot x} + \frac{n(n-1)}{2!} \frac{h^2}{x^2} + \cdots) - 1]$$

$$\frac{d}{dx}x^n = nx^{n-1}$$

$\therefore$

### (iii) DIFFERENTIAL COEFFICIENT OF THE PRODUCT OF A CONSTANT AND A FUNCTION OF $x$.

Let $c$ be a constant and $\mathfrak{f}(x)$ be the given function; then,

$$\frac{d}{dx}[cf(x)] = \lim_{h \to 0} \frac{cf(x+h)-cf(x)}{h}$$

$$= \lim_{h \to 0}\left[c.\frac{f(x+h)-f(x)}{h}\right] = c\frac{d}{dx}f(x)$$

Hence, *the differential coefficient of the product of a constant and function is equal to the product of the constant and the differential coefficient of the function.*

### (iv) DIFFERENTIAL COEFFICIENT OF $e^x$.

Let $f(x) = e^x$; then $f(x+h) = e^{x+h}$.

$$\therefore \quad f'(x) = \lim_{h \to 0} \frac{e^{(x+h)}-e^x}{h}$$

$$= \lim_{h \to 0} \frac{e^x}{h}\left[(1+h+\frac{h^2}{2!}+\frac{h^3}{3!}+\cdots)-1\right]\ [\because e^x = 1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\cdots]$$

$$= \lim_{h \to 0} e^x\left[1+\frac{h}{2!}+\frac{h^2}{3!}+\cdots\right] = e^x.$$

$$\therefore \quad \frac{d}{dx}e^x = e^x$$

### (v) DIFFERENTIAL COEFFICIENT OF $\log_e x$ We have

$$\frac{d}{dx}(\log_e x) = \lim_{h \to 0} \frac{\log_e(x+h)-\log_e x}{h}$$

$$= \lim_{h \to 0} \frac{\log_e(\frac{x+h}{x})}{h} \qquad [\because \log_e \quad -\log_e n = \log_e \frac{m}{n}]$$

$$= \lim_{h \to 0} \frac{\log_e(1+\frac{h}{x})}{h}$$

$$= \lim_{h \to 0} \frac{1}{h}\left[\frac{h}{x} - \frac{h^2}{2x^2} + \frac{h^3}{3x^3} - \cdots\right]\ [\because \log_e(1+x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \cdots]$$

$$= \lim_{h \to 0}\left[\frac{1}{x} - \frac{h}{2x^2} + \frac{h^2}{3x^3} - \cdots\right] = \frac{1}{x}.$$

$$\therefore \quad \frac{d}{x}\log_e x = \frac{1}{x}$$

### (vi) DIFFERENTIAL COEFFICIENT OF $\log_a x$ Changing the base from $a$ to $e$ we have

$$log_a x = log_e x . log_a e.$$

$$\therefore \quad \frac{d}{dx}(log_a x) = \frac{d}{dx}(log_e x . log_a e)$$

$$= log_a e . \frac{d}{dx}(log_e x) = (log_a e)\frac{1}{x}.$$

$$\frac{d}{dx} log_a x = \frac{log_a e}{x}$$

$$\therefore$$

## 5.5 DIFFERENTIAL COEFFICIENT OF SUM OF TWO FUNCTIONS

The differential coefficient of the sum of the functions is equal to the sum of the differential coefficient of the two functions.

It should be clear that the above method can be extended to the sum or difference of any number of functions. Thus,

$$\frac{d}{dx}[f_1(x) \pm f_2(x) \pm f_3(x) \pm \cdots \pm f_n(x)] = \frac{d}{dx}f_1(x) \pm \frac{d}{dx}f_2(x) \pm \frac{d}{dx}f_3(x) \pm \cdots + - \frac{d}{dx}f_n(x).$$

**Example 5.** $\frac{d}{dx}(3x^4) = 3 \cdot \frac{d}{dx}x^4 = 3 \cdot 4 \cdot x^{4-1} = 12x^3.$

**Example 6.** $\frac{d}{dx}(2\sqrt{x}) = 2 \cdot \frac{d}{dx}x^{1/2} = 2 \cdot \frac{1}{2} \cdot x_2^{\frac{1}{2}-1} = x^{-1/2} = \frac{1}{\sqrt{x}}.$

**Example 7.** $\frac{d}{dx}(x^3 + 3x^2) = \frac{d}{dx}(x^3) + 3 \cdot \frac{d}{d}(x^2) = 3 \cdot x^2 + 3 \cdot 2x = 3x^2 + 6x.$

**Example 8.** $\frac{d}{dx}(x^2 + a^2) = \frac{d}{dx}(x^2) + \frac{d}{dx}(a^2) = 2x + 0 = 2x.$

**Example 9.** $\frac{d}{dx}(x^3 + 2 log_e x) = \frac{d}{dx}x^3 + 2\frac{d}{dx}(log_e x) = 3x^2 + \frac{2}{x}.$

## 5.6 TEST YOUR UNDERSTANDING (A)

Find out the differential coefficient w.r.t. $x$ of the functions in questions 1 to 7:

**2.**     $x^{1/4}, x^{2/3}, x^{-5/6}$     **1.**     $x^2, x^{10}, \frac{1}{x^5}$.

**3.**     (a)$(x^3 + 2)$,     (b)$(2x^3 + 3x^2 + 4)$,     (c)$(x + \frac{1}{x})$.

**4.**     (a)$(x^n + a^n)$,     (b)$(\sqrt{x} + \sqrt{a})$,     (c)$a^n(x + b)$,     (d)$\frac{(x+a)^3}{\sqrt{x}}$.

**5.**     (a)$2e^x$,     (b)$(e^x - 3x^2)$     (c)$(4x^3 - 7e^x)$.

**6.**     (a)$3 \log_e x$     (b)$\log_e x^2$     (c)$\log_e x^{-5}$     (d)$\log_e \sqrt{x}$.

**7.**     $4x^{1/3} + e^x$.

**8.**     If $y = x^3 + 3x^2 + 2x + 1$, Find $\frac{dy}{dx}$ for $x = 0$.

# Answers

**1.**     $2x, 10x^9, -\frac{5}{x^6}$

**2.**     $\frac{1}{4}x^{-3/4}, \frac{2}{3}x^{-1/3}, \frac{-5}{6}x^{-11/6}$

**3.**     (a)$3x^2$ (b)$6x(x + 1)$     (c)$(1 - x^{-2})$

$$(d)(5 x^{\frac{3}{2}} + {}^9 ax^{\frac{1}{2}} + {}^3 a^2 x^{-\frac{1}{2}} \quad {}^2 - \frac{1}{2}a^3 x^{-\frac{3}{2}})$$

(c)$a^n$

**4.**     (a)$nx^{n-1}$     (b)$\frac{1}{2\sqrt{x}}$

**5.**     (a)$2e^x$ (b)$(e^x - 6x)$     (c)$(12x^2 - 7e^x)$

**6.**     (a)$\frac{3}{x}$     (b)$\frac{2}{x}$     (c)$\frac{-5}{x}$     (d)$\frac{1}{2x}$

**7.**     $\frac{4}{3}x^{-2/3} + e^x$

**8.**     2

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**5.7 DIFFERENTIAL COEFFICIENT OF THE PRODUCT TO TWO FUNCTIONS**

If $f_1(x)$ and $f_2(x)$ are the two functions of $x$, we have

$$\frac{d}{dx}[f_1(\ ) \cdot f_2(x)] = f_1(x) \cdot \frac{d}{dx}[f_2(x)] + f_2(x) \cdot \frac{d}{dx}[f_1(x)].$$

*The derivative of the product of two functions = first function × derivative of second function + second function × derivative of first function.*

**Note :**

1.        If $u$ and $v$ are two functions of $x$, the above formula can be written as

$$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}.$$

2.        The above formula can be extended to cover the function which is the product of more than two functions. For example, if $u$, $v$ and $w$ are the functions of $x$, we have

$$\frac{d}{dx}(uvw) = uv\frac{dw}{dx} - uw\frac{dv}{dx} + vw\frac{du}{dx}$$

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## 5.8 DIFFERENTIAL COEFFICIENT OF THE QUOTIENT OF TWO FUNCTIONS

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If $f_1(x)$ and $f_2(x)$ are the functions of $x$ and $f_2(x) \neq 0$, we have

$$\frac{d}{dx}\left[\frac{f_1(x)}{f_2(x)}\right] = \frac{f_2(x) \cdot \frac{d}{dx}[f_1(x)] - f_1(x) \cdot \frac{d}{dx}[f_2(x)]}{[f_2(x)]^2}$$

*The derivative of the quotient of two functions is*

$$\frac{(Denominator)(Der.\ of\ Numerator) - (Numerator)(Der.\ of\ Denominat\ r)}{(Denominator)^2}$$

**Note :**

If $u$ and $v$ are two functions of $x$, then

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

**Example 10.** *Obtain the derivative of* $x^2 \cdot \log x$ *with respect to* $x$.

**Solution :** Let $y = x^2 \cdot \log x$

Then, $\dfrac{dy}{dx} = x^2 \cdot \dfrac{d}{dx}(\log x) + (\log x)\dfrac{d}{dx}(x^2)$

$x^2 \cdot \dfrac{1}{x} + (\log x)2x = x(1 + 2\log x)$

.

**Example 11.** *Find the differential coefficient w.r.t. of* $(x^2 + 5)(3x + 2)$ *in two defferent ways, and compare the results.*

**Solution :** Let

$$y = (x^2 + 5)(3x + 2)$$

$$= 3x^3 + 2x^2 + 15x + 10.$$

Then, $\dfrac{dy}{dx} = \dfrac{d}{dx}(3x^3) + \dfrac{d}{dx}(2x^2) + \dfrac{d}{dx}(15x) + \dfrac{d}{dx}(10)$

$$= 9x^2 + 4x + 15 + 0$$

$$= 9x^2 + 4x + 15$$

…(i)

Also, we have

$$y = (x^2 + 5)(3x + 2)$$

$\therefore \quad \dfrac{dy}{dx} = (x^2 + 5) \cdot \dfrac{d}{dx}(3x + 2) + (3x + 2) \cdot \dfrac{d}{dx}(x^2 + 5)$

$$= (x^2 + 5) \cdot 3 + (3x + 2) \cdot 2x$$

$$= 3x^2 + 15 + 6x^2 + 4x$$

$$= 9x^2 + 4x + 15$$

…(ii)

In (i) and (ii) we have obtained of the given function in two different ways. Evidently, both are the same.

**Example 12.** *Differentiate* $\dfrac{x^{2+3}}{\sqrt{x}}$ *with respect to .*

**Solution :** Let

$$y = x^2 \cdot \log x$$

Then, $$\frac{dy}{dx} = x^2 \cdot \frac{d}{dx}(\log x) + (\log x)\frac{d}{dx}(x^2)$$

$$= x^2 \cdot \frac{1}{x} + (\log x)2x = x(1 + 2\log x)$$

**Example 13.** *If* $= \dfrac{e^x}{(1+x)}$*, find* $dy/dx$*.*

**Solution :** $$\frac{dy}{dx} = \frac{(1+x)\cdot \frac{d}{dx}e^x - e^x \cdot \frac{d}{dx}(1+x)}{(1+x)^2}$$

$$= \frac{(1+x)e^x - e^x(0+1)}{(1+x)^2} = \frac{e^x(1+x-1)}{(1+x)^2} = \frac{x\,e^x}{(1+x)^2}.$$

## 5.9 TEST YOUR UNDERSTANDING (B)

Find the differential coefficients of the following functions with respect to :

**1.** $x^3 \log_e x, \quad e^x \log_a x, \qquad e^x\sqrt{x}.$

**2.** $(x^3 + x^4)(e^x \log_e x).$

**3.** $\dfrac{x}{1+x}, \quad \dfrac{x}{(a^2+x^2)}$

**4.** $\dfrac{\dfrac{e^x}{x}^n}{\log_e x} \quad \dfrac{x}{\log_e x}, \cdot$

**5.** $\dfrac{e^x(x-1)}{(x+1)}, \dfrac{\sqrt{a}+\sqrt{\phantom{x}}}{\sqrt{a}-\sqrt{x}}.$

## Answers

**1.** $x^2(1 + 3\log_e x), \quad e^x(\log_a x + \dfrac{\log_a e}{x}), \quad [e^x\sqrt{x} + \dfrac{e^x}{2\sqrt{x}}]$

**2.** $e^x \log_e x(x^4 + 5x^3 + 3x^2) + e^x(x^3 + x^2)$

**3.** $\dfrac{1}{(x+1)^2}, \quad \dfrac{a^2-x^2}{(a^2+x^2)^2}$

**4.** $\dfrac{x^{n-1}[n\,\log_e x-1]}{(\log_e x)^2}$, $\dfrac{e^x(x\log x-1)}{x(\log x)^2}$

5. $\dfrac{e^x(x^2+1)}{(x+1)^2}$, $\dfrac{\sqrt{a}}{\sqrt{x}\left(\sqrt{a}-\sqrt{x}\right)^2}$.

---

## 5.10 DERIVATIVE OF A FUNCTION OF A FUNCTION

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Let us first consider what is meant by a function of a function. Let $y$ be a function of $t$ and $t$ be a function of $x$; then, $y$ is called a function of a function of $x$. Consider the example of the function

$y = (3x^2 + 7x + 8)^{10}$. In this function, let $t = 3x^2 + 7x + 8$. Hence, $y = t^{10}$. Thus, $y$ is a function of $t$ and $t$ is a function of $x$; hence, $y$ is a function of a function of a $x$.

Such a function as done not directly depend on the independent variable is called a *function of a function*. We may extend this type of function as a function of a function of a function of …… of a function. For example,

$\{\log \log(ae^x + bx^2)\}^m$ is an extended version of such type of function.

Finding the derivative of a function of a function.

For $v = f(t)$ and $t = \theta(x)$. Now, we are to find $\dfrac{dy}{dx}$.

Let $\delta t$ be the change product in $t$ be the change $\delta x$ in $x$, $\delta y$ be the change the product in $y$ by the change $\delta t$ in $t$ and $\delta t$ be different from zero. Then multiplying and dividing $\dfrac{\delta y}{\delta x}$ by $\dfrac{\delta t}{\delta x}$, we get

$$\frac{\delta y}{\delta x} = \frac{\delta y}{\delta t}\cdot\frac{\delta t}{\delta}$$

When $\delta x \to 0$, each of $\delta t$ and $\delta y \to 0$ and the functions $\dfrac{\delta y}{\delta t}$ and $\dfrac{\delta t}{\delta x}$ approach respectively to the

limits $\dfrac{dy}{dt}$ and $\dfrac{dt}{dx}$.

Hence, in the limit when $\delta x \to 0$, we have

$$\frac{Lim}{\delta x \to 0}\frac{\delta y}{\delta x} = \frac{Lim}{\delta x \to 0}\frac{\delta y}{\delta t} \times \frac{Lim}{\delta x \to 0}\frac{\delta t}{\delta x}$$

Or

$$\frac{dy}{dx} = \frac{dy}{dt}\cdot\frac{dt}{dx}$$

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This important result is usually referred to as the chain rule or function of a function rule of finding the derivative. This rule is a very important one in finding the derivatives.

If $y$ is a function of $u$ where $u$ is a function of $v$ and $v$ is a function of $x$, the rule can be extended as under :

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{d} \cdot \frac{dv}{dx}$$

In general, the rule may be expressed as

$$\frac{d \text{ (1st function)}}{dx} = \frac{d \text{ (1st function)}}{d \text{ (2nd function)}} \times \frac{d \text{ (2nd function)}}{d \text{ (3rd function)}} \times \dots \times \frac{d \text{ (last function)}}{dx}$$

**Example 14.** *Find* $\frac{dy}{dx}$ *for* $y = (3x^2 + 7x + 8)^{10}$.

**Solution :** Let $t = 3x^2 + 7x + 8$. Hence, $y = t^{10}$. Now, from chain rule,

$$\frac{dy}{dx} = \frac{dy}{dt} \cdot \frac{dt}{dx} = \frac{d(t)^{10}}{dt} \cdot \frac{d}{dx}(3x^2 + 7x + 8)$$

$$= 10t^9 \cdot (6x + 7) = 10(3x^2 + 7x + 8)^9 (6x + 7)$$

.

**Note :**

In practice, the substitution of $t$ for $3x^2 + 7x + 8$ is done only mentally (and not in writing) and we directly write the answer, as given below:

$$\frac{dy}{dx} = \frac{d}{dx}(3x^2 + 7x + 8)^{10}$$

$$= 10(3x^2 + 7x + 8)^9 \frac{d}{dx}(3x^2 + 7x + 8) = 10(3x^2 + 7x + 8)^9 (6x + 7).$$

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### 5.11 DIFFERENTIAL COEFFICIENT OF $a^x$

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We know that $a^x = e^{x \log_e a}$.

$\therefore \quad \frac{d}{dx}a^x = \frac{d}{dx}e^{x \log_e a}$

$$= e^{x \log_e a} \times \frac{d}{dx}(x \log_e a)$$

(assuming mentally $t = x \log_e a$ and using chain rule)

$$= e^{x \log_e a} \cdot \log_e a = a^x \cdot \log_e a.$$

$$\frac{d}{dx}a^x = a^x \log_e a$$

∴

## ILLUSTRATIVE EXAMPLES

**Example 15.** *Differentiate* $e^{(3x2-6x+2)}$ *with respect to .*

**Solution :**  Let $y = e^{(3x2-6x+2)}$

Then, we can consider

$$y = e^u, \quad \text{where } u = 3x^2 - 6x + 2.$$

∴  $\frac{dy}{du} = e^u$  and  $\frac{du}{dx} = 3.2x - 6.1 + 0$

$$= 6x - 6.$$

By chain rule,

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$= e^u(6x - 6)$$
$$= 6(x - 1)e^{(3x^2-6x+2)}.$$


**Example 16.** *Differentiate* $\log\{x + \sqrt{(x^2 + a^2)}\}$ *with respect to .*

**Solution :** Let $y = \log\{x + \sqrt{(x^2 + a^2)}\}$

$$\frac{dy}{dx} = \frac{d}{dx}[\log\{x + \sqrt{(x^2 + a^2)}\}]$$

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}} \cdot \frac{d}{dx}\{x + \sqrt{(x^2 + a^2)}\} \qquad \text{(using}$$

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}} [\frac{d}{dx}(x) + \frac{d}{dx}\{\sqrt{(x^2 + a^2)}\}]$$

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}} [1 + \frac{1}{2}(x^2 + a^2)^{-1/2} \cdot \frac{d}{dx}(x^2 + a^2)]$$

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}} [1 + \frac{1}{2}(x^2 + a^2)^{-1/2} \cdot 2x]$$

∴

chain rule)

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}}[1+\frac{x}{\sqrt{(x^2+a^2)}}]$$

$$= \frac{1}{\{x+\sqrt{(x^2+a^2)}\}}[\frac{\{x+\sqrt{(x^2+a^2)}\}}{\sqrt{(x^2+a^2)}}]$$

$$= \frac{1}{\sqrt{(x^2+a^2)}} \cdot$$

**Example 17.** *Differentiate with respect to x the function* $(x^2 + 2)^5(3x^4 - 5)^4$.

**Solution** : Let $y = (x^2 + 2)^5(3x^4 - 5)^4$ $\therefore$

$\frac{dy}{dx} = (x^2 + 2)^5 \cdot \frac{d}{dx}(3x^4 - 5)^4 + (3x^4 - 5)^4 \cdot \frac{d}{dx}(x^2 + 2)^5$

(using product rule)

$= (x^2 + 2)^5 \cdot 4(3x^4 - 5)^3 \cdot \frac{d}{d}(3x^4 - 5) + (3x^4 - 5)^4 \cdot (x^2 + 2)^4 \cdot \frac{d}{dx}(x^2 + 2)$

(using chain rule)

$= 4(x^2 + 2)^5(3x^4 - 5)^3 \cdot 12x^3 + (3x^4 - 5)^4 \cdot 5(x^2 + 2)^4 \cdot 2x$

$= 2x(x^2 + 2)^4(3x^4 - 5)^3[24x^2(x^2 + 2) + 5(3x^4 - 5)] =$

$2x(x^2 + 2)^4(3x^4 - 5)^3(39x^4 + 48x^2 - 25)$.

**Example 18.** *Find the derivative of* $e^{x2/(1+x2)}$ *with respect to x.*

**Solution :** Let $y = e^{x2/(1+x2)}$.

$\therefore \quad \frac{dy}{dx} = \frac{d}{dx}[e^{x^2/(1+x^2)}]$

$= e^{x^2/(1+x^2)} \cdot \frac{d}{dx}(\frac{x^2}{1+x^2})$

$= e^{x^2/(1+x^2)} [\frac{(1+x^2) \cdot \frac{d}{dx}x^2 - x^2 \cdot \frac{d}{dx}(1+x^2)}{(1+x^2)^2}]$

$= e^{x^2/(1+x^2)} [\frac{(1+x^2) \cdot 2x - x^2 \cdot 2x}{(1+x^2)^2}]$

$= e^{x^2/(1+x^2)} [\frac{2x(1+x^2-x^2)}{(1+x^2)^2}]$

$$= \frac{2x}{(1+x^2)^2} \cdot e^{x^2/(1+x^2)}.$$

**Example 19.** *If* $= \sqrt{\frac{1-x}{1+x}}$, *show that* $(1 - x^2)\frac{dy}{dx} + y = 0$

**Solution :** Given $y = \sqrt{\frac{1-x}{1+x}}$, differentiating w.r.t. $x$, we get

$$\frac{dy}{dx} = \frac{1}{2}\left(\frac{1-x}{1+x}\right)^{-1/2} \cdot \frac{d}{x}\left(\frac{1-x}{1+x}\right)$$

$$= \frac{1}{2}\left(\frac{1-x}{1+x}\right)^{-1/2} \cdot \frac{(1+x)(0-1)-(1-x)(0+1)}{(1+x)^2}$$

$$= \frac{1}{2}\frac{\sqrt{1+x}}{\sqrt{1-x}} \cdot \frac{-1-x-1+x}{(1+x)^2} = \frac{1}{\sqrt{1-x}(1+x)^{3/2}}$$

$$\therefore \ (1 - x^2)\frac{dy}{dx} + y = (1 - x^2) \cdot \frac{1}{\sqrt{1-x}(1+x)^{3/2}} + \sqrt{\frac{1-x}{1+x}}$$

$$= -\frac{(1-x)(1+x)}{\sqrt{1-x}(1+x)^{3/2}} + \sqrt{\frac{1-x}{1+x}}$$

$$= -\sqrt{\frac{1-x}{1+x}} + \sqrt{\frac{1-x}{1+x}} = 0.$$

**Example 20.** *Find the derivatives of the following functions :*

*(iii)* $\frac{\sqrt{x^2+1}-x}{\sqrt{x^2+1}+x}$

    *(i)* $\log (x + \sqrt{x^2 - a^2})$     *(ii)* $\left(\frac{\sqrt{x+1}+\sqrt{x-1}}{\sqrt{x+1}-\sqrt{x-1}}\right)$

**Solution :** (i) Let $y = \log (x + \sqrt{x^2 - a^2})$, differentiating w.r.t. $x$, we get

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$$\frac{dy}{dx} = \frac{1}{x+\sqrt{x^2-a^2}} \cdot \frac{d}{dx}(x + \sqrt{x^2 - a^2})$$

$$= \frac{1}{x+\sqrt{x^2-a^2}} \cdot [1 + \frac{1}{2}(x^2 - a^2)^{-1/2} \cdot 2x]$$

$$= \frac{1}{x+\sqrt{x^2-a^2}} \cdot (1 + \frac{x}{\sqrt{x^2-a^2}})$$

$$= \frac{1}{x+\sqrt{x^2-a^2}} \cdot \frac{\sqrt{x^2-a^2}+x}{\sqrt{x^2-a^2}} = \frac{1}{\sqrt{x^2-a^2}} \cdot$$

*(ii)* Let

$$y = \log\left(\frac{\sqrt{x+1}+\sqrt{x-1}}{\sqrt{x+1}-\sqrt{x-1}}\right) = \log\left(\frac{\sqrt{x+1}+\sqrt{x-1}}{\sqrt{x+1}-\sqrt{x-1}} \times \frac{\sqrt{x+1}+\sqrt{x-1}}{\sqrt{x+1}+\sqrt{x-1}}\right)$$

$$= \log\left(\frac{(x+1)+(x-1)+2\sqrt{x+1}+\sqrt{x-1}}{(x+1)-(x-1)}\right) = \log\left(\frac{2x+2\sqrt{x^2-1}}{2}\right)$$

$$= \log(x + \sqrt{x^2 - 1}), \text{ differentiating w.r.t.} x \text{ , we get}$$

$$\frac{dy}{dx} = \frac{1}{x+\sqrt{x^2-1}} \cdot [1 + \frac{1}{2}(x^2 - 1)^{-1/2} \cdot 2x]$$

$$= \frac{1}{x+\sqrt{x^2-1}} \cdot (1 + \frac{x}{\sqrt{x^2-1}}) = \frac{1}{x+\sqrt{x^2-1}} \cdot \frac{\sqrt{x^2-1}+x}{\sqrt{x^2-1}} = \frac{1}{\sqrt{x^2-1}} \cdot$$

*(iii)* Let ____

$$y = \frac{\sqrt{x^2+1}-x}{\sqrt{x^2+1}+x} = \frac{\sqrt{x^2+1}-x}{\sqrt{x^2+1}+x} \times \frac{\sqrt{x^2+1}-x}{\sqrt{x^2+1}-x}$$

$$= \frac{(x^2+1)+x^2-2x\sqrt{x^2+1}}{(x^2+1)-x^2} = \frac{2x^2+1-2x\sqrt{x^2+1}}{1}$$

$$= 2x^2 + 1 - 2x\sqrt{x^2 + 1}, \text{ differentiating w.r.t.} x \text{ , we get}$$

$$\frac{dy}{dx} = 2.2x + 0 - 2\left[x \cdot \frac{1}{2}(x^2 + 1)^{-1/2} \cdot 2x + \sqrt{x^2 + 1} \cdot 1\right]$$

$$= 4x - 2\left[\frac{x^2}{\sqrt{x^2+1}} + \sqrt{x^2 + 1}\right]$$

$$= 4x - 2 \cdot \frac{x^2+(x^2+1)}{\sqrt{x^2+1}} = 2\left[2x - \frac{2x^2+1}{\sqrt{x^2+1}}\right]$$

**Example 21.** *If* $y = (x + \sqrt{x^2 - 1})^m$, *prove that* $(x^2 - 1)\left(\frac{dy}{dx}\right)^2 = m^2 y^2$.

**Solution :** Given $y = (x + \sqrt{x^2 - 1})^m$ ...(i)

Differentiating w.r.t. $x$, we get

$$\frac{dy}{dx} = m \cdot (x + \sqrt{x^2 - 1})^{m-1} \cdot [1 + \frac{1}{2}(x^2 - 1)^{-1/2} \cdot 2x]$$

$$= m \cdot (x + \sqrt{x^2 - 1})^{m-1} \cdot (1 + \frac{x}{\sqrt{x^2-1}})$$

$$= m \cdot (x + \sqrt{x^2 - 1})^{m-1} \cdot \frac{\sqrt{x^2-1}+x}{\sqrt{x^2-1}}$$

$$= m \cdot \frac{(x+\sqrt{x^2-1})^m}{\sqrt{x^2-1}} = \frac{my}{\sqrt{x^2-1}} \text{[using (i)]}$$

On squaring both sides, we get

$$\left(\frac{dy}{dx}\right)^2 = \frac{m^2y^2}{x^2-1} \Rightarrow (x^2 - 1)\left(\frac{dy}{dx}\right)^2 = m^2y^2.$$

**Example 22.** *If* $y = e^{3 \log x + 2x}$, *prove that* $\frac{dy}{dx} = x^2 e^{2x}(2x + 3)$

**Solution :** Given $y = e^{3 \log x + 2x} = e^{\log x3} \cdot e^{2x} = x^3 \cdot e^{2x} (\because e^{\log x} = x, x > 0)$ Differentiating w.r.t. $x$, we get

$$\frac{dy}{dx} = x^3 \cdot e^{2x} \cdot 2 + e^{2x} \cdot 3x^2$$

$$= x^2 e^{2x}(2x + 3).$$

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## 5.12 TEST YOUR UNDERSTANDING (C)

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Write down the differential coefficients of the following functions with respect to :

1. $(3 - 2x)^5$, $(e^x)^3$, $(\log_e x)^3$.

2. $e^{x^3}$, $\log (x^n + a)$, $\log (e^x + 1)$, $\sqrt{\log x}$.

3. **(a)** $\log_e\{x + \sqrt{(x^2 + 1)}\}$, **(b)** $\log_e(x + \sqrt{x^2 + a^2})$.

4. $\log_e (x + \frac{1}{x})$.

   $e^x + e^{-x}$

5. **(a)** $e^{x - e - x}$, **(b)** $\sqrt{\frac{1+x}{1-x}}$.

**Answers**

**1.** $-10(3-2x)^4$, $\quad 3e^{3x}$, $\quad 3(\log x)^2/x$ ;

**2.** $e_{x3} \cdot 3x_2$, $\quad \underline{\qquad nx_{n-1} \qquad}(x \, n+a)$ , $\dfrac{e^x}{e^x+1}$ , $\dfrac{1}{2x\sqrt{\log \, x}}$ ;

**3.** (a)$\dfrac{1}{\sqrt{x^2+1}}$ (b)$\dfrac{1}{\sqrt{(x^2+a\,)}}$ ;

**4.** $-\dfrac{(x^2-1)}{x(x^2+1)}$ ;

**5.** (a)$\dfrac{-4}{(e^x+e^{-x})^2}$ $\qquad$ (b)$\dfrac{1}{(1-x)\sqrt{(1-x^2)}}$.

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## 5.13 FINDING DERIVATIVE USING $\dfrac{dy}{dx} \times \dfrac{dx}{dy} = 1$ (WHEN NO DERIVATIVE IS ZERO)

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**Example 23.** *Find* $\dfrac{dy}{dx}$ *for* $x = 3y^2 - 4y + 8$.

**Solution :** We are given $x = 3y^2 - 4y + 8$

Differentiating both sides with respect to $y$, we get

$$\dfrac{dx}{y} = 6y - 4.$$

$$\dfrac{dy}{dx} = \dfrac{1}{6y-4} \,.$$

$\therefore$

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## 5.14 LOGARITHMIC DIFFERENTIATION

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Under the logarithmic differentiation, we first take a log of both sides of the function and then differentiate both the sides with respect to the given variable. Finally the equation is solved for the required derivative. This method is useful in the following cases :

(i) When the function to be differentiate has the variable as in index and

(ii) When the function to be differentiated is a product or quotient of many factors.

## ILLUSTRATIVE EXAMPLES

**Example 24.** *(When variable occurs as in index) find* $\frac{dy}{dx}$ *for the following :*

(i)   $y = x^x$ (ii) $y = x^{xx}$

**Solution :**   (i) We are given $y = x^x$.

Taking the logarithm of both sides, we get

$$\log y = x \log x$$

Differentiating both sides w.r.t. $x$,

$$\frac{1}{y}\frac{dy}{dx} = x \cdot \frac{d}{dx}\log x + (\log x) \cdot \frac{d}{dx}(x)$$

$$\Rightarrow \quad \frac{1}{y} \cdot \frac{dy}{dx} = x \cdot \frac{1}{x} + \log x$$

$$\Rightarrow \quad \frac{dy}{dx} = y(1 + \log x) = x^x(1 + \log x).$$

(ii)   We are given $y = x^{xx}$.

Taking the logarithm of both sides, we get

$$\log y = x^x \log x$$

Differentiating both sides w.r.t. $x$,

$$\frac{1}{y}\frac{dy}{dx} = x^x \frac{d}{dx}\log x + (\log x) \frac{d}{dx}x^x$$

$$\Rightarrow \qquad \frac{1}{y}\frac{dy}{dx} = x^x \frac{1}{x} + (\log x)x^x(1 + \log x)$$

(substituting the value of $\frac{d}{dx}x^x$ obtained in the part (i) of the question)

$$\Rightarrow \quad \frac{dy}{dx} = y[x^{x-1} + x^x(1 + \log x) \log x]$$

$$= x^{xx}[x^{x-1} + x^x(1 + \log x) \log x]$$

**Example 25.** *(When the function is a product or quotient of several factors).*

$$Find \frac{dy}{dx} for = \frac{(3x^2+4x)(8x-7)^3}{(2x^3+6)^2(3x^2-10)}.$$

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**Solution :** Taking the log of both sides of the given function, we have

$$\log_e y = \log_e(3x^2 + 4x) + 3\log_e(8x - 7) - 2\log_e(2x^3 + 6) - \log_e(3x^2 - 10).$$

Differentiating both sides w.r.t. $x$,

$$\frac{1}{y}\frac{dy}{dx} = \frac{6x+4}{3x^2+4x} + \frac{24}{8x-7} - \frac{12x^2}{(2x^3+6)} - \frac{6x}{3x^2-10}$$

$$\therefore \quad \frac{dy}{dx} = y\left[\frac{6x+4}{3x^2+4x} + \frac{24}{8x-7} - \frac{12x^2}{(2x^3+6)} - \frac{6x}{3x^2-10}\right].$$

**Example 26.** *Find* $\frac{dy}{dx}$ *, if* $y = x^{ex}$

**Solution :** $y = x^{ex} = (x)^{ex}$

$\therefore \quad \log_e y = e^x \log_e x$

Differentiating both sides w.r.t. $x$ , we get

$$\frac{1}{y}\cdot\frac{dy}{dx} = e^x \cdot \frac{d}{dx}(\log_e x) + \log_e x \cdot \frac{d}{dx}(e^x)$$

$$= e^x \cdot \frac{1}{x} + \log_e x \cdot e^x = e^x\left(\frac{1}{x} + \log_e x\right)$$

$$\therefore \quad \frac{dy}{dx} = y \cdot e^x \left(\frac{1}{x} + \log_e x\right) = x^{ex} \cdot e^x \left(\frac{1}{x} + \log_e x\right)$$

**Example 27.** *Find the derivative of* $e^{x2/(1+x2)}$ *with respect to* $x$.

**Solution :** We have $e^{x2/(1+x2)}$

$$\therefore \quad \log_e y = \log_e e^{x^2/(1+x^2)} = \frac{x^2}{1+x^2}\cdot\log_e e = \frac{x^2}{1+x^2} \qquad (\text{since } \log_e e = 1)$$

Differentiating both sides with respect to $x$ , we get

$$\frac{1}{y} \cdot \frac{dy}{dx} = \frac{(1+x^2) \cdot \frac{d}{dx} x^2 - x^2 \cdot \frac{d}{dx}(1+x^2)}{(1+x^2)^2}$$

$$= \frac{(1+x^2) \cdot 2x - x^2 \cdot 2x}{(1+x^2)^2}$$

$$= \frac{2x(1+x^2-x^2)}{(1+x^2)^2} = \frac{2x}{(1+x^2)^2}$$

$$\frac{dy}{dx} = y \cdot \frac{2x}{(1+x^2)^2} = \frac{2x \, e^{x^2/(1+x^2)}}{(1+x^2)^2}$$

$$\therefore \ .$$

**Example 28.** *Find $\frac{dy}{dx}$ for the function $x^y \cdot y^x = k^2$, where $k$ is a constant.*

**Solution :** We have $x^y \cdot y^x = k^2$

Taking the logarithm of both sides, we get

$$\log x^y + \log y^x = \log k^2$$

or    $y \log x + x \log y = 2 \log k.$

Differentiating both sides with respect to $x$, we have

$$y \cdot \frac{d}{dx} (\log x) + (\log x) \frac{y}{dx} + x \cdot \frac{d}{dx}(\log y) + (\log y) \frac{d}{dx}(x) = 0$$

or    $y \cdot \frac{1}{x} + (\log x) \frac{dy}{dx} + x \cdot \frac{1}{y} \cdot \frac{dy}{dx} + \log y = 0$

or    $\left(\frac{y}{x} + \log y\right) + \left(\log x + \frac{x}{y}\right) \frac{dy}{dx} = 0$

$$\therefore \qquad \frac{dy}{dx} = -\frac{(y/x + \log y)}{(\log x + x/y)}.$$

**Example 29.** *If $x^y + y^x = a^b$, find $\frac{dy}{dx}$.*

**Solution :** Let $u = x^y$ and $v = y^x$.

Hence, the given equation becomes

$$u + v = a^b.$$

Differentiating with respect to $x$, we have

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$$\frac{du}{dx} + \frac{dv}{dx} = 0 \quad \ldots(i)$$

Now, $\qquad u = x^y$

$\therefore \qquad \log u = \log x^y$

$$= y \log x.$$

Differentiating both sides with respect to $x$, we get

$$\frac{1}{u} \cdot \frac{du}{dx} = y \cdot \frac{d}{dx}(\log x) + (\log x)\frac{dy}{dx}$$

$$= \frac{y}{x} + (\log x)\frac{dy}{dx}$$

$$\frac{du}{dx} = u\left[\frac{y}{x} + (\log x)\frac{dy}{dx}\right] = x^y\left[\frac{y}{x} + (\log x)\frac{dy}{dx}\right]$$
$$\therefore .$$

Again $\qquad v = y^x$

$\therefore \qquad \log v = \log y^x$

$$= x \log y.$$

Differentiating with respect to $x$,

$$\frac{1}{v} \cdot \frac{dv}{dx} = x \cdot \frac{d}{dx}(\log y) + (\log y)\frac{d}{dx}(x)$$

$$= x \cdot \frac{1}{y} \cdot \frac{dy}{dx} + \log y$$

$\therefore \qquad \frac{dv}{dx} = v\left[\frac{x}{y}\frac{dy}{dx} + \log y\right] = y^x\left[\frac{x}{y}\frac{dy}{dx} + \log y\right].$

Putting the values of $\frac{du}{dx}$ and $\frac{dv}{dx}$ in equation (i), we get

$$x^y\left[\frac{y}{x} + (\log x)\frac{dy}{dx}\right] + y^x\left[\frac{x}{y}\frac{dy}{dx} + \log y\right] = 0$$

or $\qquad x^{y-1}y + x^y(\log x)\frac{dy}{dx} + xy^{x-1}\frac{dy}{dx} + y^x \log y = 0$

or $\qquad [x^y \log x + xy^{x-1}]\frac{dy}{dx} = -[x^{y-1}y + y^x \log y]$

$\therefore \qquad \dfrac{dy}{dx} = -\dfrac{x^{y-1}+y^x \log y}{x^y \log x + x\, y^{x-1}}.$

**5.15 TEST YOUR UNDERSTANDING (D)**

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In questions 1 & 2, find the differential coefficients with respect to :

1. $e_{xx}$, $7_{x2+2x}$.

2. $(\log x)^x$

3. If $y = x^{yx}$, prove that $\dfrac{dy}{dx} = \dfrac{y \log y (1 + x \log x \log y)}{x \log x \ (1 - \log y)}$.

4. If $y = x^a + a^x + x^x$, find $\dfrac{dy}{dx}$.

5. Find $\dfrac{dy}{dx}$ for $x = 3y^3 - 2y^2 + 8.$

## Answers

1. $e^{xx} \cdot x^x (1 + \log_e x)$, $\quad 2(\log_e 7)(x + 7) \cdot 7^{x2+2x}$;

2. $(\log x)^2 [\log(\log x) + (1/\log x)]$;

4. $ax^{a-1} + a^x \log_e a + x^x (1 + \log_e x)$;

5. $\dfrac{1}{9y^2 - 4y}$ .

___

### 5.16  DIFFERENTIATION OF IMPLICIT FUNCTIONS

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If we are to differentiate an *implicit function* $f(x, y) = 0$, we may sometimes be able to solve it

for $x$ or $y$ and proceed explicitly. Quite often it is found inconvenient or even impossible to solve

the equation $f(x, y) = 0$ either for $x$ or for $y$. In such cases, the derivative, viz., $\dfrac{dy}{dx}$ can be

obtained by the following method.

**WORKING RULE:** Differentiate both sides of the equation $f(x, y) = 0$ with respect to $x$,

remembering that $y$ is the function of $x$. This will introduce the factor $\frac{dy}{dx}$ or any term involving

$y$. After the differentiation has been completed, solve the resulting equation for $\frac{dy}{dx}$.

## 5.17  DIFFERENTIATION OF PARAMETRIC EQUATIONS

Sometimes $x$ and $y$ both are expressed in terms of a third variable. The third variable is called a

**parameter.** In such questions, $\frac{dy}{dx}$ can be obtained by the use of chain rule.

Thus, if $y = f(t)$ and $x = g(t)$, the derivative of $y$ with respect to $x$ is given by

$$\frac{dy}{dx} = \frac{dy}{dt} \cdot \frac{dt}{dx}$$

$$= \frac{dy}{dt} / \frac{dx}{dt}, \text{ which is more convenient form.}$$

**Example 30.** *Find* $\frac{dy}{dx}$ *at* $x = 1, y = 1,$ ***if*** $x^3 - 2x^2y^2 = 5 - y - 5x$.

**Solution :** We have

$$x^3 - 2x^2y^2 = 5 - y - 5x$$

or $\quad x^3 - 2x^2y^2 + 5x + y - 5 = 0$.

Differentiating both sides with respect to $x$ , we get

$$\frac{d}{dx}(x^3) - 2\frac{d}{dx}(x^2y^2) + 5\frac{d}{dx}(x) + \frac{d}{dx}(y) - \frac{d}{dx}(5) = 0$$
or

$$3x^2 - 2\left[x^2\frac{d}{dx}(y^2) + y^2 \cdot \frac{d}{dx}(x^2)\right] + 5 + \frac{dy}{dx} = 0$$

or $\quad 3x^2 - 2\left[x^2 \cdot 2y\frac{dy}{dx} + y^2 \cdot 2x\right] + 5 + \frac{dy}{dx} = 0$

or $\quad (1 - 4x^2\,y)\frac{dy}{dx} = -(3x^2 - 4xy^2 + 5)$

$$\frac{dy}{dx} = \frac{3x^2 - 4xy^2 + 5}{4x^2\,y - 1}.$$

$\therefore$ (Taking $-$ common)

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$$\therefore \quad \text{At} x = 1, y = 1,$$

$$\frac{dy}{dx} = \frac{3.1^2 - 4.1.1^2 + 5}{4.1^2 .1 - 1} = \frac{4}{3} \cdot$$

**Example 31.** *If* $x^y = e^{x-y}$, *prove that* $\frac{dy}{dx} = \frac{\log x}{(1+\log x)^2}$.

**Solution :** We have

$$x^y = e^{x-y}$$

Taking the logarithm of both sides, we get

$$y \log_e x = (x - y) \log_e e$$

$$= x - y \qquad (\text{since } \log_e e = 1)$$

or $\quad y \log x + y = x$ or $\quad y(1 + \log x) = x$

$$y = \frac{x}{(1+\log x)}$$

or .

Differentiating both sides with respect to $x$, we get

$$\frac{dy}{dx} = \frac{(1+\log x)\cdot \frac{dy}{dx}(x) - x\cdot \frac{d}{dx}(1+\log x)}{(1+\log x)^2}$$

$$= \frac{(1+\log x)\cdot 1 - x(\frac{1}{x}+0)}{(1+\log x)^2}$$

$$= \frac{(1+\log x) - 1}{(1+\log x)^2} = \frac{\log x}{(1+\log x)^2} \cdot$$

**Example 32.** *If* $x^m y^n = (x + y)^{m+n}$, *prove that* $\frac{dy}{dx} = \frac{y}{x}$.

**Solution :** We have $\quad x^m y^n = (x + y)^{m+n}$

Taking the logarithm of both sides with respect to the base $e$, we get

$$m \log_e x + n \log_e y = (m + n) \log_e(x + y).$$

Differentiating both sides with respect to $x$, we get

$$m \cdot \frac{1}{x} + n \cdot \frac{1}{y} \cdot \frac{dy}{dx} = (m + n) \cdot \frac{1}{x+y} \cdot \frac{d}{dx}(x + y)$$

or $\qquad \frac{m}{x} + \frac{n}{y} \cdot \frac{dy}{dx} = \frac{(m+n)}{x+y}(1 + \frac{dy}{dx})$

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or $\left(\dfrac{n}{y} - \dfrac{m+n}{x+y}\right)\dfrac{dy}{dx} = \dfrac{m+n}{x+y} - \dfrac{m}{x}$

or $\left\{\dfrac{(nx+ny-my-ny)}{y(x+y)}\right\}\dfrac{dy}{dx} = \dfrac{(mx+nx-mx-my)}{x(x+y)}$

or $\left(\dfrac{nx-my}{y}\right)\dfrac{dy}{dx} = \dfrac{nx-my}{x}$

$$\dfrac{dy}{dx} = \dfrac{y}{x}$$

$\therefore$ .

**Example 33.** *If* $x = t \log t$ *and* $y = (\log t)/t$, *find* $\dfrac{dy}{dx}$ *for* $t = 1$.

**Solution :**   We have $x = t \cdot \log t$

$\therefore \quad \dfrac{dx}{dt} = t \cdot \dfrac{d}{dt}(\log t) + \log t \cdot \dfrac{d}{dt}(t)$

$$= t \cdot \dfrac{1}{t} + \log t \cdot 1 = 1 + \log t.$$

Again, $\qquad y = \dfrac{\log t}{t}$

$\therefore \qquad\qquad \dfrac{dy}{dt} = \dfrac{t \cdot \dfrac{d}{dt}(\log t) - (\log t)\dfrac{d}{dt}(t)}{t^2}$

$$= \dfrac{t \cdot \dfrac{1}{t} - (\log t)1}{t^2} = \dfrac{1 - \log t}{t^2}$$

Now, $\qquad \dfrac{dy}{dx} = \dfrac{dy/dt}{dx/dt} = \dfrac{(1-\log t)/t^2}{(1+\log t)} = \dfrac{1-\log t}{t^2(1+\log t)}$.

At $t = 1$, $\quad \dfrac{dy}{dx} = \dfrac{1-\log t}{t^2(1+\log t)} = \dfrac{1-0}{1+0} = 1$.

**Example 34.** *Differentiate* $x^{\log x}$ *w.r.t.* $t = e^x$.

**Solution :** Let $y = x^{\log x}$ and $t = e^x$. Hence, we are to find $dy/dt$, which is given by
$$\dfrac{dy}{dt} = \dfrac{dy}{dx} \div \dfrac{dt}{dx} \qquad \dots(i)$$

Now, $\qquad y = x^{\log x}$

Taking log on both sides,

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$\Rightarrow \quad \log y = (\log x) \log x = (\log x)^2.$

Differentiating both sides with respect to $x$,

$$\frac{1}{y}\frac{dy}{dx} = \frac{2}{x} \cdot \log x \Rightarrow \frac{dy}{dx} = \frac{2y}{x} \cdot \log x = \frac{2}{x} \cdot x^{\log x.\log x}.$$

Again, $t = e^x \Rightarrow \frac{dt}{dx} = e^x.$

Hence, $\quad \frac{dy}{dt} = \frac{2}{x} \cdot x^{\log x} \cdot \log x \div e^x \quad$ [substituting the values in (i)]

$$= \frac{2x^{\log x} \cdot \log x}{x \ e^x}.$$

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**5.18 TEST YOUR UNDERSTANDING (E)**

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Find $\frac{dy}{dx}$ in questions 1 & 2, when

1. $x^3 + 3axy + y^3 = a^3.$

2. (i) $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0.$

   (ii) $3x^4 - x^2y + 2y^3 = 0.$

3. If $y = x^y$, prove that $\frac{dy}{dx} = \frac{y^2}{x(1-y \log_e x)}.$

4. If $x\sqrt{1+y} + y\sqrt{1+x} = 0$, prove that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}.$

   [**Hint :** Transpose, square and solve for $y$ . Reject the root $y = x$ which does not satisfy the given equation and differentiate the other root to obtain the desired result.]

5. If $x = \frac{3at}{1+t^3}$ and $= \frac{3at^2}{1+t^3}$, show that $\frac{dy}{dx} = \frac{t(2-t^3)}{1-2t^3}.$

6. Differentiate $e^x$ with respect to $\sqrt{x}.$

**7.**     Differentiate $\log_{10} x$ with respect to $x^2$.

$$y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\sqrt{x}... to \infty}}}$$

**8.**     If , prove that $x \dfrac{dy}{dx} = \dfrac{y^2}{2(1-y \log_e \sqrt{x})}$.

## Answers

**1.**$-\dfrac{(x^2+ay)}{(ax+y^2)}$

(i)   $-\dfrac{ax+hy+g}{hx+by+f}$

(ii)$\dfrac{2x(6x^2-y)}{x^2-6y^2}$

**2.**,

**6.**$2\sqrt{x}.\,e^x$

**7.**$\dfrac{\log_{10} e}{2x^2}$

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### 5.19 SUCCESSIVE DIFFERENTIATION

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As observed in many of the preceding examples, the derivative of a function of $x$ is, in general, also a function of $x$. This derivative, which may be called the *first derivative* of the function, may itself be differentiated. The result is accordingly called the *second derivative* of the original function. If the second derivative is differentiated, the result is called the *third derivative,* and so on. If the operation of differentiation is performed on a function n times in succession, the final result is called the $n$th derivative of the function.

   **Notations.** If $y$ denotes the function of $x$, the successive derivatives of $y$ with respect of $x$ are denoted as under:
   The first derivative is denoted by $\dfrac{dy}{dx}$.

The second derivative is denoted by $\dfrac{d^2y}{dx^2}$.

$$\therefore \qquad \frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d^2y}{dx^2}.$$

Similarly, the third derivative is denoted by $\dfrac{d^3y}{dx^3}$, and so on.

The letter $D$ is frequently used in place of the symbol $\dfrac{d}{dx}$. The successive derivatives of $y$ are thus denoted as $Dy$, $D^2y$, $D^3y$,...., $D^ny$.

Instead of the symbol $\dfrac{d}{dx}$ or $D$, the following symbols are also used to denote the successive derivatives :

$$y', y'', y''', ...., y^n$$

or $\quad f'(x), f''(x), f'''(x),...., f^n(x)$ or $y_1, \quad 2, y_3, ...., y_n.$

**Example 35.** *If* $y = a\, e^{mx} + b\, e^{-mx}$, *show that* $\dfrac{d^2y}{dx^2} = m^2y.$

**Solution :** We have

$$y = a\, e^{mx} + b\, e^{-mx} \qquad ...(i)$$

Differentiating with respect to $x$, we get

$$\frac{dy}{dx} = a\, e^{mx} \cdot \frac{d}{dx}(mx) + b\, e^{-mx} \cdot \frac{d}{dx}(-mx)$$

$$= a\, m e^{mx} - b\, m e^{-mx}$$

Differentiating again with respect to $x$, we get

$$\frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right)$$

$$= a\, m\, e^{mx} \cdot \frac{d}{dx}(mx) - b\, m\, e^{-mx} \cdot \frac{d}{dx}(-mx)$$

$$= a\, m^2 e^{mx} + b\, m^2 e^{-mx}$$

$$= m^2(a\, e^{mx} + b\, e^{-mx})$$

$$= m^2 y \text{ [from (i)]}$$

**Example 36.** *If* $= x^3 \log \frac{1}{x}$, *prove that* $x \dfrac{d^2y}{dx^2} - 2 \dfrac{dy}{dx} + 3x^2 = 0.$

**Solution :** We have

$$y = x^3 \log \frac{1}{x} = x^3[\log 1 - \log x] = -x^3 \log x.$$

$$\therefore \quad \frac{dy}{dx} = -\left[x^3 \cdot \frac{d}{dx}(\log x) + (\log x) \cdot \frac{d}{dx}(x^3)\right]$$

$$= -\left[x^3 \cdot \frac{1}{x} + (\log x)3x^2\right] = -x^2 - 3x^2 \log x.$$

$$\therefore \quad x \frac{dy}{dx} = -x^3 - 3x^3 \log x$$

or $\qquad x \dfrac{dy}{dx} = 3y - x^3$

Differentiating again with respect to $x$, we have

$$x \cdot \frac{d}{dx}\left(\frac{dy}{x}\right) + \frac{dy}{dx} \cdot \frac{d}{dx}(x) = 3\frac{dy}{dx} - \frac{d}{dx}(x^3)$$

or $\quad x \dfrac{d^2y}{dx^2} + \dfrac{dy}{dx} = 3\dfrac{dy}{dx} - 3x^2$ $\qquad\qquad$ or

$$x \frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 3x^2 = 0.$$

**Example 37.** *If* $y = \log(x + \sqrt{1 + x^2})$, *show that* $(l + x^2)y_2 + xy_l = 0$

**Solution :** We have

$$y = \log(x + \sqrt{1 + x^2})$$

$$\therefore \qquad \frac{dy}{dx} = \frac{1}{x+\sqrt{1+x^2}} \frac{d}{dx}[x + \sqrt{1 + x^2}]$$

$$= \frac{1}{x+\sqrt{1+x^2}}[1 + \frac{1}{2}(1 + x^2)^{-1/2}\, 2x]$$

$$= \frac{1}{x+\sqrt{1+x^2}}[1 + \frac{x}{\sqrt{1+x^2}}]$$

$$= \frac{1}{x+\sqrt{1+x^2}}[\frac{\sqrt{(1+x^2)}+x}{\sqrt{1+x^2}}]$$

$$= \frac{1}{\sqrt{1+x^2}}$$

or   $\sqrt{(1 + x^2)} \frac{dy}{dx} = 1$

$$(1 + x^2) \left(\frac{dy}{dx}\right)^2 = 1$$

or .

Differentiating both sides with respect to $x$, we get

$$(1 + x^2) 2 \frac{dy}{dx} \cdot \frac{d}{dx}\left(\frac{dy}{dx}\right) + \left(\frac{dy}{dx}\right)^2 (0 + 2x) = 0$$

$$2(1 + x^2) \frac{dy}{dx} \cdot \frac{d^2y}{dx^2} + 2 x \left(\frac{dy}{dx}\right)^2 = 0$$

or

Dividing both sides by $\frac{2dy}{dx}$, we get

$$(1 + x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} = 0.$$

i. e.,                  $(1 + x^2) y_2 + x\, y_1 = 0.$

**Example**

**38. If** $y = (x + \sqrt{1 + x^2})^m$, **prove that** $(1 + x^2) \frac{d^2y}{dx^2} + x \frac{dy}{dx} - m^2 y = 0.$

**Solution :** We have

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$$y = (x + \sqrt{1 + x^2})^m$$

$$\frac{dy}{dx} = m(x + \sqrt{1 + x^2})^{m-1} \frac{d}{dx}(x + \sqrt{1+x^2})$$

$$= m(x + \sqrt{1 + x^2})^{m-1}[1 + \frac{1}{2}(1 + x^2)^{-1/2} \cdot 2x]$$

$$= m(x + \sqrt{1 + x^2})^{m-1}[1 + \frac{x}{\sqrt{1+x^2}}]$$

$$= m(x + \sqrt{1 + x^2})^m \cdot \frac{1}{\sqrt{1+x^2}} = \frac{my}{\sqrt{1+x^2}}$$

$$\sqrt{(1 + x^2)}\frac{dy}{dx} = my$$

$$(1 + x^2)\left(\frac{dy}{dx}\right)^2 = m^2 y^2$$

$\therefore$

or

or

Differentiating both sides with respect to $x$.

$$(1 + x^2) \cdot 2\left(\frac{dy}{dx}\right) \cdot \frac{d^2 y}{dx^2} + \left(\frac{dy}{dx}\right)^2 \cdot 2x = m^2 \cdot 2y\frac{dy}{dx}$$

Dividing both sides by $2\frac{dy}{dx}$, we get

$$(1 + x^2)\frac{d^2 y}{dx^2} + x\frac{dy}{dx} = m^2 y$$

or $\quad (1 + x^2)\frac{d^2 y}{dx^2} + x\frac{dy}{dx} - m^2 y = 0$

**Example 39.** *If $y = (a + bx)e^{cx}$, prove that $y_2 - 2cv + c^2y = 0$.*

**Solution :** Given, $\qquad y = (a + bx)e^{cx}$ $\hspace{4cm}$ …(i)

Differentiating w.r.t. $x$, we get

$$y_1 = (a + bx) \cdot e^{cx} \cdot c + e^{cx} \cdot (0 + b.1)$$

$\Rightarrow \qquad\qquad y_1 = cy + b\,e^{cx}$ $\hspace{4cm}$ …(ii) [using (i)]

Differentiating again w.r.t. $x$, we get

$$y_2 = cy_1 + be^{cx} \cdot c = cy_1 + c(y_1 - cy) \qquad \text{[using (ii)]}$$

$\Rightarrow \quad y_2 - 2cy_1 + c^2y = 0.$

**Example 40.** *If $y = x^x$, prove that $\dfrac{d^2y}{dx^2} - \dfrac{1}{y}\left(\dfrac{dy}{dx}\right)^2 - \dfrac{y}{x} = 0$.*

**Solution :** Given $y = x^x$, taking logarithm of both sides, we get

$\log y = x \log x$, differentiating w.r.t. $x$, we get

$$\frac{1}{y} \cdot \frac{dy}{dx} = x \cdot \frac{1}{x} + \log x \cdot 1$$

$\Rightarrow \quad \dfrac{dy}{dx} = y(1 + \log x) \quad \text{…(i)}$

Differentiating again w.r.t. $x$, we get

$$\frac{d^2y}{dx^2} = y \cdot \left(0 + \frac{1}{x}\right) + (1 + \log x) \cdot \frac{dy}{dx}$$

$\Rightarrow \qquad \dfrac{d^2y}{dx^2} = \dfrac{y}{x} + \dfrac{1}{y} \cdot \dfrac{dy}{dx} \cdot \dfrac{dy}{d}$

$$\frac{d^2y}{dx^2} - \frac{1}{y}\left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0.$$

$\hspace{10cm}$ [using (i)]

$\Rightarrow$

## 5.20 TEST YOUR UNDERSTANDING (F)

1. Given $y = x\sqrt{x^2 + 9}$, find $\dfrac{d^2 y}{dx^2}$ at $x = 4$ $\left[\dfrac{236}{125}\right]$

2. If $y = \left(x + \sqrt{x^2 - 1}\right)^m$, prove that $\left(x^2 - 1\right)\dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} - m^2 y = 0$.

3. If $y = \sqrt{x+1} - \sqrt{x-1}$, prove that $(x^2 - 1)y_2 + xy_1 = \dfrac{1}{4}y$.

4. If $x^3 + y^3 = 3axy$, show that $\dfrac{d^2 y}{dx^2} = \dfrac{2a^3 xy}{(ax-y^2)^3}$.

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## 5.21 APPLICATIONS OF DIFFERENTIATION

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In economics and commerce, variation of one quantity $y$ with respect to another quantity $x$ usually described in terms of two concepts :

(i) average concept, and

(ii) marginal concept

The average concept expresses the variation of one quantity over a specified range of values of a second quantity. It is usually measured from zero to a certain selected value.The marginal concept concerns with instantaneous rate of change on the dependent variable $y$ for every small variation of $x$. Therefore, a marginal concept is precise only when variations in $x$ are made smaller$\lim$ and smaller. Therefore, the $\dfrac{\Delta y}{}$, i. e., the derivative $\dfrac{dy}{}$ is interpreted as the marginal

$\overline{\phantom{xxx}}$

$\Delta x \to 0 \ \Delta x$ $\qquad$ $dx$ value of $x$.

## 5.21.1 AVERAGE COST AND MARGINAL COST

Let the total cost $C$ of the output $x$ is given by

$$c = f(x)$$

then the average cost is defined as the ratio of the total cost of the output $(x)$ and is denoted by AC.

Thus, Average cost (A.C.)=$\dfrac{\text{Total Cost}}{\text{Output}}=\dfrac{c}{x}=\dfrac{f(x)}{x}$

or    Total cost $=$ A.C. $\times x$

Now, if the output is increased from $x$ to $x$, and corresponding total cost becomes $c + \Delta c$, the then increase in cost per unit output is given by the ratio $\dfrac{\Delta c}{\Delta x}$ and the marginal cost is defined as :

Marginal $\lim$     Cost (M.C.) $=$                     $(\Delta c) = dc$

$\Delta x \to 0$  $\overline{\Delta x}$     $\overline{dx}$

In other words, marginal cost is the first derivative of the total cost $c$ with respect to output $x$ and is the rate of increase in total cost with increase in output.

**Example 41.**_The total cost_ $c(x)$_, associated with producing and marketing_ $x$ _units of an item is given by :_

$$c(x) =\cdot 005x^3 -\cdot 02x^2 + 30x + 5000$$

_Find_          _(i) the average cost function_

_(ii) the average cost of output of 10 units_

_(iii)      the marginal cost functions  (iv)  the marginal cost when 3 units are produced._

**Solution :**(i) The average cost function (or average cost) A.C.

$$\text{A.C.} = \dfrac{c(x)}{x} -\dfrac{\cdot 005x^3 -\cdot 02x^2 + 30x + 5000}{x}$$

$$=\cdot 005x^3 -\cdot 02x^2 + 30x + \dfrac{5000}{x}$$

(ii) Average cost at $x = 10$ becomes

$$= 0\cdot 005 \times 10^2 - 0\cdot 02 \times 10 + 30 + \dfrac{5000}{10}$$

$$= 0\cdot 5 - 0\cdot 2 + 30 + 500 = 530\cdot 3$$

Hence, average cost $= Rs.\ 530\cdot 3.$

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(iii)  The marginal cost function (or marginal cost), M.C. is obtained by differentiating $c$ with respect to $x$ .

Thus,   M.C. $= \dfrac{dc}{dx}$

$$= \dfrac{d}{dx}(\cdot 005x^3 - \cdot 02x^2 + 30x + 5000)$$

$$= \cdot 005(3x^2) - \cdot 02(2x) + 30$$

$$= 0 \cdot 015x^2 - \cdot 04x + 30$$

(iv)  The marginal cost when 3 units are produced is M.C. at $x = 3$.

$$= \cdot 015 \times 3^2 - \cdot 04 \times 3 + 30 =$$

$$0 \cdot 135 - \cdot 12 + 30 = 30 \cdot 45$$

Hence, Marginal Cost at $x = 3$ is $Rs. 30 \cdot 45$.

## 5.21.2 TOTAL REVENUE, AVERAGE REVENUE AND MARGINAL REVENUE

Let $p$ be the price per unit and $x$ is the number of units of an item sold. Then the total revenue is given by

$$R = p \times x$$

Now, Average Revenue (A.R.) is give by

Average Revenue $(A.R.) = \dfrac{Total\ Revenue}{x} = \dfrac{R}{x} = \dfrac{px}{x} = p$ (price)

Further, Marginal Revenue (M.R.) is given by

Marginal Revenue (M.R.)$= \dfrac{dR}{dx} = p + x\dfrac{dp}{dx}$

$$= p\,(1 + \dfrac{x}{p}\dfrac{dp}{dx})$$

**Example 42.** *The demand function of a monopolistic is given by* $p = 1500 - 2x - x^2$*. Find marginal revenue for any level of output* x*. Also find M.R. when (i)* x $= 5$*, (ii)* x $= 20$*.*

**Solution :** The demand function is $p = 1500 - 2x - x^2$

$\therefore$ Total Revenue $= R = p \cdot x = (1500 - 2x - x^2)x = 1500x - 2x^2 - x^3$ M.R.

$$= \frac{dR}{dx} = 1500 - 4x - 3x^2$$

(i) M.R. at $x = 5$ is $1500 - 4 \times 5 - 3 \times 5^2 = 1500 - 200 - 75 = 1405$

(ii) M.R. at $x = 20$ is $1500 - 4 \times 20 - 3 \times 20^2 = 1500 - 80 - 1200 = 220$

## 5.21. 3 Elasticity of Demand and Supply :

**ELASTICITY OF DEMAND**

There is a relation between Price of the product and demand of the product. When price change, demand also change. This responsiveness of change in demand to change is price is called price elasticity of demand. So, we can define price elasticity of demand as relative change in demand due to relative change in price. Mathematically:

$$Ep = \frac{Percentage\ Change\ in\ quantity\ demanded}{Percentage\ change\ in\ Price}.$$

$$= \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

**PRICE ELASTICITY OF SUPPLY:**

There is a relation between Price of the product and Supply of the product. When price change, supply also change. This responsiveness of change in supply to change is price is called price elasticity of supply. So, we can define price elasticity of supply as relative change in supply due to relative change in price. Mathematically:

$$Ep = \frac{Percentage\ Change\ in\ quantity\ supplied}{Percentage\ change\ in\ Price}.$$

$$= \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

**Example43**. If the demand function is $q = 100 - 2p - 2p^2$ calculate the slope of demand curve and also find Elasticity of demand when $P = 100$.

**Solution**

The demand function is $q = 100 - 2p - 2p^2$

Differentiating wrt p

$$\frac{dq}{dp} = \frac{d}{dp}(100 - 2p - 2p^2) = -2 - 4p$$

Slope of the demand cureve $= \frac{dq}{dp} = -(-2 - 4p) = 2+4p$

(ii) Elasticity of demand $= \dfrac{p}{-p} \times \dfrac{dq}{dp}$

$= -\dfrac{p}{100-2p-2p^2} \times (-2 - 4p) = \dfrac{p(2+4p)}{100-2p-2p^2}$

Elasticity of demand when $p = 10$

$$-\frac{10(2+40)}{100-20-200} = \frac{-420}{120} = \frac{-70}{2}$$

**Example44**. For the supply function $x = 2 + 3p^2$, find the elasticity of supply at $p = 3$

**Solution**

The supply function

$x = 2 + 3p^2$

Thus $\dfrac{dx}{dp} = 6p$

Now elasticity of supply $= \dfrac{p \, dx}{x \, dp} = \dfrac{p}{2+3p^2} \times 6^p = \dfrac{6p^2}{2+3p^2}$

Elasticity of supply when $p = 3$

$= \dfrac{6 \times 9}{2+27} = \dfrac{54}{29}$

## 5.22 MAXIMA AND MINIMA

A function $f(x)$ is said to have attained its maximum value at $x = c$, if the function ceases to increase and begins of decrease at $x = c$.

Similarly, a function $f(x)$ is said to have attained its minimum value at $x = d$, if the function ceases to decrease and begins to increase at $x = d$.

Let us suppose that a function $f(x)$ is defined in an interval by such an expression that it is difficult to get an idea about its behavior just by a glance. In such cases, the best procedure is to

draw the curve $y = f(x)$. We know that for drawing a curve just plot some individual points and then join these points by a smooth and regular curve.

Suppose that Fig. 1 shows the graph of some function of $x$ on interval $[a, b]$. The points $A_2$ and $A_4$ are called *maximum points* of the graph while the points $A_1$ and $A_3$ are called *minimum points*. The function has a maximum value $A_2$ when $x = M_2$, and a maximum value $A_4$ when $x = M_4$. Again the function has a minimum value $A_1$ when $x = M_1$ and a minimum value $A_3$ when $x = M_3$. Notice that in this case the minimum value $A_1$ is greater then the maximum value $A_4$.
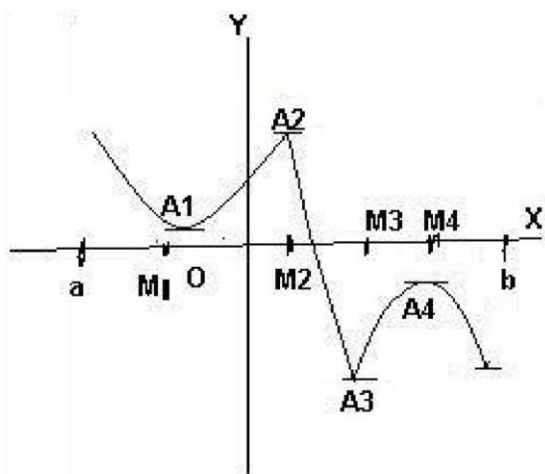


Fig. 1

The following points regarding minima and maxima should be noted carefully :

(i)   The maximum and minimum values of a function at a point does not mean the greatest and least values of the function; they only mean the greatest and the smallest value of the function in the immediate neighborhood of that point.

(ii)  The function may have several maximum and minimum values, and these must occur alternately.

(iii) Some of the maximum values of the function may be greater than some of its maximum values.

(iv) The maximum and minimum values of the function together are also called the extreme values (extreme) or optimum values (optima) of the function. Minimization and maximization together may be called optimization.

(v) The whole concept of minimum and maximum values discussed above relates to *local* or *relative* minimum and maximum values, i. *e.,* minimum or maximum value in its immediate neighborhood. The *global* or *absolute* minimum or maximum value of the function may not be any of them; it (global extreme value) may instead lie the end-point of the interval, as is the case in Fig. 1 in which the overall maximum value lies at $x = a$ and minimum value at $x = b$.

(vi) The terms maxima, minima, extreme and optima are the plural forms of maximum, minimum, extremum and optimum respectively.

## CRITERIA FOR MINIMUM AND MAXIMUM

**(a)** Suppose $f(x)$ has a maximum at $x = c$. Then, by definition, it is an increasing function for the values of $x$ immediately before $x = c$ and a decreasing function for the values of $x$ immediately after $x = c$. If the function and its derivatives are continuous, $f(x)$ will be positive just before $x = c$ and increasing function after $x = c$. The derivative $f'(x)$ will be negative just before $x = c$, positive just after $x = c$ zero at $x = c$. Thus, the following criteria for the minimum and maximum emerge :

(i)   $f(x)$ has a minimum or maximum at a point where $f(x) = 0$. Let this point be $c$.

(ii)  If $f(x) > 0$ for $x$ a little less then $c$ and $f(x) < 0$ for $x$ a little greater then $c$, $f(x)$ has a maximum value at $x = c$. If $f'(x) < 0$ for $x$ a little less then $c$ and $f'(x) > 0$ for $x$ a little greater then $c$, $f(x)$ has a minimum value at $x = c$.

**(b)** If the function $f(x)$ is twice differentiable, the sign of the second derivative at a point $c$ for which $f'(x) = 0$ may be used to determine the minimum and maximum. If $f''(c) > 0$, $f'(c)$ will be changing sign from negative to positive near the point $x = c$ as we move from left to right, i. *e.,* at $x = c$, $f(x)$ will have a minimum value. If $f''(c) < 0$, $f(c)$ will be changing sign from positive to negative near the point $x = c$, i. *e.,* at $x = c$, $f(x)$ will have a maximum value.

Thus, an alternative criteria for the minimum and maximum may be given a under :

(i)    $f(x)$ has a minimum or maximum at a point where $f'(x) = 0$. Let this point be $c$.

(ii)   If $f''(c) > 0$, $f(x)$ has a minimum.

       If $f''(c) > 0$, $f(x)$ has a maximum.

## Notes :

(i)  The conditions (i) and (ii) [given under (a) and (b) above] are called **first order condition** and **second order condition** respectively.

(ii) The points at which the first derivative is zero are called **stationary points.** At a stationary point, we have a minimum, maximum or point of inflexion.

Working rule for finding maximum and minimum values of a function :

(I)    Find $\frac{dy}{dx}$ for the given function $y = f(x)$.

(II)   Find the values of $x$ for which $\frac{dy}{dx}$ is zero. Let these be $a_1, a_2, a_3, \ldots$

## Method 1.

(III)  Take the first value $a_1$. If $\frac{dy}{dx}$ is positive for $x < a_1$ and negative for $x > a_1$, the function

       has a maximum at $x = a_1$. If $\frac{dy}{dx}$ is negative for $x < a_1$ and positive for $x > a_1$, the

       function has a minimum at $x = a_1$. Similarly test the other values $a_2, a_3, \ldots$ of $x$ found in

       step II.

## Method 2.

$$\frac{dy}{dx^2} \quad ^2 \quad \text{(IV)}$$

Find

$x = a_1$   in   $\dfrac{d^2y}{dx^2}$,

(V) Put  If the result is negative, the function has a maximum value at

$x = a_1$ in $\dfrac{d^2y}{dx^2}$,

$x = a_1$ and the maximum value is $y = f(a_1)$. If, by putting the result is positive, the function has a minimum value at $x = a_1$ and the minimum value is $y = f(a_1)$. Similarly test the other values $a_2, a_3, ...$ of $x$ found in step II.

## ILLUSTRATIVE EXAMPLES

**Example 45.** *Find the maximum and minimum values of the polynomial*

$$8x^5 - 15x^4 + 10x^2$$

**Solution :** Let $\quad y = 8x^5 - 15x^4 + 10x^2$

$\therefore \quad \dfrac{dy}{dx} = 40x^4 - 60x^3 + 20x$

For maxima or minima,
$$\dfrac{dy}{dx} = 0$$

i. e., $40x^4 - 60x^3 + 20x = 0$ or .

$$20(x - 1)^2(2x + 1) = 0$$

Hence, for $y$ to be maximum or minimum, $x = 0, 1, -1/2$.

Now, $\quad \dfrac{d^2y}{dx^2} = 160x^3 - 180x^2 + 20$

$$= 20(8x^3 - 9x^2 + 1)$$

When $= -\dfrac{1}{2}$, $\dfrac{d^2y}{dx^2} = -45$which is negative. Therefore, for this value of $x$, $y$ has a maximum and that value is $\dfrac{21}{10}$.

Again, when $x = 0$, $\dfrac{d^2y}{dx^2} = 20$which is positive. Therefore, at $x = 0$, $y$ has a minimum which is zero.

Now, at $x = 1$, $\dfrac{d^2y}{dx^2} = 0$. Hence, for further investigation, we will have to find the next higher derivative.

Now, $\dfrac{d^2y}{dx^2} = 480x^2 - 360x.$

$\therefore$ at $x = 1$, $\dfrac{d^2y}{dx^2} = 120$ which is not zero. Hence, at $x = 1$ the function has neither a maximum nor a minimum but a point of inflexion.

**Example 46.** *Test the following function for minimum, maximum and point of inflexion :*

$$y = x^3 - 3x + 8$$

**Solution :** At minimum or maximum,

$$y_1 = 0 \implies 3x^2 - 3 = 0 \implies x \pm 1.$$

Now, $y_2 = 6x$.

At $x = 1$, $y_2 = 6 > 0$. Hence, $y$ has a minimum at $x = 1$.

At $x = -1$, $y_2 = -6 < 0$. Hence, $y$ has a maximum at $x = -1$.

At a point of inflexion, $y_2 = 0$ and $y_3 \neq 0$.

Now, $\qquad y_2 = 0 \implies 6x = 0 \implies x = 0.$

$\qquad\qquad y_3 = 6 \neq 0.$ Hence, $y$ has a

point of inflexion at $x = 0$.


**Example 47.** *Show that the demand function* $x = 4a^2 - 3ap^2 + p^3$ *(where p is price, x is quantity, a is positive constant and p < 2a) is downward sloping with a point of inflexion.*

**Solution :** $\frac{dx}{dp} = -6ap + 3p^2 = -3p(2a - p) < 0 \qquad (\because 2a > p \text{ and } p > 0)$

Hence, the function is downward sloping

At the point of inflexion, we have

$$\frac{d^2x}{dp^2} = 0 \quad \text{and} \quad \frac{d^3x}{dp^3} \neq 0.$$

Now $\qquad \frac{d^2x}{dp^2} = 0 \qquad \Rightarrow \qquad -6a + 6p = 0 \Rightarrow p = a$

$$\frac{d^3x}{dp^3} = \frac{d}{dp}[-6a + 6p] = 6 \neq 0.$$

$\therefore$ At $p = a$, the function has a point of inflexion. Thus, the function is downward sloping with a point of inflexion.


**Example 48.** *The production manager of a company plans to include* 180 *square centimeters of actual printed matter in each page of a book under production. Each page should have* 2. 0 *cm wide margin along the top and bottom and* 2. 5 *cm wide margin along the sides. What are the most economical dimensions of each printed page ?*

**Solution :** Let $x$, $y$ denote the length and breadth of the printed matter in each page. Then, printed area of each page,

$$xy = 180 \qquad \text{…(i)}$$

Due to margin, the dimensions of each page will be $(x + 2 \times 2)$ and $(y + 2 \times 2.5)$, i. *e.* , $(x + 4)$ and $(y + 5)$.

Let $A$ be the total area of each page; then,

$$A = (x + 4)(y + 5) = xy + 5x + 4y + 20$$
$$= 200 + 5x + 4 \times \frac{180}{x} \qquad \qquad \text{...(ii)}$$

For maximum and minimum,

$$\frac{dA}{dx} = 0 \Rightarrow 5 - \frac{720}{x^2} = 0$$

$$\Rightarrow \quad x^2 = 144 \Rightarrow x = \pm 12$$

$\therefore x = 12$, discarding the negative value.

Again, $\quad \frac{d^2A}{dx^2} = \frac{2 \times 720}{x^2} > 0, \qquad \text{when} x = 12$

$\therefore x = 12$ minimizes $A$ .

Substituting $x = 12$ in (i), we have

$$y = \frac{180}{12} = 15.$$

Hence, the most economical dimensions are :

length$= x + 4 = 16$ cm and breadth $= y$

$+ 5 = 20$ cm.

**Example 49.** *The demand function for a particulars commodity is $p = 15e^{-x/3}, 0 \leq x \leq$*

*8, where $p$ is price per unit and $x$ is the number of units demanded. Determine the price and quantity for which the revenue is maximum.*

**Solution :** The demand function is $p = 15e^{-x/3}, 0 \leq x \leq 8$

$\therefore \qquad$ Total $\quad$ Revenue $\quad = \quad R \quad = \quad p. \quad x \quad = \quad 15e^{-x/3} \quad \therefore$

$\frac{dR}{dx} = 15\left[xe^{-x/3}. \left(-\frac{1}{3}\right) + 1. e^{-x/3}\right]$

$\qquad = 15e^{-x/3}\left[-\frac{x}{3} + 1\right] = 15e^{-x/3}\left[-\frac{x+3}{3}\right]$

$\qquad = e^{-x/3}[15 - 5x]$

$\frac{d^2R}{dx^2} = e^{-x/3}(-5) + e^{-x/3}\left(-\frac{1}{3}\right)(15 - 5x)$

$\qquad = e^{-x/3}\left[-5 - 5 + \frac{5}{3}x\right] = e^{-x/3}\left[\frac{5x}{3} - 10\right]$

$\frac{dR}{dx} = 0 \Rightarrow e^{-x/3}(15 - 5x) = 0 \Rightarrow 15 - 5x = 0 \Rightarrow x = 3$

and

Now,

Also, $\frac{d^2R}{dx^2}\Big]_{x=3}$ gives $e^{-3/3}\left[\frac{5\times 3}{3} - 10\right] = -\frac{5}{e} < 0$

$\therefore R$ is maximum when $x = 3$. when $x = 3$,

we have $p = 15e^{-x/3} = \frac{15}{e}$.

**Example 50.** *The cost of manufacturing a certain article is given by $c = q^2 - 4q + 100$, where* q *is the number of articles manufactured. Find the minimum value of* $c$. **Solution :** Here

$c = q^2 - 4q + 100$

$\therefore \quad \frac{dc}{dq} = 2q - 4$

Now, for the minimum $\quad \frac{dc}{dq} = 0 \implies 2q - 4 = 0 \implies q = 2.$

Also, $\frac{d^2c}{dq^2} = 2 > 0$

Since, $\frac{d^2c}{dq^2} > 0$, therefore, $q = 2$ gives minimum costs.

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**5.23 TEST YOUR UNDERSTANDING (G)**

1. Find the maximum and minimum value of the function $y = \frac{1}{3}x^3 - 2x^2 + 3x + 1$

2. Find the maximum and minimum values of $y = (x - 1)(x - 2)(x - 3)$.

3. The demand equation for a manufacturer's product is $= \frac{80-x}{4}$, where $x$ is the number of

   units and $p$ is the price per unit. At what value of $x$ will there be maximum revenue ? What

   is the maximum revenue ?

4. The cost of manufacturing a particular type of Cricket ball is given by

$$c(x) = x^2 - 1200x + 360040$$

Where $x$ denotes the number of balls produced. How many balls should the company manufacture at which cost is minimum, and what would be cost per ball at this level of production ?

5. If the cost function is given by $c = a + bx + cx^2$, where $x$ is the quantity of output. Show that

$$\frac{d}{dx}(\text{A.C.}) = \frac{1}{x}(\text{M.C.} - \text{A.C.})$$

where M.C. and A.C. are marginal cost and average cost respectively.

6. The demand curve for a monopolist is given by $q = 100 - 4p$.
   (i) find total average and marginal revenue.
   (ii) at what value of $q$ , M.R.$= 0$
   (iii) what is the price when M.R. $= 0$ ?

7. The demand for a certain product is represented by the equation :

$$p = 20 + 5x - 3x^2$$

   where $x$ is the number of units demanded and $p$ is the price per unit.
   (i) Find the marginal revenue. (ii) Obtain the marginal revenue when 2 units are sold.

## Answers

;

$$\text{Max } (y)_{x=2-1/3} = \frac{2}{9}\sqrt{3}, \text{ Min. } (y)_{x=2+1/\sqrt{3}} = -\frac{2}{9}\sqrt{3}$$

1. Max $(y)_{x=1} = \frac{7}{3}$

2.                                                                              ;

3.                                                        $x = 40, Rs.\ 400$

4.                                                        $x = 600, Rs.\ 40$

6. (i) $R = 25q - \frac{1}{4}q^2$   ,    A.R.

   $= 25 - \frac{1}{4}q$, M.R.$= 25 - \frac{1}{2}q$

   (ii)  M.R. $= 0$ when $q = 50$

(iii) M.R. $= 0, p = 12 \cdot 5$

7.    (i) M.R. $= 20 + 10x - 9x^2$ (ii)

    M.R. at $x = 2,4$ .

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## 5.24 LET US SUM UP

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- In this unit we have discussed the meaning of Derivative of a function as the rate at which a function changes with respect to its independent variable.

- We learnt the method of finding the derivative of a function by using definition (First Principle).

- After that derivative of some standard functions were discussed along with derivative of sum, product and quotient of two functions,

- Derivative of composite, logarithmic, exponential and implicit functions were also discussed.

- Differentiation of second and third order is covered in the unit.

- Economic applications of Revenue, Cost and Elasticity is discussed in the unit.

- Concept of Maxima and Minima is also discussed in the unit.

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## 5.25 KEY TERMS

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- **DERIVATIVE:**The rate at which a function changes with respect to its independent variable is called the *derivative* in the function.

- **ELASTICITY OF DEMAND:** The responsiveness of change in demand to change is price is called price elasticity of demand. So, we can define price elasticity of demand as relative change in demand due to relative change in price.

- **PRICE ELASTICITY OF SUPPLY:**The responsiveness of change in supply to change is price is called price elasticity of supply. So, we can define price elasticity of supply as relative change in supply due to relative change in price..

- **MAXIMA:**A function $f(x)$ is said to have attained its maximum value at $x = c$, if the function ceases to increase and begins of decrease at $x = c$.

- **MINIMA**:Similarly, a function $f(x)$ is said to have attained its minimum value at $x = d$, if the function ceases to decrease and begins to increase at $x = d$.

## 5.26 FURTHER READINGS

1. Mizrahi and John Sullivan. *Mathematics for Business and Social Sciences*. Wiley and Sons.
2. Budnick, P. *Applied Mathematics.* McGraw Hill Publishing Co.
3. N. D. Vohra, *Business Mathematics and Statistics*, McGraw Hill Education (India) Pvt Ltd 4. J.K. Thukral, *Mathematics for Business Studies,* Mayur Publications
5. J. K. Singh, *Business Mathematics,* Himalaya Publishing House.

# B. COM (DIGITAL)

## SEMESTER II

## COURSE: BUSINESS MATHEMATICS AND STATISTICS

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**Unit 6 – Basic Mathematics of Finance**

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## 6.0 OBJECTIVES

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**After studying the Unit, students will be able to**
- Describe the concept of Interest.
- Understand the meaning of simple and compound interest.
- Calculate Nominal and Effective rate of interest.
- Apply the concept of compounding and discount in real life situation.

- Apply the concept of continuous compounding.

## 6.1 INTRODUCTION

In this chapter, our main focus is on the concept of time value of money. Time value of money basically means that the value of a unity of money is different in different time periods. It is based on the concept that the present worth of money received after some time will be less than a money received today. So as the value of money keeps on changing with time, therefore sometimes it becomes necessary to evaluate the value of money at a particular point of time. In the present chapter we will cover such issues.

## 6.2 INTEREST

Interest is the additional amount paid by a borrower for the use of a lender's money.If you borrow (or lend) some money from (or to) a person for a particular period, you would have to pay (or would receive) more money than your initial borrowing (or lending). This excess or additional money you paid (or received) is called interest.

Interest can be calculated in two ways:

**(i)** Simple Interest
**(ii)** Compound Interest

## 6.3 SIMPLE INTEREST

Simple interest is the interest computed only on the original amount borrowed (or lent). It is the extra money paid (or taken) on that principal for one time period i. *e.,* when the principal remains the same for entire loan period, irrespective of the length of period for which it is borrowed (or lent) then interest is called Simple interest. It is calculated by using following formula :

$$S.I. = \frac{P \times r \times t}{100}$$

Where    $P$ = Principal (i. e., the initial amount of borrowing or lending).

$r$ = Rate of Interest (i. e., the interest charged generally for 1 $year$ per Rs. 100).

$t$ = Time period for which money is borrowed or lent(in years).

**Note :**

For any transaction, time may be given in months, weeks or days. However, in case of $S.I.$ formula, $t$ must be in years only. For that the following conversions may be used :

$n$ months = $\dfrac{n}{12}$ years ($\because$ 1 year = 12 months)

$m$ weeks = $\dfrac{m}{52}$ years ($\because$ 1 year = 52 weeks)

$= \dfrac{k}{365}$

$k$ days years            ($\because$ 1 year = 365 days)

Also, $A$ = The total money paid back at the end of specified period.

$\therefore$            $Amount = Principal + Interest$

i. e.,        $A = P + S.$

I.

**Example 1.** *Find the simple interest on Rs.* 2000 *at* 6% *p. a.,* $t = 2$ *y ars.*

**Solution :** Here, $P$ = Rs. 2000, $r$ = 6% $p.a.$, $t = 2\ years$

$\therefore$    $S.I. = \dfrac{2000 \times 6 \times 2}{100} = Rs.\ 240.$

**Example 2.** *Find the simple interest on* Rs. 10, 000 *for* 7 *years at* 5% *p. a.* *Find the amount at the end of* 7 *years.*

**Solution :** Here, $P$ = 10,000, $r$ = 5% $p.a.$, $t = 7\ years$

$\therefore$    $S.I. = \dfrac{P \times r \times t}{100} = \dfrac{10,000 \times 5 \times 7}{100}$

$= Rs.\ 3500$

$$\therefore \qquad\qquad Amount = P + S.\,I.$$

$$= 10{,}000 + 3500$$

$$= Rs.\,13{,}500.$$

**Example 3.** *Find the time required to earn Rs. 72, 675 as simple interest on the principal of Rs. 5, 000 at the rate 4. 5% p. a.*

**Solution :** Here, $P = 85{,}000, r = 4.5\%\ p.\,a.,\ t = ?, S.\,I. = 72{,}675$

We know that, $\qquad S.\,I. = \dfrac{P \times r \times t}{100}$

$\Rightarrow \qquad 72{,}675 = \dfrac{85{,}000 \times 4.5 \times t}{100}$

$\Rightarrow \qquad\qquad T = \dfrac{72{,}675 \times 100}{85{,}000} 4.5$

$\qquad t = \dfrac{85.5}{4.5} = 19$

$\Rightarrow$

$\therefore \qquad$ The required time is $19\ years$.

**Example 4.** *At what rate of interest would the sum Rs. 46, 875 grow to Rs. 50, 000 in 1 year and months?*

**Solution :** Here, $P = Rs.\,46{,}875$

$$A = Rs.\,50{,}000$$

$$t = 1\ year\ \text{and}\ 8\ months$$

$$= 1\frac{8}{12}\ years$$

$$= 1\frac{2}{3}\ years$$

$$= \frac{5}{3}\ y\ ars$$

Now, $\qquad Amount = Principal + Simple$
$\qquad\qquad\quad Interest$

i. *e.* $\qquad\qquad A = P + S.\,I.$

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$\Rightarrow \quad A = P + \dfrac{P \times r \times t}{100}$

$\Rightarrow \qquad A = P\left(1 + \dfrac{rt}{100}\right)$

$50{,}000 = 46{,}875\left(1 + \dfrac{5}{3}i\right)$

$\Rightarrow (where\ i = \dfrac{r}{100})$

$\Rightarrow \quad \dfrac{50{,}000}{46{,}875} = 1 + \dfrac{5}{3}i$

$(1.067 - 1) \times \dfrac{3}{5} = i$

$\Rightarrow$

$\Rightarrow \qquad\qquad i = 0.04$

$\Rightarrow \qquad\qquad r = 4\%\ p.\,a.$

**Example 5.** *Ram deposited some amount in a bank at simple interest, such that it would amount to Rs. 7650 in 4 years and Rs. 8100 in 6 years. Find the sum deposited and the rate of simple interest ?*

**Solution :** Here,

$Principal + S.\,I.\ \text{for } 4\ years = Rs.\,7650$ ...(i)

$Principal + S.\,I.\ \text{for } 6\ years = Rs.\,8100$ ...(ii)

Subtracting (ii) from (i), we obtain

$Simple\ Interest\ \text{for } 2\ years = Rs.\,450$

$\therefore \quad S.\,I.\ \text{for } 1\ year = \dfrac{450}{2} = Rs.\,225$

Now, $\qquad S.\,I.\ \text{for } 4\ years = Rs.\,(4 \times 225)$

$= Rs.\,900$ ...(iii)

Putting (iii) in (i), we get

$Principal + Rs.\,900 = Rs.\,7650$

$\Rightarrow \quad Principal = Rs.\,(7650 - 900) = Rs.\,6750$

Now, as $S. I. = \frac{P \times r \times t}{100}$

$$\therefore \quad r = \frac{S.I. \times 100}{P \times t}$$

For 4 $years$, $\quad S. I. = s. 900$

Also, $\quad P = Rs. 6750$

$$\therefore$$
$$r = \frac{900 \times 100}{6750 \times 4} = \frac{10}{3}$$

$r = 3\frac{1}{3}\% \; p. a$

i. e. ., which is the required rate.


**Example 6.** *A sum of Rs.* 720 *is due after* 4 *years at* 5% *p. a. simple interest. Find its present worth ?*

**Solution :** Let '$P$' be the required present worth.

Now, according to given question
$$A = Rs. 720$$

$$t = 4 \; years$$

$$r = 5\% \; p. a.$$

As $\quad \Rightarrow \quad A = P + S. I.$

i. e. $\quad A = P + \frac{P \times r \times t}{100}$

$\quad = P \left(1 + \frac{rt}{100}\right)$

$720 = P \left(1 + \frac{5 \times 4}{100}\right)$

$720 = P \left(1 + \frac{20}{100}\right)$

$\quad \Rightarrow$

$\Rightarrow$

$\Rightarrow \quad 720 = P\left(\frac{120}{100}\right)$

$P = \frac{720 \times 100}{120} = Rs.\, 600$

$\Rightarrow$

Hence, the present worth of the given sum is $Rs.\, 600$.

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## 6.4 COMPOUND INTEREST

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In this case, the borrower and the lender agree to fix up a certain interval of time (that may be a year or a half-year or a quarter of year or a month etc.), so that the amount (i. $e.$ $Principal +$ $Interest$) at the end of each interval becomes the new principal for the next interval, thus increasing the principal base, at the end of each specified period of time, on which subsequent interest is calculated. By repeating this process till the last period of specified time, if we calculate the total interest over all the intervals, the interest thus calculated is called the compound interest.

$i.\, e.\quad C.\, I. = Amount - Principal$

i. $e.$ the difference between the final amount and the original principal gives required compound interest for the given time.

**Note :**

Interest need not to be compounded annually only, but it may be compounded semi-annually, i. $e.$ two times a year or quarterly i. $e.$ four times a year, and so on. This fixed interval of time at the end of which the interest is calculated and added to the principal to form a new principal for the next interval is called the conversion period.

The formula for calculating the compound amount and compound interest is given below:

$$A = P\left(1 + \frac{r}{100}\right)^t$$

Where $\qquad P = \text{Principal}$

$\qquad\qquad r = \text{Rate of Interest per payment period}$

$\qquad\qquad t = \text{Number of payment periods or total}$
$\qquad\qquad\qquad \text{number of conversion periods}$

$\qquad\qquad A = \text{Total amount accumulated after } t \text{ payment periods.}$

$\therefore \qquad\qquad Compond\ Interest = Amount - Principal$

i. e. $\qquad C. I. = A - P$

i. e. $\quad C. I. = P\left[\left(1 + \dfrac{r}{100}\right)^t - 1\right]$

**Note :**

If $r_1, r_2, r_3$ are the rates of interest (per payment period) for first $n_1$ conversion periods, second $n_2$ conversion periods, third $n_3$ conversion periods then

$$A = P\left(1 + \dfrac{r_1}{100}\right)^{n_1}\left(1 + \dfrac{r_2}{100}\right)^{n_2}\left(1 + \dfrac{r_3}{100}\right)^{n_3}$$

### DOUBLING PERIOD

The time period in which an amount becomes double of itself at a certain given rate of interest can be calculated by putting $A = 2P$ and then finding $t$.

This doubling period can also be calculated by using the following formula:

**(a)** Rule of $72$ :

$$Doubling\ Period = \dfrac{72}{Rate\ of\ interest}$$

**(b)** Rule of 69:

$$Doubling\ Period = 0.35 + \dfrac{69}{Rate\ of\ interest}$$

**Example 7.** *Find the compound interest on Rs.* $500$ *for* $3$ *years at* $5\%$ *p. a. compound annually.*

**Solution :** Here, $P = Rs.\ 500, t = 3\ years, r = 5\%\ p.\ a.$

$$\therefore \quad A = P\left(1 + \frac{r}{100}\right)^t$$

$$= 500\left(1 + \frac{5}{100}\right)^3$$

$$= 500(1.05)^3 = Rs.\,578.8125$$

Hence, compound interest

$$C.\,I. = A - P$$

$$= 578.8125 - 500$$

$$= Rs.\,78.81$$

**Example 8.** *Mr. Ramesh deposits Rs. $10,\,000$ today at $6\%$ p. a. rate of interest. In many years will this amount become double of itself ? Work out this problem by using the rule of $72$ and rule of $69$.*

**Solution :** According to rule of 72

$$Doubling\ period = \frac{72}{Rate\ of\ interest}$$

$$= \frac{72}{6} = 12\ years$$

and, According to rule of 69

$$Doubling\ period = 0.35 + \frac{69}{Rate\ of\ interest}$$

$$= 0.35 + \frac{69}{6}$$

$$= 0.35 + 11.50$$

$$= 11.85 \approx 12\ years.$$

**Example 9.** *Find the compound amount of Rs. $5000$ lent for $3$ years at $16\%$ p. a. converted.*

*(a) Annually       (b) Semi-Annually     (c) Quarterly*
**Solution :** Here, $P = Rs.\,5000$

$$t = 3\ Years$$

$$= 6\ half - years$$

$$= 12 \ quarters \ r$$

$$= 8\% \ p.\,a.$$

$$= 4\% \ half \ yearly$$

$$= 2\% \ quarterly$$

Now,

(a) Annually

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$= 5000\left(1 + \frac{8}{100}\right)^3$$

$$= 5000\,(1.08)^3$$

$$= Rs.\,6298.56$$

(b) Semi-Annually

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$= 5000\left(1 + \frac{4}{100}\right)^6$$

$$= 5000\,(1.04)^6$$

$$= Rs.\,6326.59$$

(c) Quarterly

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$$= 5000\left(1 + \frac{2}{100}\right)^{12}$$

$$= 5000\,(1.02)^{12}$$

$$= Rs.\,6341.20$$

**Example 10.** *When a child was born, a sum of Rs. 5000 was deposited in his bank account. The bank pays 12% p. a. interest compounded half-yearly. What amount would be received by the child on his 5ᵗʰ birthday ?*

**Solution :** Here, the amount received on child's fifth birthday will be the future value of $Rs.\,5000$ after $5\ years$

Now,　　$P = 5000$

$\qquad r = 12\%\ p.\,a.$

$\qquad\quad = 6\%\ half\ yearly$

$\qquad t = 5\ years$

$\qquad\quad = 10\ half\ years$

$\therefore\qquad A = P\ (1 + \tfrac{r}{100})^t$

$\qquad\qquad = 5000\ (1 + \tfrac{6}{100})^{10}$

$\qquad\qquad = 5000(1.06)^{10}$

$\qquad\qquad = Rs.\,8954$

**Example 11.** *Find the compound interest on $Rs.\ 7000$ for $3\ years$, if the rate of interest for first two years is $6\%\ p.\,a.$ and $9\%\ p.\,a.$ for the third year half yearly.*

**Solution :** Here, $P = Rs.\,7000$

$$r_1 = \text{rate of interest for first two years} = 6\%\ p.\,a.$$
$$r_2 = \text{rate of interest for the third year} = 9\%\ p.\,a. = \tfrac{9}{2}\%\ half\ yearly$$

$t = t_1 + t_2$

$= 2\ years + 1\ year$

$= 2\ years + 2\ half\ years$

Now,

$$Compound\ Amount = Principal + Compound\ Interest$$

$\Rightarrow$  $A = P + C.I.$

$C.I. = A - P$

$$= P\left(1 + \frac{r_1}{100}\right)^{t_1}\left(1 + \frac{r_2}{100}\right)^{t_2} - P$$

$$= 7000\left[\left(1 + \frac{6}{100}\right)^2\left(1 + \frac{9}{200}\right)^2 - 1\right]$$

$\Rightarrow$

$$= 7000\left[(1.06)^2(1.045)^2 - 1\right]$$

$$7000\left[(1.1236)(1.092025) - 1\right]$$

$$7000\left[0.2269929\right]$$

$$Rs.\ 1588.99$$

$$Rs.\ 1589$$

$=$

$=$

$=$

$\approx$

**Example 12.** *In how many years will a certain sum double itself at* $10\%$ *p. a. when the interest is compounded half yearly.*

**Solution :** Here, if '$P$' is the principal amount, then

$$A = 2P$$

Also,  $r = 10\%\ p.\ a. = 5\%\ half\ yearly$

$t = ?$, where $t$ = no. of half years

Now, as

$$A = P\left(1 + \frac{r}{100}\right)^t$$

$\therefore$  $2P = P\left(1 + \frac{5}{100}\right)^t$

$$2 = \left(\frac{105}{100}\right)^t$$

$$2 = \left(\frac{21}{20}\right)^t$$

$\Rightarrow$

$\Rightarrow$

Taking log on both sides, we get

$$\log 2 = t(\log 21 - \log 20)$$

$\Rightarrow \quad 0.3010 = t(1.3222 - 1.3010)$

$t(0.0212) = 0.3010$

$t = \dfrac{3010}{212} = 14.2 \; half \; years$

$\Rightarrow$

$\Rightarrow$

$\therefore \quad$ Required time $= \dfrac{14.2}{2} = 7.1 \; years$

**Example 13.** *At what rate of compound interest will a certain sum double itself in*

*6 years?*

**Solution :** Here, if '$P$' is the principal amount, then

$$Compound \; Amount, \; A = 2P$$

Also, $\quad t = 6 \; years$

$\quad\quad\quad\quad r = ?$

$\therefore \quad A = P \left(1 + \dfrac{r}{100}\right)^{t}$

$2P = P \left(1 + \dfrac{r}{100}\right)^{6}$

$\dfrac{2P}{P} = \left(1 + \dfrac{r}{100}\right)^{6}$

$2 = \left(1 + \dfrac{r}{100}\right)^{6}$

$\Rightarrow$

$\Rightarrow$

$\Rightarrow$

Taking log on both sides, we get

$$\log 2 = 6 \log \left(1 + \frac{r}{100}\right)$$

$$\Rightarrow \quad \frac{0.3010}{6} = \log \left(1 + \frac{r}{100}\right)$$

$$0.0501 = \log \left(1 + \frac{r}{100}\right)$$

$$\text{Antilog}(0.0501) = \left(1 + \frac{r}{100}\right)$$

$$1 + \frac{r}{100} = \text{Antilog}(0.0501)$$

$$1 + \frac{r}{100} = 1.122$$

$$\frac{r}{100} = 1.122 - 1 = 0.122$$

$$r = 0.122 \times 100 = 12.2$$

$\Rightarrow$

$\Rightarrow$

i. $e.$

$\Rightarrow$

$\Rightarrow$

$\Rightarrow$

$\therefore$    Required rate of interest $= 12.2\% \; p. \, a.$

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## 6.5 TEST YOUR UNDERSTANDING (A)

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1. Find the simple interest on a sum of $Rs.$ $600$ for 4 years at $5\% \, p. \, a.$

2. At what rate percent a sum of $Rs.$ $5000$ amounts to $Rs.$ $10,000$ in 5 years.

3. How long will it take for a certain sum of $Rs.$ $2000$ to accumulate to $Rs.$ $2500$ at $5\% \, p. \, a.$

4. A certain sum amounts to $Rs.$ $2784$ in 2 years and $Rs.$ $3360$ in 5 years at simple interest. Find the sum and the rate of simple interest.

5. Calculate the compound value of $Rs.$ $12,000$ at the end of 3 years at $10\% \; p. \; a.$ rate of interest. Also find the compound interest.

**6.** Find the amount of *Rs.* 2800 lent for the $1\frac{1}{2}$ years at 10% *p. a.*, interest being payable compounded half yearly.

**7.** Ram offers his friend to pay *Rs.* 12,000 after 15 years in exchange of *Rs.* 1000 today. What interest rate is implicit in the offer ?

**8.** Divide *Rs.* 24,000 between Ram and Shyam so that the amount Ram receives in 4 years at 12.5% *p. a.* rate of interest is equal to the amount received by Shyam in 3 years at 10% *p. a.* rate of interest.

**9.** In how many years will a certain sum double itself at 10% *p. a.*, interest being compounded quarterly.

**10.** The difference between compound interest and simple interest on a certain sum of money at 5% *p. a.* for 2 years is *Rs.* 2.30. Find the sum ?

**11.** An investment company pays 12% *p. a.* rate of interest by compounding the sum quarterly. If *Rs.* 5000 is deposited initially, how much shall it grow to in 5 years ?

**12.** What rate of interest per annum doubles an investment in 7 years, if the interest is being compounded annually ?

## Answers

**1.** *Rs.* 120

**2.** 20%

**3.** 5 years

**4.** *Rs.* 2400, 8%

**5.** *Rs.* 15,972, *Rs.* 3972

**6.** *Rs.* 3241.35

**7.** 18%

**8.** *Rs.* 10,892, *Rs.* 13,108

**9.** 7.03 years

**10.** *Rs.* 1000

**11.** *Rs.* 9030

**12.** 10.41% *p. a.*

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## 6.6 NOMINAL AND EFFECTIVE RATE OF INTEREST

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From the above discussion and examples it is clear that in case of compound interest if the interest is being compounded more than once a year, the amount grows faster. It is so because the actual rate of interest realized, called *effective rate*. In case of multi-period compounding is more than the apparent annual rate of interest called *nominal rate*.

For example, the future value of $Rs.$ 100 at the end of one year, at the rate of interest 10% *p. a.* will become $Rs.$ 110. But if the interest is calculated on half yearly basis, then At the end of first six months, we will have $Rs.$ 105.

   i. *e., Rs.* 100 + 5% of $Rs.$ 100 = $Rs.$ 105 And so,
   at the end of next six months, it will be

$$Rs.\,105 + 5\% \text{ of } Rs.\,105 = Rs.\,110.25$$

Hence, the total interest realized in case half yearly compounding is $Rs.$ 10.25 or we can say that effective rate of interest is 10.25% while the nominal rate is 10%.

**6.6.1 NOMINAL RATE OF INTEREST :** In case of compound interest, the apparent annual rate of interest is called the *nominal rate of interest*.

**6.6.2 EFFECTIVE RATE OF INTEREST :** In case of compound interest, if the interest is being calculated more than once a year (i. *e.,* a case of multi-period compounding) the interest actually earned or realized is called the *effective rate of interest*.

   **Relationship between Nominal and Effective Rate of Interest**

   Let, $E$ = Effective rate of interest $r$ = Nominal rate of interest

            = Frequency of compounding per year
   Then,

$$E = (1 + \frac{r}{100m})^{m} - 1$$

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**Example 14.** *Find the effective rate of interest equivalent to nominal rate of* 6% *compounded monthly*.

**Solution :**  $r = 6\%\ p.\ a.$

$m = 12$ Now,

as we have

$$E = (1 + \frac{r}{100m})^m - 1$$

$\therefore$ Effective rate of interest,

$$E = (1 + \frac{6}{1200})^{12} - 1$$

$$= (1.0075)^{12} - 1$$

$$= 1.0930 - 1$$

$$= 0.0930$$

$$= 9.3\%$$

**Example 15.** *Which is better option for an investor, compounding* 9. 1% *semi-annually or* 9% *monthly ?*

**Solution :** Let us find the effective rate of interest when compounding is done at 9.1% semi-annually.

$\therefore$ For the first investment,

$$r = 9.1\%\ p.\ a.$$

$$m = 2$$

$$\therefore \quad E = (1 + \frac{9.1}{200})^2 - 1$$

$$= (1 + 0.0455)^2 - 1$$

$$= 0.09307025 = 9.30\%$$

i. *e.,* Effective rate of interest in case of first investment $= 9.30\%$

Now, to find the effective rate of interest when compounding is done at 9% monthly, we have

$$r = 9\% \, p.\, a.$$

$$m = 12$$

$$\Rightarrow \quad E = \left(1 + \frac{9}{1200}\right)^{12} - 1$$

$$= (1 + 0.0075)^{12} - 1$$

$$x = (1.0075)^{12}$$

…(i)

Let

Taking log on both sides, we get

$$\log x = 12 \, \log(1.0075)$$
$$= 12(0.0034)$$

$$\therefore \qquad \log x = 0.0408$$

$$\Rightarrow \qquad x = \text{Antilog} \, (0.0408)$$

$$\Rightarrow \qquad x = 1.098$$

$\therefore$ (i) becomes

$$E = 1.098 - 1 = 0.098 = 9.8\%$$

i. $e.,$ Effective rate of interest in case of second investment $= 9.8\%$

$\therefore$ Second investment option is better

## 6.7 CONTINUOUS COMPOUNDING OF INTEREST

We know that in case of compound interest, the compound amount '$A$' for the principal '$P$' after '$t$' year at rate of $r \, \% \, p.\, a.$,

$$\text{Amount}, A = P \left(1 + \frac{r}{100}\right)^{t}$$

But, if the compounding is done '$m$' times in a year, then we will have

$$A = P \left(1 + \frac{r}{m \times 100}\right)^{t \times m}$$

Where, $\quad m =$

When the compounding is done continuously i. $e.\,,\, m$ becomes very large$(m \to \infty)$, we have

$$A = \lim_{m \to \infty} P\left(1 + \frac{r}{t \times m}\right)^{m \times 100 \quad \frac{rt}{100}}$$

$$= P \lim_{m \to \infty} \left(1 + \frac{r}{100m}\right)^{\overline{\frac{100}{r}} \times \frac{rt}{100}}$$

$$= Pe^{rt/100}$$

As $\left(\lim_{x \to \infty}(1 + x)^{1/x} = e\right)$

Where $e$ is the numerical constant and $e = 2.7183$

Thus, the compound amount '$A$' accumulated after '$t$' years, if the interest is compounded continuously at the rate '$r$', is

$$A = Pe^{rt/100}$$

**Example 16.** *Which investment option is better* 16% *compounded quarterly or* 12. 2% *compounded continuously ?*

**Solution :** For first investment Let

$$P = Rs.\,100$$

$$r = 16\%\ p.\,a. = \frac{16}{4}\%$$

quarterly

$$= 4\%\ \text{quarterly}$$

$$t = 1\ \text{year} = 4\ \text{quarters}$$

$$\therefore A = 100\left(1 + \frac{4}{100}\right)^4 = 100(1.04)^4$$

$$= 100(1.169858)$$

$$= Rs. \, 116.98$$

$\Rightarrow$ Effective rate of interest

$$= (116.98 - 100)$$

$$= 16.98\% \text{ For}$$

second investment

Let $\qquad P = Rs. \, 100$

$$r = 12.2\% \, p. \, a.$$

$$t = 1 \, year$$

As interest is being compounded continuously

$\therefore \quad A = Pe^{rt/100}$

$\Rightarrow \quad A = 100 \times e^{12.2/100} = 100e^{0.122}$

Taking log on both sides, we get

$$\log A = \log 100 + 0.122 \log e$$
$$= 2 + (0.122) \log(2.7183) \qquad (\because e = 2.7183)$$
$$= 2 + (0.122)(0.4343)$$
$$= 2 + 0.053$$
$$= 2.053$$

$\Rightarrow \quad A = \text{Antilog}(2.053) = 113.0$

$\Rightarrow \quad A = Rs. \, 113.0$

Thus, Effective rate of interest

$$= (113.0 - 100)$$
$$= 13\%$$

$\therefore$ First investment is better

**Note.** We can also say that if the nominal rate $r$ is compounded continuously, then the formula of effective rate $E$, becomes

In case of continuous compounding

$$E = (e^{r/100} - 1)$$

or $\quad E = 100(e^{r/100} - 1)\%$

**Example 17.** *Find the effective rate equivalent to nominal rate* $6\%$ *compounded*

*(a) Monthly*        *(b) Continuously*

**Solution :** (a) We have

$$r = 6\%$$

$$m = 12$$

$$\therefore \text{Effective rate}, E = \left(1 + \frac{r}{1200}\right)^{12} - 1$$

$$= (1.005)^{12} - 1$$

$$= 1.0616 - 1$$

$$= 0.0616$$

$$= 6.16\%$$

*(b)* We have

$$r = 6\%$$

$$\therefore \qquad E = e^{r/100} - 1$$

$$= e^{6/100} - 1$$

$$= e^{0.06} - 1 \qquad \qquad \qquad \text{…(i)}$$

Take $\qquad x = e^{0.06}$

$\therefore \qquad \log x = 0.06 \log e = 0.06 \times \log(2.7183)$

$\Rightarrow \qquad \log x = 0.06 \times 0.4343$

$$= 0.026058$$

$\Rightarrow \qquad x = \text{Antilog } (0.0260)$

$\therefore \qquad x = 1.062$

$\Rightarrow$ (i) becomes

$$E = 1.062 - 1 = 0.062 = 6.2\%$$

$\Rightarrow \quad E = 6.2\%$

**6.8 TEST YOUR UNDERSTANDING (B)**

**1.** Find the effective rate equivalent to nominal rate 12% compounded quarterly.

**2.** Which is better investment either 5.7% compounded half yearly or 5% compounded monthly ?

**3.** Find the effective rate of interest corresponding to the nominal rate of interest 8% $p.\ a.$, if it is converted to

(i) Semi-annually (ii) Quarterly

**4.** If you invest $s.\ 4,50,000$ at an annual interest rate of 7% compounded continuously, then find the final amount you will have in the account after 5 years.

## Answers

**1.** 12.55%

**2.** First

**3.** (i) 8.16% half yearly       (ii) 8.24% quarterly

**4.** $Rs.\ 6,38,550$

## 6.9 COMPOUNDING & DISCOUNTING OF A SUM USING DIFFERENT TYPE OF RATES

### 6.9.1 COMPOUNDING (OR GROWTH)

If '$r$' is the rate of increase per 100 per year, then the value after '$n$' years $(P_n)$ is given by

$$P_n = P_o \left(1 + \frac{r}{100}\right)^n$$

Where       $P_o = $ Present Value

If the rate of increases is different for different years, i. $e.\ r_1, r_2, \ldots, r_n$ then $(P_n)$ is given by

$$P_n = P_o \left(1 + \frac{r_1}{100}\right)\left(1 + \frac{r_2}{100}\right)\ldots.\left(1 + \frac{r_n}{100}\right)$$

**Example 18.** *The present population of a town is* 2, 80, 000. *If it increase at the rate of* 6% *p. a. What will be its population after* 2 *years* ? **Solution :** Population after '$n$' years, i. e.

$$= P_o \left(1 + \frac{r}{100}\right)^n$$

$P_n$

Where $\qquad P_o =$ Present Population

$\qquad\qquad = 2,80,000$

$\qquad r =$ Rate of Growth

$\qquad\qquad = 6\% \, p. \, a.$

and $\quad n =$ Time $= 2$ years

$\Rightarrow$ Population after 2 years

$= 2,80,000 \left(1 + \frac{6}{100}\right)^2$

$= 2,80,000 \times \frac{106}{100} \times \frac{106}{100}$

$= 3,14,608$

**Example 19.** *The present population of a tour is* 50, 000. *It grows at the rate of* 4%, 5% *and* 8% *during first year, second year and third year respectively. Find its population after* 3 *years* ?

**Solution :** If '$P$' denotes the population of the tour after 3 years, then

$$P = P_o \left(1 + \frac{r_1}{100}\right)\left(1 + \frac{r_2}{100}\right)\left(1 + \frac{r_3}{100}\right)$$

Where $\qquad P_o = 50,000$ ,

$\qquad\qquad r_1 = 4\%$ ,

$\qquad\qquad r_2 = 5\%$ and

$\qquad r_3 = 8\%$

$\therefore \qquad = 50,000 \left(1 + \frac{4}{100}\right)\left(1 + \frac{5}{100}\right)\left(1 + \frac{8}{100}\right)$

$\qquad = 50,000 \times \frac{104}{100} \times \frac{105}{100} \times \frac{108}{100}$

$\qquad = 50,000 \times \frac{26}{25} \times \frac{21}{20} \times \frac{27}{25}$

$\qquad = 61,740$

**6.9.2 DISCOUNTING (ON DEPRECIATION OR PRESENT VALUE)**

The value of certain fixed assets like plant, machinery etc. decrease (due to wear and tear) with the passage of time. This relative decrease in the value of fixed assets over a certain period of time is called *depreciation*. This process is called *Discounting*.

If '$r\%$' is the rate of depreciation per annum, then the value of the fixed asset after '$n$' years i. e. , $V_n$

$$V_n = V_o \left(1 - \frac{r}{100}\right)^n$$

Where, $V_0 =$ The value of the fixed asset at present

If the rate of depreciation is different for different years, i. e. $r_1, r_2,...., r_n$ then $(V_n)$ is given as

$$n = V_o \left(1 - \frac{r1}{100}\right)\left(1 - \frac{r2}{100}\right)....\left(1 - \frac{rn}{100}\right)$$

**Example 20.** *The value of a machine depreciates at $12\%$ annually. If its present value is Rs. $38,720$. What will its value after $6$ years ?*

**Solution :** The value of the machine after $6$ years $V_6$ is given by

$$V_6 = V_o \left(1 - \frac{r}{100}\right)^n$$

Where     $V_o =$ Present value of the machine

$$= Rs. 38,720$$

$$r = \text{Annual rate of depreciation}$$

$$= 12\%$$

$$n = \text{Time period}$$

$$= 6 \text{ years}$$

$$V_6 = 38,720 \left(1 - \frac{12}{100}\right)^6$$

$$= 38,720 \left(\frac{88}{100}\right)^6$$

$$\therefore$$

Taking log on both sides, we get

$$\log V_6 = \log 38,720 + 6(\log 88 - \log 100)$$

$$= 4.5879 + 6(1.9445 - 2.0000)$$

$$= 4.5879 + 6(-0.0555)$$

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$$= 4.5879 - 0.3330$$
$$= 4.2549$$

$\Rightarrow \quad V_6 = \text{Antilog}(4.2549) = 17{,}990.0$

$\therefore$ Depreciated value of the machine $= Rs.\ 17{,}990$

**Example 21.** *The initial cost of a machine is Rs.* 64, 000. *For the first* 2 *years, the rate of depreciation is* 5%, *then for the next* 2 *years it becomes* 8% *and for the fifth year it depreciates at* 10%. *Find the depreciated value of the machine after* 5 *years ?*

**Solution :** The depreciated value of the machine after 5 years, $n$ i. e. $V_5$ is given by

$$V_5 = V_o \left(1 - \frac{r_1}{100}\right)^{n_1} \left(1 - \frac{r_2}{100}\right)^{n_2} \left(1 - \frac{r_n}{100}\right)^{3}$$

Where $\quad V_o =$ Initial cost of the machine

$$r_1 = 5\%\ p.\ a. \quad \text{and} \quad n_1 = 2$$
$$r_2 = 8\%\ p.\ a. \quad \text{and} \quad n_2 = 2$$

$$r_3 = 10\%\ p.\ a.\ \text{and}\ n_3 = 1$$

$$V_5 = 64{,}000 \left(1 - \frac{5}{100}\right)^{2} \left(1 - \frac{8}{100}\right)^{2} \left(1 - \frac{10}{100}\right)^{1}$$

$$= 64{,}000 \left(\frac{95}{100}\right)^{2} \left(\frac{92}{100}\right)^{2} \left(\frac{90}{100}\right)^{1}$$

$$= 64{,}000 \times \frac{19}{20} \times \frac{19}{20} \times \frac{23}{25} \times \frac{23}{25} \times \frac{9}{10}$$

$$= 43{,}999.26$$
$\therefore$

$\therefore$ Depreciated cost of the machine $= Rs.\ 43{,}999.26$

**Example 22.** *The value of a machine originally costing Rs.* 48, 000 *depreciates at* 10% *p. a. and eventually its scrap value becomes Rs.* 18, 000. *Estimate its effective life during which it remained in use.*

**Solution :** Let '$n$' years be the effective life of the machine. Then, we have

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$$V_o = \quad \text{Original cost of machine} \quad = Rs. \, 48{,}000$$

$$r = \quad \text{Rate of depreciation} \quad = 10\% \, p.\,a.$$

$$V_n = \text{Scrap value of the machine after '}n\text{' years} \quad = Rs. \, 18{,}000$$

$$V_n = V_o \left(1 - \frac{r}{100}\right)^n$$

$$18{,}000 = 48{,}000 \left(1 - \frac{10}{100}\right)^n$$

So,

$\Rightarrow$

$\therefore \quad \dfrac{18}{48} = \left(\dfrac{90}{100}\right)^n$

$\dfrac{3}{8} = \left(\dfrac{9}{10}\right)^n$

$\Rightarrow$

Taking log on both sides, we get

$\Rightarrow \quad \log\left(\dfrac{3}{8}\right) = \log\left(\dfrac{9}{10}\right)^n$

$$\log 3 - \log 8 = n(\log 9 - \log 10)$$

$$- 0.9031 = n(0.9542 - 1)$$

$$-0.4260 = -0.0458 \times n$$

$$= \frac{0.4260}{0.0458} = \frac{4260}{458} = 9.3$$

$\Rightarrow$

$\Rightarrow \quad 0.4771$

$\Rightarrow \Rightarrow$

$\therefore$ Machine remained in use for 9.3 years.

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## 6.10 TEST YOUR UNDERSTANDING (C)

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1.  The present population of a town is 40,960. It increases at the rate of 6.25% $p.\,a.$ What will be its population after 2 years ?

**2.** The population of a town is 2,50,000 at present. It increases at 4%, 5% and 8% during first year, second year and third year respectively. Find its population after 3 years ?

**3.** A population grows at the rate of 2.3% per year. How long does it take for the population to double ?

**4.** The value of a car depreciates at 9% annually. If its present value is *Rs.* 3,75,000. What will be its value after 6 years ?

**5.** The value of a machinery plant depreciates by 12% annually. It its present value is *Rs.* 38,720. Find its value 2 years ago.

**6.** An electric typewriter worth *Rs.* 12,500 depreciates at the rate of 12% *p. a.* Ultimately it was sold for *Rs.* 9680. Estimate the effective life during which the electronic typewriter remained in use.

**7.** A certain machinery depreciates at the rate of 8% *p. a.* How long does it take for the value of the machinery to reduce to $\frac{1}{4}$ of its original value ?

## Answers

**1.** 49,130

**2.** 2,94,840

**3.** 31 Years (approx.)

**4.** *Rs.* 2,12,950

**5.** *Rs.* 49,990

**6.** 2 Years

**7.** 16.63 Years (approx.)

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### 6.11 LET US SUM UP

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- Interest is the extra amount paid by borrower to the lender on the funds provided by him.

- Interest can be simple interest or compound interest. • Simple interest is charged on Principal amount only.

- Compound interest is charged on Principal amount plus accumulated Interest.

- Nominal interest is the interest apparent on the amount.

- Real Interest is the interest actually earned by the lender.

- Compounding can be done on periodic basis or on continuous basis.

- From present value finding future value is called compounding and from future value finding present value is called discounting.

## 6.12 KEY TERMS

- **INTEREST:** Interest is the additional amount paid by a borrower for the use of a lender's money.

- **SIMPLE INTEREST:** Simple interest is the interest computed only on the original amount borrowed (or lent). It is the extra money paid (or taken) on that principal for one time period.

- **COMPOUND INTEREST**: Compound interest is charged on Principal amount plus accumulated Interest.

- **NOMINAL RATE OF INTEREST :** In case of compound interest, the apparent annual rate of interest is called the *nominal rate of interest*.

- **EFFECTIVE RATE OF INTEREST :** In case of compound interest, if the interest is being calculated more than once a year (i. *e.,* a case of multi-period compounding) the interest actually earned or realized is called the *effective rate of interest*.

## 6.13 FURTHER READINGS

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2. Budnick, P. *Applied Mathematics.* McGraw Hill Publishing Co.
3. J. K. Singh, *Business Mathematics,* Himalaya Publishing House.
4. J. K. Sharma, *Business Statistics,* Pearson Education.

# B. COM (DIGITAL)

## SEMESTER II

## COURSE: BUSINESS MATHEMATICS AND STATISTICS

## UNIT 7 – MEASURES OF CENTRAL TENDENCY

**STRUCTURE**

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## 7.0 OBJECTIVES

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**After studying the Unit, students will be able to**

- Define what Average.
- Know why average is calculated.
- Understand features of good measure of Average.
- Find different types of Averages for various types of data.
- Understand the relation that exists between different types of Averages. • Know merits and limitations of each type of average.

## 7.1 INTRODUCTION

We can say that modern age is the age of Statistics. There is no field in the modern life in which statistics is not used. Whether it is Business, Economics, Education. Government Planning or any other field of our life, statistics is used everywhere. Business manager use statistics for business decision making, Economists use statistics for economic planning, Investors use statistics for future forecasting and so on. There are many techniques in statistics that helps us in all these purposes. Average or Central Tendency is one such technique that is widely used in statistics. This technique is used almost in every walk of the life.

## 7.2 MEANING OF AVERAGE OR CENTRAL TENDENCY

Average or Central tendency is the most used tool of statistics. This is the tool without which statistics is incomplete. In simple words we can say that Average is the single value which is capable of representing its series. It is the value around which other values in the series move. We can define Average as the single typical value of the series which represent whole data of the series. Following is the popular definition of average:

*"An average is a single value within the range of data that is used to represent all values in the series. Since an average is somewhere within the range of the data, it is also called a measure of Central Value".* **: -Croxton and Cowden**

## 7.3 OBJECTIVES AND FUNCTIONS OF AVERAGE

1. **SINGLE VALUE REPRESENTING WHOLE DATA:** In statistics data can be shown with the help of tables and diagrams. But some time data is very larger and it is not easy to present in table or graph. So, we want to represent that data in summarised form. Average helps us to represent data in summarised form. For example, that data of national income of India is very large but when we calculate per capita income it gives us idea of the national income.

2. **TO HELP IN COMPARISON**: In case we want to compare two different series of data, it is very difficult to compare. There are many difficulties like number of items in the series may be different. In such case average helps us in making the comparison. For example, if we want to compare income of people living in different countries like India and Pakistan, we can do so by calculating per capita income which is a form of average.

3. **DRAW CONCLUSION ABOUT UNIVERSE FROM SAMPLE:** This is one of the important function of average. If we take the average of a sample, we can draw certain conclusion about the universe from such Average. For example mean of a sample is representative of its universe.

4. **BASE OF OTHER STATISTICAL METHODS:** There are many Statistical

Techniques that are based on average. If we don't have an idea about the average, we cannot apply those techniques. For example Dispersion, Skewness, Index Number are based on average.

5. **BASE OF DECISION MAKING**: Whenever we have to make certain decision, average plays very crucial role in the decision making. From the average we could have idea about the data and on the basis of that information we can take decision. For example, a company can take decision regarding its sales on the basis of average yearly sales of past few years.

6. **PRECISE RELATIONSHIP**: Average helps us to find out if there is precise relation between two variables or two items. It also removes the biasness of the person making analysis. For example if you say that Rajesh is more intelligent than Rav,i it is only our personal observation and does not make any precise relation. If we compare the average marks of both the students we could have a precise relation.

7. **HELPFUL IN POLICY FORMULATION**: Average helps the government in formulation of the policy. Whenever government has to formulate economic policy they consider various averages like per capita income, average growth rate etc.

## 7.4 REQUISITE / FEATURES OF GOOD AVERAGE

1. **RIGIDLY DEFINED:** A good measure of average is one which is having a clear cut definition and there is no confusion in the mind of person who is calculating the average. In case person applies his discretion while calculating the average, we cannot say that average is a good measure. Good average must have fix algebric formula, so that whenever average of same data is calculated by two different persons, result are always same.

2. **EASY TO COMPUTE**: Good average is one which does not involve much calculation and are easy to compute. A good average is one which can be calculated even by a person having less knowledge of Statistics. If it is very difficult to calculate the average, we cannot regard it as a good measure.

3. **BASED ON ALL OBSERVATIONS:** Good average must consider all the values or data that is available in the series. If average is based on only few observations of the series, we cannot say that it is a good measure of average.

4. **NOT AFFECTED BY EXTREME VALUES**: A good measure of average is one which is not affected by the extreme values present in the Data. Sometime data contains values which are not within normal limits, these values are called extreme values. If average is affected by these extreme values, we cannot claim that average is a good measure.

5. **REPRESENTATIVE OF WHOLE SERIES:** A good measure of average is one which represent characteristics of whole series of the data.

6. **EASY TO UNDERSTAND:** A good measure of average is one that is not only easy to understand but also easy to interpret.

7. **NOT AFFECTED BY FLUCTUATIONS IN THE SAMPLING:** If we take one sample from the universe and calculate average, then we draw another sample from the same universe and calculate the average again, there must not be much difference

between these two averages. If average significantly change with the change in sample, we cannot treat it as a good measure of average.

8. **CAPABLE OF FURTHER ALGEBRAIC TREATMENT:** a good average is one on which we can apply further algebraic treatment. In case further algebraic treatment is not possible, we cannot say that it is a good average. Sch further algebraic treatment may be anything like calculating combined average when average of two different series is available.

9. **LOCATED GRAPHICALLY:** It will be better if we can locate average graphically also. Graphs are easy to understand and interpret, so the average that can be located graphically is a good average.

As no single average has all these features, we cannot say which measure of average is best. Each measure has its own merits and limitation. Moreover, each measure is suitable for particular situation.

## 7.5 MEASURES OF CENTRAL TENDENCY

There are many methods through which we can calculate average or central tendency. We can divide these methods into two categories that are Algebraic Method and Positional Average. Algebraic methods are those in which the value of average depends upon the mathematical formula used in the average. The mathematical average can further be divided into three categories that are Arithmetic Mean, Geometric Mean and Harmonic Mean. On the other hand positional average are those average which are not based on the mathematical formula used in calculation of average rather these depends upon the position of the variable in the series. As these depends upon the position of the variable, these averages are not affected by the extreme values in the data. Following chart shows different types of averages.
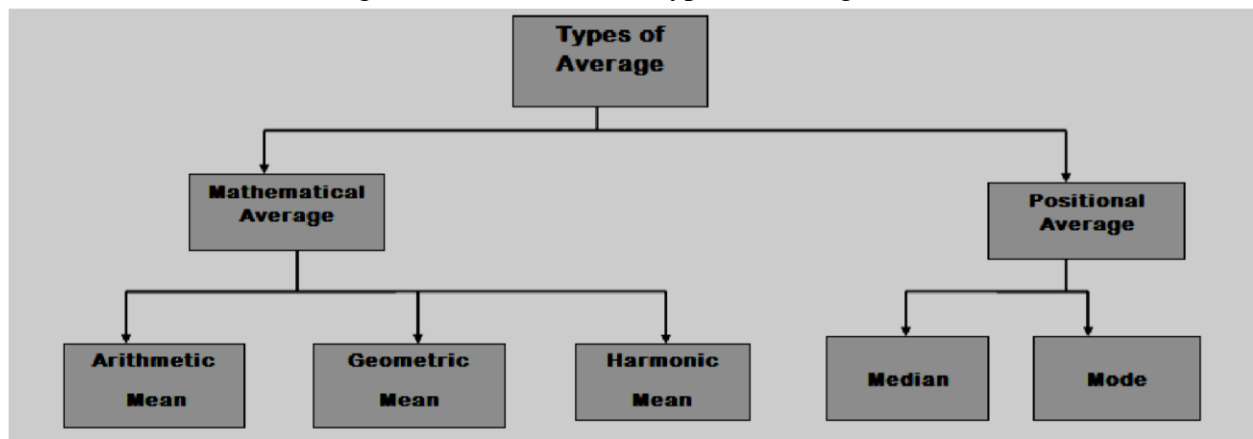


## 7.6 ARITHMETIC MEAN

It is the most popular and most common measure of average. It is so popular that for a common man the two terms Arithmetic Mean and Average are one and the same thing. However, in reality these two terms are not same and arithmetic mean is just one measure of the average. We can define the arithmetic mean as:

" The value obtained by dividing sum of observations with the number of observations".

So arithmetic mean is very easy to calculate, what we have to do is just add up the value of all the items given in the data and then we have to divide that total with the number of items in the data. Arithmetic mean is represented by symbol $A.M.$ or $\overline{X}$

## 7.6.1 ARITHMETIC MEAN IN CASE OF INDIVIDUAL SERIES

Individual series are those series in which all the items of the data are listed individually. There are two methods of finding arithmetic mean in the individual series. These two methods are Direct method and Shortcut Method.

1. **DIRECT METHOD:** According to this method calculation of mean is very simple and as discussed above, we have to just add the items and then divide it by number of items.

Following are the steps in calculation of mean by direct method:

1. Suppose our various items of the data are $X_1$, $X_2$, $X_3$ ................................... $X_n$ 2. Add all the values of the series and find $\sum X$.
3. Find out the number of items in the series denoted by n.
4. Calculate arithmetic mean dividing sum value of observation with the number of observations using following formula:

$$\overline{X} = \frac{X1 + X2 + X3 + ------Xn}{} = \frac{\sum X}{N}$$

Where $\overline{X} = Mean$
N = Number of items
$\sum X$ = Sum of observation

Example 1. *The daily income of* 10 *families is a as given below (in rupees) :*

130, 141, 147, 154, 123, 134, 137, 151, 153, 147 *Find the arithmetic mean by direct method.*

**Solution :** Computation of Arithmetic Mean

| Serial No. | Daily Income (in *Rs.*) X |
|------------|---------------------------|
| 1 | 130 |
| 2 | 141 |
| 3 | 147 |
| 4 | 154 |
| 5 | 123 |

| 6 | 134 |
|---|---|
| 7 | 137 |
| 8 | 151 |
| 9 | 153 |
| 10 | 147 |
| $N = 10$ | $\sum X = 1417$ |

A. M.,   $\overline{X} = \dfrac{X1 + X2 + X3 + - - - - - - -XN}{N} = \dfrac{\sum X}{N} = \dfrac{1417}{10} = Rs.\,141.7$

2. **SHORT CUT METHOD:** Normally this method is used when the value of items is very large and it is difficult to make calculations. Under this method we take one value as mean which is known as assumed mean and deviations are calculated from this as you mean. This method is also known as is assumed mean method. Following are the steps of this method:

1. Suppose our various items of the data are $X_1$, $X_2$, $X_3$ .................................... $X_n$
2. Take any value as assumed mean represented by 'A'. This value may be any value among data or any other value even if that is not presented in data.
3. Find out deviations of items from assumed mean. For that deduct Assumed value from each value of the data. These deviations are represents as 'dx'
4. Find sum of the deviations represented by $\sum$dx.
5. Find out the number of items in the series denoted by n.
6. Calculate arithmetic mean dividing sum deviations of the observation with the number of observations using following formula:

$$\overline{X} = A + \dfrac{\sum dx}{N}$$

Where $\overline{X} = Mean$
   A = Assumed Mean
   N = Number of items
   $\sum$dx = Sum of deviations

**Example 2.** *Calculate A . M. by short - cut method for the following data*

| R. No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Marks | 50 | 60 | 65 | 88 | 68 | 70 | 83 | 45 | 53 | 58 |

**Solution :** Let assumed Mean ($A$) be 60

| R. No. | Marks (X) | $dx = X - A$ |
|--------|-----------|--------------|
| 1 | 50 | −10 |
| 2 | 60 | 0 |
| 3 | 65 | 5 |
| 4 | 88 | 28 |
| 5 | 68 | 8 |
| 6 | 70 | 10 |
| 7 | 83 | 23 |
| 8 | 45 | −15 |
| 9 | 53 | −7 |
| 10 | 58 | −2 |
| $N = 10$ | | $\sum dx = 40$ |

As $\overline{X} = A + \dfrac{\sum dx}{N}$

$\overline{X} = 60 + \dfrac{40}{10}$

$= 60 + 4$

$\Rightarrow$

$\Rightarrow \quad \overline{X} = 64$Marks

## 7.6.2 ARITHMETIC MEAN IN CASE OF DISCRETE SERIES

In individual series if any value is repeated that is shown repeatedly in the series. It makes series lengthy and make calculation difficult. In case of discrete series, instead of repeatedly showing the items we just group those items and the number of time that item is repeated is shown as frequency. In case of discrete series we can calculate Arithmetic mean. By using Direct Method and Shortcut Method.

1. **DIRECT METHOD:** In indirect method we multiply the value of items (X) with their respective frequency (f) to find out the the product item (fX). Then we take up sun of the product and divide it with the number of items. Following are the steps
   1. Multiply the value of items (X) with their respective frequency (f) to find out the the product item (fX)
   2. Add up the product so calculated to find $\sum fX$.
   3. Find out the number of items in the series denoted by n.
   4. Calculate arithmetic mean dividing sum of the product with the number of observations using following formula:

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$$\bar{x}= = \frac{\Sigma fX}{N}$$

Where $\bar{x} = Mean$

N = Number of items $\Sigma fX$ = Sum of product of observations.

**Example 3.** *Find the average income*

| Daily Income (in rupees) | 200 | 500 | 600 | 750 | 800 |
|---|---|---|---|---|---|
| No. of Workers | 2 | 1 | 4 | 2 | 1 |

**Solution :**

| Daily Income (Rs.) X | No. of Workers Frequency (f) | f |
|---|---|---|
| 200 | 2 | 400 |
| 500 | 1 | 500 |
| 600 | 4 | 2400 |
| 750 | 2 | 1500 |
| 800 | 1 | 800 |
| | $\Sigma f = 10$ | $\Sigma fX = 5600$ |

∴    Average Income $\bar{x} = \dfrac{\Sigma fK}{\Sigma f}$

$$= \frac{5600}{10}$$

$$= Rs.\,560$$

2. **SHORT CUT METHOD:** Under this method we take one value as mean which is known as assumed mean and deviations are calculated from this as you mean. Then average is calculated using assumed mean. Following are the steps of this method:

   1. Suppose our items of the data are 'X' and its corresponding frequency is 'f'.

   2. Take any value as assumed mean represented by 'A'.

   3. Find out deviations of items from assumed mean. For that deduct Assumed value from each value of the data. These deviations are represents as 'dx'

   4. Multiply the values of dx with corresponding frequency to find out product denoted by fdx

   5. Find sum of the product so calculated represented by $\Sigma$fdx.

   6. Find out the number of items in the series denoted by n.

   7. Calculate arithmetic mean dividing sum deviations of the observation with the number of observations using following formula:

$$\bar{x} = A + \frac{\sum f dx}{N}$$

Where $\bar{x} = Mean$
A = Assumed Mean
N = Number of items $\sum fdx$ = Sum of product of deviation with frequency.

**Example 4.** *From the following data find out the mean height of the students*.

| Height (in cms.) | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Students | 1 | 6 | 10 | 22 | 21 | 17 | 14 | 5 | 3 | 1 |

**Solution :** Let the Assumed Mean ($A$) be 150

| Height in cms. X | No. of students f | $dX = (X - A)$ $= X - 150$ | $fdX$ |
|---|---|---|---|
| 154 | 1 | 4 | 4 |
| 155 | 6 | 5 | 30 |
| 156 | 10 | 6 | 60 |
| 157 | 22 | 7 | 154 |
| 158 | 21 | 8 | 168 |
| 159 | 17 | 9 | 153 |
| 160 | 14 | 10 | 140 |
| 161 | 5 | 11 | 55 |
| 162 | 3 | 12 | 36 |
| 163 | 1 | 13 | 13 |
| | $\sum f = 100$ | | $\sum fdX = 813$ |

Applying the formula

$$\bar{x} = A + \frac{\sum fdK}{\sum f}$$

We get

$$\bar{x} = 150 + \frac{813}{100}$$
$$= 150 + 8.13$$
$$= 158.13$$

∴ Mean Height $= 158.13$ cm

## 7.6.3 ARITHMETIC MEAN IN CASE OF CONTINUOUS SERIES

Continuous series is also known as Grouped Frequency Series. Under this series

the values of the observation are grouped in various classes with some upper and lower limit. For example classes like 10-20, 20-30, 30-40 and so on. In the class 10-20 lower limit is 10 and upper limit is 20. So all the observations having values between 10 and 20 are put in this class interval. Similar procedure is adopted for all class intervals. The procedure of calculating Arithmetic Mean is continuous series is just like discrete series except that instead of taking values of observations we take mid value of the class interval. The mid value is represented by 'm' and is calculated using following formula:

$$m = \frac{Lower\ Limit + Upper\ Limit}{2}$$

1. **DIRECT METHOD:** In indirect method we multiply the mid values (m) with their respective frequency (f) to find out the the product item (fm). Then we take up sun of the product and divide it with the number of items. Following are the steps

   1. Multiply the mid values (m) with their respective frequency (f) to find out the the product item (fm)
   2. Add up the product so calculated to find $\sum fm$.
   3. Find out the number of items in the series denoted by n.
   4. Calculate arithmetic mean by dividing sum of the product with the number of observations using following formula:

$$\bar{X} = \frac{\sum fm}{N}$$

Where $\bar{X} = Mean$
   N = Number of items $\sum fm$ = Sum of product of observations of mean and frequencies.

**Example 5.** *Calculate the arithmetic mean of the following data :*

| Class Intervals C.I. | 100 − 200 | 200 − 300 | 300 − 400 | 400 − 500 | 500 − 600 | 600 − 70 |
|---|---|---|---|---|---|---|
| f | 4 | 7 | 16 | 20 | 15 | 8 |

**Solution :**

| Class Intervals C.I. | Mid Value m | Frequency f | fm |
|---|---|---|---|
| 100 − 200 | 150 | 4 | 600 |
| 200 − 300 | 250 | 7 | 1750 |
| 300 − 400 | 350 | 16 | 5600 |
| 400 − 500 | 450 | 20 | 9000 |
| 500 − 600 | 550 | 15 | 8250 |

| 600 – 700 | 650 | 8 | 5200 |
|---|---|---|---|
|  |  | $\Sigma f = 70$ | $\Sigma fm = 30{,}400$ |

As $\bar{x} = \dfrac{\Sigma fm}{\Sigma f}$

$\bar{x} = \dfrac{30{,}400}{70}$

$\quad = 434.3$

$\therefore$

2. **SHORT CUT METHOD:** This method of mean is almost similar to calculation in the discrete series but here the assumed mean is selected and then the deviation are taken from mid value of the observations. Following are the steps of this method:
   1. Calculate the Mid Values of the series represented by 'm'.
   2. Take any value as assumed mean represented by 'A'.
   3. Find out deviations of items from assumed mean. For that deduct Assumed value from mid values of the data. These deviations are represents as 'dm'
   4. Multiply the values of dm with corresponding frequency to find out product denoted by fdm
   5. Find sum of the product so calculated represented by $\Sigma$fdm.
   6. Find out the number of items in the series denoted by n.
   7. Calculate arithmetic mean dividing sum deviations of the observation with the number of observations using following formula:

$$\bar{x} = A + \frac{\Sigma fdm}{N}$$

Where $\bar{x} = Mean$
   A = Assumed Mean
   N = Number of items $\Sigma$fdm = Sum of product of deviation from mid values with frequency.

**Example 6.** *Calculate the mean from the following data*

| Daily Wages (Rs.) | 0/100 | 100\|200 | 200\|300 | 300\|400 | 400\|500 | 500\|600 | 600\|700 | 700\|800 | 800\|900 |
|---|---|---|---|---|---|---|---|---|---|
| No. of Workers | 1 | 4 | 10 | 22 | 30 | 35 | 10 | 7 | 1 |

**Solution :** Let the assumed mean, $A = 150$

| Daily Wages (Rs.) C.I. | No. of Workers f | Mid Value m | dm = m − A ( − 150) | fdm |
|---|---|---|---|---|
| 0 − 100 | 1 | 50 | −100 | −100 |
| 100 − 200 | 4 | 150 | 0 | 0 |
| 200 − 300 | 10 | 250 | 100 | 1000 |
| 300 − 400 | 22 | 350 | 200 | 4400 |
| 400 − 500 | 30 | 450 | 300 | 9000 |
| 500 − 600 | 35 | 550 | 400 | 14,000 |
| 600 − 700 | 10 | 650 | 500 | 5000 |
| 700 − 800 | 7 | 750 | 600 | 4200 |
| 800 − 900 | 1 | 850 | 700 | 700 |
| | $\sum f = 120$ | | | $\sum fdm = 38,200$ |

As $\quad \overline{\times} = A + \dfrac{\sum fdm}{\sum f}$

$= 150 + \dfrac{38,200}{120}$

$= 150 + 318.33 = 468.33$

$\overline{\times} = 468.33$

⇒

3. **STEP DEVIATION METHOD:** Step Deviation method is the most frequently used method of finding Arithmetic Mean in case of continuous series. This method is normally used when the class interval of the various classes is same. This method make the process of calculation simple. Following are the steps of this method:

1. Calculate the Mid Values of the series represented by 'm'.
2. Take any value as assumed mean represented by 'A'.
3. Find out deviations of items from assumed mean. For that deduct Assumed value from mid values of the data. These deviations are represents as 'dm'.
4. Find out if all the values are divisible by some common factor 'C' and divide all the deviations with such common factor to find out dm' which is dm/c
5. Multiply the values of dm' with corresponding frequency to find out product denoted by fdm'
6. Find sum of the product so calculated represented by $\sum$fdm'.
7. Find out the number of items in the series denoted by n.
8. Calculate arithmetic mean dividing sum deviations of the observation with the number of observations using following formula:

$\overline{\times} = A + \dfrac{\sum fdm'}{\sum f} \times C$

Where $\overline{\times} = Mean$

A = Assumed Mean

N = Number of items

C = Common Factor

$\sum$fdm' = Sum of product of deviation after dividing with common factors and multiplying it with frequency.

**Example 7.** *Use step deviation method to find $\bar{x}$ for the data given below :*

| *Income (Rs. )* | 1000 − 2000 | 2000 − 3000 | 3000 − 4000 | 4000 − 5000 | 5000 − 6000 | 6000 − 7000 |
|---|---|---|---|---|---|---|
| *No. of Persons* | 4 | 7 | 16 | 20 | 15 | 8 |

**Solution :** Let the assumed mean $A = 4500$

| Income (Rs. ) C. I. | No of Persons $f$ | Mid Value $m$ | $dm = m - A =$ $(m - 4500)$ | $dm' = \dfrac{dm}{C}$ $C = 1000$ | $fdm'$ |
|---|---|---|---|---|---|
| $1000 - 2000$ | 4 | 1500 | $-3000$ | $-3$ | $-12$ |
| $2000 - 3000$ | 7 | 2500 | $-2000$ | $-2$ | $-14$ |
| $3000 - 4000$ | 16 | 3500 | $-1000$ | $-1$ | $-16$ |
| $4000 - 5000$ | 20 | 4500 | $0$ | $0$ | $0$ |
| $5000 - 6000$ | 15 | 5500 | $1000$ | $1$ | $15$ |
| $6000 - 7000$ | 8 | 6500 | $2000$ | $2$ | $16$ |
| | $\sum f = 70$ | | | | $\sum fdm' = -11$ |

As $\bar{x} = A + \dfrac{\sum fdm'}{\sum f} \times C$

$\bar{x} = 4500 + \dfrac{(-11)}{70} \times 1000$

$= 4500 - \dfrac{1100}{7}$

$= 4500 - 157.14$

$= 4342.86$

$\bar{x} = 4342.86$

$\therefore$

**OTHER SPECIAL CASE OF CONTINUOUS SERIES**

**7.6.4 ARITHMETIC MEAN IN CASE OF CUMULATIVE FREQUENCY SERIES:**

The normal continuous series give frequency of the particular class. However, in case of cumulative frequency series, it does not give frequency of particular class rather it gives the total of frequency including the frequency of preceding classes. Cumulative frequency series may be of two types, that are 'less than' type and 'more than' type. For calculating Arithmetic mean in cumulative frequency series, we convert such series into the normal frequency series and then apply the same method as in case of normal series.

### LESS THAN CUMULATIVE FREQUENCY DISTRIBUTION

**Example 8. *Find the mean for the following frequency distribution :***

| Marks Less Than | 10 | 20 | 30 | 40 | 50 | 60 |
|---|---|---|---|---|---|---|
| No. of Students | 5 | 15 | 40 | 70 | 90 | 100 |

**Solution :** Convert the given data into exclusive series :

| Marks C.I. | No. of Students $f$ | Mid Value $m$ | $dm = m - A$ $A = 25$ | $dm' = \dfrac{}{C}$ $C = 10$ | $fdm'$ |
|---|---|---|---|---|---|
| $0 - 10$ | 5 | 5 | $-20$ | $-2$ | $-10$ |
| $10 - 20$ | $15 - 5 = 10$ | 15 | $-10$ | $-1$ | $-10$ |
| $20 - 30$ | $40 - 15 = 25$ | 25 | 0 | 0 | 0 |
| $30 - 40$ | $70 - 40 = 30$ | 35 | 10 | 1 | 30 |
| $40 - 50$ | $90 - 70 = 20$ | 45 | 20 | 2 | 40 |
| $50 - 60$ | $100 - 90 = 10$ | 55 | 30 | 3 | 30 |
|  | $\Sigma f = 100$ |  |  |  | $\Sigma fdm' = 80$ |

As    $\overline{x} = A + \dfrac{\Sigma fdm'}{\Sigma f} \times C$

$\overline{x} = 25 + \dfrac{80}{100} \times 10 = 33$

$\overline{x} = 33$

$\Rightarrow$

$\Rightarrow$

### MORE THAN CUMULATIVE FREQUENCY DISTRIBUTION

**Example 9. *Find the mean for the following frequency distribution***

| Marks More Than | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of Students | 80 | 77 | 72 | 65 | 55 | 43 | 28 | 16 | 10 | 8 |

**Solution :** Convert the given data into exclusive series

| Marks C.I. | No. of Students ƒ | Mid Value | $dm = m - A$ $A = 55$ | $dm' = \dfrac{dm}{C}$ $C = 10$ | ƒdm' |
|---|---|---|---|---|---|
| $0 - 10$ | $80 - 77 = 3$ | 5 | $-50$ | $-5$ | $-15$ |
| $10 - 20$ | $77 - 72 = 5$ | 15 | $-40$ | $-4$ | $-20$ |
| $20 - 30$ | $72 - 65 = 7$ | 25 | $-30$ | $-3$ | $-21$ |
| $30 - 40$ | $65 - 55 = 10$ | 35 | $-20$ | $-2$ | $-20$ |
| $40 - 50$ | $55 - 43 = 12$ | 45 | $-10$ | $-1$ | $-12$ |
| $50 - 60$ | $43 - 28 = 15$ | 55 | 0 | 0 | 0 |
| $60 - 70$ | $28 - 16 = 12$ | 65 | 10 | 1 | 12 |
| $70 - 80$ | $16 - 10 = 6$ | 75 | 20 | 2 | 12 |
| $80 - 90$ | $10 - 8 = 2$ | 85 | 30 | 3 | 6 |
| $90 - 100$ | 8 | 95 | 40 | 4 | 32 |
|  | $\sum f = 80$ |  |  |  | $\sum ƒdm' = -26$ |

As $\quad \overline{x} = A + \dfrac{\sum ƒdm'}{\sum f} \times C$

$\overline{x} = 55 + \dfrac{(-26)}{80} \times 10$

$= 55 - \dfrac{13}{4}$

$= \dfrac{220 - 13}{4}$

$= \dfrac{207}{4} = 51.75$

$\overline{x} = 51.75$

$\therefore$

$\Rightarrow$

**7.6.5 ARITHMETIC MEAN IN CASE OF UNEQUAL CLASS INTERVAL SERIES:**

Sometime the class interval between two classes is not same, for example 10-20, 20-40 etc. These series are known as unequal class interval series. However, it does not affect the finding of arithmetic mean as there is not precondition of equal class interval in case of arithmetic mean. So, mean will be calculated in usual manner.

**Example 10.** *Calculate* $\overline{x}$ *if the data is given below :*

| C.  . | $4 - 8$ | $8 - 20$ | $20 - 28$ | $28 - 44$ | $44 - 68$ | $68 - 80$ |
|---|---|---|---|---|---|---|
| ƒ | 3 | 8 | 12 | 21 | 10 | 6 |

**Solution :**

| C. I. | f | Mid Value $m$ | $dm = m - A$ $A = 26$ | $fdm$ |
|-------|---|---------------|----------------------|-------|
| $4 - 8$ | 3 | 6 | $-20$ | $-60$ |
| $8 - 20$ | 8 | 14 | $-12$ | $-96$ |
| $20 - 28$ | 12 | 24 | $-2$ | $-24$ |
| $28 - 44$ | 21 | 36 | $+10$ | 210 |
| $44 - 68$ | 10 | 56 | $+30$ | 300 |
| $68 - 80$ | 6 | 74 | $+48$ | 288 |
| | $\sum f = 60$ | | | $\sum fdm = 618$ |

As $\quad \overline{x} = A + \dfrac{\sum fdm}{\sum f}$

$\overline{x} = 26 + \dfrac{618}{60}$

$= 26 + 10.3 = 36.3$

$\overline{x} = 36.3$

$\Rightarrow$

$\Rightarrow$

## 7.6.6 COMBINED ARITHMETIC MEAN:

Sometime we have the knowledge of mean of two or more series separately but we are interested in finding the mean that will be obtained by taking all these series as one series, such mean is called combined mean. It can be calculated using the following formula.

$$\overline{X_{12}} = \frac{N_1 \overline{X_1} + N_2 \overline{X_2}}{N_1 + N_2}$$

Where $\quad N_1 =$ Number of items in first series

$N_2 =$ Number of of items in second series

$\overline{X_1} =$ Mean of first series

and $\quad \overline{X_2} =$ Mean of second series

**Example 11.** *Find the combined mean for the following data*

| | Firm A | Firm B |
|--|--------|--------|
| No. of Wage Workers | 586 | 648 |
| Average Monthly Wage $(Rs.)$ | 52.5 | 47.5 |

**Solution :** Combined mean wage of all the workers in the two firms will be

$$\overline{X_{12}} = \frac{N_1 \overline{X_1} + N_2 \overline{X_2}}{N_1 + N_2}$$

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Where   $N_1 =$ Number of workers in Firm $A$

$N_2 =$ Number of workers in Firm $B$

$\overline{X_1} =$ Mean wage of workers in Firm $A$

and   $\overline{X_2} =$ Mean wage of workers in Firm $B$

We are given that

$N_1 = 586$   $N_2 = 648$

$\overline{X_1} = 52.5$   $\overline{X_2} = 47.5$

$\therefore$ Combined Mean, $\overline{X_{12}}$

$= \dfrac{(586 \times 52.5) + (648 \times 47.5)}{586 + 648}$

$= \dfrac{61{,}545}{1234}$

$= Rs.\, 49.9$

## 7.6.7 CORRECTING INCORRECT MEAN

Many a time it happens that we take some wrong items in the data or overlook some item. This results in wrong calculation of Mean. Later we find the correct values and we want to find out correct mean. This can be done using the following steps:

1. Multiply the incorrect mean of the data (incorrect $\overline{x}$) with number of items to find out incorrect $\sum \overline{x}$.

2. Now subtract all the wrong observation from the above values and add the correct observation to the above value to find out correct $\sum \overline{x}$. 3. Now divide the correct $\sum \overline{x}$ with the number of observations to find correct mean.

**Example12.** *Mean wage of* $100$ *workers per day found to be* $75$**.** *But later on it was found that the wages of two labourers* $Rs.\,98$ *and* $Rs.\,69$ *were misread as* $Rs.\,89$ *and* $Rs.\,96$**.**

*Find out the correct mean wage*.

**Solution :** We know that

Correct $\sum X =$ Incorrect $\sum X -$ (Incorrect items) $+$ (Correct Items)

Also $\overline{X} = \dfrac{\sum K}{N}$

$\Rightarrow$   Incorrect $\sum X = 100 \times 75 = 7500$

$\therefore$   Correct $\sum X = 7500 - (89 + 96) + (98 + 69)$

$= 7482$

$\Rightarrow$   Correct $\overline{X} = \dfrac{\text{Correct} \sum K}{N}$

$= \dfrac{7482}{100}$

$= 74.82$

### DETERMINATION OF MISSING FREQUENCY

**Example 13.** *Find the missing frequencies of the following series, if* $\overline{X} = 33$ *and* $N = 100$

| X | 5 | 15 | 25 | 35 | 45 | 55 |
|---|---|----|----|----|----|----|
| $f$ | 5 | 10 | ? | 30 | ? | 10 |

**Solution :** Let the missing frequencies corresponding to X $=$ 25 and X $=$ 45 be '$f_1$' and '$f_2$' respectively.

| X | $f$ | $fX$ |
|---|-----|------|
| 5 | 5 | 25 |
| 15 | 10 | 150 |
| 25 | $f_1$ | $25f_1$ |
| 35 | 30 | 1050 |
| 45 | $f_2$ | $45f_2$ |
| 55 | 10 | 550 |
| | $\sum f = 55 + f_1 + f_2$ | $\sum fX = 1775 + 25f_1 + 45f_2$ |

Now,  $N = 100$   (Given)

$$55 + f_1 + f_2 = 100$$

$$f_1 + f_2 = 45$$

$$\overline{X} = \frac{\sum fK}{N}$$

$\therefore$

$\Rightarrow$ ...(i)

Also

$\Rightarrow$  $33 = \frac{1775 + 25f_1 + 45f_2}{100}$

$3300 = 1775 + 25f_1 + 45f_2$

$\Rightarrow$

$\Rightarrow$  $25f_1 + 45f_2 = 1525$   ...(ii)

Solving (i) and (ii), we get

$$25 \times (f_1 + f_2 = 45) \qquad \Rightarrow 25f_1 + 25f_2 = 1125$$

$$1 \times (25f_1 + 45f_2 = 1525) \quad \Rightarrow 25f_1 + 45f_2 = 1525$$

$$\overline{\quad (-)(-) \quad\; (-) \quad}$$

$$-20f_2 = -400$$

$$f_2 = \frac{400}{20} = 20$$

$$\therefore \qquad f_2 = 20$$

Put $\qquad f_2 = 20$ in (i) $f_1$

$$+\, 20 = 45$$

$$\Rightarrow \qquad f_1 = 45 - 20 = 25$$

$$\therefore \qquad f_1 = 25$$

$$\therefore \qquad f_1 = 25, f_2 = 20$$

## 7.6.8 PROPERTIES OF ARITHMETIC MEAN

1. If we take the deviations of the observations from its Arithmetic mean and then sum up such deviations, then sum of such deviations will always be zero.
2. If we take the square of the deviations of items from its Arithmetic mean and then sum up such squares, the value obtained will always be less than the square of deviation taken from any other values.
3. If we have separate mean of two series, we can find the combined mean of the series.
4. If the value of all items in that data is increased or decreased by some constant value say 'k', then the Arithmetic mean is also increased or decreased by same 'k'. In other words if k is added to the items then actual mean will be calculated by deducting that k from the mean calculated.
5. If value of all items in the series is divided or multiplied by some constant 'k' then the mean is also multiplied or divided by the same constant 'k'. In other words if we multiply all observations by 'k' then actual mean can be calculated by dividing the mean to obtained by the constant 'k'.

## 7.6.9 MERITS OF ARITHMETIC MEAN

1. Arithmetic mean is very simple to calculate and it is also easy to understand.
2. It is most popular method of calculating the average.
3. Arithmetic mean is rigidly defined means it has a particular formula for calculating the mean.
4. Arithmetic mean is comparatively less affected by fluctuation in the sample.
5. It is most useful average for making comparison.
6. We can perform further treatment on Arithmetic mean.
7. We need not to have grouping of items for calculating Arithmetic mean. 8. Arithmetic mean is based on all the values of the data.

## 7.6.10 LIMITATIONS OF ARITHMETIC MEAN

1. The biggest limitation of Arithmetic mean is that it is being affected by extreme values.
2. If we have open end series, it is difficult to measure Arithmetic mean.
3. In case of qualitative data it is not possible to calculate Arithmetic mean.
4. Sometime it give absurd result like we say that there are 20 students in one class and 23 students in other class then average number of students in a class is 21.5, which is not possible because student cannot be in fraction.
5. It gives more importance to large value items than small value items.
6. Mean cannot be calculated with the help of a graph. 7. It cannot be located by just inspections of the items.

## 7.7 TEST YOUR UNDERSTANDING (A)

1. Following data pertains to the monthly salaries in rupees of the employees of a Mohanta Enterprises . Calculate the average salary per employ

    , 4100 , 4700 , 5400 , 2300 , 3400, 3700, 5100 , 5300 , 4700

2. Calculate mean for the following data using the shortcut method . 700 , 650 , 550, 750, 800 , 850, 650, 700 , 950

3. Following is the height of students of class tenth of a school. Find out the mean height of the students .

| Height in Inches | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 |
|---|---|---|---|---|---|---|---|---|---|---|
| No.of students | 1 | 6 | 10 | 22 | 21 | 17 | 14 | 5 | 3 | 1 |

4. Calculate A.M for the following frequency distribution of Marks .

| Marks | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
|---|---|---|---|---|---|---|---|---|
| No of students | 5 | 7 | 9 | 10 | 8 | 6 | 5 | 2 |

5. Calculate mean for the following data

| Marks | 5-15 | 15-25 | 25-35 | 35-45 | 45-55 | 55-65 |
|---|---|---|---|---|---|---|
| No of Students | 8 | 12 | 6 | 14 | 7 | 3 |

6. Calculate mean for the given data by step deviation method

| C.I | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 |
|---|---|---|---|---|---|---|---|
| f | 8 | 12 | 14 | 16 | 15 | 9 | 6 |

7. From the following data , find the average sale per shop .

| Sales in '000; units | 10-12 | 13-15 | 16-18 | 19-21 | 22-24 | 25-27 | 28-30 |
|---|---|---|---|---|---|---|---|
| No. shops | 34 | 50 | 85 | 60 | 30 | 15 | 7 |

8. For the following data ( Cumulative Series) , find the average income .

| Income Below in ( Rs.) | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|
| No. of persons | 16 | 36 | 61 | 76 | 87 | 95 | 100 |

9. Calculate the average marks for the following cumulative frequency distribution .

| Marks Above | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
|---|---|---|---|---|---|---|---|---|---|---|
| No of students | 80 | 77 | 72 | 65 | 55 | 43 | 28 | 16 | 10 | 8 |

10. For a group of 50 male workers, their average monthly wage Rs.6300 and for a group of 40 female workers this average is Rs.5400 . Find the average monthly wage for the combined group of all the workers.

11. The average marks of 100 students is given to be 45 . But later on it was found that the marks of students getting 64 was misread as 46 . Find the correct mean.

12. Find missing frequency when mean is 35 and number is 68.

X; 0-10  10-20 20-30 30-40 40-50 50-60

F:     4      10    12    ?     20    ?

13. The mean age of combined group of men and women is 30 years. The mean age of group of men is 32 years and women is 27 years. Find the percentage of men and women in the group

**Answers**

1) **4170**
2) **733.30**
3) **68.13 inches**
4) **20.48**
5) **31.8**
6) **33.625**
7) **17.8 (in 000 units)**
8) **48**
9) **51.75**
10) **5900**
11) **45.18**
12) **10,12**
13) **Men 60%**

**7.8 GEOMETRIC MEAN:**

Some time we deal with such quantities or items that change over a period of time. In that case we are interested in finding the rate of change in the item over the period of time. In other words we can say that we are interested in finding the rate of growth or rate of decline in the item. For example we want to know average rate of growth in the population, growth in national income of the country or annual decline rate in the value of machinery etc. In that case the most appropriate measure of average is geometric mean. The geometric mean is represented by G.M. we can define Geometric mean as:

" *Geometric mean of N items is root nth of the product of item*" Symbolically we can write Geometric mean as:

$$G.M. = \sqrt[N]{X_1 \times X_2 \times X_3 \times \ldots\ldots\ldots X_N}$$

Where $G.M. = Geometric\ Mean$

$N$ = Number of items

$X_1, X_2, X_3 \ldots\ldots\ldots\ldots$ = Various items or observations.

### 7.8 .1 GEOMETRIC MEAN IN INDIVIDUAL SERIES

Following are the steps for calculating Geometric mean in the individual series

1. Take the logarithm of all the values.
2. Find the sum of the values after taking the logarithm.
3. Divide the sum with number of items.
4. Find out antilogarithm of the resultant figure.

$$\text{Geometric Mean or } G.M. = \text{Antilog}\left(\frac{\sum \log X}{N}\right)$$

**Example 14.** *Calculation geometric mean for the data given below*

| 7.7 CHECK YOUR UNDERSTANDING (A) | | | | | |
|---|---|---|---|---|---|
| | | | | | |

**Solution :**

| X | log X | |
|---|---|---|
| 60 | log 60 | 1.7782 |
| 75 | log 75 | 1.8751 |
| 90 | log 90 | 1.9542 |
| 90 | log 90 | 1.9542 |
| 90 | log 90 | 1.9542 |
| $N = 5$ | | $\sum \log X = 9.5159$ |

As   Geometric Mean, $G = \text{Antilog} \left( \frac{\sum \log K}{N} \right)$

$G = \text{Antilog} \left( \frac{9.5159}{5} \right)$

$= \text{Antilog}(1.9032) = 80$

$\Rightarrow \quad G = 80$

## 7.8.2 GEOMETRIC MEAN IN DISCRETE SERIES

Following are the steps for calculating Geometric mean in the individual series
1. Take the logarithm of all the values.
2. Multiply the logarithm with the corresponding frequency of the items.
3. Find the sum of the prodcut.
4. Divide the sum with number of items.
5. Find out antilogarithm of the resultant figure.

$$\text{Geometric Mean or } G.M = \text{Antilog} \left( \frac{\sum f \log X}{N} \right)$$

**Example 15. *Find G, the geometric mean, for the following data***

| X | 15 | 25 | 35 | 45 | 55 |
|---|----|----|----|----|----|
| f | 5  | 10 | 15 | 7  | 4  |

**Solution :**

| X | f | log X | | f log X |
|---|---|-------|--------|---------|
| 15 | 5 | log 15 | 1.1761 | 5.8805 |
| 25 | 10 | log 25 | 1.3979 | 13.9790 |
| 35 | 15 | log 35 | 1.5441 | 23.1615 |
| 45 | 7 | log 45 | 1.6532 | 11.5724 |
| 55 | 4 | log 55 | 1.7404 | 6.9616 |
| | $\sum f = N = 41$ | | | $\sum f \log X = 61.5550$ |

As   Geometric Mean, $G = \text{Antilog} \left( \frac{\sum f \log K}{N} \right)$

$\therefore \quad G = \text{Antilog} \left( \frac{61.5550}{41} \right)$

$= \text{Antilog}(1.5013) = 31.72$

$G = 31.72$

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### 7.8.3 GEOMETRIC MEAN IN DISCRETE SERIES

Finding G.M. in the continuous series is same as in case of discrete series except that we have to find the mid values of the class intervals. Rest all the steps are same. Following are the steps for calculating Geometric mean in the individual series

1.  Find mid values of each class interval.
2.  Take the logarithm of all the mid values.
3.  Multiply the logarithm with the corresponding frequency of the items.
4.  Find the sum of the product.
5.  Divide the sum with number of items.
6.  Find out antilogarithm of the resultant figure.

$$\text{Geometric Mean or } G.M = \text{Antilog}\left(\frac{\Sigma f \log X}{N}\right)$$

**Example 16.** *Find GM*

| C. I. | $1.5 - 2.5$ | $2.5 - 3.5$ | $3.5 - 4.5$ | $4.5 - 5.5$ | $5.5 - 6.5$ |
|-------|-------------|-------------|-------------|-------------|-------------|
| $f$   | 10          | 15          | 7           | 18          | 12          |

**Solution :**

| C. I. | $f$ | Mid Value $x$ | $\log x$ | $f \log x$ |
|-------|-----|---------------|----------|------------|
| $1.5 - 2.5$ | 10 | 2 | 0.3010 | 3.0100 |
| $2.5 - 3.5$ | 15 | 3 | 0.4771 | 7.1565 |
| $3.5 - 4.5$ | 7 | 4 | 0.6021 | 4.2147 |
| $4.5 - 5.5$ | 18 | 5 | 0.6990 | 12.5820 |
| $5.5 - 6.5$ | 12 | 6 | 0.7782 | 9.3384 |
| | $\Sigma f = N = 62$ | | | $\Sigma f \log x = 36.3016$ |

As $\quad G = \text{Antilog}\left(\frac{\Sigma f \log K}{\Sigma f}\right)$

$\quad G = \text{Antilog}\left(\frac{36.3016}{62}\right)$

$\quad = \text{Antilog}(0.5855) = 3.850$

$\quad G = 3.850$

### 7.8.4 MERITS OF GEOMETRIC MEAN.
1. Geometric mean is rigidly defined.
2. It is very suitable for calculating growth or decline rate.
3. Its calculation is based on all the items under observation.
4. Further mathematical treatment can be applied to it.
5. Like Arithmetic mean shows biasness for higher values, Geometric mean shows business for lower values which is useful in many situations like price analysis.
6. It is comparatively less affected by Extreme value. 7. It does not change much with the change in sample.

### 7.8.5 DEMERITS OF GEOMETRIC MEAN
1. It is comparatively difficult to calculate.
2. It is also difficult to understand and interpret .
3. It cannot be calculated if negative values are present in the series.
4. Even if a single observation is zero in the series the geometric mean becomes zero.

### 7.9 HARMONIC MEAN

Harmonic mean is a average that is used for finding average rate like we are interested in finding the average speed of the vehicle or we know that three persons take 10, 12 and 14 hours to complete a work individually and we are interested in finding average time. In this case there is reciprocal relation between the time taken and speed of the work, more is the time taken by the person less is the speed and less is the time taken by the person more is the speed. In these situations we can use harmonic mean. In harmonic mean we give more weightage to smaller items and less weightage to larg items. it is most useful measure of Central tendency for calculating the ratio. Harmonic mean can be defined as

*"It is reciprocal of Arithmetic mean of reciprocal of the observations."* Mathematically we can write Harmonic Mean as

$$Harmonic\ Mean\ or\ H.M. = \frac{N}{\Sigma\left(\frac{1}{X}\right)}$$

Where $H.M. = Harmonic\ Mean$
N = Number of items $\Sigma X$
= Sum of observation.

### 7.9.1 HARMONIC MEAN IN INDIVIDUAL SERIES
 Following are the steps for calculating Geometric mean in the individual series
1. Take the reciprocal of all the values.
2. Find the sum of the reciprocal of the values.
3. Find the arithmetic mean of sum of reciprocal.

4. Reciprocal to the arithmetic mean so calculated is Harmonic Mean to the data.

$$Harmonic\ Mean\ or\ H.M. = \frac{N}{\Sigma\left(\frac{1}{X}\right)}$$

**Example 17.** *Find the* $H.M.$ *for the data given below :*

| X | 35 | 45 | 89 | 87 | 66 | 76 | 110 | 135 |
|---|----|----|----|----|----|----|-----|-----|

**Solution :**

| X | $\dfrac{1}{X}$ |
|---|----|
| 35 | 0.0286 |
| 45 | 0.0222 |
| 89 | 0.0112 |
| 87 | 0.0115 |
| 66 | 0.0151 |
| 76 | 0.0131 |
| 110 | 0.0091 |
| 135 | 0.0074 |
| $N = 8$ | $\Sigma\left(\dfrac{1}{X}\right) = 0.1184$ |

As   Harmonic Mean, $H.M. = \dfrac{N}{\Sigma\left(\frac{1}{X}\right)}$

$$= \frac{8}{0.1184} = 67.57$$

$\therefore$   $H.M. = 67.57$

## 7.9.2 HARMONIC MEAN IN DISCRETE SERIES

Following are the steps for calculating Geometric mean in the individual series
1. Take the reciprocal of all the values.
2. Multiply the reciprocal with corresponding frequencies to find product.
3. Find the sum of the product of reciprocals and frequencies.
4. Find the arithmetic mean of sum of reciprocal.
5. Reciprocal to the arithmetic mean so calculated is Harmonic Mean to the data.

$$Harmonic\ Mean\ or\ H.M. = \frac{N}{\Sigma\left(f \times \frac{1}{X}\right)}$$

**Example 18.** *Find H. M.*

| X | 20 | 50 | 55 | 65 |
|---|----|----|----|----|
| f | 10 | 20 | 15 | 10 |

**Solution :**

| X | f | 1/X | $\dfrac{f}{X}$ |
|---|---|-----|----------------|
| 20 | 10 | 1/20 | $^{10}/20 = 0.5$ |
| 50 | 20 | 1/50 | $^{20}/50 = 0.4$ |
| 55 | 15 | 1/55 | $^{15}/55 = 0.2727$ |
| 65 | 15 | 1/65 | $^{15}/65 = 0.2308$ |
| | $\Sigma f = N = 60$ | | $\Sigma\left(\dfrac{f}{X}\right) = 1.4035$ |

As  Harmonic Mean, $H.M. = \dfrac{N}{\Sigma\left(\frac{1}{X}\right)}$

$$= \frac{60}{1.4035} = 42.75$$

∴   $H.M. = 42.75$

## 7.9.3 HARMONIC MEAN IN CONTINUOUS SERIES

Calculation of Harmonic mean in continuous and discrete series is almost same except that in continuous series we take mean value of the class intervals. Following are the steps for calculating Geometric mean in the individual series

1. Find mid value of each class.
2. Take the reciprocal of all the mid values.
3. Multiply the reciprocal with corresponding frequencies to find product.
4. Find the sum of the product of reciprocals and frequencies.
5. Find the arithmetic mean of sum of reciprocal.
6. Reciprocal to the arithmetic mean so calculated is Harmonic Mean to the data.

$$Harmonic\ Mean\ or\ H.M. = \frac{N}{\Sigma\left(f \times \frac{1}{X}\right)}$$

**Example 19.** *Find Harmonic mean, if the data is given as*

| C.I. | 0 − 100 | 100 − 200 | 200 − 300 | 300 − 400 | 400 − 500 |
|------|---------|-----------|-----------|-----------|-----------|
| f    | 2       | 7         | 13        | 5         | 3         |

**Solution :**

| C.I. | f | Mid Value $x$ | $\frac{f}{x}$ |
|------|---|---------------|---------------|
| 0 − 100 | 2 | 50 | 0.040 |
| 100 − 200 | 7 | 150 | 0.0467 |
| 200 − 300 | 13 | 250 | 0.052 |
| 300 − 400 | 5 | 350 | 0.0143 |
| 400 − 500 | 3 | 450 | 0.0067 |
| | $\Sigma f = N = 30$ | | $\Sigma\left(\frac{f}{x}\right) = 0.1597$ |

As   Harmonic Mean, $H.M. = \dfrac{N}{\Sigma\left(\frac{f}{x}\right)}$

$$= \frac{30}{0.1597} = 180.79$$

∴   $H.M. = 180.79$

## 7.9.4 MERITS OF HARMONIC MEAN

1. Harmonic mean is rigidly defined.
2. Its calculation is based on all observations.
3. Further algebraic treatment can be applied on it.
4. It is not affected by fluctuation in the sampling.
5. In the problem related to time and work, time and speed etc, this is the best average to measure central tendency.

## 7.9.5 LIMITATIONS OF HARMONIC MEAN

1. This is least understood average.
2. Calculation of reciprocal values is not easy task.
3. More weightage is given to small items and big items get lesser weightage. 4. If observation has zero or negative value , it cannot be calculated.

## 7.10 TEST YOUR UNDERSTANDING (B)

1. Find Geometric Mean

| X | 10 | 110 | 35 | 120 | 50 | 59 | 60 | 7 |
|---|----|-----|----|-----|----|----|----|---|

2. It arithmetic mean of data is 12.5 and G.M. is 10 find the difference between the items.

3. Calculate G.M.

| X | 10 | 15 | 18 | 25 |
|---|----|----|----|----|
| f | 2 | 3 | 5 | 4 |

4. Find G.M from the following data

| X | 3834 | 382 | 63 | 9 | .4 | .009 | .0005 |
|---|------|-----|----|----|----|------|-------|

5. Find the G.M of 2, 4 and 8 and prove it is less than A.M

6. Find G.M

| C. I. | $0 - 10$ | $10 - 20$ | $20 - 30$ | $30 - 40$ | $40 - 50$ |
|-------|----------|-----------|-----------|-----------|-----------|
| f | 4 | 8 | 10 | 6 | 7 |

7. Find H.M.

| X | 10 | 20 | 40 | 60 | 120 |
|---|----|----|----|----|-----|

8. Calculate H.M.

| X | 10 | 20 | 25 | 40 | 50 5 |
|---|----|----|----|----|------|
| f | 20 | 30 | 50 | 15 | |

9. Find H.M from the following data

| X | 3834 | 382 | 63 | .8 | .4 | .03 | .009 | .0005 |
|---|------|-----|----|----|----|-----|------|-------|

10. Find H.M

| C. I. | $10 - 20$ | $20 - 30$ | $30 - 40$ | $40 - 50$ | $50 - 60$ |
|-------|-----------|-----------|-----------|-----------|-----------|

| f | 4 | 6 | 10 | 7 | 3 |
|---|---|---|---|---|---|

**Answers**

1) **46.56**
2) **15**
3) **18.2**
4) **1.609**
6) **22.06**
7) **25**
8) **20.08**
9) **0.00373**
10) **29.88**

## 7.11 MEDIAN

Median is the positional measure of Central tendency. It means the median does not depend upon the value of the item under the observation, rather it depend on the position of the item in the series. Median is a value that divide the series exactly in two equal parts, it means 50% of the observation lies below the median and 50% of the observations lies above the median. However, it is important to arrange the series either in ascending order or in descending order before calculation of Median. If series is not arranged, than Median cannot be calculated
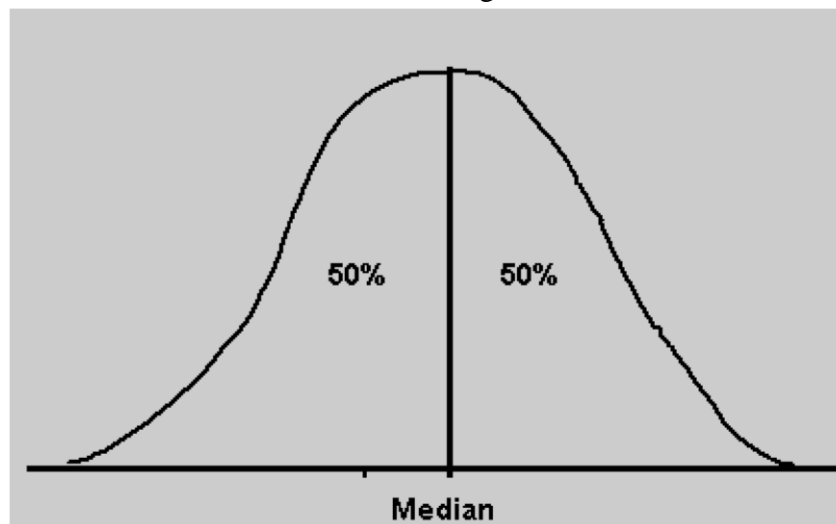


**For calculating Median**

| 1. Series should be in ascending or descending order. |
| 2. Series should be exclusive, not inclusive. |

### 7.11.1 MEDIAN IN CASE OF INDIVIDUAL SERIES.

For calculating the median in individual series, following are the steps:

1. Arrange the series in ascending or descending order.
2. Calculate the number of observations. It is denoted by N.
3. Calculate the $\left(\frac{N+1}{2}\right)^{th}$ term
4. Corresponding value to this item is the median of the data
5. In case there are even number of items in the series, this value will be in fraction. In that case take the arithmetic mean of the adjacent items in which Median is falling. For example if it is 4.5 than take arithmetic mean of 4$^{th}$ item and 5$^{th}$ item.

$$\textbf{Median = value of } \left(\frac{N+1}{2}\right)^{th} \textbf{term}$$

**When the number of observations $N$ is odd**

**Example 20.** *Calculation median from the following observations* :

$$15, 17, \ 19, \ 22, \ 18, \ 47, \ 25, \ 35, \ 21$$

**Solution :** Arranging the given items in ascending order, we get

$$15, 17, 18, 19, 21, 22, 25, 35, 47$$

Now    Median, $M = $ Size of $\left(\frac{N+1}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\frac{9+1}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 5^{th} \text{ item}$$

$$= 21$$

$\Rightarrow \quad = 21$

**When the number of observation $N$ is even**

**Example 21.** *Find median from the following data*

$$28, 26, \ 24, \ 21, \ 23, \ 20, \ 19, \ 30$$

**Solution :** Arranging the given figures in ascending order, we get

$$20, \ 21, \ 23, \ 24, \ 26, \ 28, \ 30\underset{\cdot}{1}9,$$

Now    Median, $M = $ Size of $\left(\frac{N+1}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\frac{8+1}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 4.5^{th} \text{item}$$

$$= \frac{4^{th}\text{item} + 5^{th}\text{item}}{2}$$

$$= \frac{23+24}{2} = \frac{47}{2} = 23.5$$

$\Rightarrow \quad M = 23.5$

## 7.11.2 MEDIAN IN CASE OF DISCRETE SERIES

Following are the steps in case of discrete series:

1. Arrange the data in ascending or descending order.
2. Find the cumulative frequency of the series.
3. Find the $\left(\frac{N+1}{2}\right)^{th}$ term
4. Now look at this term in the cumulative frequency of the series.
5. Value against which such cumulative frequency falls is the median value.

$$\textbf{Median = value of } \left(\frac{N+1}{2}\right)^{th} \textbf{ term}$$

**Example 22.** *Calculate the value of median, if the data is as given below* :

| Height (in cms.) | 110 | 125 | 250 | 200 | 150 | 180 |
|---|---|---|---|---|---|---|
| No. of Students | 8 | 12 | 3 | 10 | 13 | 15 |

**Solution :** Arranging the given data in ascending order, we get

| Height (in cms.) | No. of Students $f$ | Cumulative Frequency $C \cdot f$ |
|---|---|---|
| 110 | 8 | 8 (1 – 8) |
| 125 | 12 | 20 (9 – 20) |
| 150 | 13 | 33 (21 – 33) |
| 180 | 15 | 48 (34 – 48) |
| 200 | 10 | 58 (49 – 58) |
| 250 | 3 | 61 (59 – 61) |
| | $\Sigma f = N = 61$ | |

Now    Median, $M = $ Size of $\left(\frac{N+1}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\frac{6+1}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 31^{st} \text{ item}$$

$$= \quad 150 \quad \Rightarrow$$

Median, $M = 150$ cms.

## 7.11.3 MEDIAN IN CASE OF CONTINUOUS SERIES

Following are the steps in case of continuous series:

1. Arrange the data in ascending or descending order.
2. Find the cumulative frequency of the series.
3. Find the $\left(\frac{N}{2}\right)^{th}$ term
4. Now look at this term in the cumulative frequency of the series. The value equal to or higher than term calculated in third step is the median class.
5. Find median using following formula.

$$M = L + \frac{\frac{N}{2} - C \cdot f}{f} \times i$$

Where M = Median

L = Lower Limit of Median Class

N = Number of Observations.

c.f. = Cumulative frequency of the Median Class. f
= Frequency of the class preceeding Median Class. i
= Class interval of Median Class

### Example 23. *Calculate Median*

| Marks | $5-10$ | $10-15$ | $15-20$ | $20-25$ | $25-30$ | $30-35$ |
|---|---|---|---|---|---|---|
| No. of Students | 8 | 7 | 14 | 16 | 9 | 6 |

**Solution :**

| C.I. | No. of Students<br>f | Cumulative Frequency<br>$C \cdot f$ |
|---|---|---|
| $5-10$ | 8 | 8 $(1-8)$ |
| $10-15$ | 7 | 15 $(9-15)$ |
| $15-20$ | 14 | 29 $(16-29)$ |

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| | | |
|---|---|---|
| 20 − 25 | 16 | 45 (30 − 45) |
| 25 − 30 | 9 | 54 (46 − 54) |
| 30 − 35 | 6 | 60 (55 − 60) |
| | $\Sigma f = N = 60$ | |

Median, $M = $ Size of $\left(\dfrac{N}{2}\right)^{th}$ item

$M = $ Size of $\left(\dfrac{60}{2}\right)^{th}$ item

$= $ Size of $30^{th}$ item

$\Rightarrow$ Median lies in the class interval $20 − 25$

As Median, $M = L + \dfrac{\frac{N}{2} - C \cdot f}{f} \times i$

Here $L = $ Lower limit of the median class $= 20$

$N = 60 \quad C \cdot f = 29 \quad f = 16 \quad i = $ Class −

length of the median class$= 5$

$\therefore \quad M = 20 + \dfrac{(30-29)}{16} \times 5$

$= 20 + \dfrac{5}{16}$

$= 20 + 9.312 = 29.312$

$\Rightarrow \quad M = 29.312$

**Inclusive Series** − It must be converted to Exclusive Series before calculation of the Median.

**Example 24.** *Find Median from the given data*

| X | 10 − 19 | 20 − 29 | 30 − 39 | 40 − 49 | 50 − 59 | 60 − 69 | 70 − 79 | 80 − 89 |
|---|---|---|---|---|---|---|---|---|
| f | 6 | 53 | 85 | 56 | 21 | 16 | 4 | 4 |

**Solution :** Converting the given data into exclusive form, we get

$$\left[\text{Correction factor} = \dfrac{L_2 - U_1}{2} = \dfrac{20 - 19}{2} = \dfrac{1}{2} = 0.5\right]$$

(0.5 is subtracted from all lower limits and added to all upper limits)

| X | f | Cumulative frequency C·f | |
|---|---|---|---|
| 9.5 – 19.5 | 6 | 6 | (1 – 6) |
| 19.5 – 29.5 | 53 | 59 | (7 – 59) |
| 29.5 – 39.5 | 85 | 144 | (60 – 144) |
| 39.5 – 49.5 | 56 | 200 | (145 – 200) |
| 49.5 – 59.5 | 21 | 221 | (201 – 221) |
| 59.5 – 69.5 | 16 | 237 | (222 – 237) |
| 69.5 – 79.5 | 4 | 241 | (238 – 241) |
| 79.5 – 89.5 | 4 | 245 | (242 – 245) |
| | $\sum f = N = 245$ | | |

Median, $M = $ Size of $\left(\frac{N}{2}\right)^{th}$ item

$M = $ Size of $\left(\frac{245}{2}\right)^{th}$ item

$= $ Size of $122.5^{th}$ item

∴ The real class limits of the median class $= (29.5 - 39.5)$

So $M = L + \dfrac{\left(\frac{N}{2} - C \cdot f\right)}{f} \times i$

⇒ $M = 29.5 + \left(\dfrac{122.5 - 59}{85}\right) \times 10$

$= 29.5 + \left(\dfrac{63.5}{85} \times 10\right)$

$= 29.5 + \left(\dfrac{635}{85}\right)$

$= 29.5 + 7.47 = 36.97$

$M = 36.97$

⇒

**Cumulative Series (More than and Less than)**

**Example 25.** *Find median, if the data is as given below* :

| Marks More than | 20 | 35 | 50 | 65 | 80 | 95 |
|---|---|---|---|---|---|---|
| No. of Students | 100 | 94 | 74 | 30 | 4 | 1 |

**Solution :** Converting the given data into class – interval form, we get

| Marks<br>C.I. | Frequency $f$ | Cumulative Frequency<br>$C \cdot f$ | |
|---|---|---|---|
| $20 - 35$ | $100 - 94 = 6$ | 6 | $(1 - 6)$ |
| $35 - 50$ | $94 - 74 = 20$ | 26 | $(7 - 26)$ |
| $50 - 65$ | $74 - 30 = 44$ | 70 | $(27 - 70)$ |
| $65 - 80$ | $30 - 4 = 26$ | 96 | $(71 - 96)$ |
| $80 - 95$ | $4 - 1 = 3$ | 99 | $(97 - 99)$ |
| $95 - 110$ | 1 | 100 | $(100)$ |
| | $\Sigma f = N = 100$ | | |

Now $\quad$ Median, $M = $ Size of $\left(\dfrac{N}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\dfrac{100}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 50^{th} \text{ item}$$

$\Rightarrow \quad$ Median lies in the class interval $= 50 - 65$

So $\quad M = L + \dfrac{\left(\dfrac{N}{2} - C \cdot f\right)}{f} \times i$

$M = 50 + \left(\dfrac{50 - 26}{44}\right) \times 15$

$\Rightarrow$

$= 50 + \left(\dfrac{24}{44} \times 15\right)$

$= 50 + 8.18 = 58.18$

$\Rightarrow \quad M = 58.18$

**Example 26.** *Find median, if the data is as given below* :

| Marks Less than | 10 | 0 | 30 | 40 | 50 | 60 | 70 | 80 |
|---|---|---|---|---|---|---|---|---|
| No. of Students | 20 | 30 | 50 | 94 | 96 | 127 | 198 | 250 |

**Solution :** Converting the given data into class interval form, we get

| Marks $C.I.$ | No. of Students $f$ | Cumulative Frequency |
|---|---|---|
| | | 20 |
| $0 - 10$ | 20 | $c \cdot f$ |
| $10 - 20$ | $30 - 20 = 10$ | $(1 - 20)$ |
| $20 - 30$ | $50 - 30 = 20$ | $(21 - 30)$ |
| $30 - 40$ | $94 - 50 = 44$ | $(31 - 50)$ |
| $40 - 50$ | $96 - 94 = 2$ | $(51 - 94)$ |
| $50 - 60$ | $127 - 96 = 31$ | $(95 - 96)$ |
| $60 - 70$ | $198 - 127 = 71$ | $(97 - 127)$ |
| $70 - 80$ | $250 - 198 = 52$ | $(128 - 198)$ |
| | | $(199 - 250)$ |
| | | 30 |
| | | 50 |
| | | 94 |
| | | 96 |
| | | 127 |
| | | 198 |
| | | 250 |
| | $\sum f = N = 250$ | |

Now    Median, $M$ = Size of $\left(\dfrac{N}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\dfrac{250}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 125^{th} \text{ item}$$

$\Rightarrow$    Median lies is the class – interval $= 50 - 60$

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So $M = L + \dfrac{\frac{N}{2} - C \cdot f}{f} \times i$

$M = 50 + \left(\dfrac{125 - 96}{31}\right) \times 10$

$\Rightarrow$

$= 50 + \left(\dfrac{29}{31} \times 10\right)$

$= 50 + \dfrac{290}{31}$

$= 50 + 9.35 = 59.35$

$\Rightarrow \quad M = 59.35$

**Mid – Value Series**

**Example 27.** *Find the value of median for the following data :*

| Mid Value | 15 | 25 | 35 | 45 | 55 | 65 | 75 | 85 | 95 |
|-----------|----|----|----|----|-----|----|----|----|----|
| $f$ | 8 | 26 | 45 | 72 | 116 | 60 | 38 | 22 | 13 |

**Solution :** It is clear form the mid – value that the class size is 10. For finding the limits of different classes, apply the formula :

$$L = m - \dfrac{i}{2} \qquad \text{and} \qquad U = m + \dfrac{i}{2}$$

Where, $L$ and $U$ denote the lower and upper limits of different classes, '$m$' denotes the mid – value of the corresponding class interval and 'i' denotes the difference between mid values. $\therefore$ Corresponding to mid – value '15', we have $L = 15 - \dfrac{10}{2} \qquad \text{and} \qquad U = 15 + \dfrac{10}{2}$

i. e. $C.I. = 10 - 20$

Similarly other class intervals can be located

| Mid Value | $f$ | $C.I.$ | Cumulative Frequency $C \cdot f$ | |
|-----------|-----|--------|------|------|
| 15 | 8 | $10 - 20$ | 8 | $(1 - 8)$ |
| 25 | 26 | $20 - 30$ | 34 | $(9 - 34)$ |
| 35 | 45 | $30 - 40$ | 79 | $(35 - 79)$ |
| 45 | 72 | $40 - 50$ | 151 | $(80 - 151)$ |

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| | | | | |
|---|---|---|---|---|
| 55 | 116 | 50 – 60 | 267 | (152 – 267) |
| 65 | 60 | 60 – 70 | 327 | (268 – 327) |
| 75 | 38 | 70 – 80 | 365 | (328 – 365) |
| 85 | 22 | 80 – 90 | 387 | (366 – 387) |
| 95 | 13 | 90 – 100 | 400 | (388 – 400) |
| | $N = 100$ | | | |

Now      Median, $M$ = Size of $\left(\dfrac{N}{2}\right)^{th}$ item

$$M = \text{Size of } \left(\dfrac{400}{2}\right)^{th} \text{item}$$

$$= \text{Size of } 200^{th} \text{ item}$$

$\Rightarrow$    Median lies is the class – interval $= 50 - 60$

So    $M = L + \dfrac{\frac{N}{2} - C \cdot f}{f} \times i$

$$M = 50 + \left(\dfrac{200 - 151}{116}\right) \times 10$$

$$= 50 + \left(\dfrac{49}{116} \times 10\right)$$

$$= 50 + \dfrac{490}{116}$$

$\Rightarrow$

$$= 50 + 4.224 = 54.224$$

$\Rightarrow$      $M = 54.224$

**Determination of Missing Frequency**

**Example 28.** *Find the missing frequency in the following distribution if* $N = 72, Q_1 = 25$ *and* $Q_3 = 50$

| C. I. | 0 − 10 | 10 − 20 | 20 − 30 | 30 − 40 | 40 − 50 | 50 − 60 | 60 − 70 | 70 − 80 |
|---|---|---|---|---|---|---|---|---|
| f | 4 | 8 | − | 19 | − | 10 | 5 | − |

**Solution :** Let the missing frequencies be $f_1$, $f_2$ and $f_3$ respectively.

| C. I. | f | Cumulative Frequency $C \cdot f$ |
|---|---|---|
| 0 − 10 | 4 | 4 |
| 10 − 20 | 8 | 12 |
| 20 − 30 | $f_1$ | $12 + f_1$ |
| 30 − 40 | 19 | $31 + f_1$ |

| 40 − 50 | $f_2$ | $31 + f_1 + f_2$ |
|---|---|---|
| 50 − 60 | 10 | $41 + f_1 + f_2$ |
| 60 − 70 | 5 | $46 + f_1 + f_2$ |
| 70 − 80 | $f_3$ | $46 + f_1 + f_2 + {}^{3}$ |
| Now | $N = 72 = \Sigma f$ $\Sigma f = 46 + f_1 + f_2 + f_3$ | |

$N = 72$

$$= \Sigma f$$

$$= 46 + f_1 + f_2 + f_3$$

$\Rightarrow \qquad f_1 + f_2 + f_3 = 72 - 46 = 26$

$\Rightarrow \qquad f_1 + f_2 + f_3 = 26 \qquad \qquad \qquad \text{…(i)}$

Also, $\qquad Q_1 = 25 \qquad$ (Given)

$\Rightarrow \qquad Q_1$ lies in the class – interval $20 - 30$

$\Rightarrow \quad Q_1 = L + \dfrac{\frac{N}{4} - C \cdot f}{f} \times i$

$25 = 20 + \dfrac{\frac{72}{4} - 12}{f_1} \times 10$

$25 = 20 + \dfrac{18 - 12}{f_1} \times 10$

$25 - 20 = \dfrac{6}{f_1} \times 10$

$5f_1 = 60$

$f_1 = \dfrac{60}{5}$

$f_1 = 12$

$\Rightarrow \dots (ii)$

Similarly, we are given that

$$Q_3 = 50$$

$\Rightarrow \quad Q_3$ lies in the class – interval $50 - 60$

$\Rightarrow \quad Q_3 = L + \dfrac{\frac{3N}{4} - C \cdot f}{f} \times i$

$50 = 50 + \dfrac{\frac{3 \times 72}{4} - (31 + f_1 + f_2)}{10} \times 10$

$50 = 50 + \dfrac{54 - (31 + 12 + f_2)}{1}$

$$(\because f_1 = 12 \text{ By (ii)})$$

$50 - 50 = 54 - (43 + f_2)$

$0 = 54 - (43 + f_2)$

$43 + f_2 = 54 \quad f_2 =$

$54 - 43$

$\Rightarrow \quad f_2 = 11 \qquad \dots(iii)$

Putting (ii) and (iii) in (i), we get

$f_1 + f_2 + f_3 = 26$

$12 + 11 + f_3 = 26$

$23 + f_3 = 26 \quad f_3 =$

$26 - 23$

$\Rightarrow \quad f_3 = 3$

#### 7.11.4 MERITS OF MEDIAN
1. Median is easy to calculalte.
2. It is capable of Graphic presentation.
3. It is possible even in case of open ende series.
4. This is rigidly defined.
5. It is not affected by extreme values. **6.** In case of qualitative data, it is very useful.

#### 7.11.5 LIMITATIONS OF MEDIAN
1. It is not capable of further algebraic treatment.
2. It is positional average and is not based on all observation.
3. It is very much affected by fluctuation in sampling.
4. Median needs arrangement of data before calculation.
5. In case of continuous series it assumes that values are equally distributed in a particular class.

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## 7.12 OTHER POSITIONAL MEASURES (QUARTILES, DECILES AND PERCENTILES)

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As median divide the series into two equal parts, there are many other positional measures also. These Positional measures are also known as partition values. Following are some of the positional measure

### 7.12.1 QUARTILES
Quartile are the values that divide the series in four equal parts. There are total three quarter in number denoted by Q1, Q2 and Q3. First quartile is placed at 25% of the items, second quartile at 50% of the items, third quartile at 75% of the items. The value of second quartile is always equal to Median.
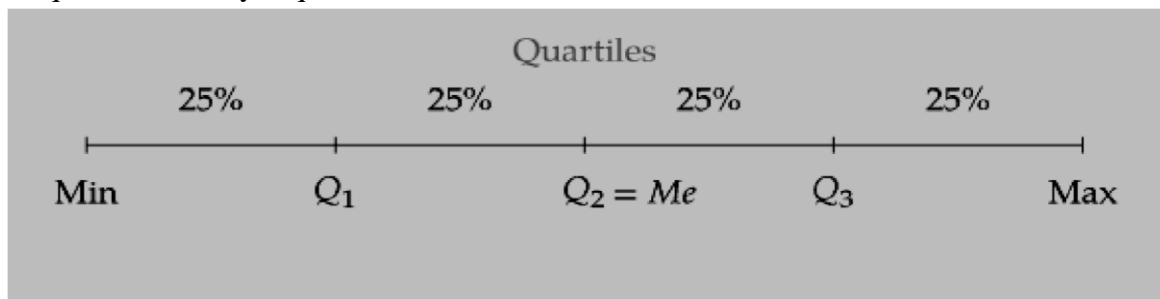


### 7.12.2 DECILES
Deciles are the values that divide the series in ten equal parts. There are total nine Deciles in number denoted by D1, D2, D3 and so on upto D9. The first decile is placed at 10% of the items, second quartile at 20% of the items, similarly last at 90% of the items. The value of fifth Decile is always equal to Median.

Deciles
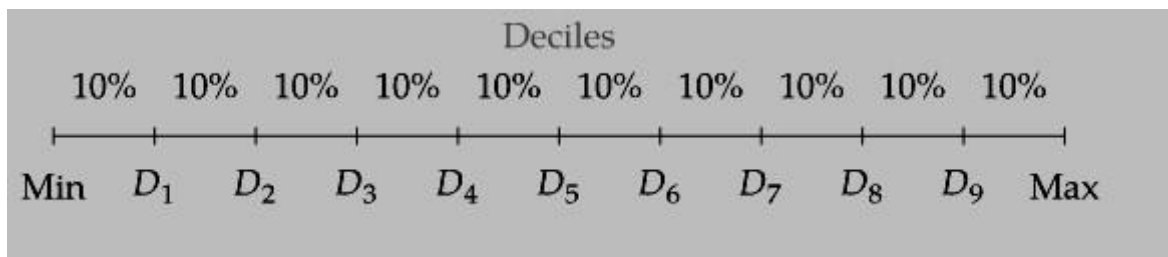
## 7.12.3 PERCENTILE

Percentiles are the values that divide the series in hundred equal parts. There are total ninety nine Percentiles in number denoted by P1, P2, P3 and so on upto P99. The first Percentile is placed at 1% of the items, second quartile at 2% of the items, similarly last at 99% of the items. The value of fifteeth Percentile is always equal to Median.



Percentiles
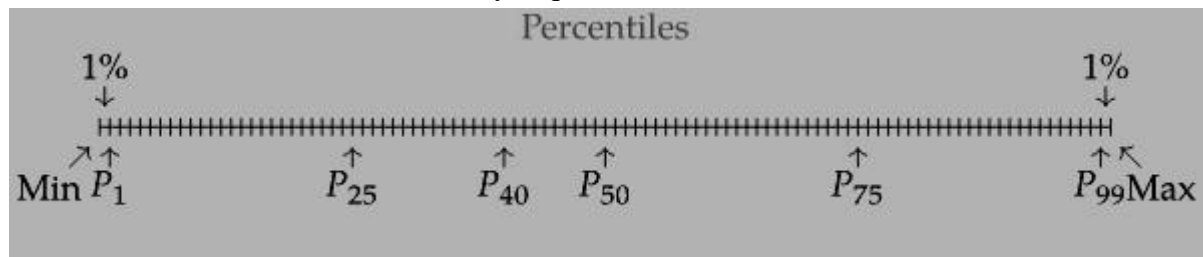
The methods of finding positional measures are same as in case of median. However following are the formulas that can be used for finding positional measures.

| Partition Value | Individual Series | Discrete Series | Continuous Series | Continuous Series |
|---|---|---|---|---|
| Q1 | Value of $\left(\frac{N+1}{4}\right)^{th}$ item | Value of $\left(\frac{N+1}{4}\right)^{th}$ item | Value of $\left(\frac{N}{4}\right)^{th}$ item | $L + \dfrac{\dfrac{N}{4} - C \cdot f}{f} \times i$ |
| Q3 | Value of $3\left(\dfrac{N+1}{4}\right)^{th}$ item | Value of $3\left(\dfrac{N+1}{4}\right)^{th}$ item | Value of $3\left(\dfrac{N}{4}\right)^{th}$ item | $L + \dfrac{3\left(\dfrac{N}{4}\right) - C \cdot f}{f} \times i$ |
| D6 | Value of $6\left(\dfrac{N+1}{10}\right)^{th}$ item | Value of $6\left(\dfrac{N+1}{10}\right)^{th}$ item | Value of $6\left(\dfrac{N}{10}\right)^{th}$ item | $L + \dfrac{6\left(\dfrac{N}{10}\right) - C \cdot f}{f} \times i$ |

| P40 | Value of $40 \left(\frac{N+1}{100}\right)^{th}$ item | Value of $40 \left(\frac{N+1}{100}\right)^{th}$ item | Value of $40 \left(\frac{N}{100}\right)^{th}$ item | $L + \dfrac{40 \left(\frac{N}{100}\right) - C \cdot f}{f} \times i$ |
|---|---|---|---|---|

Similarly all the values can be calculated.

### (A) INDIVIDUAL SERIES

**Example 29.** *From the data given below, determine* $O_1, O_3, D_5, P_{40}$.

| Marks in Economics | 18 | 20 | 25 | 24 | 32 | 50 | 55 | 45 | 55 | 40 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Solution :** Arranging the given figures in ascending order, we get

| S. No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | $N = 11$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Marks | 18 | 20 | 24 | 25 | 32 | 40 | 45 | 50 | 52 | 55 | 66 | |

Now $\quad Q_1 = $ Value of $\left(\frac{N+1}{4}\right)^{th}$ item

$\qquad = $ Value of $\left(\frac{11+1}{4}\right)^{th}$ item

$\qquad = $ Value of $3^{rd}$ item $= 24$

$\therefore \quad Q_1 = 24$

$Q_3 = $ Value of $3\left(\frac{N+1}{4}\right)^{th}$ item

$\qquad 3\left(\frac{11+1}{4}\right)^{th}$

$\qquad = $ Value of item

$\qquad = $ Value of $9^{th}$ item $= 52$

$\therefore \quad Q_3 = 52$

$5\left(\frac{N+1}{10}\right)^{th}$

$D_5 = $ Value of $^{th}$ item

$\qquad = $ Value of $5\left(\frac{11+1}{10}\right)$ item

$\qquad = $ Value of $6^{th}$ item $= 40$

$\therefore \quad D_5 = 40$

$40\left(\dfrac{N+1}{100}\right)^{th}$

$$P_{40} = \text{Value of item}^{th}$$

$$= \text{Value of } 40\left(\dfrac{12}{100}\right)\text{item}$$

$$= \text{Value of } 4.8^{th} \text{ item} = 24$$

$\Rightarrow \qquad P_{40} = 4^{th}\text{item} + 0.8\ (5^{th}\text{item} - 4^{th}\text{item})$

$$= 25 + 0.8\ (32 - 25)$$

$$= 25 + 0.8\ (7)$$

$$= 25 + 5.6 = 30.6$$

$\therefore \qquad P_{40} = 30.6$

## (B) DISCRETE SERIES

**Example 30.** *Form the following data, compute $O_1$, $O_3$, $D_8$ and $P_{70}$.*

| X | 110 | 120 | 130 | 140 | 150 | 160 | 170 |
|---|-----|-----|-----|-----|-----|-----|-----|
| $f$ | 2 | 3 | 5 | 10 | 5 | 3 | 2 |

**Solution :**

| X | $f$ | | C.I. |
|---|-----|---|------|
| 110 | 2 | 2 | $(1-2)$ |
| 120 | 3 | 5 | $(3-5)$ |
| 130 | 5 | 10 | $(6-10)$ |
| 140 | 10 | 20 | $(11-20)$ |
| 150 | 5 | 25 | $(21-25)$ |
| 160 | 3 | 28 | $(26-28)$ |
| 170 | 2 | 30 | $(29-30)$ |
| | $\Sigma f = N = 30$ | | |

Now $\qquad Q_1 = \text{Value of}\left(\dfrac{N+1}{4}\right)^{th}\text{item}$

$$= \text{Value of}\left(\dfrac{30+1}{4}\right)^{th}\text{item}$$

$= \text{Value of } 23.25^{th} \text{ item} = 150$

$\therefore \quad Q_1 = 150$

$$Q_3 = \text{Value of } 3 \left(\frac{N+1}{4}\right)^{th} \text{item}$$

$$= \text{Value of } 3\left(\frac{30+1}{4}\right)^{th} \text{item}$$

$= \text{Value of } 9.3^{rd} \text{ item} = 130$

$\therefore \quad Q_3 = 130$

$$D_8 = \text{Value of } 8\left(\frac{N+1}{10}\right)^{th} \text{item}$$

$$= \text{Value of } 8\left(\frac{31+1}{10}\right)^{th} \text{item}$$

$= \text{Value of } 24.8^{th} \text{ item} = 150$

$\therefore \quad D_8 = 150$

$$P_{70} = \text{Value of } 70\left(\frac{N+1}{100}\right)^{th} \text{item}$$

$$= \text{Value of } 70\left(\frac{30+1}{100}\right)^{th} \text{item}$$

$= \text{Value of } 21.7^{th} \text{ item} = 150$

$\therefore \quad P_{70} = 150$

### (C) CONTINUOUS SERIES

**Example 31.** *Calculate Quartiles, $D_6$ and $P_{20}$*

| $C.I.$ | $0-10$ | $10-20$ | $20-30$ | $30-40$ | $40-50$ | $50-60$ | $60-70$ | $70-80$ |
|---|---|---|---|---|---|---|---|---|
| $f$ | 8 | 22 | 40 | 70 | 90 | 40 | 20 | 10 |

**Solution :**

| $C.I.$ | $f$ | Cumulative Frequency $C \cdot f$ |
|---|---|---|
| | | |

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| | | | |
|---|---|---|---|
| $0 - 10$ | 8 | 8 | $(1 - 8)$ |
| $10 - 20$ | 22 | 30 | $(9 - 30)$ |
| $20 - 30$ | 40 | 70 | $(31 - 70)$ |
| $30 - 40$ | 70 | 140 | $(71 - 140)$ |
| $40 - 50$ | 90 | 230 | $(141 - 230)$ |
| $50 - 60$ | 40 | 270 | $(231 - 270)$ |
| $60 - 70$ | 20 | 290 | $(271 - 290)$ |
| $70 - 80$ | 10 | 300 | $(291 - 300)$ |
| | $\Sigma f = N = 300$ | | |

Now $\qquad Q_1 = $ Size of $\left(\frac{N}{4}\right)^{th.}$ item

$$= \text{Size of} \left(\frac{300}{4}\right)^{th.} \text{item}$$

$$= \text{Size of } 75^{th} \text{ item}$$

$\Rightarrow \quad Q_1$ lies in the class – interval $30 - 40$

$\Rightarrow \quad Q_1 = L + \dfrac{\frac{N}{4} - C \cdot f}{f} \times i$

$$= 30 + \frac{75 - 70}{70} \times 10$$

$$= 30 + \frac{50}{70} = 30.71$$

$\qquad Q_1 = 30.71$

$\therefore$

$2 \left(\frac{N}{4}\right)^{th}$

$\qquad Q_2 = $ Size of item

$$= \text{Size of} 2 \left(\frac{300}{4}\right)^{th} \text{item}$$

$$= \text{Size of } 150^{th} \text{ item}$$

$\Rightarrow \quad Q_2$ lies in the class – interval $40 - 50$

$\Rightarrow \quad Q_2 = L + \dfrac{2\left(\frac{N}{4}\right) - C \cdot f}{f} \times i$

$$= 40 + \frac{150-140}{90} \times 10$$

$$= 40 + \frac{100}{90} = 41.11$$

$\therefore \quad Q_2 = 41.11$

$3\left(\frac{N}{4}\right)^{th}$

$\qquad Q_3 = \text{Size of item}$

$$= \text{Size of } 3\left(\frac{300}{4}\right)^{th} \text{item}$$

$$= \text{Size of } 225^{th} \text{ item}$$

$\Rightarrow \quad Q_3$ lies in the class – interval $40 - 50$

$\Rightarrow \quad Q_3 = L + \dfrac{3\left(\frac{N}{4}\right) - C \cdot f}{f} \times i$

$$= 40 + \frac{225-140}{90} \times 10$$

$$= 40 + \frac{850}{90} = 49 + 9.44 = 49.44$$

$Q_3 = 49.44$

$\therefore$

$6\left(\frac{N}{10}\right)^{th}$

$\qquad D_6 = \text{Size of item}$

$$= \text{Size of } 6\left(\frac{300}{10}\right)^{th} \text{item}$$

$$= \text{Size of } 180^{th} \text{ item}$$

$\Rightarrow \quad D_6$ lies in the class – interval $40 - 50$

$\Rightarrow \quad D_6 = L + \dfrac{6\left(\frac{N}{10}\right) - C \cdot f}{f} \times i$

$$= 40 + \frac{180-140}{90} \times 10$$

$$= 40 + \frac{40}{9} = 40 + 4.44 = 44.44$$

$D_6 = 44.44$

$\therefore$

$20\left(\frac{N}{100}\right)^{th}$

$\qquad P_{20} = \text{Size of item}$

$$= \text{Size of } 20\left(\frac{300}{100}\right)^{th} \text{item}$$

$$= \text{Size of } 60^{th} \text{ item}$$

$\Rightarrow \quad P_{20}$ lies in the class – interval $20 - 30$

$$\Rightarrow \quad P_{20} = L + \frac{20\left(\frac{N}{100}\right) - C \cdot f}{f} \times i$$

$$= 20 + \frac{60-30}{40} \times 10$$

$$= 20 + \frac{30}{4} = 20 + 7.5 = 27.5$$

$$\therefore \quad P_{20} = 27.5$$

## 7.13 TEST YOUR UNDERSTANDING (C)

1. Calculate Median 30, 45,75, 65, 50, 52, 28, 40, 49, 35, 52,

2. Calculate Median 36, 32,28, 22, 26, 20, 18, 40,

3. Find Median

| Wages: | 100 | 150 | 80 | 200 | 250 | 180 |
|---|---|---|---|---|---|---|
| No. of workers | 24 | 26 | 16 | 20 | 6 | 30 |

4. Calculate Median

| X; | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 |
|---|---|---|---|---|---|---|---|
| F: | 4 | 6 | 10 | 16 | 12 | 8 | 4 |

5. Calculate Median:

| X; | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 |
|---|---|---|---|---|---|---|
| F: | 4 | 8 | 12 | 16 | 10 | 6 |

6. Find Median:

| Income | 100-200 | 200-400 | 400-700 | 700-1200 | 1200-2000 |
|---|---|---|---|---|---|
| Number of firms | 40 | 100 | 260 | 80 | 20 |

7. Find missing frequency when median is 50 and number is 100.

| X; | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
|---|---|---|---|---|---|
| F: | 1 4 | ? | 27 | ? | 15 |

8. Find $Q_1$, $Q_3$, $D_5$, $P_{25}$ and $P_{67}$
X: 37, 39, 45, 53, 41, 57, 43, 47, 51, 49, 55

9. Calculate Median, Quartile and $D_6$

| Marks Less Than | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 |
|---|---|---|---|---|---|---|---|---|
| No. of Students | 100 | 90 | 80 | 60 | 32 | 20 | 13 | 5 |

**Answers**

    **1)    49**
    **2)    27**
    **3)    150**
    **4)    18.125**
    **5)    42**
    **6)    526.92**
    **7)    23,21**
    **8)    41, 53, 47, 41, 51.08**
    **9)    M = 46.4, $Q_1$ = 34.2, $Q_3$ = 57.5, $D_6$ = 50**

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## 7.14 MODE

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Mode is another positional measure of Central Tendency. Mode is the value that is repeated most number of time in the series. In other words the value having highest frequency is called Mode. The term 'Mode' is taken from French word 'La Mode' which means the most fashionable item. So, Mode is the most popular item of the series.
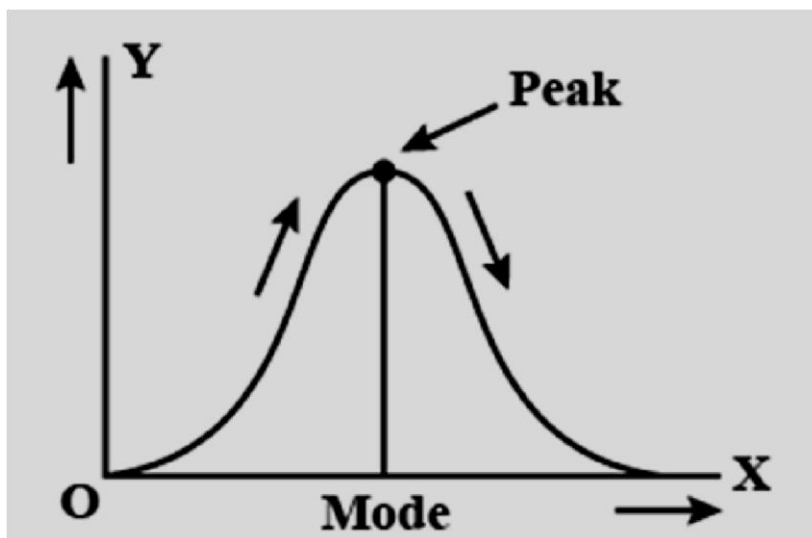
For calculating Mode

1.  **Series should be in ascending or descending order.**
2.  **Series should be exclusive, not inclusive.**
3.  **Series should have equal class intervals.**

## 7.14.1 MODE IN INDIVIDUAL SERIES.

In case of Individual series, following are the steps of finding the Mode.

1.  Arrange the series either in ascending order or descending order.
2.  Find the most repeated item.
3.  This item is Mode.

**Example 32.** *Calculate mode from the following data of marks obtained by* 10 *students*

| S. No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Marks obtained* | 10 | 27 | 24 | 12 | 27 | 27 | 20 | 18 | 15 | 30 |

**Solution :** *By Inspection*

It can be observed that 27 occur most frequently i. *e.* 3 times. Hence, mode $=$ 27 marks
By converting into discrete series

| Marks Obtained | Frequency |
|---|---|
| 10 | 1 |
| 12 | 1 |
| 15 | 1 |
| 18 | 1 |
| 20 | 1 |
| 24 | 1 |
| 27 | 3 |
| 30 | 1 |
| | $N = 10$ |

Since,    the frequency of 27 is maximum i. *e.* 3

It implies the item 27 occurs the maximum number of times. Hence the modal marks are 27.

Mode $= 27$

## 7.14.2   MODE      IN      DISCRETE    SERIES In case of discrete series, we can find mode by two methods that are Observation Method and Grouping Method.

1. **OBSERVATION METHOD**: Under this method value with highest frequency is taken as mode.
2. Grouping Method: Following are the steps of Grouping method:
   - Prepare a table and put all the values in the table in ascending order.
   - Put all the frequencies in first column. Mark the highest frequency.
   - In second column put the total of frequencies taking two frequencies at a time like first two, than next two and so on. Mark the highest total.
   - In third column put the total of frequencies taking two frequencies at a time but leaving the first frequency like second and third, third and fourth and so on. Mark the highest total.
   - In fourth column put the total of frequencies taking three frequencies at a time like first three, than next three and so on. Mark the highest total.
   - In fifth column put the total of frequencies taking three frequencies at a time but leaving the first frequency like second , third and fourth; than fifth, sixth and seventh and so on. Mark the highest total.
   - In sixth column put the total of frequencies again taking three frequencies at a time but leaving the first two frequencies. Mark the highest total. • Value that is marked highest number of time is the mode.

**Example 33.** *Find the modal value for the following distribution*

| Age (in years) | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|
| No. of Persons | 5 | 6 | 8 | 7 | 9 | 8 | 9 | 6 |

**Solution:** Here, as maximum frequency 9 belongs to two age values 12 and 14, so its not possible to determine mode by inspection. We will have to determine the modal value through grouping and analysis table.

| Grouping Table | | | | | | |
|---|---|---|---|---|---|---|
| Age (in years) | Frequency | | | | | |
|  | $G_1$ | $G_2$ | $G_3$ | $G_4$ | $G_5$ | $G_6$ |
| 8 | 5 | 11 | 14 | 19 | 21 | |
| 9 | 6 | | | | | |
| 10 | 8 | 15 | | | | 24 |

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| 11 | 7 |    | 16 | 24 |    |    |
|----|---|----|----|----|----|----|
| 12 | 9 | 17 |    |    | 26 | 23 |
| 13 | 8 |    | 17 |    |    |    |
| 14 | 9 | 15 |    |    |    |    |
| 15 | 6 |    |    |    |    |    |

**Analysis Table**

| Group No. | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|-----------|---|---|----|----|----|----|----|----|
| $G_1$ |   |   |   |   | × |   | × |   |
| $G_2$ |   |   |   |   | × | × |   |   |
| $G_3$ |   |   |   |   |   | × | × |   |
| $G_4$ |   |   |   | × | × | × |   |   |
| $G_5$ |   |   |   |   | × | × | × |   |
| $G_6$ |   |   | × | × | × |   |   |   |
| Total | × | × | 1 | 2 | 5 | 4 | 3 | × |

Since, 12 occurs maximum number of times i. *e.* 5 times, the modal age is 12 years

Mode= 12

## 7.14.3 MODE IN CONTINUOUS SERIES

In case of continuous series, we can find mode by two methods that are Observation Method and Grouping Method.

1. **OBSERVATION METHOd**: Under this method value with highest frequency is taken as mode class than the mode formula is applied which is given below.
2. **GROUPING METHOD**: Following are the steps of Grouping method:
   - Prepare a table and put all the classes of data in the table in ascending order.
   - Put all the frequencies in first column. Mark the highest frequency.
   - In second column put the total of frequencies taking two frequencies at a time like first two, than next two and so on. Mark the highest total.
   - In third column put the total of frequencies taking two frequencies at a time but leaving the first frequency like second and third, third and fourth and so on. Mark the highest total.

- In fourth column put the total of frequencies taking three frequencies at a time like first three, than next three and so on. Mark the highest total.
- In fifth column put the total of frequencies taking three frequencies at a time but leaving the first frequency like second , third and fourth; than fifth, sixth and seventh and so on. Mark the highest total.
- In sixth column put the total of frequencies again taking three frequencies at a time but leaving the first two frequencies. Mark the highest total.
- Class that is marked highest number of time is the mode class.
- Apply following formula for calculating the mode:

$$Z = L + \frac{f_m - f_1}{2f_m - f_1 - f_2} \times i$$

Where

Z = Mode

L = Lower limit of the mode class $f_m$ =

Frequency of mode class. $f_1$ = Frequency of

class preceeding mode class $f_2$ = Frequency of

class succeeding mode class i = Class interval

**Example 34.** *Find the mode for the following frequency distribution*

| Age (in years) | 30 − 35 | 35 − 40 | 40 − 45 | 45 − 50 | 50 − 55 | 55 − 60 |
|---|---|---|---|---|---|---|
| No. of Persons | 3 | 8 | 12 | 20 | 15 | 2 |

**Solution :** Here, the maximum frequency is corresponding to the class – interval $45 - 50$.

So,      the modal class is $45 - 50$.

Now,      the mode is given by the formula

     Mode, $Z = L + \dfrac{f_m - f_1}{2f_m - f_1 - f_2} \times i$

Here      $L$ = Lower limit of modal class = 45

     $f_m$ = Frequency of modal class = 20

     $f_1$ = Frequency of class preceeding the modal class = 12

     $f_2$ = Frequency of class succeeding the modal class = 15 i

     = Class length of modal class = 5

$\therefore$      Mode, $Z = 45 + \dfrac{20-12}{(2\times20)-12-15} \times 5$

     $= 45 + \dfrac{8}{40-27} \times 5$

     $= 45 + 3.07$

       $= 48.1$ years (approx.)

$\Rightarrow$   $Z = 48.1$ years

**Example 35.** *Calculate mode from the following data*

| C. I. | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| f | 2 | 9 | 10 | 13 | 11 | 6 | 13 | 7 | 4 | 1 |

**Solution :** Here as it is not possible to find modal class by inspection, so we have to determine it through grouping and analysis table.

**Grouping Table**

| C. I. | Frequency | | | | | |
|---|---|---|---|---|---|---|
| | $G_1$ | $G_2$ | $G_3$ | $G_4$ | $G_5$ | $G_6$ |
| $0 - 10$ | 2 | 11 | | 21 | | |
| $10 - 20$ | 9 | | 19 | | 32 | |
| $20 - 30$ | 10 | 23 | | | | 34 |
| $30 - 40$ | 13 | | 24 | | | |
| $40 - 50$ | 11 | 17 | | 30 | 30 | |
| $50 - 60$ | 6 | | 19 | | | 26 |
| $60 - 70$ | 13 | 20 | | | | |
| $70 - 80$ | 7 | | 11 | 24 | 12 | |
| $80 - 90$ | 4 | 5 | | | | |
| $90 - 100$ | 1 | | | | | |

**Analysis Table**

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| Group No. | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| $G_1$ | | | | × | | | × | | | |
| $G_2$ | | | × | × | | | | | | |
| $G_3$ | | | | × | × | | | | | |
| $G_4$ | | | | × | × | × | | | | |
| $G_5$ | | × | × | × | | | | | | |
| $G_6$ | | | × | × | × | | | | | |
| Total | × | 1 | 3 | 6 | 3 | 1 | 1 | × | × | × |

Clearly    the modal class is $30 - 40$

Now        the mode is given by the formula

$$\text{Mode}, Z = L + \frac{f_m - f_1}{2f_m - f_1 - f_2} \times i$$

Here $L$ = Lower limit of modal class $30 - 40 = 30$ $f_m$ = Frequency corresponding to modal class = $13$ $f_1$ = Frequency of interval preceding modal class $f_2$ = Frequency of interval succeeding and $i$ = Class length of modal class

$\therefore$    $\text{Mode}, Z = 30 + \dfrac{13-10}{(2\times13)-10-11} \times 10$

$\qquad = 30 + \dfrac{3}{26-21} \times 10$

$\qquad = 30 + \dfrac{30}{5}$

$\qquad = 30 + 6$

$\qquad = 36$

$\Rightarrow$   $Z = 36$

**Example 36.** *Determine the missing frequencies when it is given that* $N = 230$, *Median* $M, = 233.5$ *and Mode*, $Z = 234$

| C.I | 200-210 | 210-220 | 220-230 | 230-240 | 240-250 | 250-260 | 260-270 |
|---|---|---|---|---|---|---|---|

| f | 4 | 16 | − | − | − | 6 | 4 |

**Solution :** Let the missing frequencies be $f_1$, $f_2$ and $f_3$ respectively.

| C. I | f | C·f |
|------|---|-----|
| $200 - 210$ | 4 | 4 |
| $210 - 220$ | 16 | 20 |
| $220 - 230$ | $f_1$ | $20 + f_1$ |
| $230 - 240$ | $f_2$ | $20 + f_1 + f_2$ |
| $240 - 250$ | $f_3$ | $20 + f_1 + f_2 + f_3$ |
| $250 - 260$ | 6 | $26 + f_1 + f_2 + f_3$ |
| $260 - 270$ | 4 | $30 + f_1 + f_2 + f_3$ |
|  | $N = 230 = \sum f$ |  |
|  | $\sum f = 30 + f_1 + f_2 + f_3$ |  |

Now    $N = 230 = \sum f$    (Given)

$$= 30 + f_1 + f_2 + f_3$$

$\Rightarrow$    $f_1 + f_2 + f_3 = 230 - 30 = 200$

$\Rightarrow$    $f_1 + f_2 + f_3 = 200$                                    …(i)

Also,    Median $= 233.5$    (Given)

$\Rightarrow$    Median class is $230 - 240$

$\Rightarrow$    $M = L + \dfrac{\frac{N}{2} - C \cdot f}{f} \times i$

$$233.5 = 230 + \dfrac{\frac{230}{2} - (20 + f_1)}{f_2} \times 10$$

$$3.5 = \dfrac{115 - 20 - f_1}{f_2} \times 10$$

$$3.5f_2 = 950 - 10f_1$$

$$10f_1 + 3.5f_2 = 950$$

$\Rightarrow$ …(ii)

Now        Mode $= 234$ lies in $230 - 240$

$\therefore$    $Z = L + \dfrac{f_2 - f_1}{2f_2 - f_1 - f_3} \times i$

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$$\Rightarrow \quad 234 = 230 + \frac{f_2 - f_1}{2f_2 - f_1 - f_3} \times 10$$

$$\Rightarrow \quad 4 = \frac{f_2 - f_1}{2f_2 - f_1 - (200 - f_1 - f_2)} \times 10 \quad \text{[Using (i)]}$$

$$4 = \frac{f_2 - f_1}{2f_2 - f_1 - 200 - f_1 - f_2} \times 10$$

$$\Rightarrow$$

$$\Rightarrow \quad 4 = \frac{(f_2 - f_1) \times 10}{3f_2 - 200}$$

$$\Rightarrow \quad 12f_2 - 800 = 10f_2 - 10f_1$$

$$\Rightarrow \quad 2f_2 - 800 + 10f_1 = 0$$

$$\Rightarrow \quad 10f_1 + 2f_2 = 800 \qquad \qquad \text{...(iii)}$$

Solving   (ii) and (iii), we get

$$10f_1 + 3.5f_2 = 950$$

$$10f_1 + 2f_2 \quad = 800$$

$$\underline{(-)(-) \quad (-)}$$

$$1.5f_2 = 150$$

$$\Rightarrow \quad f_2 = \frac{150}{1.5} = 100$$

$$f_2 = 100$$

$$\text{...(iv)}$$

Put (iv) in (iii)

$$10f_1 + 2(100) = 800$$

$$\Rightarrow \quad 10f_1 = 800 - 200 = 600$$

$$\Rightarrow \quad 10f_1 = 600$$

$$\Rightarrow \quad f_1 = 60 \qquad \qquad \text{...(v)}$$

Put (iv) and (v) in (i)

$$60 + 100 + f_3 = 200$$

$$\Rightarrow \quad f_3 = 40$$

$\therefore$     The missing frequencies are 60, 100 and 40.

## 7.14.4 MERITS OF MEDIAN

1. Mode is easy to calculate.
2. People can understood this in routine life.
3. It is capable of Graphic presentation.
4. It is possible even in case of open end series.
5. This is rigidly defined.
6. It is not affected by extreme values.
7. In case of qualitative data, it is very useful**.**

## 7.14.5 LIMITATIONS OF MEDIAN
1. It is not always determinable as series may be Bi-modal or Tri-modal.
2. It is not capable of further algebraic treatment.
3. It is positional average and is not based on all observation.
4. It is very much affected by fluctuation in sampling. 5. Mode needs arrangement of data before calculation.

## 7.15 RELATION BETWEEN MEAN, MEDIAN AND MODE

In a normal series the value of Mean, Median and Mode is always same. However, Karl Pearson studied the empirical relation between the Mean, Median and Mode and found that in moderately skewed series the Median always lies between the Mean and the Mode. Normally it is two third distance from Mode and one third distance from Mean.
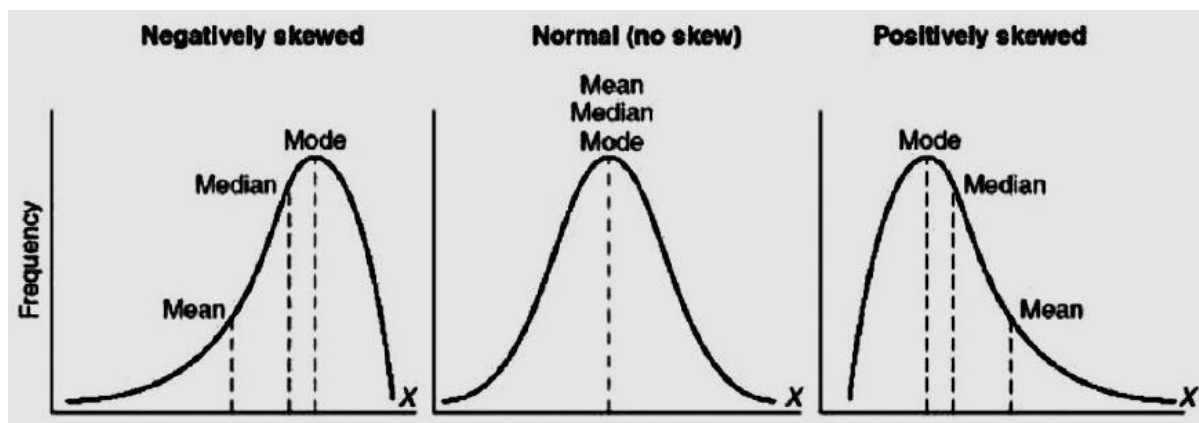


On the basis of this relation following formula emerged

> **Mode = 3 Median – 2 Mean or**
> $$Z = 3M - 2\overline{X}$$

**Example.** *Calculate* M *when* $\overline{X}$ *and* Z *of a distribution are given to be* 35. 4 *and* 32. 1 *respectively.*

**Solution :** We are given that

$$\text{Mean, } \overline{X} = 35.4$$
$$\text{Mode, } Z = 32.1$$

As   we know the empirical relation between Mean, Median and Mode.

i. *e.*   Mode = 3 Median − 2 Mode

$\Rightarrow$   $Z = 3M - 2\overline{X}$

$M = \dfrac{1}{3}(Z + 2\overline{X})$

$M = \dfrac{1}{3}(32.1 + 2(35.4))$

$= \dfrac{1}{3}(32.1 + 70.8)$

$= \dfrac{1}{3}(102.9) = 34.3$

$\Rightarrow$

$\Rightarrow$

$\Rightarrow$   Median, $M = 34.3$

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## 7.16 TEST YOUR UNDERSTANDING - D

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1. Find Mode:
X 22, 24, 17, 18, 19, 18, 21, 20, 21, 20, 23, 22, 22, 22

2. Find Mode by inspection method

| X | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 |
|---|---|----|----|----|----|----|----|----|
| f | 9 | 11 | 25 | 16 | 9 |  | 10 | 6 | 3 |

3. . Find Mode by Grouping Method

| X | 21 | 22 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|----|----|----|----|----|----|----|----|

| F | 7 | 10 | 15 | 18 | 13 | 7 | 3 | 2 |

4. . Find Mode by Grouping Method and inspection method

| X; | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
|----|------|-------|-------|-------|-------|-------|-------|-------|
| F: | 2 | 18 | 30 | 45 | 35 | 20 | 6 | 4 |

5. Calculate mode using grouping and analysis methods.

| X | 100-110 | 110-120 | 120-130 | 130-140 | 140-150 | 150-160 | 160-170 | 170-180 |
|---|---------|---------|---------|---------|---------|---------|---------|---------|
| f | 4 | 6 | 20 | 32 | 33 | 17 | 8 | 2 |

6. Find Mode

| X | 0-100 | 100-200 | 200-400 | 400-500 | 500-700 |
|---|-------|---------|---------|---------|---------|
| F: | 5 | 15 | 40 | 32 | 28 |

**Anwers.**

**1.    22**
**2.    18**
**3.    26**
**4.  36**
**5.  56.46**
**6.  440**

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## 7.17 LET US SUM UP

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- **Average is the value that represent its series.**
- **A good average has many characteristics.**
- **Average is also known as Central Tendency.**
- **There are mainly five types of average Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode.**
- **Arithmetic mean is most popular average.**
- **Geometric Mean is useful for calculating growth and decline rate.**
- **Harmonic mean is useful for speed and work etc.**
- **Median divide the series in two equal parts.**
- **Mode is value repeated most number of time.**
- **There are other positional measures like Quartile, Decile and Percentile.**

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## 7.18 KEY TERMS

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- **Average:** Average is the single value which is capable of representing its series. It is the value around which other values in the series move.
- **Arithmetic Mean:** " The value obtained by  dividing sum of observations with  the number of observations".
- **Geometric Mean:** Geometric mean of N items is root nth of the product of item  • **Harmonic Mean** . It is reciprocal of Arithmetic mean of reciprocal of the observations.
- **Median:** It is a value that divide the series in two equal parts.
- **Mode:** It is the most repeated value of the series.
- **Quartile:** It is a value that divide the series in four equal parts.
- **Decile:** It is a value that divide the series in ten equal parts.
- **Percentile:** It is a value that divide the series in hundred equal parts.

## 7.19 REVIEW QUESTIONS

1. What is central tendency. What are uses of measuring central tendency.
2. Give features of ideal measure of average.
3. What is average. Give uses and limitations of average.
4. What is arithmetic mean? How it is calculated.
5. Give properties, advantages and limitations of Arithmetic mean.
6. How you can calculated combined arithmetic mean.
7. What is median? How it is calculated?
8. Give merits and limitations of Median.
9. What is mode? How it is calculated. Give its merits and limitations.
10. Explain grouping method of calculating Mode.
11. What is Geometric Mean. Give process of calculating Geometric mean in different series.
12. What are merits and limitations of geometric mean.
13. What is Harmonic Mean. How it is calculated.
14. Give relation between Mean, Median and Mode.
15. What are Quartile, Percentile and Deciles.
16. What is positional average. Give various positional average. 17. According to you which measure of average is best.

## 7.20 FURTHER READINGS

1. J. K. Sharma, *Business Statistics,* Pearson Education.
2. S.C. Gupta, *Fundamentals of Statistics,* Himalaya Publishing House.
3. S.P. Gupta and Archana Gupta, *Elementary Statistics,* Sultan Chand and Sons, New Delhi.
4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.

# B. COM (DIGITAL)

## SEMESTER II

## COURSE: BUSINESS MATHEMATICS AND STATISTICS

## UNIT 8 – DISPERSION

**STRUCTURE**

## 8.0 OBJECTIVES

**After studying the Unit, students will be able to**

- Explain what is Dispersion.
- Compare absolute and relative measures of Dispersion.
- Understand features of good measure of Dispersion.
- Calculate the Range and Quartile Deviation.
- Measure the Dispersion using Mean and Standard Deviation. • Compare the variation of the two series.

## 8.1 INTRODUCTION

Statistics is a tool that helps us in extraction of information from large pool of data. There are many tools in statistics that helps us in extraction of data. Central tendency of data is one such tool. A good measure of central tendency is one which could represent the whole data. However, many a time we find that the average is not representing it data. Following example will make this clear:

| Series X | Series Y | Series Z |
|----------|----------|----------|
| 100 | 94 | 1 |

| | | |
|---|---|---|
| 100 | 105 | 2 |
| 100 | 101 | 3 |
| 100 | 98 | 4 |
| 100 | 102 | 490 |
| | | |
| $\sum X = 500$ | $\sum Y = 500$ | $\sum Z = 500$ |
| $\bar{X} = \dfrac{\sum X}{N} = \dfrac{500}{5} = 100$ | $\bar{Y} = \dfrac{\sum Y}{N} = \dfrac{500}{5} = 100$ | $\bar{Z} = \dfrac{\sum Z}{N} = \dfrac{500}{5} = 100$ |

We can see that in all the above series the average is 100. However, in first series average is fully representing its data as all the items in the series are 100 and average is also 100. In the second series the items are very near to its average that is 100, so we can say that average is is a good representation of its series.   But in case of third series, average is not representing its data as there is a lot of difference between items and the average. In order to understand the nature of data it is very important to see the difference between items and the data. This could be done by using dispersion.

## 8.2  MEANING OF DISPERSION

Dispersion is a very important statistical tool that help us in understanding the nature of data. Dispersion shows the extent to which individual items in the data differs from its average. It is a measure of difference between data and the individual items. It indicates that how that are lacks the uniformity. Following are some of the definitions of Dispersion.

**According to Simpson and Kafka**, "The measures of the scatterness of a mass of figures in a series about an average is called measure of variation, or dispersion".

**According to Spiegel**, "The degree to which numerical data lend to spread about an average value is called the variation, or dispersion of the data".

 As the dispersion gives average of difference between items and its Central tendency, it is also known as average of second order.

## 8.3  BENEFITS / USES OF DISPERSION

Benefits of Dispersion analysis are outlined as under :
1. **To examine reliability of Central tendency:** We have already discussed that a good measure of Central tendency is one which could represent its series. Dispersion gives us the idea that whether average is in a position to represent its series or not. On the basis of this we can calculate reliability of the average.
2. **To compare two series**: In case there are two series and we want to know that which series is having more variation, we can use dispersion as it tool. In such case normally  we use relative measure of dispersion for comparing two series.

3. **Helpful in quality control**: Dispersion is tool which is frequently used in quality control by the business houses. Every manufacturer wants to maintain same quality and reduce the variation in production. Dispersion can help us in finding the deviations and removing the deviations in quality.

4. **Base of further statistical analysis:** Dispersion is a tool that is used in a number of statistical analysis. For example we use dispersion while calculating correlation, Regression, Skewness and Testing the Hypothesis etc.

## 8.4 FEATURES OF GOOD MEASURE OF DISPERSION

A good measure of dispersion has a number of features which are mentioned below:
1. A good tool of dispersion must be easy to understand and simple to calculate.
2. A good measure of dispersion must be based on all the values in the data.
3. It should not been affected by presence of extreme values in the data.
4. A good measure is one which is rigidly defined.
5. A good measure of dispersion must be capable of being further statistical analysis. 6. A good measure must not be affected by the sampling size.

## 8.5 ABSOLUTE AND RELATIVE MEASURE OF DISPERSION

There are two measures of dispersion that are absolute measure and relative measure:

1. **Absolute measure:**  the absolute measure of dispersion is one which is expressed in the same statistical unit in which the original values of that data are expressed. For example if original data is represented in kilograms, the dispersion will also be represented in kilogram. Similarly if data is represented in rupees the dispersion will also be represented in rupees. However, this measure is not useful when we have to compare two or more series that are having different units of measurement or belongs to different population.

2. **Relative measure of Dispersion**: The relative measure of dispersion is independent of unit of measurement and is expressed in pure number. Normally it is a ratio of the dispersion to the average of the data. It is very useful when we have to compare two different series that are having different unit of measurement or belongs to different population.

| Absolute Measure of Dispersion | Relative Measure of Dispersion |
| --- | --- |
| 1. Range | 1. Coefficient of Range |
| 2. Quartile Deviation | 2. Coefficient of Quartile Deviation |
| 3. Mean Deviation | 3. Coefficient of Mean Deviation |
| 4. Standard Deviation | 4. Coefficient of Standard Deviation |

## 8.6 MEASURE OF DISPERSION - RANGE

Range is one of the simplest and oldest measure of Dispersion. We can define Range as the difference between highest value of the data and the lowest value of the data. The more is the difference between highest and the lowest value, more is the value of Range which shows high dispersion. Similarly less is the difference between highest and lowest value, less is value of Range which shows less dispersion. Following is formula for calculating the value of range:

> **Range = Highest Value - Lowest Value**
> **R = H − L**

**Coefficient of Range:** Coefficient of Range is relative measure of Range and can be calculated using the following formula.

$$\textbf{Coefficient of Range} = \frac{Highest\ Value - Lowest\ Value}{Highest\ Value + Lowest\ Value}$$
$$= \frac{H - L}{H + L}$$

### 8.6.1 Range in Individual Series:

**Example 1.** Following are daily wages of workers, find out value of Range and Coefficient of Range.

| Wage (Rs.) | 330 | 300 | 470 | 500 | 410 | 380 | 425 | 360 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|

**Solution:**

$$Range = Highest\ Value - Lowest\ Value$$

$$= 500 - 300$$
$$= 200$$

$$Coefficient\ of\ Range = \frac{Highest\ Value - Lowest\ Value}{Highest\ Value + Lowest\ Value}$$
$$= \frac{500 - 300}{500 + 300}$$
$$= .25$$

### 8.6.2 Range in Discrete Series:

**Example 2.** Following are daily wages of workers, find out value of Range and Coefficient of Range.

| Wage (Rs.) | 300 | 330 | 360 | 380 | 410 | 425 | 470 | 500 |
|---|---|---|---|---|---|---|---|---|
| No. of Workers | 5 | 8 | 12 | 20 | 18 | 15 | 13 | 9 |

**Solution:**

$$\text{Range} = \text{Highest Value} - \text{Lowest Value}$$
$$= 500 - 300$$
$$= 200$$

$$\text{Coefficient of Range} = \frac{\text{ighest Value} - \text{Lowest Value}}{\text{Highest Value} + \text{Lowest Value}}$$
$$= \frac{500 - 300}{500 + 300}$$
$$= .25$$

### 8.6.3 Range in Continuous Series:

**Example 3.** Following are daily wages of workers, find out value of Range and Coefficient of Range.

| Wage (Rs.) | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|---|
| No. of Workers | 5 | 8 | 12 | 20 | 18 | 15 | 13 | 9 |

**Solution:**

$$\text{Range} = \text{Highest Value} - \text{Lowest Value Coefficient}$$

$$= 90 - 10$$
$$= 80$$

$$\text{of Range} = \frac{\text{Highest Value} - \text{Lowest Value}}{\text{Highest Value} + \text{Lowest Value}}$$
$$= \frac{90 - 10}{90 + 10}$$
$$= .80$$

### 8.6.4 Merits of Range

1. Range is one of the easiest and simplest method of dispersion.
2. The range a measure that is rigidly defined.
3. This method gives broad picture of variation in the data.
4. Range is very useful in various fields of business such as quality control and checking the difference between share prices in the stock exchange. 5. Range is also useful in forecasting.

### 8.6.5 Limitations of range

1. Rangee is not exact measure of depreciation at only gives vague picture.
2. It is not based on all the values of data.
3. It is affected by the extreme values of the data.
4. It is also affected by fluctuations in the sample. 5. In case of open-ended series range cannot be calculated.

## 8.7 TEST YOUR UNDERSTANDING (A)

.1. Compute for the following data Range and Coefficient of Range

| 28 | 110 | 27 | 77 | 19 | 94 | 63 | 25 | 111 |
|---|---|---|---|---|---|---|---|---|

2. Given below is heights of students of two classes. Compare Range of the heights :

Class I   167   162   155   180   182   175   185   158 Class II
 169   172   168   165   177   180   195   167

3. Find Range and coefficient of Range

| X | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 |
|---|---|---|---|---|---|---|---|---|
| f | 6 | 4 | 12 | 7 | 24 | 21 | 53 | 47 |

4. Calculate coefficient of Range:

X;          10-20 20-30 30-40 40-50 50-60
F:            8    10    12    8    4

**Answers**

1. **92, 0.7**
2. **.088, .083**
3. **35, 0.778**
4. **.714**

## 8.8 MEASURE OF DISPERSION – QUARTILE DEVIATION

Range is simple to calculate but suffers from limitation that it takes into account only extreme values of the data and gives a vague picture of variation. Moreover it cannot be calculated in case of open end series. In such case we can use another method of Deviation that is Quartile Deviation or Quartile Range. Quartile Range is the difference between Third Quartile and First Quartile of the data. Following is formula for calculating Quartile Range.

$$\boxed{\textbf{Quartile Range} = \textbf{Q}_3 - \textbf{Q}_1}$$

**Quartile Deviation:** Quartile deviation is the Arithmetic mean of the difference between Third Quartile and the First Quartile of the data.

$$\boxed{\textbf{Quartile Deviation} \quad = \quad \frac{Q_3 - Q_1}{2}}$$

**Coefficient of Quartile Deviation:** Coefficient of Quartile Deviation is relative measure of Quartile Deviation and can be calculated using the following formula.

$$\boxed{\textbf{Coefficient of Range} = \frac{Q_3 - Q_1}{Q_3 + Q_1}}$$

## 8.8.1 QUARTILE DEVIATION IN INDIVIDUAL SERIES:

**Example 4.** Following are daily wages of workers, find out value of Quartile Range, Quartile Deviation and Coefficient of Quartile Deviation.

| Wage (Rs.) | 300 | 330 | 380 | 410 | 425 | 470 | 500 |
|---|---|---|---|---|---|---|---|

**Solution:**

$$Q_1 = \text{Value of} \frac{N+1}{4}\text{th item} = \text{Value of} \frac{7+1}{4}\text{th item}$$
$$= \text{Value of 2n item}$$
$$= 330$$

$$Q_3 = \text{Value of } \frac{3(N+1)}{4}\text{th item} = \text{Value of} \frac{3(7+1)}{4}\text{th item}$$
$$= \text{Value of 6th item}$$
$$= 470$$

$$\text{Quartile Range} = Q_3 - Q_1$$
$$= 470 - 330$$
$$= 140$$

$$\text{Quartile Deviation} = \frac{Q_3 - Q_1}{2}$$
$$= \frac{470 - 330}{2}$$
$$= 70$$

$$\text{Coefficient of Quartile Deviation} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$
$$= \frac{470 - 330}{470 + 330}$$
$$= .175$$

## 8.8.2 QUARTILE DEVIATION IN DISCRETE SERIES:

**Example 5.** Following are daily wages of workers, find out value of Quartile Range, Quartile Deviation and Coefficient of Quartile Deviation.

| Wage (Rs.) | 300 | 330 | 380 | 410 | 425 | 470 | 500 |
|---|---|---|---|---|---|---|---|
| No. of Workers | 5 | 8 | 12 | 20 | 18 | 15 | 13 |

**Solution:**

Calculation of Quartile

| Wage (Rs.) (X) | No. of Workers (f) | Cumulative Frequency (cf) |
|---|---|---|
| 300 | 5 | 5 |
| 330 | 8 | 13 |
| 380 | 12 | 25 |
| 410 | 20 | 45 |
| 425 | 18 | 63 |
| 470 | 15 | 78 |
| 500 | 13 | 91 |

$$Q_1 = \text{Value of } \frac{N+1}{4}\text{th item} = \text{Value of} \frac{91+1}{4}\text{th item}$$
$$= \text{Value of 23rd item}$$
$$= 380$$

$$Q_3 = \text{Value of} \frac{3(N+1)}{4}\text{th item} = \text{Value of} \frac{3(91+1)}{4}\text{th item}$$
$$= \text{Value of 69th item}$$
$$= 470$$

$$\text{Quartile Range} = Q_3 - Q_1$$
$$= 470 - 380$$
$$= 90$$

$$\text{Quartile Deviation} = \frac{Q_3 - Q_1}{2}$$
$$= \frac{470 - 380}{2}$$
$$= 45$$

$$\text{Coefficient of Quartile Deviation} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$
$$= \frac{470 - 380}{470 + 380}$$
$$= .106$$

### 8.8.3 QUARTILE DEVIATION IN CONTINUOUS SERIES:

**Example 6.** Following are daily wages of workers, find out value of Quartile Range, Quartile Deviation and Coefficient of Quartile Deviation.

| Wage (Rs.) | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|---|
| No. of Workers | 5 | 8 | 12 | 20 | 18 | 15 | 13 | 9 |

**Solution:**

Calculation of Quartile

| Wage (Rs.) (X) | No. of Workers (f) | Cumulative Frequency (cf) |
|---|---|---|
| 10-20 | 5 | 5 |
| 20-30 | 8 | 13 |
| 30-40 | 12 | 25 |
| 40-50 | 20 | 45 |
| 50-60 | 18 | 63 |
| 60-70 | 15 | 78 |
| 70-80 | 13 | 91 |
| 80-90 | 9 | 100 |

Calculation of $Q_1$

$$Q_1 \text{ Class} = \text{Value of } \frac{N}{4}\text{th item} = \text{Value of } \frac{100}{4}\text{th item}$$

$$Q_1 \text{ Class} = \text{Value of 25th item}$$

$$Q \text{ Class} = 30\text{-}40$$

$$Q_1 = L_1 + \frac{\frac{n}{4} - cf}{f} \times c$$

Where $L_1 = 30$, $n = 100$; $cf = 13$; $f = 12$; $c = 10$

$$Q_1 = 30 + \frac{\frac{100}{4} - 13}{12} \times 10 = 40$$

Calculation of $Q_3$

$$Q_3 \text{ Class} = \text{Value of } \frac{3N}{4} \text{ th item} = \text{Value of } \frac{300}{4}\text{th item}$$

$$Q_3 \text{ Class} = \text{Value of 75th item} \quad Q_3 \text{ Class} = 60\text{-}70$$

$$Q_3 = L_1 + \frac{\frac{n}{4} - cf}{f} \times c$$

Where $L_1 = 60$, $n = 100$; $cf = 63$; $f = 15$; $c = 10$

$$Q_1 = 60 + \frac{\frac{3(100)}{4} - 63}{15} \times 10 = 68$$

Calculation of Quartile Range, Quartile Deviation and Coefficient of Quartile Deviation

$$\text{Quartile Range} = Q_3 - Q_1$$
$$= 68 - 40$$
$$= 28$$

$$\text{Quartile Deviation} = \frac{Q_3 - Q_1}{2}$$
$$= \frac{68 - 40}{2}$$
$$= 14$$

$$\text{Coefficient of Quartile Deviation} = \frac{Q_3 - Q_1}{Q_3 + Q_1}$$

$$= \frac{68 - 40}{68 + 40}$$

$$= .259$$

## 8.8.4 MERITS OF QUARTILE DEVIATION

1. Quartile deviation is a tool which is easy to calculate and understand.
2. Quartile deviation is the best tool of dispersion in case of open ended series.
3. This method of dispersion is better than range.
4. Unlike the range, it is not affected by the extreme values.
5. This method of dispersion is rigidly defined.
6. This method is very useful specially when we want to know the variability of middle half of the data. Under this method first 25% items that are less than $Q_1$ and upper 25% items that are more than $Q_3$ are excluded and only middle 50% items are taken.

## 8.8.5 LIMITATIONS OF QUARTILE DEVIATION

1. Quartile deviation considers only middle 50% items of the data and ignore rest of the items.
2. It is not possible to make any further algebraic treatment of the quartile deviation.
3. It is not based on all the items.
4. Quartile deviation is highly affected by fluctuation in the sample.
5. It is comparatively difficult to calculate quartile deviation than range.

## 8.9 TEST YOUR UNDERSTANDING (B)

1. Find Quartile deviation and coefficient of Quartile Deviation:
   X: 59, 60, 65, 64, 63, 61, 62, 56, 58, 66

2. Find Quartile deviation and coefficient of Quartile Deviation::

| X | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 |
|---|----|----|----|----|----|----|----|----|----|
| F | 15 | 20 | 32 | 35 | 33 | 22 | 20 | 10 | 8 |

3. Find Quartile deviation and coefficient of Quartile Deviation

| X | 0-100 | 100-200 | 200-300 | 300-400 | 400-500 | 500-600 | 600-700 |
|---|-------|---------|---------|---------|---------|---------|---------|
| F: | 8 | 16 | 22 | 30 | 24 | 12 | 6 |

4. Calculate Inter Qualtile Range, Q.D and coefficient of Q.D

| X | 0-10 | 10-20 | 20-30 | 30-40 | 0-500 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|------|-------|-------|-------|-------|-------|-------|-------|-------|
| F: | 11 | 18 | 25 | 28 | 30 | 33 | 22 | 15 | 22 |

**Answers**

1. **2.75, 0.0447**
2. **1.5, .024**
3. **113.54, 0.335**
4. **34.84, 17.42, .3769**

## 8.10 MEASURE OF DISPERSION – MEAN DEVIATION

Both Range and Quartile Deviation are positional method of Dispersion and takes into consideration only two values. Range considers only highest and lowest value while calculating Dispersion, while Quartile Deviation considers on First and Third Quartile for calculating Dispersion. Both these methods are not based on all the values of the data and are considerable affected by the sample unit. A good measure of Dispersion is one which considers all the values of data.

Mean Deviation is a tool of measuring the Dispersion that is based on all the values of Data. Contrary to its name, it is not necessary to calculate Mean Deviation from Mean, it can also be calculated using the Median of the data or Mode of the data. In the Mean deviation we calculated deviations of the items of data from its Average (Mean, Median or Mode) by taking positive signs only. When we divide the sum of deviation with the number of items, we get the value of Mean Deviation. In simple words:

"Mean Deviation is the value obtained by taking arithmetic mean of the deviations obtained by deducting average of data whether Mean, Median or Mode from values of data, ignoring the signs of the deviations."

### 8.10.1 MEAN DEVIATION IN CASE OF INDIVIDUAL SERIES:

As we have already discussed that Mean Deviation can be calculated from Mean, Median or Mode. Following are the formula for calculating Mean Deviation in case of Individual series.

$$\text{Mean Deviation from Mean (M } D_X) = \frac{\sum |X - \bar{X}|}{n} = \frac{\sum |D_X|}{n}$$

$$\text{Mean Deviation from Median (M } D_M) = \frac{\sum |X - M|}{n} = \frac{\sum |D_M|}{n}$$

$$\text{Mean Deviation from Mode (M } D_Z) = \frac{\sum |X - Z|}{n} = \frac{\sum |D_Z|}{n}$$

In case we want to calculate Coefficient of Mean Deviation, it can be done using following formulas.

$$\text{Coefficient of Mean Deviation from Mean (M } D_X) = \frac{MD_X}{\bar{X}}$$

$$\text{Coefficient of Mean Deviation from Median (M } D_M )= \frac{MD_M}{M}$$

$$\text{Coefficient of Mean Deviation from Mode (M } D_Z )= \frac{MD_Z}{Z}$$

**Example 7.** Following are the marks obtained by Students of a class in a test. Calculated Mean Deviation from (i) Mean (ii) Median (iii) Mode. Also calculate Coefficient of Mean Deviation.

| Wage (Rs.) | 5 | 7 | 8 | 8 | 9 | 11 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|

**SOLUTION:**

Let us calculate Mean Median and Mode

$$\text{Mean } (\bar{X}) = \frac{5+7+8+8+9+11+13+14+15}{9} = \frac{90}{9} = 10$$

Median (M) = Value of $\frac{N+1}{2}$th item = Value of $\frac{9+1}{2}$th item

= Value of 5th item

= 9 Mode = Item having

maximum frequency i.e 8.

Calculation of Deviations

| Marks X | $D_X = \lvert X - \bar{X}\rvert$ (Where $\bar{X}$ = 10) | $D_M = \lvert X - M\rvert$ (Where M = 9) | $D_Z = \lvert X - Z\rvert$ (Where Z = 8) |
|---|---|---|---|
| 5 | 5 | 4 | 3 |
| 7 | 3 | 2 | 1 |
| 8 | 2 | 1 | 0 |
| 8 | 2 | 1 | 0 |
| 9 | 1 | 0 | 1 |
| 11 | 1 | 2 | 3 |
| 13 | 3 | 4 | 5 |
| 14 | 4 | 5 | 6 |
| 15 | 5 | 6 | 7 |
|  | $\sum D_X = 26$ | $\sum D_M = 25$ | $\sum D_Z = 26$ |

**1. Mean Deviation from Mean (MD$_X$ )** $= \frac{\Sigma\lvert X-\bar{X}\rvert}{n} = \frac{\Sigma\lvert D_X\rvert}{n} = \frac{26}{9} = 2.88$

Coefficient of Mean Deviation from Mean $(\mathrm{MD_X})$ = $\dfrac{MD_{\bar{X}}}{\bar{X}}$ $\dfrac{2.88}{10}$ = .288

**2. Mean Deviation from Median $(\mathrm{MD_M})$** = $\dfrac{\Sigma|X-M|}{n}$ = $\dfrac{\Sigma|DM|}{n}$ = $\dfrac{25}{9}$ = 2.78

Coefficient of Mean Deviation from Median $(\mathrm{MD_M})$ = $\dfrac{MDM}{M}$ = $\dfrac{2.78}{9}$ = .309

**3. Mean Deviation from Mode $(\mathrm{MD_Z})$** = $\dfrac{\Sigma|X-Z|}{n}$ = $\dfrac{\Sigma|DZ|}{n}$ = $\dfrac{26}{9}$ = 2.88

Coefficient of Mean Deviation from Mode $(\mathrm{MD_Z})$ = $\dfrac{MDZ}{Z}$ = $\dfrac{2.88}{8}$ = .36

### 8.10.2 MEAN DEVIATION IN CASE OF DISCRETE SERIES:

Following are the formula for calculating Mean Deviation in case of Discrete series.

| |
|---|
| **Mean Deviation from Mean $(\mathrm{M\ D_X})$** = $\dfrac{\Sigma f\|X-\bar{X}\|}{n}$ = $\dfrac{\Sigma f\|D_X\|}{n}$ |
| $(\mathrm{M\ D_M})$ = $\dfrac{\phantom{xxxx}}{n}$ = $\dfrac{\Sigma f\|X-M\|\quad \Sigma f\|DM\|}{n}$ **Mean** **Deviation from Median** |
| **Mean Deviation from Mode $(\mathrm{M\ D_Z})$** = $\dfrac{\Sigma f\|X-Z\|}{n}$ = $\dfrac{\Sigma f\|DZ\|}{n}$ |

**Example 8.** Following are the wages of workers that are employed in a factory. Calculate Mean Deviation from (i) Mean (ii) Median (iii) Mode. Also calculate Coefficient of Mean Deviation.

| Wage (Rs.) | 300 | 330 | 380 | 410 | 425 | 470 | 500 |
|---|---|---|---|---|---|---|---|
| No. of Workers | 6 | 8 | 15 | 25 | 18 | 15 | 13 |

**Solution:**

Let us calculate Mean Median and Mode

| X | f | fX | Cf |
|---|---|---|---|
| 300 | 5 | 1500 | 5 |
| 330 | 8 | 2640 | 13 |
| 380 | 15 | 5700 | 28 |
| 410 | 26 | 10660 | 54 |
| 425 | 18 | 7650 | 72 |
| 470 | 15 | 7050 | 87 |
| 500 | 13 | 6500 | 100 |
| | | $\Sigma X = 41700$ | |

Mean $(\bar{X}) = \dfrac{\Sigma K}{n} = \dfrac{41700}{100} = 417$

Median (M) = Value of $\dfrac{N+1}{2}$th item = Value of $\dfrac{100+1}{2}$th item

$\qquad\qquad\qquad$ = Value of 50.5 item

$\qquad\qquad\qquad$ = 410

Mode = Item having maximum frequency i.e 410.

Calculation of Deviations

| X | f | $D_X = \|X - \bar{X}\|$ $(\bar{X} = 417)$ | $fD_X$ | $D_M = \|X - M\|$ $(M = 410)$ | $fD_M$ | $D_Z = \|X - Z\|$ $(Z = 410)$ | $fD_Z$ |
|---|---|---|---|---|---|---|---|
| 300 | 5 | 117 | 585 | 110 | 550 | 110 | 550 |
| 330 | 8 | 87 | 696 | 80 | 640 | 80 | 640 |
| 380 | 15 | 37 | 555 | 30 | 450 | 30 | 450 |
| 410 | 26 | 7 | 182 | 0 | 0 | 0 | 0 |
| 425 | 18 | 8 | 144 | 15 | 270 | 15 | 270 |
| 470 | 15 | 53 | 795 | 60 | 900 | 60 | 900 |
| 500 | 13 | 83 | 1079 | 90 | 1170 | 90 | 1170 |
| | | | $\Sigma fD_X =$ | | $\Sigma fD_M =$ | $\Sigma D_Z = 26$ | $\Sigma fD_Z =$ |
| | | | 4036 | | 3980 | | 3980 |

1. Mean Deviation from Mean $(MD_X) = \dfrac{\Sigma f \|K - \bar{X}\|}{n} = \dfrac{\Sigma f \|D_X\|}{n} = \dfrac{4036}{100} = 40.36$

$\quad$ Coefficient of Mean Deviation from Mean $(MD_X) = \dfrac{MD_X}{\bar{X}} = \dfrac{40.36}{417} = .097$

2. Mean Deviation from Median $(MD_M) = \dfrac{\Sigma f \|K - M\|}{n} = \dfrac{\Sigma f \|D_M\|}{n} = \dfrac{3980}{100} = 39.80$

$\quad$ Coefficient of Mean Deviation from Median $(MD_M) = \dfrac{MD_M}{M} = \dfrac{39.80}{410} = .097$

3. Mean Deviation from Mode $(MD_Z) = \dfrac{\Sigma f \|K - Z\|}{n} = \dfrac{\Sigma f \|D_Z\|}{n} = \dfrac{3980}{100} = 39.80$

$\quad$ Coefficient of Mean Deviation from Mode $(MD_Z) = \dfrac{MD_Z}{Z} = \dfrac{39.80}{410} = .097$

## 8.10.3 MEAN DEVIATION IN CASE OF CONTINUOUS SERIES:

In case of calculation of Mean Deviation in continuous series, the formula will remain same as we have done in Discrete Series but only difference is that instead of taking deviation from Data, we take deviations from mid value of the data. Further in case of continuous series also the Mean Deviation can be calculated from Mean, Median or Mode. However, in most of the cases it is calculated from Median. Following formulas are used for continuous series:

$$(M \quad D_X) = \frac{\sum f|X - \bar{X}|}{n} = \frac{\sum f|D_X|}{n}$$
**Mean Deviation from Mean**

$$(M \quad D_M) = \frac{}{n} = \frac{}{n} \quad \frac{\sum f|X - M|}{} \quad \frac{\sum f|D_M|}{} \quad \textbf{Mean}$$
**Deviation from Median**

$$\textbf{Mean Deviation from Mode (M} \quad D_Z) = \frac{\sum f|X - Z|}{n} = \frac{\sum f|D_Z|}{n}$$

**Example 9.** Following are daily wages of workers, find out value of Mean Deviation and Coefficient of Mean Deviation.

| Wage (Rs.) | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|---|---|
| No. of Workers | 5 | 8 | 12 | 20 | 18 | 15 | 13 | 9 |

**Solution:**

| Wage (Rs.) (X) | No. of Workers (f) | Cumulative Frequency (cf) | Mid Value m | $D_M$ $|m - M|$ | $f D_M$ |
|---|---|---|---|---|---|
| 10-20 | 5 | 5 | 15 | 37.78 | 188.9 |
| 20-30 | 8 | 13 | 25 | 27.78 | 222.24 |
| 30-40 | 12 | 25 | 35 | 17.78 | 213.36 |
| 40-50 | 20 | 45 | 45 | 7.78 | 155.6 |
| 50-60 | 18 | 63 | 55 | 2.22 | 39.96 |
| 60-70 | 15 | 78 | 65 | 12.22 | 183.3 |
| 70-80 | 13 | 91 | 75 | 22.22 | 288.86 |
| 80-90 | 9 | 100 | 85 | 32.22 | 289.98 |
| | **N = 100** | | | | $\sum f D_M$ = **1582.2** |

Calculation of Median

Median Class = Value of $\frac{N}{2}$th item = Value of $\frac{100}{2}$th item

Median Class = Value of 50th item Median
Class = 50-60

$$= L_1 + \frac{\frac{n}{2} - cf}{f}$$

$M \times c$

Where $L_1 = 50$, $n = 100$; $cf = 45$; $f = 18$; $c = 10$

$$M = 50 + \frac{\frac{100}{2} - 45}{18} \times 10 = 52.78$$

Calculation of Mean Deviation from Median

Mean Deviation from Median $(MD_M) = \frac{\sum f | K - M |}{n} = \frac{\sum f | D_M |}{n} = \frac{1582.2}{100} = 15.82$

Coefficient of Mean Deviation from Median $(MD_M) = \frac{MDM}{M} = \frac{15.82}{52.78} = .30$

## 8.10.4 MERITS OF MEAN DEVIATION

1. We can calculate mean deviation very easily.
2. Mean deviation is based on all the items of the Data. Change in any value of the data is also going to affect mean deviation.
3. As it is based on all the items of the data, it is not affected by the extreme values of the data.
4. Mean deviation can be calculated from Mean, Median or Mode.
5. Mean deviation is a rigidly defined method of measuring dispersion. 6. Mean deviation can be used for comparison of two different series.

## 8.10.5 LIMITATIONS OF MEAN DEVIATION

1. While calculating the mean deviation, we consider only positive sign and ignore the negative sign.
2. In case mean deviation is calculated from mode, it is not a reliable measure of dispersion as mode is not a true representative of the series.
3. It is very difficult to calculate Mean Deviation in case of open ended series.
4. Mean deviation is not much capable of further statistical calculations.
5. In case we have Mean Deviation of two different series, we cannot calculate combined mean deviation of the data.
6. In case value of Mean, Median or Mode is in fraction, it is difficult to calculate mean deviation.

## 8.11 TEST YOUR UNDERSTANDING (C)

1. Calculate Mean Deviation from i) Mean, ii) Median, iii) Mode X: 7, 4, 10, 9, 15, 12, 7, 9, 7

2. With Median as base calculate Mean Deviation of two series and compare variability:

Series A:      3484   4572   4124   3682   5624   4388   3680   4308
Series B:      487    508    620    382    408    266    186    218

3. Calculate Co-efficient of mean deviation from Mean, Median and Mode from the following data

X:     4      6      8      10     12     14     16
f:     2      1      3      6      4      3      1

4. Calculate Co-efficient of Mean Deviation from Median.

X;     20-25 25-30 30-40 40-45 45-50 50-55 55-60 60-70 70-80
F:     7     13    16    28    12    9     7     6     2

5. Calculate M.D. from Mean and Median

| X | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
|---|------|-------|-------|-------|-------|
| f | 6    | 28    | 51    | 11    | 4     |

6. Calculate Co-efficient of Mean Deviation from Median.

X;     16-20 21-25 26-30 31-35 36-40 41-45 46-50 51-55 56-60
F:     8     13    15    20    11    7     3     2     1

**Answers**

   1.  **2.35, 2.33, 2.56**
   2.  **11.6%, 30.73%**
   3.  **.239, .24, .24**
   4.  **.214**
   5.  **M.D. (Mean) 6.572, Coefficient of M.D. (Mean) .287, M.D. (Median) 6.4952, Coefficient of M.D. (Median) .281**
   6.  **.22**

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## 8.12 MEASURE OF DISPERSION – STANDARD DEVIATION

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Standard deviation is assumed as best method of calculating deviations. This method was given by great statistician Karl Pearson in the year 1893. In case of Mean deviation, when we take deviations from actual mean, the sum of deviations is always zero. In order to avoid this problem, we have to ignore the sign of the deviations. However, in case of Standard Deviation this problem is solved by taking the square of the deviations, because when we take a square of the negative sign, it is also converted into the positive sign. Then after calculating the Arithmetic mean of the deviations we again take square root, to find out standard deviation. In other words

we can say that "Standard Deviation is the square root of the Arithmetic mean of the squares of deviation of the item from its Arithmetic mean."

The standard deviation is always calculated from the Arithmetic mean and is an absolute measure of finding the dispersion. We could also find a relative measure of standard deviation which is known as coefficient of standard deviation.

**Coefficient of Standard Deviation –**

Coefficient of Deviation is the relative measure of the standard deviation and can be calculated by dividing the Value of Standard Deviation with the Arithmetic Mean. The value of coefficient always lies between 0 and 1, where 0 indicates no Standard Deviation and 1 indicated 100% standard deviation. Following is the formula for calculating coefficient of Standard Deviation.

$$\text{Coefficient of Standard Deviation} = \frac{SD}{X}$$

**Coefficient of Variation –**

Coefficient of Variation is also relative measure of the standard deviation, but unlike Coefficient of Standard Deviation it is not represented in fraction rather it is represented in terms of %age. It can be calculated by dividing the Value of Standard Deviation with the Arithmetic Mean and then multiplying resulting figure with 100. The value of coefficient always lies between 0 and 100. Following is the formula for calculating coefficient of Standard Deviation. Low Coefficient of Variation implies less variation, more uniformity and reliability. Contrary to this higher Coefficient of Variation implies more variation, less uniformity and reliability.

$$\text{Coefficient of Standard Deviation} = \frac{SD}{X} \times 100$$

**Variance –**

Variance is the square of the Standard Deviation. In other words it is Arithmetic mean of square of Deviations taken from Actual Mean of the data. This term was first time used by R. A. Fischer in 1913. He used Variance in analysis of financial models. Mathematically:

$$\textbf{Variance =}(\text{Standard Deviation})^2 \textbf{ or } \sigma^2$$

## 8.12.1 STANDARD DEVIATION IN CASE OF INDIVIDUAL SERIES

Following are the formula for calculating Standard Deviation in case of the Individual Series:

1. **ACTUAL MEAN METHOD –** In this method we take deviations from actual mean of the data.

$$\text{Standard Deviation (SD or } \sigma )=\sqrt{\frac{\Sigma x^2}{n}}$$

Where $x = X - X$
n = Number of Items.

2. **ASSUMED MEAN METHOD -** In this method we take deviations from assumed mean of the data. Any number can be taken as assumed mean, however for sake of simplicity it is better to take whole number as assumed mean.

$$\text{Standard Deviation (SD or } \sigma) = \sqrt{\frac{\sum dx^2}{n} - \left(\frac{\sum dx}{n}\right)^2}$$

Where $dx = X - A$

$n = $ Number of Items.

3. **DIRECT METHODS -** In this method we don't take deviations and standard deviation is calculated directly from the data.

$$\text{Standard Deviation (SD or } \sigma) = \sqrt{\frac{\sum X^2}{n} - \left(\frac{\sum X}{n}\right)^2}$$

**Example 10.** Following are the marks obtained by Students of a class in a test. Calculate Standard Deviation using (i) Actual Mean (ii) Assumed Mean (iii) Direct Method. Also calculate Coefficient of Standard Deviation.

| Marks | 5 | 7 | 11 | 16 | 15 | 12 | 18 | 12 |

**Solution:**

**1. Standard Deviation using Actual Mean**

| Marks X | $x = X - \bar{X}$ (Where $\bar{X} = 12$) | $x^2$ |
|---|---|---|
| 5 | -7 | 49 |
| 7 | -5 | 25 |
| 11 | -1 | 01 |
| 16 | 4 | 16 |
| 15 | 3 | 09 |
| 12 | 0 | 00 |
| 18 | 6 | 36 |
| 12 | 0 | 00 |
| $\sum X = 96$ | | $\sum x^2 = 136$ |

Mean $(\bar{X}) = \frac{\sum K}{n} = \frac{96}{8} = 12$

Standard Deviation (SD or $\sigma$) $= \sqrt{\frac{\sum x^2}{n}} = \sqrt{\frac{136}{8}} = \sqrt{17} = 4.12$

Coefficient of Standard Deviation $= \frac{SD}{\bar{X}} = \frac{4.12}{12} = .34$

**2. Standard Deviation using Assumed Mean**

| Marks X | dx = X - A (Where A = 11) | dx² |
|---|---|---|
| 5 | -6 | 36 |
| 7 | -4 | 16 |
| 11 | 0 | 00 |
| 16 | 5 | 25 |
| 15 | 4 | 16 |
| 12 | 1 | 01 |
| 18 | 7 | 49 |
| 12 | 1 | 01 |
| $\sum X = 96$ | $\sum dx = 8$ | $\sum dx^2 = 144$ |

Mean $(\bar{X}) = A + \dfrac{\sum dK}{n} = 11 + \dfrac{8}{8} = 12$

Standard Deviation $(\sigma) = \sqrt{\dfrac{\sum dx^2}{n} - \left(\dfrac{\sum dx}{n}\right)^2} = \sqrt{\dfrac{144}{8} - \left(\dfrac{8}{8}\right)^2} = \sqrt{18 - 1} = \sqrt{17} = 4.12$

Coefficient of Standard Deviation $= \dfrac{SD}{\bar{X}} = \dfrac{4.12}{12} = .34$


### 3. Standard Deviation by Direct Method

| Marks X | X₂ |
|---|---|
| 5 | 25 |
| 7 | 49 |
| 11 | 121 |
| 16 | 256 |
| 15 | 225 |
| 12 | 144 |
| 18 | 324 |
| 12 | 144 |
| $\sum X = 96$ | $\sum X2 = 1288$ |

Mean $(\bar{X}) = \dfrac{\sum K}{n} = \dfrac{96}{8} = 12$

Standard Deviation $(\sigma) = \sqrt{\dfrac{\sum K^2}{n} - \left(\dfrac{\sum K}{n}\right)^2} = \sqrt{\dfrac{1288}{8} - \left(\dfrac{96}{8}\right)^2} = \sqrt{161 - 144} = \sqrt{17} = 4.12$

Coefficient of Standard Deviation $= \dfrac{SD}{\bar{X}} = \dfrac{4.12}{12} = .34$

**Example 11.** Two Players scored following scores in 10 cricket matches. On base of their performance find out which is better scorer and also find out which player is more consistent.

| Player X | 26 | 24 | 28 | 30 | 35 | 40 | 25 | 30 | 45 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|
| Player Y | 10 | 15 | 24 | 26 | 34 | 45 | 25 | 31 | 20 | 40 |

**Solution:**
**Mean and Standard Deviation of Player X**

| Score X | $x = X - \bar{X}$ (Where $\bar{X} = 30$) | $x^2$ |
|---|---|---|
| 26 | -4 | 16 |
| 24 | -6 | 36 |
| 28 | -2 | 2 |
| 30 | 0 | 0 |
| 35 | 5 | 25 |
| 40 | 10 | 100 |
| 25 | -5 | 25 |
| 30 | 0 | 0 |
| 45 | 15 | 225 |
| 17 | -13 | 169 |
| **$\sum X = 300$** | | **$\sum x^2 = 600$** |

Mean $(\bar{X}) = \dfrac{\sum K}{n} = \dfrac{300}{10} = 30$

Standard Deviation (SD or $\sigma$) $= \sqrt{\dfrac{\sum x^2}{n}} = \sqrt{\dfrac{600}{10}} = \sqrt{60} = 7.746$

Coefficient of Variation $= \dfrac{SD}{\bar{X}} \times 100 = \dfrac{7.746}{30} \times 100 = 25.82\%$

**Mean and Standard Deviation of Player Y**

| Score Y | $y = Y - \bar{Y}$ (Where $\bar{Y} = 27$) | $y^2$ |
|---|---|---|
| 10 | -17 | 289 |
| 15 | -12 | 144 |
| 24 | -3 | 9 |
| 26 | -1 | 1 |
| 34 | 7 | 49 |
| 45 | 18 | 324 |

| | | |
|---|---|---|
| 25 | -2 | 4 |
| 31 | 4 | 16 |
| 20 | -7 | 49 |
| 40 | 13 | 169 |
| $\sum X = 270$ | | $\sum x^2 = 1054$ |

Mean $(\overline{Y}) = \dfrac{\sum F}{n} = \dfrac{270}{10} = 27$

Standard Deviation (SD or $\sigma$) $= \sqrt{\dfrac{\sum y^2}{n}} = \sqrt{\dfrac{1054}{10}} = \sqrt{105.40} = 10.27$

Coefficient of Variation $= \dfrac{SD}{\overline{Y}} \times 100 = \dfrac{10.27}{27} \times 100 = 38.02\%$

Conclusion:

1. As average score of Player X is more than Player Y, he is better scorer. 2. As Coefficient of Variation of Player X is less than Player Y, he is more consistent also.

## 8.12.2 STANDARD DEVIATION IN CASE OF DISCRETE SERIES

Following are the formula for calculating Standard Deviation in case of the Discrete Series: 1.
**Actual Mean Method** – In this method we take deviations from actual mean of the data.

> **Standard Deviation (SD or $\sigma$) $=\sqrt{\dfrac{\sum fx^2}{n}}$**
>
> **Where x = X -** X
> f = Frequency
> n = Number of Items.

2. **Assumed Mean Method -** In this method we take deviations from assumed mean of the data.

> **Standard Deviation (SD or $\sigma$) $=\sqrt{\dfrac{\sum fdx^2}{n} - \left(\dfrac{\sum fdx}{n}\right)^2}$**
>
> Where dx = X – A
> n = Number of Items.

3. **Direct Methods -** In this method we don't take deviations and standard deviation is calculated directly from the data.

> **Standard Deviation (SD or $\sigma$) $=\sqrt{\dfrac{\sum fX^2}{n} - \left(\dfrac{\sum fX}{n}\right)^2}$**

**Example 12.** Following are the marks obtained by Students of a class in a test. Calculate Standard Deviation using (i) Actual Mean (ii) Assumed Mean (iii) Direct Method.

| Marks | 5 | 10 | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|---|---|
| Frequency | 2 | 7 | 11 | 15 | 10 | 4 | 1 |

**Solution:**

**1. Standard Deviation using Actual Mean**

| Marks X | f | fX | $x = X - \bar{X}$ ($\bar{X} = 19$) | $x^2$ | $fx^2$ |
|---|---|---|---|---|---|
| 5 | 2 | 10 | -14 | 196 | 392 |
| 10 | 7 | 70 | -9 | 81 | 567 |
| 15 | 11 | 165 | -4 | 16 | 176 |
| 20 | 15 | 300 | 1 | 1 | 15 |
| 25 | 10 | 250 | 6 | 36 | 360 |
| 30 | 4 | 120 | 11 | 121 | 484 |
| 35 | 1 | 35 | 16 | 256 | 256 |
| | N = 50 | $\sum fX = 950$ | | | $\sum x^2 = 2250$ |

$$\text{Mean } (\bar{X}) = \frac{\sum fK}{n} = \frac{950}{50} = 19$$

$$\text{Standard Deviation (SD or } \sigma) = \sqrt{\frac{\sum fx^2}{n}} = \sqrt{\frac{2250}{50}} = \sqrt{45} = 6.708$$

**2. Standard Deviation using Assumed Mean**

| Marks X | f | $dx = X - A$ (A = 20) | $dx^2$ | fdx | $fdx^2$ |
|---|---|---|---|---|---|
| 5 | 2 | -15 | 225 | -30 | 450 |
| 10 | 7 | -10 | 100 | -70 | 700 |
| 15 | 11 | -5 | 25 | -55 | 275 |
| 20 | 15 | 0 | 0 | 0 | 0 |
| 25 | 10 | 5 | 25 | 50 | 250 |
| 30 | 4 | 10 | 100 | 40 | 400 |
| 35 | 1 | 15 | 225 | 15 | 225 |
| | N = 50 | | | $\sum fdx = -50$ | $\sum fdx^2 = 2300$ |

$$= \sqrt{\frac{\sum fdx^2}{n} - \left(\frac{\sum fdx}{n}\right)^2}$$

$$= \sqrt{\frac{2300}{50} - \left(\frac{-50}{50}\right)^2} = \sqrt{46 - 1} = \sqrt{45} = 6.708$$

Standard Deviation ($\sigma$)

## 3. Standard Deviation using Direct Method

| Marks X | f | X₂ | fX | ƒX² |
|---|---|---|---|---|
| 5 | 2 | 25 | 10 | 125 |
| 10 | 7 | 70 | 70 | 700 |
| 15 | 11 | 225 | 165 | 2475 |
| 20 | 15 | 400 | 300 | 6000 |
| 25 | 10 | 625 | 250 | 6250 |
| 30 | 4 | 900 | 120 | 3600 |
| 35 | 1 | 1225 | 35 | 1225 |
| | **N = 50** | | **∑fX = 950** | **∑ƒX² = 20300** |

Standard Deviation ($\sigma$) $= \sqrt{\dfrac{\sum fK^2}{n} - \left(\dfrac{\sum fK}{n}\right)^2}$

$= \sqrt{\dfrac{20300}{50} - \left(\dfrac{950}{50}\right)^2} = \sqrt{406 - 361} = \sqrt{45} = 6.708$

## 8.12.3 STANDARD DEVIATION IN CASE OF CONTINUOUS SERIES

In case of continuous series the calculation will remain same as in case of discrete series but the only difference is that instead of taking deviations from data, deviations are taken from Mid value of the data. Formulas are same as discussed above for discrete series.

**Example 13.** Following are the marks obtained by Students of a class in a test. Calculate Standard Deviation using (i) Actual Mean (ii) Assumed Mean (iii) Direct Method. Also calculate coefficient of variation and Variance.

| Marks | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 | 35-40 |
|---|---|---|---|---|---|---|---|
| Frequency | 2 | 7 | 11 | 15 | 10 | 4 | 1 |

**Solution:**

## 1. Standard Deviation using Actual Mean

| Marks X | m | f | fX | x = m - X̄ (X̄ = 21.5) | x₂ | ƒx² |
|---|---|---|---|---|---|---|
| 5-10 | 7.5 | 2 | 15 | -14 | 196 | 392 |
| 10-15 | 12.5 | 7 | 87.5 | -9 | 81 | 567 |
| 15-20 | 17.5 | 11 | 192.5 | -4 | 16 | 176 |
| 20-25 | 22.5 | 15 | 337.5 | 1 | 1 | 15 |

| 25-30 | 27.5 | 10 | 275 | 6 | 36 | 360 |
| 30-35 | 32.5 | 4 | 130 | 11 | 121 | 484 |
| 35-40 | 37.5 | 1 | 37.5 | 16 | 256 | 256 |
| | | **N = 50** | **∑fX = 1075** | | | **∑x² = 2250** |

Mean $(\overline{X}) = \dfrac{\Sigma fK}{n} = \dfrac{1075}{50} = 21.5$

Standard Deviation (SD or $\sigma$) $= \sqrt{\dfrac{\Sigma fx^2}{n}} = \sqrt{\dfrac{2250}{50}} = \sqrt{45} = 6.708$

## 2. Standard Deviation using Assumed Mean

| Marks X | m | f | dx = X - A (A = 22.5) | dx² | Fdx | fdx² |
|---------|------|------|------|------|------|------|
| 5-10 | 7.5 | 2 | -15 | 225 | -30 | 450 |
| 10-15 | 12.5 | 7 | -10 | 100 | -70 | 700 |
| 15-20 | 17.5 | 11 | -5 | 25 | -55 | 275 |
| 20-25 | 22.5 | 15 | 0 | 0 | 0 | 0 |
| 25-30 | 27.5 | 10 | 5 | 25 | 50 | 250 |
| 30-35 | 32.5 | 4 | 10 | 100 | 40 | 400 |
| 35-40 | 37.5 | 1 | 15 | 225 | 15 | 225 |
| | | **N = 50** | | | **∑fdx = -50** | **∑fdx² = 2300** |

$$= \sqrt{\dfrac{\Sigma fdx^2}{n} - \left(\dfrac{\Sigma fdx}{n}\right)^2}$$

$$= \sqrt{\dfrac{2300}{50} - \left(\dfrac{-50}{50}\right)^2} = \sqrt{46-1} = \sqrt{45} = 6.708$$

Standard Deviation ($\sigma$)

## 3. Standard Deviation using Direct Method

| Marks X | m | f | X₂ | fX | fX² |
|---------|------|------|------|------|------|
| 5-10 | 7.5 | 2 | 56.25 | 15 | 112.5 |
| 10-15 | 12.5 | 7 | 156.25 | 87.5 | 1093.75 |
| 15-20 | 17.5 | 11 | 306.25 | 192.5 | 3368.75 |
| 20-25 | 22.5 | 15 | 506.25 | 337.5 | 7593.75 |
| 25-30 | 27.5 | 10 | 756.25 | 275 | 7562.5 |
| 30-35 | 32.5 | 4 | 1056.25 | 130 | 4225 |
| 35-40 | 37.5 | 1 | 1406.25 | 37.5 | 1406.25 |

| | | N = 50 | | $\sum fX = 1075$ | $\sum fX^2 = 25366.5$ |
|---|---|---|---|---|---|

Standard Deviation ($\sigma$)

$$= \sqrt{\frac{\sum fK^2}{n} - \left(\frac{\sum fK}{n}\right)^2}$$

$$= \sqrt{\frac{25366.5}{50} - \left(\frac{1075}{50}\right)^2} = \sqrt{507.25 - 462.25} = \sqrt{45} = 6.708$$

Coefficient of Standard Deviation $= \dfrac{SD}{\overline{X}} \times 100 = \dfrac{6.708}{21.5} \times 100 = 31.2\%$

Variance $=$ (Standard Deviation)$^2$ or $\sigma^2 = (6.708)^2 = 45$

### 8.12.4 COMBINED STANDARD DEVIATION

The main benefit of standard deviation is that if we know the mean and standard deviation of two or more series, we can calculate combined standard deviation of all the series. This feature is not available in other measures of dispersion. That's why we assume that standard deviation is best measure of finding the dispersion. Following formula is used for this purpose:

$$\sigma_{123} = \sqrt{\frac{n_1 \sigma_1^2 + n_2 \sigma_2^2 + n_3 \sigma_3^2 + n_1 d_1^2 + n_2 d_2^2 + n_3 d_3^2}{n_1 + n_2 + n_3}}$$

Where

$n_1$, $n_2$, $n_3$ = number of items in series 1, 2 and 3 $\sigma_1$, $\sigma_2$, $\sigma_3$ = standard deviation of series 1, 2 and 3 $d_1$, $d_2$, $d_3$ = difference between mean of the series and combined mean for 1, 2 and 3. *Example14. Find the combined standard deviaiton for the following data*

| | Firm A | Firm B |
|---|---|---|
| No. of Wage Workers | 70 | 60 |
| Average Daily Wage (Rs. ) | 40 | 35 |
| S.D of wages | 8 | 10 |

**Solution :** Combined mean wage of all the workers in the two firms will be

$$\overline{X_{12}} = \frac{N_1 \overline{K_1} + N_2 \overline{K_2}}{N_1 + N_2}$$

Where $\quad N_1 =$ Number of workers in Firm $A$

$\qquad N_2 =$ Number of workers in Firm $B$

$\qquad \overline{X_1} =$ Mean wage of workers in Firm $A$

and $\quad \overline{X_2} =$ Mean wage of workers in Firm $B$

We are given that

$$N_1 = 70 \qquad N_2 = 60$$
$$\overline{X_1} = 40 \qquad \overline{X_2} = 35$$

∴ Combined Mean, $\overline{X_{12}}$

$$= \frac{(70\times40)+(60\times35)}{70+60}$$

$$= \frac{4900}{130}$$

$$= Rs.\ 37.69$$

Combined Standard Deviation =

$$\sigma_{123} = \sqrt{\frac{n_1 \sigma_1^2 + n_2 \sigma_2^2 + n_1 d_1^2 + n_2 d_2^2}{n_1 + n_2}}$$

$d_1 = 40 - 37.69 = 2.31$
$d_2 = 35 - 37.69 = -2.69$

$$\sigma_{123} = \sqrt{\frac{70\ (8)^2 + 60\ (10)^2 + 70\ (2.31)^2 + 60\ (-2.69)^2}{70+60}} = 9.318$$

*Example 15. Find the missing values*

| | Firm A | Firm B | Firm C | Combined |
|---|---|---|---|---|
| **No. of Wage Workers** | 50 | ? | 90 | **200** |
| **Average Daily Wage** (Rs. ) | 113 | ? | 115 | **116** |
| **S.D of wages** | 6 | 7 | ? | 7.746 |

**Solution :**

Combined $n = n_1 + n_2 + n_3$
$200 = 50 + n_2 + 90\ N_2$
$= 60$

Now Combined mean wage of all the workers in the two firms will be

$$\overline{X_{12}} = \frac{N_1\overline{K_1} + N_2\overline{K_2} + N_3\overline{K_3}}{N_1 + N_2 + N_3}$$

We are given that

$$N_1 = 50 \quad N_2 = 60 \quad N_3 = 90 \qquad\qquad X_1 = 113 \quad X_2$$
$$X_3 = 115 \qquad \overline{X_{123}} = 116$$
$$= ?$$

∴ Combined Mean, $\overline{X_{12}}$

$$116 = \frac{(50\times113) + (60\times\overline{K_2}) + (90\times115)}{50+60+90}$$

$$116 = \frac{565 + (60 \times \overline{X_2}) + 1035}{50 + 60 + 90}$$

$$2320 = 1600 + 6\,\overline{X_2}$$

$$\overline{X_2} = 120$$

Combined Standard Deviation =

$$\sigma_{123} = \sqrt{\frac{n_1\,\sigma_1^2 + n_2\,\sigma_2^2 + 3\,\sigma_3^2 + n_1\,d_1^2 + n_2\,d_2^2 + n_3\,d_3^2}{n_1 + n_2 + n_3}}$$

$d_1 = 113 - 116 = -3$
$d_2 = 120 - 116 = 4\ d_3$
$= 115 - 116 = -1$

$$\sigma_{123} = \sqrt{\frac{50\,(6)^2 + 60\,(7)^2 + 90\,(\sigma_3)^2 + 50\,(-3)^2 + 60\,(4)^2 + 90\,(-1)^2}{50 + 60 + 90}} = 7.746$$

Squaring the both sides

$$60 = \frac{180 + 294 + 9\sigma_3^2 45 + 96 + 9}{200}$$

$$1200 = 9\,\sigma_3{}^2 +$$

$624\ \sigma_3 = 8$

## 8.12.5 Properties of Standard Deviation

1. Standard Deviation of first 'n' natural numbers is $\sqrt{\dfrac{n^2 - 1}{12}}$

2. It is independent of change in origin it means it is not affected even if some constant is added or subtracted from all the values of the data.

3. It is not independent of change in scale. So if we divide or multiply all the values of the data with some constant, Standard Deviation is also multiplied or divided by same constant.

4. We can calculate combined Standard Deviation by following formula:

$$\sigma_{123} = \sqrt{\frac{n_1\,\sigma_1^2 + n_2\,\sigma_2^2 + n_3\,\sigma_3^2 + n_1\,d_1^2 + n_2\,d_2^2 + n_3\,d_3^2}{n_1 + n_2 + n_3}}$$

5. In case of normal distribution following results are found:

Areas under the normal curve that lie between 1, 2, and 3 standard deviations on each side of the mean
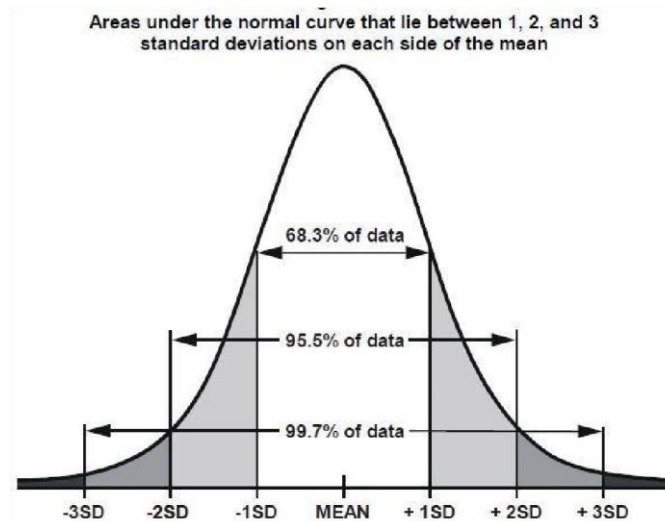
68.27% item lies within the range of : $\overline{X} \pm \sigma$ 95.45% item lies within the range of : $\overline{X} \pm 2\sigma$

99.73% item lies within the range of : $\overline{X} \pm 3\sigma$

6. In case of normal distribution there is relation between Quartile Deviation, Mean Deviation and Standard Deviation which is as follows:

$$6 \text{ (Q.D.)} = 5 \text{ (M.D.)} = 4 \text{ (S.D.)}$$

7. In perfect symmetric distribution following result follows:
Range = 6 (S.D.)

8. When we take square of Standard Deviation it is called Variance.

$$\text{Variance} = (\text{S.D})^2$$

## 8.12.6 MERITS OF STANDARD DEVIATION

1. It is rigidly defined.
2. It is best measure to find out deviations.
3. It is based on arithmetic mean.
4. It is based on all the values.
5. We can find combined standard deviation of different series under this.
6. It is capable of further algebraic treatment. 7. By finding coefficient of variation we can compare two different series.

## 8.12.7 Limitations of Standard Deviation 1.
It is comparatively difficult to calculate.

2. It is mostly affected by extreme values. 3. Common people are not aware about the concept of standard deviation.

## 8.13 TEST YOUR UNDERSTANDING (D)

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1. Calculate Standard Deviation and find Variance:

| X: | 5 | 7 | 11 | 16 | 15 | 12 | 18 | 12 |
|----|---|---|----|----|----|----|----|----|

2. Two Batsmen X and Y score following runs in ten matches. Find who is better Scorer and who is more consistent?

| X: | 26 | 24 | 28 | 30 | 35 | 40 | 25 | 30 | 45 | 17 |
|----|----|----|----|----|----|----|----|----|----|----|
| Y: | 10 | 15 | 24 | 26 | 34 | 45 | 25 | 31 | 20 | 40 |

3. Calculate S.D, coefficient of SD, coefficient of Variation:

| X | 15 | 25 | 35 | 45 | 55 | 65 |
|---|----|----|----|----|----|----|
| f | 2 | 4 | 8 | 20 | 12 | 4 |

4. Find Standard Deviation.

| X; | 5-10 | 10-15 | 15-20 | 20-25 | 25-30 | 30-35 |
|----|------|-------|-------|-------|-------|-------|
| F: | 2 | 9 | 29 | 24 | 11 | 6 |

5. Find Standard Deviation and coefficient of variation.

| X; | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-99 |
|----|-------|-------|-------|-------|-------|-------|-------|
| F: | 1 | 4 | 14 | 20 | 22 | 12 | 2 |

6. Find Standard Deviation.

| X; | 0-50 | 50-100 | 100-200 | 200-300 | 300-400 | 400-600 |
|----|------|--------|---------|---------|---------|---------|
| F: | 4 | 8 | 10 | 15 | 9 | 7 |

7. Find combined Mean and Combined Standard Deviation:

| Part | No. of Items | Mean | S.D. |
|------|--------------|------|------|
| 1 | 200 | 25 | 3 |
| 2 | 250 | 10 | 4 |
| 3 | 300 | 15 | 5 |

8. Find missing information:

|  | Group I | Group II | Group III | Combined |
|--|---------|----------|-----------|----------|
| No. of Items | 200 | ? | 300 | 750 |
| Mean | ? | 10 | 15 | 16 |
| S.D | 3 | 4 | ? | 7.1924 |

**Answers**

      **1.  4.12, 16.97**

2.  **X is better and consistent,X mean 30 CV 25.82%, Y mean 27 CV 38.02%**
3.  **11.83, 0.265, 26.5%**
4.  **5.74**
5.  **12.505, 18.36%**
6.  **141.88**
7.  **16, 7.2**
8.  **250, 25, 5**

## 8.14 LET US SUM UP

- **Dispersion shows that whether average is a good representative of the series or not.**
- **High dispersion mean values differ more than its average.**
- **There are two measures of dispersion, Absolute measure and relative measure.**
- **There are four methods that can be used for measuring the dispersion namely, Range, Quartile Deviation, Mean Deviation and Dispersion.**
- **Range is simples method of dispersion.**
- **Mean deviation can be calculated from Mean, Median or Mode**
- **Standard Deviation is the best measure of Dispersion.**
- **If we know standard deviation of two series we can calculate combined standard deviation.**

## 8.15 KEY TERMS

- **DISPERSION:** Dispersion shows the extent to which individual items in the data differs from its average. It is a measure of difference between data and the individual items. It indicates that how that are lacks the uniformity.
- **RANGE:** Range as the difference between highest value of the data and the lowest value of the data. The more is the difference between highest and the lowest value, more is the value of Range which shows high dispersion.
- **QUARTILE DEVIATION:** Quartile deviation is the Arithmetic mean of the difference between Third Quartile and the First Quartile of the data.
- **MEAN DEVIATION** . Mean Deviation is the value obtained by taking arithmetic mean of the deviations obtained by deducting average of data whether Mean, Median or Mode from values of data, ignoring the signs of the deviations.

- **STANDARD DEVIATION:** Standard Deviation is the square root of the Arithmetic mean of the squares of deviation of the item from its Arithmetic mean.
- **VARIANCE:** It is square of Standard Deviation.
- **ABSOLUTE MEASURE:** Absolute measure of dispersion is one which is expressed in the same statistical unit in which the original values of that data are expressed. For example if original data is represented in kilograms, the dispersion will also be represented in kilogram.
- **RELATIVE MEASURE:** The relative measure of dispersion is independent of unit of measurement and is expressed in pure number. Normally it is a ratio of the dispersion to the average of the data.
- **COEFFICIENT OF STANDARD DEVIATION:** Coefficient of Deviation is the relative measure of the standard deviation and can be calculated by dividing the Value of Standard Deviation with the Arithmetic Mean. The value of coefficient always lies between 0 and 1, where 0 indicates no Standard Deviation and 1 indicated 100% standard deviation.

## 8.16 REVIEW QUESTIONS

1. What is Dispersion. What are uses of measuring Dispersion.
2. What are features of good measure of Dispersion.
3. What are absolute and relative measure of dispersion.
4. What is range? Give its merits and limitations.
5. What is Quartile deviations. Give its merits and limitations.
6. What is mean deviation. How it is calculated. Give its merits and limitations.
7. What is standard deviation? How it is calculated. Give its merits and limitations.
8. How combined standard deviation can be calculated.
9. Give properties of standard deviation.

## 8.19 FURTHER READINGS

1. J. K. Sharma, *Business Statistics,* Pearson Education.
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4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.

5. M.R. Spiegel, *Theory and Problems of Statistics,* Schaum's Outlines Series, McGraw Hill Publishing Co.

# B. COM (DIGITAL)

## SEMESTER II

### COURSE: BUSINESS MATHEMATICS AND STATISTICS

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## UNIT 9 – CORRELATION

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**STRUCTURE**

**9.0 Objectives**
**9.1 Introduction**
**9.2 Meaning of Correlation**
**9.3 Uses of Correlation**
**9.4 Types of Correlation**
**9.4.1 Positive, Negative and Zero Correlation 9.8.2**
**Simple and Multiple Correlation.**
**9.8.3 Total and Partial Correlation.**
**9.8.4 Linear and Non-Linear correlation.**
**9.5 Scatter Diagram Mehtod.**
**9.6 Karl Pearsons's Coefficient of Correlation**
        **9.6.1 Features of Karl Pearsons's Coefficient of Correlation**
        **9.6.2 Direct Method of Karl Pearsons's Coefficient of Correlation**
        **9.6.3 Actual Mean Method of Karl Pearsons's Coefficient of Correlation**
        **9.6.4 Assumed Mean Method of Karl Pearsons's Coefficient of Correlation**
        **9.6.5 Step Deviation Method of Karl Pearsons's Coefficient of Correlation.**
        **9.6.6 Karl Pearsons's Coefficient of Correlation from Standard Deviation.**
        **9.6.7 Assumptions of Karl Pearsons's Coefficient of Correlation.**
        **9.6.8 Merits of Karl Pearsons's Coefficient of Correlation.**
        **9.6.9 Limitations of Karl Pearsons's Coefficient of Correlation**
**9.7 Test Your Understanding - A**
**9.8 Spearman's Rank Correlation**
        **9.8.1 Features of Spearman's Rank Correlation**
        **9.8.2 Spearman's Rank Correlation when Ranks are given**
        **9.8.3 Spearman's Rank Correlation when Ranks are not given**

## 9.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Define what is Correlation.
- Distinguish between different types of correlation.
- Understand benefits of correlation.
- Find correlation using the graphic method.
- Calculate correlation by Karl Pearson Method.
- Measure correlation using Rank correlation method.

## 9.1  INTRODUCTION

When we study measurement of central tendency, dispersion analysis, skewness analysis etc., we study the nature and features of data in which only one variable is involved. However, In our daily life we come across a number of things in which two or more variables are involved and such variables may be related to each other. As these variables are related to each other, it is important to understand the nature of such relation and the extent of such relation. Identification of such relation helps us in solving a number of problems of dalily life. This is not only helpful in our daily life but also helpful in the solving many business problems. For example if a businessman knows the relation between income and demand, Price and Demand, etc, it will help him in formulation of business plans. Correlation is one such statistical technique that helps us in understanding relation between two or more variables.

## 9.2  MEANING OF CORRELATION:

Correlation is a statistical technique which studies the relation between two or more variables. It studies that how to variables are related to each other. It studies that how change in value of one variable affects the other variable, for example in our daily life we will find the relation between income and expenditure, income and demand, Price and Demand age of husband and wife

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etcetera correlation helps in understanding such relations of different variables two variables are said to be related to each other when change in value of one variable so results in to change in value of other variable.

**According to Croxton and Cowden**, "When the relationship is of a quantitative nature, the appropriate statistical tool for discovering and measuring the relationship and expressing it in a brief formula is known as correlation."

**According to W.I. King,** "Correlation means that between two series or groups of data there exists some casual connection."

## 9.3 USES OF CORRELATIONS:

1. It helps us in understanding the extent and direction of relation between two variables. It shows, whether two variables are positively correlated or negatively correlated. It also shows that whether relation between two variables is high or low.

2. Correlation also helps in prediction of future, for example if we know relation between monsoon and agricultural produce, we can predict that what will be the level of produce on basis of monsoon prediction. We can also predict price of Agricultural Products depending upon level of produce.

3. With the help of correlation, we can find the value of one variable when the value of other variable is known. This can be done by using the statistical technique called regression analysis.

4. Correlation also helps in business and Commerce. Businessman can fix price of its product using the correlation analysis. Correlation also helps him in deciding business policy.

5. Correlation also helps government in deciding its economic policy. With the help of correlation government can study relation of various economic variable, thus government can decide their economic policies accordingly.

6. Correlation is also helpful in various statistical Analysis. There are many Statistical techniques that use correlation for further analysis.

## 9.4  TYPES OF CORRELATION

### 9.4.1 POSITIVE, NEGATIVE AND NO CORRELATION

**a.  POSITIVE CORRELATION**: It is a situation in which two variables move in the same direction. In this case if the value of one variable increase the value of other variable also increase. Similarly, if the value of one variable decrease, the value of other variable also decrease. So, when both the variables either increase or decrease, it is known as positive correlation. For example we can find Positive correlation between Income and Expenditure, Population and Demand of food products, Incomes and Savings etc. Following data shows positive correlation between two variables:

| Height of Persons | 158 | 161 | 164 | 166 | 169 | 172 | 17 |

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| : X | | | | | | | 4 |
|---|---|---|---|---|---|---|---|
| Weight of Person : Y | 61 | 63 | 64 | 66 | 67 | 69 | 72 |

**b. NEGATIVE OR INVERSE CORRELATION**: When two variables move in opposite direction from each other, it is known as negative or inverse correlation. In other words, we can say that when the value of one variable increase value of other variable decrease, it is called negative correlation. In our life we find negative correlation between a number of variables, for example there is negative correlation between Price and Demand, Number of Workers and Time required to complete the work etc. Following data shows the negative correlation between two variables:

| Price of Product : X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Demand of Product : Y | 50 | 45 | 40 | 35 | 30 |

**c. Zero or No Correlation:** When two variables does not show any relation, it is known as zero or no correlation. In other words, we can say that in case of zero correlation, the change in value of one variable does not affect the value of other variable. In this case two variables are independent from each other. For example, there is zero correlation between height of the student and marks obtained by the student.

## 9.4.2 SIMPLE AND MULTIPLE CORRELATION:

a. **SIMPLE CORRELATION**: When we study relation between two variables only, it is known as simple correlation. For example, relation between income and expenditure, Price and Demand, are situations of simple correlation.

b. **MULTIPLE CORRELATION**: Multiple correlation is a situation in which more than two variables are involved. Here relation between more than two variables are studied together, for example if we are studying the relation between income of the consumer, price if the product and demand of the product, it is a situation of multiple correlation.

## 9.4.3 TOTAL AND PARTIAL CORRELATION:

a. **TOTAL CORRELATION**: In case we study relation of more than two variables and all the variables are taken together, it is a situation of total correlation. For example, if we are studying the relation between the income of the consumer, price of the product and demand of the product, taking all the factors together it is called total correlation.

b. **PARTIAL CORRELATION**: In case of partial correlation more than two variables are involved, but while studying the correlation we take only two factors in consideration assuming that the value of other factors is constant. For example, while studying the relation between income of the consumer, price of the product and demand of the product, we take into consideration only relation between price of the product and demand of the product assuming that income of the consumer is constant.

### 9.4.4 LINEAR AND NON LINEAR CORRELATION:

**a.** **LINEAR CORRELATION:** When the change in value of one variable results into constant ratio of change in the value of other variable, it is called linear correlation. In such case if we draw the values of two variables on the graph paper, all the points on the graph paper will fall on a straight line. For example, every change in income of consumer by Rs. 1000 results into increase in consumption by 10 k.g., is known as linear correlation. Following data shows example of linear correlation:

| Price of Product : X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Demand of Product : Y | 50 | 45 | 40 | 35 | 30 |



Linear Correlation
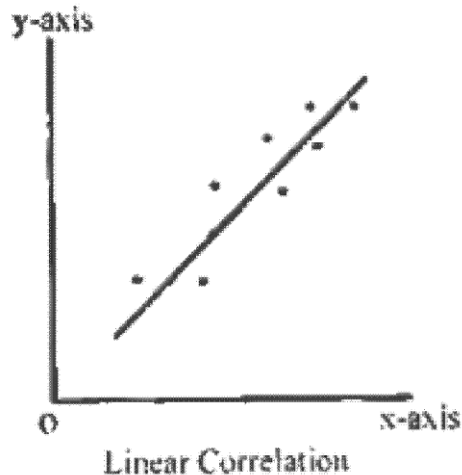
**b.** **NON - LINEAR CORRELATION:** When the change in value of one variable does not result into constant ratio of change in the value of other variable, it is called non linear correlation. In such case, if we draw the value of two variables on the graph paper all the points will not fall in the straight line on the graph. Following data shows non linear correlation between two variables:

| Price of Product : X | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Demand of Product : Y | 50 | 40 | 35 | 32 | 30 |



Non Linear Correlation
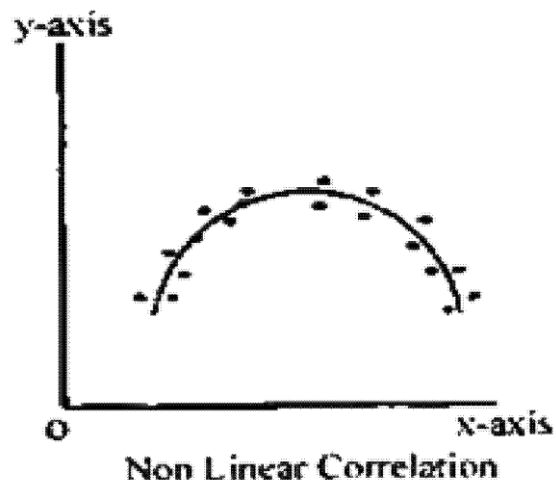
## 9.5 SCATTER DIAGRAM METHOD

Scatter Diagram is one of the oldest and simple method of measuring the correlation. This is a graphic method of measuring the correlation. This method use diagram representation of bivariate data to find out degree and direction of correlation. Under this method, values of the data are plotted on a graph paper by taking one variable on the x-axis and other variable on the y-axis. Normally independent variable is shown on x-axis whereas the value of the dependent variable is taken on the y-axis. Once all the values are drawn on the graph paper we can find out degree of correlation between two variables by looking at direction of dots on the graph. Scatter Diagram shows whether two variables are co related to each other or not. It also shows the direction of correlation whether positive or negative and the shows extent of correlation whether high or low. Following situations are possible in the scatter diagram.

1.      **PERFECT POSITIVE CORRELATION**: After we plot two variables on the graph, if the points of graph fall in a straight line which moves from lower left hand side to the upper corner on the right hand side, then it is assumed that there is perfect positive correlation between the variables.

2.      **PERFECT NEGATIVE CORRELATION:** After drawing the variables on the graph, if all the points fall in a straight line but direction of the points is downward from right hand corner to left hand side corner, then it is assumed that there is perfect negative correlation between the variable.

3.      **HIGH DEGREE OF POSITIVE CORRELATION**: If we draw two variables on the graph and we find that the points move in upward direction from left hand corner to the right hand corner but not in a straight line, rather these are in narrow band, we can assume that there is high degree of positive correlation between the variables.

4.      **HIGH DEGREE OF NEGATIVE CORRELATION**: After plotting the dots on a graph, if we find that all the dots move downward from left hand corner to the right hand side corner but not in a straight line rather in a narrow band, we can say that there is high degree of negative correlation between the variables.

5.      **LOW DEGREE OF POSITIVE CORRELATION**: In case the dots drawn on a graph paper moves upward from left side to right side but the dots are widely scattered, it can be said that there is low degree of positive correlation between the variables.

6.      **LOW DEGREE OF NEGATIVE CORRELATION**: In case the points drawn on a graph are in downward direction from left side to right side but the points are widely scattered, it is the situation of low degree of negative correlation between the variables.

**7.** **ZERO OR NO CORRELATION**: Sometime find that the dots drawn on a graph paper does not move in any direction and are widely scattered in the graph paper, we can assume that there is no correlation between the two variables.



Perfect Positive Correlation



Perfect Negative Correlation



High Positive Correlation



High Negative Correlation

Low Positive Correlation


Low Negative Correlation


No Correlation

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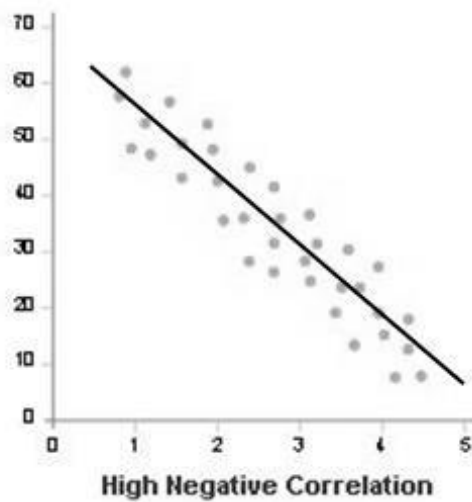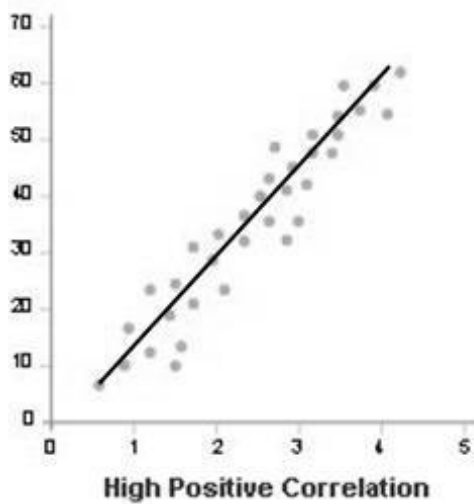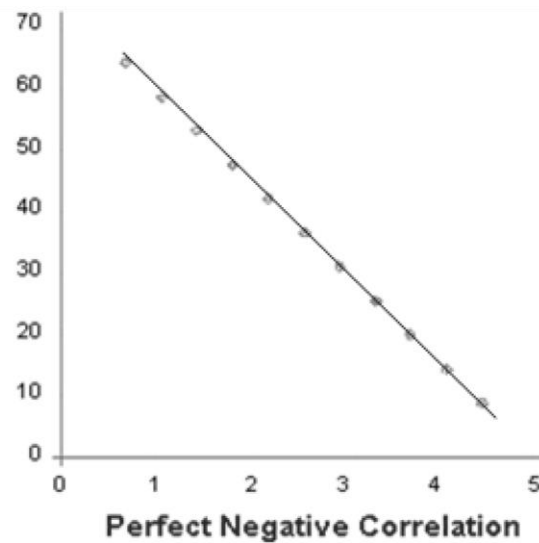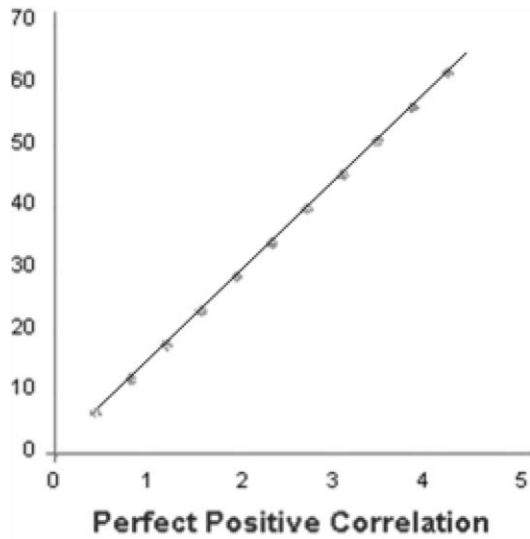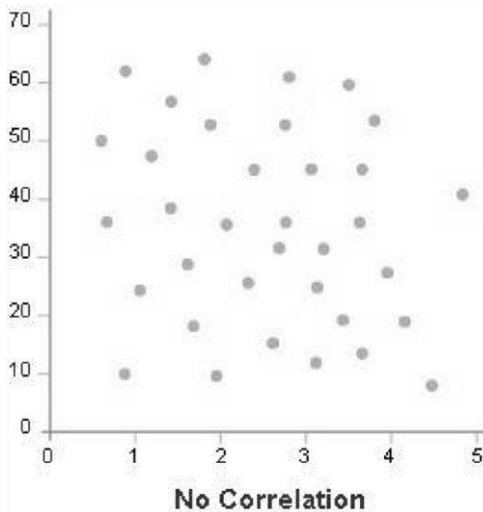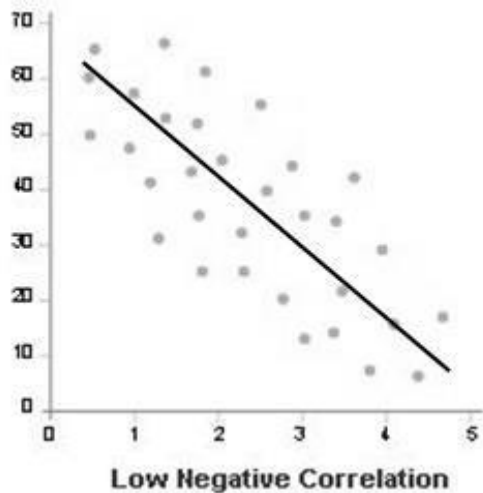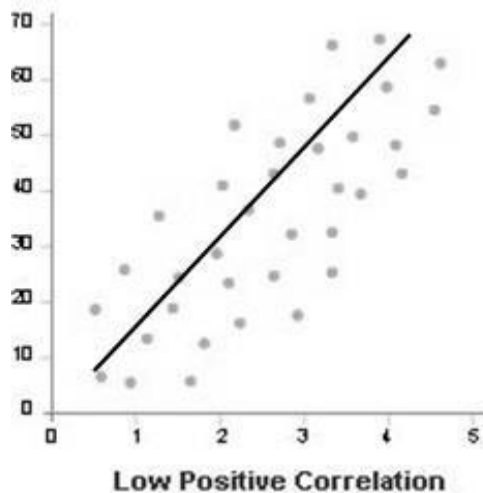
## 9.6  KARL PEARSONS'S COEFFICIENT OF CORRELATION

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Karl Peason's Coefficient of Correlation is the most important method of measuring the correlation. He was the first person who introduced the mathematical model of finding the correlation. Karl Peason's Coefficient of correlation is also denoted as 'Product Moment

Correlation' also. The coefficient of correlation given by Karl Pearson is denoted as a symbol 'r'. It is the relative measure of finding the correlation. According to Karl Pearson we can determine correlation by dividing the product of deviations taken from mean of the data .

### 9.6.1 FEATURES OF KARL PEARSON'S COEFFICIENT OF CORRELATION
   1.  Karl Pearson's method is algebraic method of finding correlation.
   2.  The coefficient of correlation may be positive or negative.
   3.  This method is based on Arithmetic mean of the data and the standard deviation of the data.

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4. The value of coefficient of correlation always lies between -1 and + 1. -1 refers to 100% negative correlation, plus one refers to 100% positive correlation, and zero refers to no correlation between the items.
5. This method is based on all the items of the Data.

## 9.6.2 DIRECT METHOD OF CALCULATING CORRELATION

Correlation can be calculated using the direct method without taking any mean. Following are the steps:

1. Take two series X and Y.
2. Find the sum of these two series denoted as $\sum X$ and $\sum Y$.
3. Take the square of all the values of the series X and series Y.
4. Find the sum of the square so calculated denoted by $\sum X^2$ and $\sum Y^2$.
5. Multiply the corresponding values of series X and Y and find the product.
6. Sum up the product so calculated denoted by $\sum X Y$.
7. Apply the following formula for calculating the correlation.

**Coefficient of Correlation,** $r = \dfrac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{N \sum X^2 - (\sum X)^2}\sqrt{N \sum Y^2 - (\sum Y)^2}}$

**Example 1.** *Calculate the Karl Pearson's coefficient of correlation for the following data*

| X | 2 | 3 | 1 | 5 | 6 | 4 |
|---|---|---|---|---|---|---|
| Y | 4 | 5 | 3 | 4 | 6 | 2 |

**Solution :**

| X | Y | X² | Y² | XY |
|---|---|---|---|---|
| 2 | 4 | 4 | 16 | 8 |
| 3 | 5 | 9 | 25 | 15 |
| 1 | 3 | 1 | 9 | 3 |
| 5 | 4 | 25 | 16 | 20 |
| 6 | 6 | 36 | 36 | 36 |
| 4 | 2 | 16 | 4 | 8 |
| $\sum X = 21$ | $\sum Y = 24$ | $\sum X^2 = 91$ | $\sum Y^2 = 106$ | $\sum XY = 90$ |

$N = 6$

Coefficient of Correlation, $r = \dfrac{N\sum KF - (\sum K)(\sum F)}{\sqrt{N\sum{}^2 - (\sum K)^2}\sqrt{N\sum F^2 - (\sum F)^2}}$

$$= \dfrac{6\times 90 - 21\times 24}{\sqrt{6\times 91 - (21)^2}\sqrt{6\times 106 - (24)^2}}$$

$$= \dfrac{540 - 504}{\sqrt{546 - 441}\sqrt{636 - 576}}$$

$$= \dfrac{36}{\sqrt{105}\sqrt{60}}$$

$$= \dfrac{36}{10.246\times 7.7459}$$

$$= \dfrac{36}{79.31} = 0.4539$$

$\Rightarrow \qquad r = 0.4539$

## 9.6.3 ACTUAL MEAN METHOD OF CALCULATING CORRELATION

Under this Correlation is calculated by taking the deviations from actual mean of the data. Following are the steps:

1. Take two series X and Y.

2. Find the mean of both the series $\overline{X}$ and $\overline{Y}$, denoted by $\overline{X}$ and $\overline{Y}$.
3. Take deviations of series X from it mean and it is denoted by 'x'.
4. Take deviations of series Y from it mean and it is denoted by 'y'.
5. Take square of deviation of series X denoted by $x^2$.
6. Sum up square of deviations of series X denoted by $\sum x^2$.
7. Take square of deviation of series Y denoted by $y^2$.
8. Sum up square of deviations of series Y denoted by $\sum y^2$.
9. Find the product of x and y and it is denoted by xy.
10. Find the sum of 'xy 'it is denoted by $\sum xy$
11. Apply the following formula for calculating the correlation.

$$r = \dfrac{\sum xy}{\sqrt{\sum x^2}\sqrt{\sum y^2}} = \dfrac{\sum(X-\overline{X})(Y-\overline{Y})}{\sqrt{\sum(X-\overline{X})^2}\sqrt{(Y-\overline{Y})^2}}$$

**Example 2.** *Calculate Karl Pearson's coefficient of correlation*

| X | 50 | 50 | 55 | 60 | 65 | 65 | 65 | 60 | 60 | 50 |
|---|----|----|----|----|----|----|----|----|----|----|
| Y | 11 | 13 | 14 | 16 | 16 | 15 | 15 | 14 | 13 | 13 |

**Solution :** When deviations are taken from actual arithmetic mean, '$r$' is given by

$$r = \frac{\Sigma xy}{\sqrt{\Sigma x^2}\sqrt{\Sigma y^2}} = \frac{\Sigma(K-\overline{X})(F-\overline{Y})}{\sqrt{\Sigma(K-\overline{X})^2}\sqrt{(F-\overline{Y})^2}}$$

Where $x = X - \overline{X} =$ Deviation from $A.M.$ of X series
$y = Y - \overline{Y} =$ Deviation from $A.M.$ of $Y$ series

| X | Y | $x = (X - \overline{X})$ | $x^2$ | $y = (Y - \overline{Y})$ | $y^2$ | $xy$ |
|---|---|---|---|---|---|---|
| 50 | 11 | −8 | 64 | −3 | 9 | 24 |
| 50 | 13 | −8 | 64 | −1 | 1 | 8 |
| 55 | 14 | −3 | 9 | 0 | 0 | 0 |
| 60 | 16 | 2 | 4 | 2 | 4 | 4 |
| 65 | 16 | 7 | 49 | 2 | 4 | 14 |
| 65 | 15 | 7 | 49 | 1 | 1 | 7 |
| 65 | 15 | 7 | 49 | 1 | 1 | 7 |
| 60 | 14 | 2 | 4 | 0 | 0 | 0 |
| 60 | 13 | 2 | 4 | −1 | 1 | −2 |
| 50 | 13 | −8 | 64 | −1 | 1 | 8 |
| $\Sigma X = 580$ | $\Sigma Y = 140$ | | $\Sigma x^2 = 360$ | | $\Sigma y^2 = 22$ | $\Sigma xy = 70$ |

Here, $N = 10$

$A.M.$ of X series, $\overline{X} = \dfrac{\Sigma K}{N} = \dfrac{580}{10} = 58$

$A.M.$ of Y series, $\overline{Y} = \dfrac{\Sigma F}{N} = \dfrac{140}{10} = 14$

Coefficient of Correlation, $r = \dfrac{\Sigma xy}{\sqrt{\Sigma x^2}\sqrt{\Sigma y^2}} = \dfrac{70}{\sqrt{360 \times 22}} = \dfrac{70}{\sqrt{7920}} = 0.7866$

$\Rightarrow \quad r = 0.7866$

## 9.6.4 ASSUMED MEAN METHOD OF CALCULATING CORRELATION

Under this Correlation is calculated by taking the deviations from assumed mean of the data.

Following are the steps:

1. Take two series X and Y.
2. Take any value as assumed mean for series X .
3. Take deviations of series X from its assumed mean and it is denoted by 'dx'.
4. Find sum of deviations denoted by $\Sigma$dx.
5. Take square of deviation of series X denoted by $dx^2$ 6. Sum up square of deviations of series X denoted by $\Sigma dx^2$.
7. Take any value as assumed mean for series Y .
8. Take deviations of series Y from its assumed mean and it is denoted by 'dy'.
9. Find sum of deviations of series Y denoted by $\Sigma$dy.
10. Take square of deviation of series Y denoted by $dy^2$ 11. Sum up square of deviations of series Y denoted by $\Sigma dy^2$.
12. Find the product of dx and dy and it is denoted by dxdy.
13. Find the sum of 'dxdy 'it is denoted by $\Sigma$ dxdy
14. Apply the following formula for calculating the correlation.

$$r = \frac{N \Sigma\, dxdy - (\Sigma\, dx)(\Sigma\, dy)}{\sqrt{N \Sigma\, dx^2 - (\Sigma\, dx)^2}\sqrt{N \Sigma\, dy^2 - (\Sigma\, dy)^2}}$$

**Example 3. Compute coefficient of correlation from the following figures**

| City | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Population (in thousands) | 78 | 25 | 16 | 14 | 38 | 61 | 30 |
| Accident Rate (per million) | 80 | 62 | 53 | 60 | 62 | 69 | 67 |

**Solution :** Here, $N = 7$

Coefficient of Correlation, $r$ is given by

$$r = \frac{N \Sigma\, dxdy - (\Sigma\, dx)(\Sigma\, dy)}{\sqrt{N \Sigma\, dx^2 - (\Sigma\, dx)^2}\sqrt{N \Sigma\, dy^2 - (\Sigma\, dy)^2}}$$

Where $dx$ = Deviations of terms of X series from assumed mean $A_K = X - A_K$

$dy$ = Deviations of terms of $Y$ series from assumed mean $A_F = Y - A_F$

| X | Y | $dx$ $= X - A_K$ $A_K = 38$ | $dy = Y - A_F$ $A_F = 67$ | $dx^2$ | $dy^2$ | $dxdy$ |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 70 | 80 | 32 | 13 | 1024 | 169 | 416 |
| 25 | 62 | −13 | −5 | 169 | 25 | 65 |
| 16 | 53 | −22 | −14 | 482 | 196 | 308 |
| 14 | 60 | −24 | −7 | 576 | 49 | 168 |
| 38 | 62 | 0 | −5 | 0 | 25 | 0 |
| 61 | 69 | 23 | 2 | 529 | 4 | 46 |
| 30 | 67 | −8 | 0 | 64 | 0 | 0 |
| | | $\sum dx = -12$ | $\sum dy = -16$ | $\sum dx^2 = 2846$ | $\sum dy^2 = 468$ | $\sum dxdy = 1003$ |

Here, $N = 7$

$\therefore$ Coefficient of Correlation, $r = \dfrac{7 \times 1003 - (-12)(-16)}{\sqrt{7 \times 2846 - (-12)^2}\sqrt{7 \times 468 - (-16)^2}}$

$= \dfrac{7021 - 192}{\sqrt{19{,}922 - 144}\sqrt{3276 - 256}}$

$= \dfrac{6829}{\sqrt{19{,}778}\sqrt{3020}} = 0.8837$

$\Rightarrow \quad r = 0.8837$

## 9.6.5 STEP DEVIATION METHOD OF CALCULATING CORRELATION

Under this method assumed mean is taken but the difference is that after taking the deviation, these are divided by some common factor to get the step deviations. Following are the steps:

1. Take two series X and Y.
2. Take any value as assumed mean for series X .
3. Take deviations of series X from its assumed mean and it is denoted by 'dx'. 4. Divide the value of 'dx' so obtained by some common factor to get $dx'$ 5. Find sum of deviations denoted by $\sum dx'$.

6. Take square of deviation of series X denoted by $dx'^2$ 7. Sum up square of deviations of series X denoted by $\sum dx'^2$.

8. Take any value as assumed mean for series Y .
9. Take deviations of series Y from its assumed mean and it is denoted by 'dy'. 10. Divide the value of 'dy' so obtained by some common factor to get $dy'$

11. Find sum of deviations of series Y denoted by $\sum dy'$.
12. Take square of deviation of series Y denoted by $dy'^2$
13. Sum up square of deviations of series Y denoted by $\sum dy'^2$.
14. Find the product $dx'$ of and $dy'$ and it is denoted by $dx'dy'$ .
15. Find the sum of 'dxdy 'it is denoted by $\sum dx'dy'$

16. Apply the following formula for calculating the correlation.

**Coefficient of Correlation,** $r = \dfrac{N \sum dx^F\, dy^F - (\sum dx^F)(\sum dy^F)}{\sqrt{N \sum dx^{F2} - (\sum dx^F)^2}\sqrt{N \sum dy^{F2} - (\sum dy^F)^2}}$

**Example 4.** *Find the coefficient of correlation by Karl Pearson's method*

| Price (Rs.) | 5 | 10 | 15 | 20 | 25 |
|-------------|----|----|----|----|----|
| Demand (kg) | 40 | 35 | 30 | 25 | 20 |

**Solution :**

| X | Y | $dx = X - A$<br>$A = 15$ | $dx' = \dfrac{dx}{C_1}$<br>$C_1 = 5$ | $dy = Y - B$<br>$B = 30$ | $dy' = \dfrac{dy}{C_1}$<br>$C_2 = 5$ | $dx'^2$ | $d'_2$ | $dx'dy'$ |
|----|----|----|----|----|----|----|----|----|
| 5 | 40 | −10 | −2 | 10 | 2 | 4 | 4 | −4 |
| 10 | 35 | −5 | −1 | 5 | 1 | 1 | 1 | −1 |
| 15 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20 | 25 | 5 | 1 | −5 | −1 | 1 | 1 | −1 |
| 25 | 20 | 10 | 2 | −10 | −2 | 4 | 4 | −4 |
| | | | $\sum dx'$ <br> $= 0$ | | $\sum dy'$ <br> $= 0$ | $\sum dx'^2$ <br> $= 10$ | $\sum dy'^2$ <br> $= 10$ | $\sum dx'dy'$ <br> $= -10$ |

Here    $N = 5$

Coefficient of Correlation, $r = \dfrac{N \sum dx^F dy^F - (\sum dx^F)(\sum dy^F)}{\sqrt{N \sum dx^{F2} - (\sum dx^F)^2}\sqrt{N \sum dy^{F2} - (\sum dy^F)^2}}$

$= \dfrac{5 \times (-10) - 0 \times 0}{\sqrt{5 \times 10 - 0^2}\sqrt{5 \times 10 - 0^2}}$

$= \dfrac{-50}{\sqrt{50} \times \sqrt{50}} = -1$

$\Rightarrow$      $r = -1$

## 9.6.6 CALCULATING CORRELATION WITH HELP OF STANDARD DEVIATIONS

Under this method assumed mean is taken but the difference is that after taking the deviation, these are divided by some common factor to get the step deviations. Following are the steps:

   1. Take two series X and Y.

2. Find the mean of both the series X and Y, denoted by $\overline{X}$ and $\overline{Y}$.
3. Take deviations of series X from it mean and it is denoted by 'x'.
4. Take deviations of series Y from it mean and it is denoted by 'y'.
5. Find the product of x and y and it is denoted by xy.
6. Find the sum of 'xy' it is denoted by $\sum xy$
7. Calculate the standard deviation of both series X and Y.
8. Apply the following formula for calculating the correlation.

$$r = \frac{\sum xy}{N\sigma_X\sigma_Y}$$

**Example 5.** *Given*

*No. of pairs of observations* $= 10$

$\qquad \sum xy = 625$

$\qquad$ X *Series Standard Deviation* $= 9$

$\qquad$ Y *Series Standard Deviation* $= 8$

$\qquad$ *Find 'r'.*

**Solution :** We are given that

$\qquad N = 10, \ \sigma_K = 9 \ \sigma_F = 8$ and $\qquad \sum xy = 625$

Now $r = \dfrac{\sum xy}{N\sigma_X\sigma_Y}$

$\qquad = \dfrac{625}{10 \times 9 \times 8}$

$\qquad = \dfrac{625}{720}$

$\qquad = 0.868$

$\Rightarrow \qquad r = +.868$

**Example 6.** *Given*

*No. of pairs of observations* $= 10$

$\qquad$ X *Series Arithmetic Mean* $= 75$

$\qquad$ Y *Series Arithmetic Mean* $= 125$

$\qquad$ X *Series Assumed Mean* $= 69$

$\qquad$ Y *Series Assumed Mean* $= 110$

$\qquad$ X *Series Standard Deviation* $= 13.07$

$\qquad$ Y *Series Standard Deviation* $= 15.85$

*Summation of products of corresponding deviation of* X *and* Y *series* $= 2176$ *Find* '*r*'.

**Solution :** We are given that

$$N = 10, \qquad X = 75, \qquad A_K = 69, \qquad \sigma_K = 13.07$$

$$Y = 125, \qquad \qquad \sigma_F = 15.85$$

$$A_F = 110,$$

and $\qquad \sum xy = 2176$

Now $r = \dfrac{\sum xy - N(\bar{X} - A_X)(\bar{Y} - A_Y)}{N \sigma_X \sigma_Y}$

$\qquad = \dfrac{2176 - 10(75 - 69)(125 - 110)}{10 \times 13.07 \times 15.85}$

$\qquad = \dfrac{2176 - 900}{2071.595}$

$\qquad = 0.6159 \approx 0.616$

$\qquad r = +0.616$

$\Rightarrow$

**Example 7.** *A computer while calculating the coefficient of correlation between the variables* X *and* Y *obtained the values as*

$$N = \qquad , \qquad \sum X = 50, \qquad \sum X^2 = 448$$

$$\sum Y = 106, \qquad \sum Y^2 = 1896, \ \sum XY = 879$$

*But later on, it was found that the computer had copied down two pairs of observations as*

| X | Y |
|---|---|
| 5 | 15 |
| 10 | 18 |

*While the correct values were*

| X | Y |
|---|---|
| 6 | 18 |
| 10 | 19 |

*Find the correct value of correlation coefficient.*

**Solution :** Incorrect value of $\sum X = 50$

∴ Correct value of $\sum X = 50 - 5 - 10 + 6 + 10$

$$= 51 \text{ Incorrect}$$

value of $\sum Y = 106$

∴ Correct value of $\sum Y = 106 - 15 - 18 + 18 + 19$

$$= 110$$

Incorrect value of $\sum X^2 = 448$

∴ Correct value of $\sum X^2 = 448 - 5^2 - (10)^2 + 6^2 + (10)^2$

$$= 459$$

Incorrect value of $\sum Y^2 = 1896$

∴ Correct value of $\sum Y^2 = 1896 - 15^2 - (18)^2 + (18)^2 + 19^2$

$$= 2032$$

Incorrect value of $\sum XY = 879$

∴ Correct value of $\sum XY = 879 - (5 \times 15) - (10 \times 18) + (6 \times 18) + (10 \times 19)$

$$= 952$$

Thus, the corrected value of coefficient of correlation

$$= \frac{N \sum KF - (\sum K)(\sum F)}{\sqrt{N \sum K^2 - (\sum K)^2}\sqrt{N \sum F^2 - (\sum F)^2}}$$

$$= \frac{6 \times 952 - 51 \times 110}{\sqrt{6 \times 459 - (51)^2}\sqrt{6 \times 2032 - (110)^2}}$$

$$= \frac{5712 - 5610}{\sqrt{2754 - 2601}\sqrt{12,192 - 12,100}}$$

$$= \frac{102}{\sqrt{153}\sqrt{92}}$$

$$= \frac{102}{12.369 \times 9.59}$$

$$= \frac{102}{118.618} = 0.8599$$

⇒ $r = +0.8599$

**Example 8. Find Correlation between daily wage and food expenditure.**

**Daily Wage**

| Food Expenditure | 100-150 | 150-200 | 200-250 | 250-300 | 300-350 |
|---|---|---|---|---|---|
| 0 –10 | 5 | 4 | 5 | 2 | 4 |
| 10 –20 | 2 | 7 | 3 | 7 | 1 |
| 20 –30 | - | 6 | - | 4 | 5 |
| 30 –40 | 8 | - | 4 | - | 8 |

| 40 –50 | - | 7 | 3 | 5 | 10 |
|--------|---|---|---|---|----|

## Solution:

**Assumed Mean of series X = 225**

**Assumed Mean of series Y = 25**

**Class interval of series X = 50**

**Class interval of series Y = 10**

**Value of dx is calculated by applying the formula** $= \dfrac{m-A}{c}$

**Value of dy is calculated by applying the formula** $= \dfrac{m-A}{c}$

CalculationofKarlPearson'scoefficientofcorrelation

| X | | 100-150 | 150–200 | 200–250 | 250–300 | 300–350 | f | dy | fdy | $fdy^2$ | fdxdy |
|---|---------|---------|---------|---------|---------|---------|---|----|-----|---------|-------|
| Y | MidPoint | 125 | 175 | 225 | 275 | 325 | | | | | |
| 0–10 | 5 | 20 / 5 | 8 / 4 | 0 / 5 | -4 / 2 | -16 / 4 | 20 | -2 | -40 | 80 | 8 |
| 10–20 | 15 | 4 / 2 | 7 / 7 | 0 / 3 | -7 / 7 | -2 / 1 | 20 | -1 | -20 | 20 | 2 |
| 20–30 | 25 | - / - | 0 / 6 | - / - | 0 / 4 | 0 / 5 | 15 | 0 | 0 | 0 | 0 |
| 30–40 | 35 | -16 / 8 | - / - | 0 / 4 | - / - | 16 / 8 | 20 | 1 | 20 | 20 | 0 |
| 40–50 | 45 | - / - | -14 / 7 | 0 / 3 | 10 / 5 | 40 / 10 | 25 | 2 | 50 | 100 | 36 |
| F | | 15 | 24 | 15 | 18 | 28 | 100 =N | | 10 | 220 | 46 |
| Dx | | -2 | -1 | 0 | 1 | 2 | | | ∑fdy | ∑fdy2 | ∑fdxdy |

| Fdx | -30 | -24 | 0 | 18 | 56 | 20 | $\sum$fdx | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| fdx2 | 60 | 24 | 0 | 18 | 112 | 214 | $\sum$fdx2 | | | |
| Fdxdy | 8 | 1 | 0 | -1 | 38 | 46 | $\sum$fdxdy | | | |

Coefficient of Correlation, $r =$

$$\frac{N \sum fdx'dy' - (\sum fdx')(\sum fdy')}{\sqrt{N \sum fdx'^2 - (\sum fdx')^2}\sqrt{N \sum fdy'^2 - (\sum fdy')^2}}$$

$$= \frac{100 \times 46 - 20 \times 10}{\sqrt{100 \times 214 - (20)^2}\sqrt{100 \times (220) - (10)^2}}$$

$$= \frac{4600 - 200}{\sqrt{21400 - 400}\ \sqrt{22000 - 100}}$$

$$= \frac{4400}{\sqrt{21000}\sqrt{21900}}$$

$$= \frac{4400}{21445.28} = .2052$$

### 9.6.7 ASSUMPTIONS OF KARL PEARSON'S COEFFICIENT OF CORRELATION

1. Linear Relation: It assumes that there exist linear relation between two variable.
2. Causal Relation: It assumes that the relation between variables is not mere chance rather there is cause and effect relation between the variables.
3. Normal Distribution: The series from which data is taken is a normal series.
4. Error of measurement: There is no error in measurement of the data.

### 9.6.8 BENEFITS OF KARL PEARSON'S COEFFICIENT OF CORRELATION

1. It is most popular method of correlation.
2. It is based on mathematical formula.
3. It give degree of correlation as well as direction of correlation.
4. It is based on all the observations of the data.
5. It is capable of further algebraic treatment.

### 9.6.9 LIMITATIONS OF KARL PEARSON'S COEFFICIENT OF CORRELATION

1. It is comparatively difficult to calculate.
2. It is time consuming method.

3. It is based on unrealistic assumptions.
4. It is affected by extreme values.
5. It cannot be applied on qualitative data.

## 9.7 TEST YOUR UNDERSTANDING (A)

1. From the following data of prices of product X and Y draw scatter diagram.

| | 1 | 2nd | 3 | 4 | 5th | 6th | 7th | 8th | 9th | 10th |
|---|---|---|---|---|---|---|---|---|---|---|
| Price of X | 60 | 65 | 65 | 70 | 75 | 75 | 80 | 85 | 80 | 100 |
| Price of Y | 120 | 125 | 120 | 110 | 105 | 100 | 100 | 90 | 80 | 60 |

st        rd                th

2. Calculate Karl Pearson's coefficient of correlation

| X | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| Y | 46 | 42 | 38 | 34 | 30 | 26 | 22 | 18 | 14 | 10 |

3. Calculate Karl Pearson's coefficient between X and Y

| X | 42 | 44 | 58 | 55 | 89 | 98 | 66 |
|---|---|---|---|---|---|---|---|
| Y | 56 | 49 | 53 | 58 | 65 | 76 | 58 |

4. Find correlation between marks of subject A Subject B

| Subject A | 24 | 26 | 32 | 33 | 35 | 30 |
|---|---|---|---|---|---|---|
| Subject B | 15 | 20 | 22 | 24 | 27 | 24 |

5. Find correlation between Height of Mother and Daughter

| Height of Mother (Inches) | 54 | 56 | 56 | 58 | 62 | 64 | 64 | 66 | 70 | 70 |
|---|---|---|---|---|---|---|---|---|---|---|
| Height of | 46 | 50 | 52 | 50 | 52 | 54 | 56 | 58 | 60 | 62 |

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| Daughter(Inches) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

6. What is the Karl Pearson's coefficient of correlation if $\sum xy = 40$ , $n = 100$, $\sum x^2 = 80$ and $\sum y^2 = 20$.

7. Calculate the number of items for which r = 0.8 , $\sum xy = 200$. Standard deviation of y = 5 and $\sum x^2 = 100$ where x and y denote the deviations of items from actual means.

8. Following values were obtained during calculation of correlation:
N = 30;  $\sum X=120$      $\sum X2 =600$      $\sum Y=90$          $\sum Y2=250$        $\sum XY=335$
Later found that two pairs were taken wrong which are as follows:

| pairsofobservationsas: | (X,Y): | (8,10) | (12,7) |
|---|---|---|---|
| Whilethecorrectvalueswere: | (X,Y): | (8,12) | (10,8) |

Find correct correlation.

9. From the data given below calculate coefficient of correlation.

| | X series | Y series |
|---|---|---|
| Number of items | 8 | 8 |
| Mean | 68 | 69 |
| Sum of squares of deviation from mean | 36 | 44 |
| Sum, of product of deviations x and y from means | 24 | 24 |

10. Find the correlation between age and playing habits from the following data :

| Age | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|
| No of students | 20 | 270 | 340 | 360 | 400 | 300 |
| Regular players | 150 | 162 | 170 | 180 | 180 | 120 |

11. From the table given below find the correlation coefficient between the ages of husbands and wives

| Age of Wives Y | Ages of Husbands | | | | | |
|---|---|---|---|---|---|---|
| | X | | | | | |
| | 20 − 30 | 30 − 40 | 40 − 50 | 50 − 60 | 60 − 70 | Total |
| 15 − 25 | 5 | 9 | 3 | − | − | 17 |
| 25 − 35 | − | 10 | 25 | 2 | − | 37 |

| | | | | | |
|---|---|---|---|---|---|
| 35 − 45 | − | 1 | 12 | 2 | − | 15 |
| 45 − 55 | − | − | 4 | 16 | 5 | 25 |
| 55 − 65 | − | − | − | 4 | 2 | 6 |
| Total | 5 | 20 | 44 | 24 | 7 | 100/100 |

**Answers**

| | |
|---|---|
| 2. | -1 |
| 3. | .9042 |
| 4. | .92 |
| 5. | .95 |
| 6. | 1 |
| 7. | 25 |
| 8. | -.4311 |
| 9. | .603 |
| 10. | -.94 |
| 11. | .795 |

## 9.8 SPEARMAN'S RANK CORRELATION

Karl Peason's Coefficient of Correlation is very useful if data is quantitative, but in case of qualitative data it is a failure. Spearman's Rank correlation is a method that can calculate correlation both from quantitative and qualitative data if the data is ranked like in singing contest we rank the participants as one number, two number or three number etc. This method was given by Charles Edward Spearman in 1904. In this method we gives Rank to the data and with help of such ranks, correlation is calculated.

### 9.8.1 FEATURES OF SPEARMAN'S RANK CORRELATION
1. The coefficient of correlation may be positive or negative.
2. The value of coefficient of correlation always lies between -1 and + 1. -1 refers to 100% negative correlation, plus one refers to 100% positive correlation, and zero refers to no correlation between the items.
3. This method is based ranks of the data.
4. Sum of difference between ranks in this method is always zero i.e. $\sum D = 0$.
5. There is no assumption of normal distribution in this method.
6. In case all the ranks of the two series are same the value of $\sum D^2 = 0$, it shows that there is perfect positive correlation between the data.

### 9.8.2 SPEARMAN'S RANK CORRELATION WHEN RANKS ARE GIVEN.

1. Calculate the difference between ranks of both the series denoted by $\sum$D.
2. Take square of deviations and calculate the value of $D^2$.
3. Calculate sum of square of deviations denoted by $\sum D^2$.
4. Apply following formula.

**Example 9.** *Following are given the ranks of 8 pairs. Find 'r'*

| Rank X | 6 | 4 | 8 | 2 | 7 | 5 | 3 | 1 |
|--------|---|---|---|---|---|---|---|---|
| Rank Y | 4 | 8 | 7 | 3 | 6 | 5 | 1 | 2 |

**Solution :**

| Rank X | Rank $Y$ | Difference of Ranks $D$ | $D_2$ |
|--------|----------|-------------------------|-------|
| 6 | 4 | +2 | 4 |
| 4 | 8 | −4 | 16 |
| 8 | 7 | −1 | 1 |
| 2 | 3 | −1 | 1 |
| 7 | 6 | +1 | 1 |
| 5 | 5 | 0 | 0 |
| 3 | 1 | +2 | 4 |
| 1 | 2 | −1 | 1 |
| $N = 8$ | | | $\sum D^2 = 28$ |

Coefficient of Rank Correlation, $r = 1 - \dfrac{6\sum D^2}{N(N^2-1)}$

$$= 1 - \frac{6\times28}{8(8^2-1)}$$

$$= 1 - \frac{168}{8(64-1)}$$

$$= 1 - \frac{168}{8(63)}$$

$$= 1 - \frac{168}{504} = 1 - 0.33 = 0.67$$

$\Rightarrow$    Rank Correlation Coefficient $= 0.67$

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**Example 10.** *In a beauty contest, three judges gave the following ranks to* 10 *contestants. Find out which pair of judges agree or disagree the most.*

| Judge 1 |   | 1 | 6 | 3 | 8 | 7 | 10 | 9 | 2 | 4 |
|---------|---|---|---|---|---|---|----|---|---|---|
| Judge 2 | 9 | 7 | 10 | 5 | 8 | 4 | 3 | 6 | 1 | 2 |
| Judge 3 | 6 | 4 | 7 | 10 | 5 | 3 | 1 | 9 | 2 | 8 |

**Solution :**

| Ranks by | | | $D_1 = R_1 - R_2$ | $D_1{}^2$ | $D_2 = R_2 - R_3$ | $D_2{}^2$ | $D_3 = R_1 - R_3$ | $D_3{}^2$ |
|---|---|---|---|---|---|---|---|---|
| Judge 1 $R_1$ | Judge 2 $R_2$ | Judge 3 $R_3$ | | | | | | |
| 5 | 9 | 6 | −4 | 16 | 3 | 9 | −1 | 1 |
| 1 | 7 | 4 | −6 | 36 | 3 | 9 | −3 | 9 |
| 6 | 10 | 7 | −4 | 16 | 3 | 9 | −1 | 1 |
| 3 | 5 | 10 | −2 | 4 | −5 | 25 | −7 | 49 |
| 8 | 8 | 5 | 0 | 0 | 3 | 9 | 3 | 9 |
| 7 | 4 | 3 | +3 | 9 | 1 | 1 | 4 | 16 |
| 10 | 3 | 1 | +7 | 49 | 2 | 4 | 9 | 81 |
| 9 | 6 | 9 | +3 | 9 | −3 | 9 | 0 | 0 |
| 2 | 1 | 2 | +1 | 1 | −1 | 1 | 0 | 0 |
| 4 | 2 | 8 | +2 | 4 | −6 | 36 | −4 | 16 |
| | | | | $\sum D_1{}^2$ $= 144$ | | $\sum D_2{}^2$ $= 112$ | | $\sum D_3{}^2$ $= 182$ |

Now $r_{12} = 1 - \dfrac{6 \sum D1^2}{N(N^2-1)}$

$= 1 - \dfrac{6 \times 144}{10(10^2-1)}$

$= 1 - \dfrac{864}{10(100-1)}$

$= 1 - \dfrac{864}{10(99)}$

$= 1 - \dfrac{864}{990}$

$= 1 - 0.873 = 0.127$

∴ $r_{12} = +0.127 \Rightarrow$ Low degree$+ ve$ correlation

$r_{23} = 1 - \dfrac{6 \sum D2^2}{N(N^2-1)}$

$= 1 - \dfrac{6 \times 112}{10(10^2-1)}$

$= 1 - \dfrac{672}{10(100-1)}$

$= 1 - \dfrac{672}{10(99)}$

$= 1 - \dfrac{672}{990}$

$= 1 - 0.679 = 0.321$

∴ $r_{23} = +0.321 \Rightarrow$ Moderate degree $+ve$ correlation

Similarly $r_{31} = 1 - \dfrac{6 \sum D3^2}{N(N^2-1)}$

$= 1 - \dfrac{6 \times 182}{10(10^2-1)}$

$= 1 - \dfrac{1092}{10(100-1)}$

$= 1 - \dfrac{1092}{10(99)}$

$= 1 - \dfrac{1092}{990}$

$= 1 - 1.103 = -0.103$

∴ $r_{31} = -0.103 \Rightarrow$ Low degree $-ve$ correlation

$\Rightarrow$ Since $r_{23}$ is highest, so $2nd$ and $3rd$ judges agree the most.

Also, $r_{31}$ being lowest, $3rd$ and $1st$ judges disagree the most.

**9.8.3 SPEARMAN'S RANK CORRELATION WHEN RANKS ARE NOT GIVEN.**

1. Assign the ranks in descending order to series X by giving first rank to highest value and second rank to value lower than higher value and so on.
2. Similarly assign the ranks to series Y.
3. Calculate the difference between ranks of both the series denoted by $\sum D$.
4. Take square of deviations and calculate the value of $D^2$.
5. Calculate sum of square of deviations denoted by $\sum D^2$.
6. Apply following formula.

**Example 11.** *Following are the marks obtained by* 8 *students in Maths and Statistics. Find the Rank Correlation Coefficient.*

| Marks in Maths | 60 | 70 | 53 | 59 | 68 | 72 | 50 | 54 |
|---|---|---|---|---|---|---|---|---|
| Marks in Statistics | 44 | 74 | 54 | 64 | 84 | 79 | 53 | 66 |

**Solution :**

| X | Ranks $R_1$ | Y | Ranks $R_2$ | Difference of Ranks $= R_1 - R_2$ | $D_2$ |
|---|---|---|---|---|---|
| 60 | 4 | 44 | 8 | $-4$ | 16 |
| 70 | 2 | 74 | 3 | $-1$ | 1 |
| 53 | 7 | 54 | 6 | $+1$ | 1 |
| 59 | 5 | 64 | 5 | 0 | 0 |
| 68 | 3 | 84 | 1 | $+2$ | 4 |
| 72 | 1 | 79 | 2 | $-1$ | 1 |
| 50 | 8 | 53 | 7 | $+1$ | 1 |
| 54 | 6 | 66 | 4 | $+2$ | 4 |
| | | | | | $\sum D^2 = 28$ |

Here    $N = 8$

$\Rightarrow$    Rank Coefficient of Correlation, $r = 1 - \dfrac{6\sum D^2}{N(N^2-1)}$

$$= 1 - \dfrac{6 \times 28}{8(8^2-1)}$$

$$= 1 - \dfrac{168}{8(64-1)}$$

$$= 1 - \dfrac{168}{8(63)}$$

$$= 1 - \dfrac{168}{504}$$

$$= 1 - 0.33 = 0.67$$

$\Rightarrow$        Rank Correlation Coefficient $= 0.67$

### 9.8.4      SPEARMAN'S RANK CORRELATION WHEN THERE IS REPETITION IN RANKS.

1. Assign the ranks in descending order to series X by giving first rank to highest value and second rank to value lower than higher value and so on. If two items have same value, assign the average rank to both the item. For example two equal values have ranked at 5$^{th}$ place than rank to be given is 5.5 to both i.e. mean of 5$^{th}$ and 6$^{th}$ rank. $(\frac{5+6}{2})$.
2. Similarly assign the ranks to series Y.
3. Calculate the difference between ranks of both the series denoted by $\sum D$.
4. Take square of deviations and calculate the value of $D^2$.
5. Calculate sum of square of deviations denoted by $\sum D^2$.
6. Apply following formula.

$$r = 1 - \frac{6\{\sum D^2 + \frac{1}{12}(m_1{}^3 - m_1) + \frac{1}{12}(m_2{}^3 - m_2)\}}{N(N^2 - 1)}$$

Where m = no. of times a particular item is repeated.

**Example 12.** *Find the Spearsman's Correlation Coefficient for the data given below*

| X | 110 | 104 | 107 | 82 | 93 | 93 | 115 | 95 | 93 | 113 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Y | 80 | 78 | 90 | 75 | 81 | 70 | 87 | 78 | 73 | 85 |

**Solution :** Here, in X series the value 93 occurs thrice ($m_1 = 3$), i. e. at $7^{th}$, $8^{th}$ and $9^{th}$ rank. So all the three values are given the same average rank, i.e. $\frac{7+8+9}{3} = 8^{th}$rank.

Similarly, in $Y$ series the value 78 occurs twice ($m_2 = 2$), i. e. at $6^{th}$ and $7^{th}$ rank. So both the values are given the same average rank, i.e. $\frac{6+7}{2} = 6.5^{th}$rank.

| X | Ranking of X $R_1$ | Y | Ranking of Y $R_2$ | Difference of Ranks $D = R_1 - R_2$ | $D_2$ |
|---|---|---|---|---|---|
| 110 | 3 | 80 | 5 | $-2$ | 4 |

| 104 | 5 | 78 | 6.5 | $-1.5$ | 2.25 |
|---|---|---|---|---|---|
| 107 | 4 | 90 | 1 | $+3$ | 9 |
| 82 | 10 | 75 | 8 | $+2$ | 4 |
| 93 | 8 | 81 | 4 | $+4$ | 16 |
| 93 | 8 | 70 | 10 | $-2$ | 4 |
| 115 | 1 | 87 | 2 | $-2$ | 1 |
| 95 | 6 | 78 | 6.5 | $-0.5$ | 0.25 |
| 93 | 8 | 73 | 9 | $-1$ | 1 |
| 113 | 2 | 85 | 3 | $-1$ | 1 |
| | | | | | $\sum D^2 = 42.5$ |

Here $\quad N = 10$

Spearman's Rank Correlation Coefficient, $r = 1 - \dfrac{6\{\sum D^2 + \frac{1}{12}(m_1{}^3 - m_1) + \frac{1}{12}(m_2{}^3 - m_2)\}}{N(N^2-1)}$ i.

e. $\qquad r = 1 - \dfrac{6\{42.50 + \frac{1}{12}(3^3-3) + \frac{1}{12}(2^3-2)\}}{10(10^2-1)}$

$\qquad = 1 - \dfrac{6\{42.50 + \frac{24}{12} + \frac{6}{12}\}}{10(100-1)}$

$\qquad = 1 - \dfrac{6\{42.50 + 2 + \frac{1}{2}\}}{10 \times 99}$

$\qquad = 1 - \dfrac{6\{42.5 + 2.5\}}{990}$

$\qquad = 1 - \dfrac{6 \times 45}{990}$

$\qquad = 1 - 0.2727 = 0.7273$

$\Rightarrow \qquad$ Rank Correlation Coefficient $= 0.7273$

**Example 13.** *The rank correlation coefficient between the marks obtained by ten students in Mathematics and Statistics was found to be* $0.\ 5$*. But later on, it was found that the difference in ranks in the two subjects obtained by one students was wrongly taken as* $6$ *instead of* $9$*.*

*Find the correct rank correlation.*

**Solution :** Given $\quad N = 10 \quad$, Incorrect $r = 0.5$

We know that

$$\text{Rank Correlation Coefficient}, r = 1 - \frac{6\sum D^2}{N(N^2-1)}$$

$$= 1 - \frac{6\sum D^2}{10(10^2-1)} = 1 - \frac{6\sum D^2}{10\times99}$$

$\Rightarrow$      0.5

$\Rightarrow$      Incorrect $\sum D^2 = \frac{990}{6} \times 0.5 = 82.5$

$\therefore$      The corrected value of $\sum D^2 = 82.5 - 6^2 + 9^2$

$$= 82.5 - 36 + 81 = 127.5$$

$\therefore$      Correct Rank Correlation Coefficient , $r = 1 - \frac{6\times127.5}{10(10^2-1)}$

$$= 1 - \frac{765}{10(100-99)}$$

$$= 1 - \frac{765}{10\times99}$$

$$= 1 - \frac{765}{990}$$

$$= 1 - 0.7727$$

$$= 0.2273$$

### 9.8.5 MERITS OF SPEARMAN'S RANK CORRELATION
1. This is easy to understand.
2. It can calculate correlation from qualitative data also.
3. It does not put condition of normal series of data.
4. It can deal with quantitative data also.
5. It is not affected by presence of extreme values.

### 9.8.6 LIMITATIONS OF SPEARMAN'S RANK CORRELATION
1. It cannot deal with grouped data.
2. If large data is there, it is difficult to apply this method.
3. It cannot be applied further algebraic treatement.
4. Combined correlation cannot be calculated.
5. It gives only approximate correlation, it is not based on actual values.

### 9.9 TEST YOUR UNDERSTANDING (A)

1. Find Rank correlation on base of following data.

| X | 78 | 36 | 98 | 25 | 75 | 82 | 90 | 62 | 65 | 39 |
|---|----|----|----|----|----|----|----|----|----|----|

| Y | 84 | 51 | 91 | 60 | 68 | 62 | 86 | 58 | 53 | 47 |
|---|----|----|----|----|----|----|----|----|----|----|

In Dance competition following ranks were given by 3 judges to participants. Determine which two judges have same preference for music:

| 1stJudge | 1 | 6 | 5 | 10 | 3 | 2 | 4 | 9 | 7 | 8 |
|----------|---|---|---|----|---|---|---|---|---|---|
| 2ndJudge | 3 | 5 | 8 | 4 | 7 | 10 | 2 | 1 | 6 | 9 |
| 3rdJudge | 6 | 4 | 9 | 8 | 1 | 2 | 3 | 10 | 5 | 7 |

3. Find Rank correlation on base of following data.

| X | 25 | 30 | 38 | 22 | 50 | 70 | 30 | 90 |
|---|----|----|----|----|----|----|----|----|
| Y | 50 | 40 | 60 | 40 | 30 | 20 | 40 | 70 |

4. Find Rank correlation on base of following data.

| X | 63 | 67 | 64 | 68 | 62 | 66 | 68 | 67 | 69 | 71 |
|---|----|----|----|----|----|----|----|----|----|----|
| Y | 66 | 68 | 65 | 69 | 66 | 65 | 68 | 69 | 71 | 70 |

**Answers**

1. **.82**
2. **I and II -.2121, II and III -.297, I and III .6364, so judge I and III**
3. **0**
4. **.81**

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## 9.10 LET US SUM UP

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- **Correlation shows the relation between two or more variables.**
- **Value of the coefficient of correlation always lies between -1 and +1.**
- **Correlation may be positive or negative. • Correlation may be linear or non linear.**
- **Karl Person's coefficient of correlation is the most popular method of correlation.**
- **It can deal only with quantitative data.**
- **Spearman's Rank correlation calculated correlation on the basis of ranks given to data.**
- **It can deal with qualitative data also.**

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## 9.11 KEY TERMS

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- **CORRELATION:**Correlation is a statistical technique which studies the relation between two or more variables. It studies that how to variables are related to each other.
- **POSITIVE CORRELATION**: It is a situation in which two variables move in the same direction. In this case if the value of one variable increase the value of other variable also increase. Similarly, if the value of one variable decrease, the value of other variable also decrease.
- **NEGATIVE OR INVERSE CORRELATION:**When two variables move in opposite direction from each other, it is known as negative or inverse correlation. In other words, we can say that when the value of one variable increase value of other variable decrease, it is called negative correlation.
- **LINEAR CORRELATION:** When the change in value of one variable results into constant ratio of change in the value of other variable, it is called linear correlation. In such case if we draw the values of two variables on the graph paper, all the points on the graph paper will fall on a straight line.
- **NON - LINEAR CORRELATION:** When the change in value of one variable does not result into constant ratio of change in the value of other variable, it is called non linear correlation. In such case, if we draw the value of two variables on the graph paper all the points will not fall in the straight line on the graph.
- **SIMPLE CORRELATION:** When we study relation between two variables only, it is known as simple correlation. For example, relation between income and expenditure, Price and Demand, are situations of simple correlation.
- **MULTIPLE CORRELATION:** Multiple correlation is a situation in which more than two variables are involved. Here relation between more than two variables are studied together, for example if we are studying the relation between income of the consumer, price if the product and demand of the product, it is a situation of multiple correlation.

## 9.12 REVIEW QUESTIONS

10. What is Correlatlion. What are uses of measuring correlation.
11. Give different types of correlation.
12. Give Karl Persons method of calculating correlation.
13. Give Karl Pearson's coefficient of correlation in case of actual and assumed mean.
14. What are merits and limitations of Karl Pearson's method.
15. What is Spearman's Rank correlation. How it is determined.
16. In case of repeated ranks how would you determine Spearman's Rank correlation.
17. What are the merits and limitations of Spearman's Rank correlation

## 9.13 FURTHER READINGS

1. J. K. Sharma, *Business Statistics,* Pearson Education.
2. S.C. Gupta, *Fundamentals of Statistics,* Himalaya Publishing House.
3. S.P. Gupta and Archana Gupta, *Elementary Statistics,* Sultan Chand and Sons, New Delhi.
4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.
5. M.R. Spiegel, *Theory and Problems of Statistics,* Schaum's Outlines Series, McGraw HillPublishing Co.

## B. COM (DIGITAL)

## SEMESTER II

## COURSE: BUSINESS MATHEMATICS AND STATISTICS

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## UNIT 10 – REGRESSION

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**STRUCTURE**

**10.0 Objectives**

**10.1 Introduction**

**10.2 History of Regression Analysis**

**10.3 Meaning of Regression Analysis**

**10.4 Benefits of Regression Analysis**

**10.5 Limitations of Regression Analysis.**

**10.6 Different Types of Regression**

**10.7 Relationship between correlation and regression**

**10.8 Regression lines**

**10.9 Least Square Method of fitting Regression lines**

**10.10 Direct Method of Estimating Regression equations**

**10.11 Other Method of Estimating Regression equations**

**10.12 Properties of Regression Coefficients**

**10.13 Test your Understanding (A)**

**10.14 Let us Sum Up**

**10.15 Key Terms**

**10.16 Review Questions**

**10.17 Further Readings**

## 10.0 OBJECTIVES

**After studying the Unit, students will be able to**
- Describe what is regression.
- Distinguish between different types of Regression.
- Understand benefits of Regression.
- Find Regression using various methods.
- Show how correlation and regression are related.
- Understand properties of regression coefficients.

## 10.1 INTRODUCTION

Statistics has many applications in our life whether its business life or our routine life. There are many techniques in statistics that can help us in prediction. Regression is one such technique. In the literary meaning the term 'Regression' 'going back', or 'stepping down'. So, the regression analysis is a tool in statistics that can help in prediction of one variable when the value of other variable is known if there exists any close relation between two or more variables, though such relation may be positive or negative. The technique of Regression can be widely used used as a powerful tool in almost all the fields whether science, Social science, Business etc. However, particularly, in the fields of business and management this technique is very useful for studying the relationship between different variables scuh as, Price and Demand, Price and Supply, Production and Consumption, Income and Consumption, Income and Savings, etc.

When we find regression between two or more varibales, we try to understand the behavior of one variable with help movement of the other variable in a particular direction. For example, if the correlation coefficient between value of sales and amount spent on advertisement say +0.9, it means that if advertisement expenditure is increased, Sale is also likely to increase, as there is very high positive relation between the two variables. However, correlation only tells relation between two variables, but it does not tells the extent by which change in one variable will affect the change in other variable. For this purpose, we have to calculate the co-efficient of Regression. Regression Coefficient is a statistical measure that tries to find out the value of one variable known as dependent variable when the value of another variable known as independent variable is known. Thus, in case of two variables, like Advertisement expenditure and amount of Sales, we can estimate the likely amount of Sales if the value of Advertisement expenditure is given. Similarly, we can predict the value of Advertisement expenditure required, to achieve a particular amount of Sales. This can be done using the two regression coefficients

## 10.2 HISTORY OF REGRESSION ANALYSIS

The technique of Regression analysis was developed by the British Biometrician Sir Francis Galton in 1877 while he was studying the relationship between the heights of fathers and

the heights of their sons. The term' regression' was first time used by him in his paper 'Regression towards Mediocrity in Hereditary Stature" in which he said that:

(i) That tall fathers will most probably have tall sons, and short fathers will most probably have short sons; and the average height of the sons of tall fathers' will mostly be less than the average height of their fathers ;

(ii) He also said that the average height of the sons of short fathers' is most likely to be more than the average height of their fathers ; and

(iii) That the deviations of the mean height of the sons is most likely to be less than the deviations of the mean height of the, or that when the fathers' height move above or below the mean, the sons' height tend to go back (regress) towards the mean.

Professor Galton in his study analyzed the relationship between the two variables that is the heights of the fathers and the heights of the sons using the graphical technique and named the such line describing the relationship between height of the father and height of the son as the 'Line of Regression'.

## 10.3 MEANING OF REGRESSION ANALYSIS

Many experts have defined the term Regression in their own way. Some of these definitions are given below:

1. According to Sir Francis Galton, the term regression analysis is defined as "the law of regression that tells heavily against the full hereditary transmission of any gift, the more bountifully the parent is gifted by nature, the more rare will be his good fortune if he begets a son who is richly endowed as himself, and still more so if he has a son who is endowed yet more largely."

2. In the words of Ya Lun Chou, "Regression analysis attempts to establish the nature of the relationship between variables that is to study the functional relationship between the variables and thereby provide mechanism for prediction or forecasting".

## 10.4 BENEFITS / USES OF REGRESSION ANALYSIS

Benefits of Regression analysis are outlined as under :

1. **Forecasting or Prediction** – Regression provides a relationship between two or more variables that are related to each other. So, with the help of this technique we can easily forecast the values of one variable which is unknown from the values of another variable which is known.

2. **Cause and Effect Relationship –** This analysis helps in finding the cause and effect relationship between two or more variables. It is a powerful tool for measuring the cause and effect relationship among the economic variables. In the field of economics it is very beneficial in the estimation of Demand, Production, Supply etc.

3. **Measuring Error in Estimation** – Regression helps in measuring of errors in estimates made through the regression lines. In case the point of Regression line are less scattered around the relevant regression line, it means there are less chances of error but if these are more scattered around line of regression, it means there are more chances of error.
4. **Finding Correlation Coefficient between two variables** – Regression provides a measure of coefficient of correlation between the two variables. We can calculate correlation by taking the square root of the product of the two regression coefficients.
5. **Usefulness in Business and Commerce** – Regression is very powerful tool of statistical analysis in the field of business and commerce as it can help businessman in prediction of various values such as demand, production etc.
6. **Useful in day to day life -** This technique is very useful in our daily life as it can predict the various factors such as birth rate, death rate, etc.
7. **Testing Hypothesis** – The technique of regression can be used in testing the validity of economic theory or testing of any hypothesis.

## 10.5 LIMITATIONS OF REGRESSION ANALYSIS

Though Regression is a wonderful statistical tool, still it suffers from some limitations. Following are limitations of Regression analysis:
1. Regression analysis assumes that there exists cause and effect relationship between the variables and such relation is not changeable. This assumption may not always hold good and thus could give misleading results.
2. Regression analysis is based on some limited data available. However, as the values are based on limited data may it may give misleading results.
3. Regression analysis involves very lengthy and complicated steps of calculations and analysis. A layman may not be in a position to use this technique.
4. Regression analysis can be used in case of quantitative data only. It cannot be used where data is of qualitative nature such as hardwork, beauty etc.

## 10.6 DIFFERENT TYPES OF REGRESSION ANALYSIS

### 1. SIMPLE AND MULTIPLE REGRESSION
- **SIMPLE REGRESSION**: When there are only two variables under study it is known as a simple regression. For example we are studying the relation between Sales and

Advertising expenditure. If we consider sales as Variable X and advertising as variable Y, then the X = a+bY is known as the regression quation of X on Y where X is the dependent variables and Y and the independent variable. In other words we can find the value of variable X (Sales) if the value of Variable Y (Advertising) is given.

- **MULTIPLE REGRESSION:** The study of more than two variables at a time is known as multiple regression. Under this, only one variable is taken as a dependent variable and all the other variables are taken as independent variables. For example If we consider sales as Variable X, advertising as variable Y and Income as Variable Z, then using the functional relation X = $f$(Y, Z), we can find the value of variable X (Sales) if the value of Variable Y (Advertising) and the value of variable Z (Income) is given.

## 2. TOTAL AND PARTIAL REGRESSION

a. **TOTAL REGRESSION:** Total regression analysis is one in which we study the effect of all the variables simultaneously. For example, when we want to study the effect of advertising expenditure of business represented by variable Y, income of the consumer represented by variable Z, on the amount of sales represented by variable X, we can study impact of advertising and income simultaneously on sales. This is a case of total regression analysis. In such cases, the regression equation is represented as follows:

$$X = f(Y, Z),$$

a. **PARTIAL REGRESSION:** In the case of Partial Regression one or two variables are taken into consideration and the others are excluded. For example, when we want to study the effect of advertising expenditure of business represented by variable Y, income of the consumer represented by variable Z, on the amount of sales represented by variable X, we will not study impact of both income and advertising simultaneously, rather we will first study effect of income on sales keeping advertising constant and then effect of advertising on sales keeping income constant. Partial regression can be written as **X=f(Y not Z).**

## 3. LINEAR AND NON-LINEAR REGRESSION

a. **LINEAR REGRESSION:** When the functional relationship between X and Y is expressed as the first degree equations, it is known as linear regression. In other words, when the points plotted on a scatter diagram concentrate around a straight line it is the case of linear regression.

b. **NON-LINEAR REGRESSION:** On the other hand if the line of regression (in scatter diagram) is not a straight line, the regression is termed as curved or non-linear regression. The regression equations of non-linear regression are represented by equations of higher degree. The following diagrams show the linear and non-linear regressions:

Linear regression       Nonlinear regression
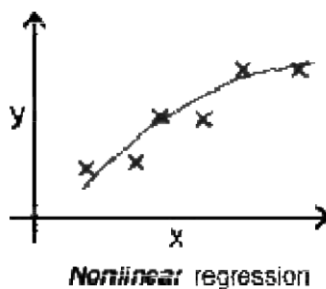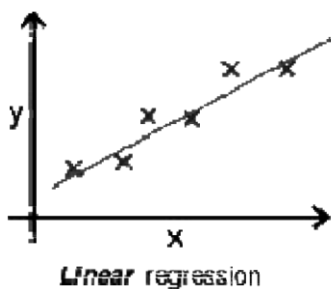
## 10.7 RELATIONSHIP BETWEEN CORRELATION AND REGRESSION

1. Correlation is a quantitative tool that measure of the degree of relationship that is present between two variables. It shows the degree and direction of the relation between tow variables. Regression helps us to find the value of a dependent variable when the value of independent variable is given.

2. Correlation between two variables is the same. For example we calculate the correlation between sales and advertising or advertising and sales, the value of correlation will remain same. But this is not true for Regression. Regression equation of Advertising on sales will be different from regression equation of Sales on advertising.

3. If there is positive correlation, the distance between the two lines will be less. That means the two regression lines will be closer to each other- Similarly, if there is low correlation, the lines will be farther to each other. A positive correlation implies that the lines will be upward sloping whereas a negative correlation implies that the regression lines will be downward sloping.

4. Correlation between two variables can be calculated by taking the square root of the product of the two regression coefficients.

Following are some of the difference between Correlation and Regression:

| No. | Correlation | Regression |
|-----|-------------|------------|
| 1. | Correlation measures the degree and direction of relationship between two variables. | Regression measures the change in value of a dependent variable given the change in value of an independent variable. |
| 2. | Correlation does not depicts a cause and effect' relationship. | Regression depicts the causal relationship between two variables. |
| 3. | Correlation is a relative measure of linear relationship that exists between two variables. | Regression is an absolute measure which measures the change in value of a variable. |
| 4. | Correlation between two variables is the same. . In other words, Correlation between two variables is the same. rxy =ryx. | Regression is not symmetrical in formation. So, the regression coefficients of X on Y and of Y on X are different. |
| 5. | Correlation is independent of Change in origin or scale. | Regression is independent of Change in origin but not of scale. |

| 6. | Correlation is not capable of any further mathematical treatment. | Regression can be further treated mathematically. |
|---|---|---|
| 7. | Coefficient of correlation always lies between -1 and +1. | Regression coefficient can have any value. |

## 10.8 REGRESSION LINES

The lines that are used in Regression for the purpose of estimation are called as regression line. In other words, the lines that are used to study the dependence of one variable on the other variable are called as regression line. If we have two variables X and Y then there .

**a.** **REGRESSION LINE OF Y ON X:** Regression Line Y on X measures the dependence of Y on X and we can estimate the value of Y for the given values of X. In this line Y is dependent

variable and X is independent variable.



y on x
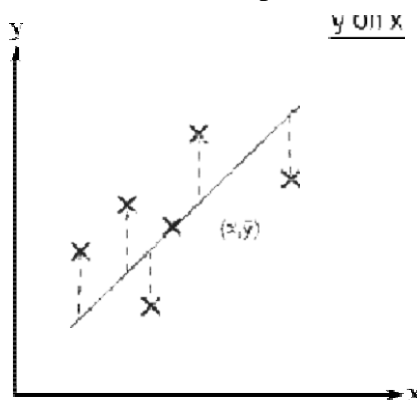
**b.** **Regression Line of X on Y**: Regression Line X on Y measures the dependence of X on Y and we can estimate the value of X for the given values of Y. In this line X is dependent variable and

Y is independent variable.



x on y
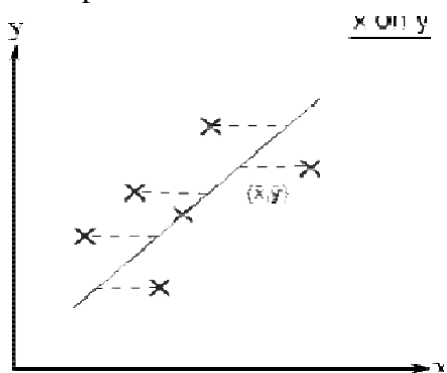
The direction of two regression equation depends upon the degree of correlation between two



Both the line will coincide with positive slope

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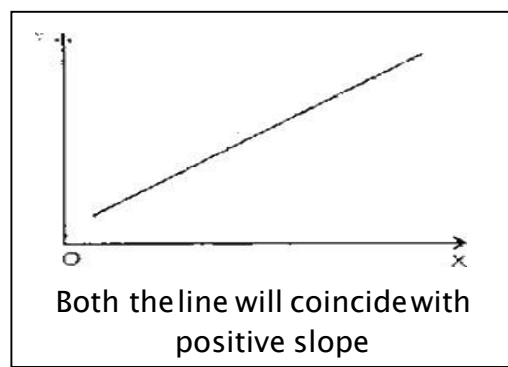
variables. Following can be the cases of correlation between two variables:

**1.     Perfect positive correlation:** If there is a perfect positive correlation between two variable (

i.e. r = +1), both the lines will coincide with each other and will be having positive slope. Both the lines X on Y and Y on X will be same in this case. In other words in that case only one regression line can be drawn as shown in the diagram. The slope of the line will be upward.

**2.     Perfect negative correlation:** If there is a perfect negative correlation between two variable ( i.e. r = -1), both the lines will coincide with each other and will in such case these lines will be having negative slope. Both the lines X on Y and Y on X will be same but downward sloping. In other words in that case only one regression line can be drawn as shown in the diagram. The slope of the line will be upward.
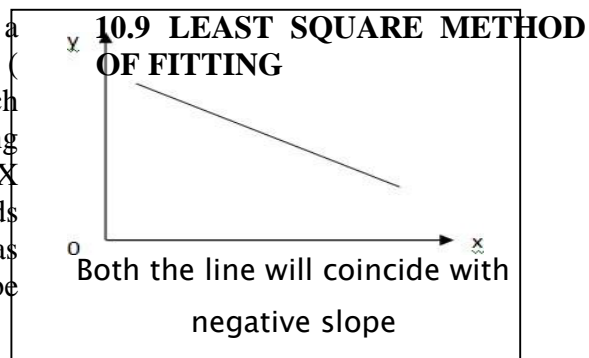
**3.     High degree of correlation:** If there is a High degree of correlation between two variable, both the lines will be near to each other. In other words these lines will be closer to each other but the lines will not coincide with each other. Both the lines will be separate. Further the direction of lines depends upon the positive or negative correlation.
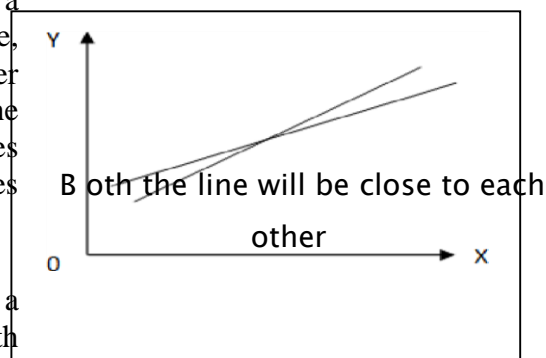
**4.     Low degree of correlation:** If there is a low degree of correlation between two variable, both the lines will be have more distance from each other. In other words these lines will be farther to each other, that is the gap between the two lines will be more. Both the lines will be separate. Further the direction of lines depends upon the positive or negative correlation.
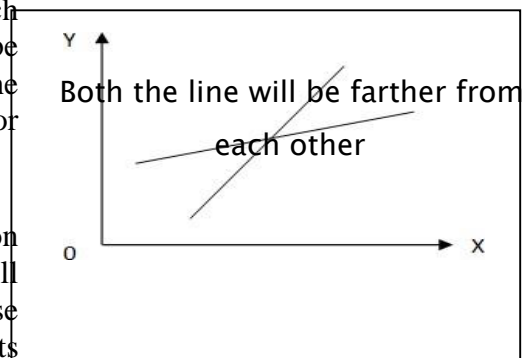
**5.     No correlation:** If there is a no correlation between two variable ( i.e. r = 0), both the lines will be perpendicular to each other. In other words these lines will cut each other at $90^0$. This diagram depicts the perpendicular relation between the two regression lines when there is absolutely zero correlation between the two variables under the study.

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**10.9  LEAST SQUARE METHOD OF FITTING**



Both the line will coincide with negative slope



Both the line will be close to each other



Both the line will be farther from each other



Both the line will be perpendicular to each other
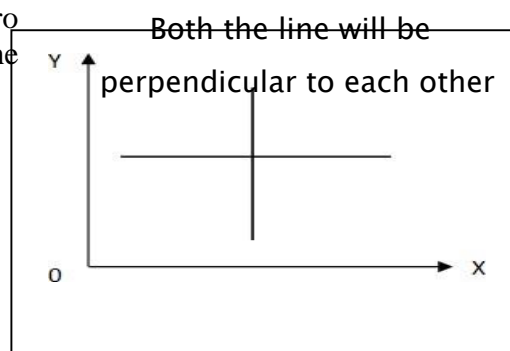
## REGRESSION LINES

Under this method the lines of best fit is drawn as the lines of regression. These lines of regression are known as the lines of the best fit because, with help of these lines we can make the estimate of the values of one variable depending on the value of other variable. According to the Least Square method, regression line should be plotted in such a way that sum of square of the difference between actual value and estimated value of the dependent variable should be least or minimum possible. Under this method we draw two regression lines that are

a. **REGRESSION LINE Y ON X**– it measures the value of Y when value of X is given. In other words it assumes that X is an Independent variable whereas the other variable Y is dependent variable. Mathematically this line is represented by

$Y = a + bX$

Where Y – Dependent Variable X
   – Independent Variable a
   & b – Constants

b. **REGRESSION LINE X ON Y** – it measures the value of X when value of Y is given. In other words it assumes that Y is an Independent variable whereas the other variable X is dependent variable. Mathematically this line is represented by

$X = a + bY$

Where X – Dependent Variable Y
   – Independent Variable a
   & b – Constants
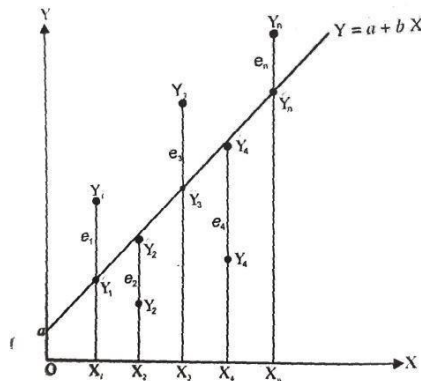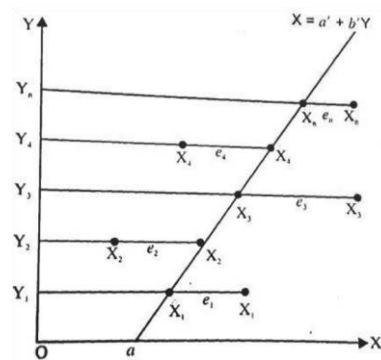


|  Equation Y on X  |  Equation X on Y  |

In the above two regression lines, there are two constants represented by "a" and "b". The constant "b" is also known as regression coefficient, which are denoted as "byx" and "bxy", Where "byx" represent regression coefficient of equation Y on X and "bxy" represent regression coefficient of equation X on Y . When the value of these two variable "a" and "b" is determined we can find out the regression line.

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## 10.10 DIRECT METHODS TO ESTIMATE REGRESSION EQUATION

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The regression equations can be obtained by 'Normal Equation Method" as follows:

1. **REGRESSION EQUATION OF Y ON X:** The regression equation Y on X is in the format of $Y = a + bX$, where Y is a Dependent Variable and X is an Independent Variable. To estimate this regression equation, following normal equations are used: $\Sigma Y = na + b_{yx}\Sigma X$ $\Sigma XY = a \Sigma X + b_{yx}\Sigma X^2$

   With the help of these two equations the values of 'a' and 'b' are obtained and by putting the values of 'a' and 'b' in the equation $Y = a + bX$ we can predict or estimate value of Y for any value of X.

2. **REGRESSION EQUATION OF X ON Y:** The regression equation X on Y is in the format of $X = a + bY$, where X is a Dependent Variable and Y is an Independent Variable. To estimate this regression equation, following normal equations are used: $\Sigma X = na + b_{xy}\Sigma Y$

   $$\Sigma XY = a \Sigma Y + b_{xy}\Sigma Y^2$$

   With the help of these two equations the values of 'a' and 'b' are obtained and by putting the values of 'a' and 'b' in the equation $X = a + bY$ we can predict or estimate value of Y for any value of X.

**Example 1.** Find out the two regression lines for the data given below using the method of least square.

Variable X :    5        10        15        20        25
Variable Y :    20        40        30        60        50

Determination of the regression lines by the method of least square. Also find out
   a. Value of Y when value of X is 40
   b. Value of X when value of Y is 80.

**Solution:**

| X | Y | X2 | Y2 | XY |
|---|---|----|----|-----|
| 5 | 20 | 25 | 400 | 100 |
| 10 | 40 | 100 | 1600 | 400 |
| 15 | 30 | 225 | 900 | 450 |
| 20 | 60 | 400 | 3600 | 1200 |

25      50      625    2500   1250
XX = 75        XY = 200      XX2=1375    XY2=9,000    XXY =3400

## (i) REGRESSION LINE OF Y ON X

This is given by $Y = a + bX$ where $a$ and $b$ are the two constants which are found by solving simultaneously the two normal equations as follows :

$$\Sigma Y = na + b_{yx}\Sigma X \ \Sigma XY$$
$$= a \Sigma X + b_{yx}\Sigma X^2$$

Substituting the given values in the above equations we get,
$200 = 5a + 75b$ ..................................................................... (i)
$3400 = 75a + 1375b$ ............................................................ (ii)
Multiplying the eqn. (i) by 15 we get
$3000 = 75a + 1125b$ ............................................................ (iii)

Subtracting the equation (iii) from equation (ii) we get,
$3400 = 75a + 1375b$
$\underline{-3000 = -75a - 1125b}$
$\ \ 400 = \ \ 250b$

or b = 1.6

Putting the above value of b in the eqn. (i) we get,
$200 = 5a + 75(1.6)$ or 5a
$= 200 - 120$ or
a = 16
Thus, a = 16, and b = 1.6

Putting these values in the equation $Y = a + bX$ we get
**Y = 16+ 1.6X**

So when X is 40, the value of Y will be
$Y = 16 + 1.6(40) = 80$

## (ii) REGRESSION LINE OF X ON Y

This is given by $X = a + bY$
where $a$ and $b$ are the two constants which are found by solving simultaneously the two normal equations as follows :

$\Sigma X = na + b_{xy}\Sigma Y$

$\Sigma XY = a \Sigma Y + b_{xy}\Sigma Y^2$

Substituting the given values in the above equations we get,

$75 = 5a+200b$ ......................................................................... (i)

$3400 = 200a + 9000b$ ......................................................... (ii)

Multiplying the eqn. (i) by 40 we get

$3000 = 200a + 8000b$ ......................................................... (iii)

Subtracting the equation (iii) from equation (ii) we get,

$3400 = 200a + 9000b$

$\underline{-3000 = -200a + -8000b}$

  $400 =\quad 1000b$

or b = .4

Putting the above value of b in the eqn. (i) we get,

$75 = 5a + 200(.4)$        or

$5a = -5$  or

$a = -1$

Thus, a = -1, and b = .4

Putting these values in the equation $X = a + bY$ we get

**X = -1+ .4Y**

So when Y is 80, the value of X will be

$X = -1+ .4(80) = 31$

## 10.11 OTHER METHODS OF ESTIMATING REGRESSION EQUATION

This method discussed above is known as direct method. This is one of the popular method of finding the regression equation. But sometime this method of finding regression equation becomes cumbersome and lengthy specially when the values of X and Y are very large. In this case we can simplify the calculation by take the deviations of X and Y thatn dealing with actual values of X and Y. In such case

Regression equation Y on X

$Y = a + bX$

will be converted to $(Y - \overline{Y}) = byx (X - \overline{X})$

Similarly Regression equation X on Y:

X = a + bY

will be converted into $(X - \bar{X}) = bxy (Y - \bar{Y})$

Now when we are using these regression equations, the calculations will become very simple as now we have to calculate value of only one constant that is value of "b" which is our regression coefficient. As there are two regression equations, so we need to calculate two regression coefficients that is Regression Coefficient X on Y, which is symbolically denoted as "bxy" and similarly Regression Coefficient Y on X, which is denoted as "byx". However, these coefficients can also be calculated using different methods. As we take deviations under this method, we can take deviations using actual mean, assumed mean or we can calculate it by not taking the deviations. Following formulas are used in such cases:

| Method | Regression Coefficient X on Y | Regression Coefficient Y on X |
|---|---|---|
| When deviations are taken from actual mean | $bxy = \dfrac{\sum xy}{\sum y^2}$ | $byx = \dfrac{\sum xy}{\sum x^2}$ |
| When deviations are taken from assumed mean | $bxy = \dfrac{N\sum dxdy - \sum dx\sum dy}{N\sum dy^2 - (\sum dy)^2}$ | $byx = \dfrac{N\sum dxdy - \sum dx\sum dy}{N\sum dx^2 - (\sum dx)^2}$ |
| Direct Method: Using sum of X and Y | $bxy = \dfrac{N\sum XY - \sum X\sum Y}{N\sum Y^2 - (\sum Y)^2}$ | $byx = \dfrac{N\sum XY - \sum X\sum Y}{N\sum X^2 - (\sum X)^2}$ |
| Using the correlation coefficient (r) and standard deviation (σ) | $bxy = r \cdot \dfrac{\sigma x}{\sigma y}$ | $byx = r \cdot \dfrac{\sigma y}{\sigma x}$ |

**Example 2.** Fromthe information give below obtaintworegressionlines X on Y and Y on X using
1. Actual Mean Method.
2. Assumed Mean Method
3. Direct Method (Without taking Mean)

| Number of Hrs Machine Operated | 7 | 8 | 6 | 9 | 11 | 9 | 10 | 12 |
|---|---|---|---|---|---|---|---|---|
| Production(Units in 000): | 4 | 5 | 2 | 6 | 9 | 5 | 7 | 10 |

**Solution:**

**1. Actual Mean Method**

CalculationofRegressionEquation

| X | Y | x =X - $\bar{X}$ | x2 | y =Y - $\bar{Y}$ | y2 | xy |
|---|---|---|---|---|---|---|
| 7 | 4 | -2 | 4 | -2 | 4 | 4 |
| 8 | 5 | -1 | 1 | -1 | 1 | 1 |
| 6 | 2 | -3 | 9 | -4 | 16 | 12 |
| 9 | 6 | 0 | 0 | 0 | 0 | 0 |

| 11 | 9 | 2 | 4 | 3 | 9 | 6 |
|---|---|---|---|---|---|---|
| 9 | 5 | 0 | 0 | -1 | 1 | 0 |
| 10 | 7 | 1 | 1 | 1 | 1 | 1 |
| 12 | 10 | 3 | 9 | 4 | 16 | 12 |
| $\sum X =72$ | $\sum Y =48$ | | $\sum x^2 = 28$ | | $\sum y^2 = 48$ | $\sum xy = 36$ |

$$\bar{X}= \frac{\sum X}{N} = \frac{72}{8} = 9$$
$$\bar{Y}= \frac{\sum Y}{N} = \frac{48}{8} = 6$$

**Regression equation of X on Y:**

$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$

Where $bxy = \dfrac{\sum xy}{y^2}$

$$= \frac{36}{48}$$
$$= .75$$

So  $(X - 9) = .75 (Y - 6)$

 $X - 9 = .75Y - 4.5$

| e gression | X = 4.5 + .75Y equation | o f Y on X: |
|---|---|---|

$(Y - \bar{Y}) = b_{xy} (X - \bar{X})$

Where $byx = \dfrac{\sum xy}{x^2}$

$$= \frac{36}{28}$$
$$= 1.286$$

So  $(Y - 6) = 1.286 (X - 9)$

 $Y - 6 = 1.286X - 11.57$

| Y = − 5.57+ 1.286X |
|---|

## 2. Assumed Mean Method

### CalculationofRegressionEquation

| X | Y | dx =X – A (A = 8) | dx$^2$ | dy =Y – A (A = 5) | dy$^2$ | dxdy |
|---|---|---|---|---|---|---|
| 7 | 4 | -1 | 1 | -1 | 1 | 1 |
| 8 | 5 | 0 | 0 | 0 | 0 | 0 |

| 6 | 2 | -2 | 4 | -3 | 9 | 6 |
|---|---|---|---|---|---|---|
| 9 | 6 | 1 | 1 | 1 | 1 | 1 |
| 11 | 9 | 3 | 9 | 4 | 16 | 12 |
| 9 | 5 | 1 | 1 | 0 | 0 | 0 |
| 10 | 7 | 2 | 4 | 2 | 4 | 4 |
| 12 | 10 | 4 | 16 | 5 | 25 | 20 |
| $\sum X =72$ | $\sum Y =48$ | $\sum dx = 8$ | $\sum dx^2 = 36$ | $\sum dy = 8$ | $\sum dy^2 = 56$ | $\sum xy = 44$ |

$\overline{X}= \dfrac{\sum X}{N} = \dfrac{72}{8} = 9$

$\overline{Y}= \dfrac{\sum Y}{N} = \dfrac{48}{8} = 6$

**Regression equation of X on Y:**

$(X - \overline{X}) = b_{xy} (Y - \overline{Y})$

Where $b_{xy} = \dfrac{N\sum dxdy - \sum dx \sum dy}{N\sum dy^2 - (\sum dy)^2}$

$= \dfrac{8\,(44) - (8)\,(8)}{8\,(56) - (8)^2}$

$= \dfrac{352 - 64}{448 - 64}$

$= \dfrac{288}{384}$

$= .75$

So $(X - 9) = .75\,(Y - 6)$  X $-$

9 $= .75Y - 4.5$

---

**X = 4.5 + .75Y**

---

**Regression equation of Y on X:**

$(Y - \overline{Y}) = b_{xy} (X - \overline{X})$

Where $b_{yx} = \dfrac{N\sum dxdy - \sum dx \sum dy}{N\sum dx^2 - (\sum dx)^2}$

$= \dfrac{8\,(44) - (8)\,(8)}{8\,(36) - (8)^2}$

$= \dfrac{288}{224}$

$= 1.286$

So $(Y - 6) = 1.286(X - 9)$

Y $- 6 = 1.286X - 11.57$

| Y = − 5.57+ 1.286X |
|---|

## 3. <u>DIRECT METHOD (WITHOUT TAKING MEAN)</u>

**CalculationofRegressionEquation**

| X | Y | X2 | Y2 | XY |
|---|---|---|---|---|
| 7 | 4 | 49 | 16 | 28 |
| 8 | 5 | 64 | 25 | 40 |
| 6 | 2 | 36 | 4 | 12 |
| 9 | 6 | 81 | 36 | 54 |
| 11 | 9 | 121 | 81 | 99 |
| 9 | 5 | 81 | 25 | 45 |
| 10 | 7 | 100 | 49 | 70 |
| 12 | 10 | 144 | 100 | 120 |
| $\sum X$ =72 | $\sum Y$ =48 | $\sum X^2$ = 676 | $\sum Y^2$ = 336 | $\sum XY$ = 468 |

$$\bar{X} = \frac{\sum X}{N} = \frac{72}{8} = 9$$
$$\bar{Y} = \frac{\sum Y}{N} = \frac{48}{8} = 6$$

## REGRESSION EQUATION OF X ON Y:

$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$

Where bxy $= \frac{N\sum XY - \sum X \sum Y}{N\sum Y^2 - (\sum Y)^2}$

$$= \frac{8\,(468) - (72)\,(48)}{8\,(336) - (48)^2}$$

$$= \frac{3744 - 3456}{2688 - 2304}$$

$$= \frac{288}{384}$$

$= .75$

So (X − 9) = .75 (Y − 6) X − 
9 = .75Y − 4.5

| X = 4.5 + .75Y |
|---|

## REGRESSION EQUATION OF Y ON X:

$(Y - \bar{Y}) = b_{xy} (X - \bar{X})$

Where byx = $\dfrac{N\Sigma XY - \Sigma X \Sigma Y}{N\Sigma X^2 - (\Sigma X)^2}$

$$= \frac{8\,(468) - (72)\,(48)}{8\,(676) - (72)^2}$$

$$= \frac{3744 - 3456}{5408 - 5184}$$

$$= \frac{288}{224}$$

$$= 1.286$$

So　　$(Y - 6) = 1.286\,(X - 9)$

$Y - 6 = 1.286X - 11.57$

---

| Y = − 5.57+ 1.286X |
| --- |

**Example 3.** Find out two Regression equations on basis of the data given below:

　　　　X　　Y

Mean　　60　　80

Standard Deviation (S.D.)　　16　　20

Coefficient of Correlation　　.9

Also find value of X when Y = 150 and value of Y when X = 100.

**Solution:**

**REGRESSION EQUATION OF X ON Y:**

$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$ Where

bxy = $r\,\dfrac{\sigma x}{\sigma y}$

$$= .9\,\frac{16}{20}$$

$$= .72$$

So　　$(X - 60) = .72\,(Y - 80)$

$X - 60 = .72Y - 57.6$

---

| X = 2.4 + .72Y |
| --- |

When Y = 150 than X = 2.4 + .72(150) = 110.4

**REGRESSION EQUATION OF Y ON X:**

$(Y - \bar{Y}) = b_{xy} (X - \bar{X})$ Where

$byx = r \dfrac{\sigma y}{\sigma X}$

$= .9 \dfrac{20}{16}$

$= 1.125$

So  $(Y - 80) = 1.125 (X - 60)$

$Y - 80 = 1.125X - 67.5$

---

**Y = 12.5+ 1.125X**

---

When X = 100 than Y = 12.5 + 1.125 (100) = 125

## 10.12 PROPERTIES OF REGRESSION COEFFICIENTS

The regression coefficients discussed above have a number of properties which are given as under :

1. The geometric Mean of the two regression coefficients gives the coefficients of correlation i.e. $r = \sqrt{bxy \times byx}$

2. Both the regression coefficients must have the same sign i.e. in other words either both coefficients will have + signs or both coefficients will have - signs. This is due to the fact that in first property we have studied that geometric means of both coefficients will give us value of correlation. If one sign will be positive and other will be negative, the product of both signs will be negative. And it is not possible to find out correlation of negative value.

3. The signs of regression coefficients will give us signs of coefficient of correlation. This means if the regression coefficients are positive the correlation coefficient will be positive, and if the regression coefficients are negative then the correlation coefficient will be negative.

4. If one of the regression coefficients is greater than unity or 1, the other must be less than unity. This is because the value of coefficient of correlation must be in between ± 1. If both the regression coefficients are more than 1, then their geometric mean will be more than 1 but the value of correlation cannot exceed 1.

   **a.** 5. The arithmetic mean of the regression coefficients is either equal to or more than the correlation coefficient $\dfrac{bxy+byx}{2} \geq \sqrt{bxy \times byx}$

5. If the regression coefficients are given we can calculate the value of standard deviation by using the following formula.

   a. $bxy = r \dfrac{\sigma X}{\sigma y}$  or  $byx = r \dfrac{\sigma y}{\sigma X}$

6. Regression coefficients are independent of change of origin but not of scale. This means that if the original values of the two variables are added or subtracted by

some constant, the values of the regression coefficients will remain the same. But if the original values of the two variables are multiplied, or divided by some constant (common factors) the values of the regression equation will not remain the same.

**Example 4.** From the following data find out two lines of regression land also find out value of correlation.

$\sum X = 250$;      $\sum Y = 300$;      $\sum XY = 7900$;
$\sum X^2 = 6500$;   $\sum Y^2 = 10000$;   $n = 10$

Solution:

$$\bar{X} = \frac{\sum X}{N} = \frac{250}{10} = 25$$

$$\bar{Y} = \frac{\sum Y}{N} = \frac{300}{10} = 30$$

## REGRESSION EQUATION OF Y ON X:

$(Y - \bar{Y}) = b_{xy} (X - \bar{X})$ Where

$$byx = \frac{N\sum XY - \sum X \sum Y}{N\sum X^2 - (\sum X)^2}$$

$$= \frac{10\,(7900) - (250)\,(300)}{10\,(6500) - (250)^2}$$

$$= \frac{79000 - 75000}{65000 - 62500}$$

$$= \frac{4000}{2500}$$

$$= 1.6$$

So      $(Y - 30) = 1.6 (X - 25)$ Y − 30 = 1.6X − 40

---

**Y = − 10+ 1. 6X**

---

## REGRESSION EQUATION OF X ON Y:

$(X - \bar{X}) = b_{xy} (Y - \bar{Y})$ Where

$$bxy = \frac{N\sum XY - \sum X \sum Y}{N\sum Y^2 - (\sum Y)^2}$$

$$= \frac{10\,(7900) - (250)\,(300)}{10\,(10000) - (300)^2}$$

$$= \frac{79000 - 75000}{100000 - 90000}$$

$$= \frac{4000}{10000}$$

$$= .4$$

So $\quad (X - 25) = .4(Y - 30)$

$\quad X - 25 = .4Y - 12$

---

$$X = 13 + .4Y$$

---

Coefficients of Correlation

$$= \sqrt{bxy \times byx}$$

$r\ r = \sqrt{1.6 \times .4}\ r$

$= \sqrt{.64}\ r = .8$

**Example 5.** From the following data find out two lines of regression land also find out value of correlation. Also find value of Y when X = 30

$\sum X = 140; \qquad \sum Y = 150; \qquad \sum(X - 10)(Y - 15) = 6;$

$\sum(X - 10)^2 = 180; \qquad \sum(Y - 15)^2 = 215; \qquad n = 10$

**Solution:**

Lets take assumed mean of Series X = 10 and Series Y = 15.

$\sum dx = \sum(X - 10) = \sum X - 10n = 140 - 100 = 40$

$\sum dy = \sum(Y - 15) = \sum Y - 15n = 150 - 150 = 0$

$\sum dx^2 = \sum(X - 10)^2 = 180$

$\sum dy^2 = \sum(Y - 15)^2 = 215$

$\sum dxdy = \sum(X - 10)(Y - 15) = 6$

So

$\bar{X} = A + \frac{\sum X}{N} = 10 + \frac{40}{10} = 14$

$\bar{Y} = A + \frac{\sum Y}{N} = 15 + \frac{0}{10} = 15$

**REGRESSION EQUATION OF Y ON X:**

$(Y - \bar{Y}) = b_{xy}(X - \bar{X})$

Where byx $= \frac{N\sum dxdy - \sum dx \sum dy}{N\sum dx^2 - (\sum dx)^2}$

$$= \frac{10(6) - (40)(0)}{10(180) - (40)^2}$$

$$= \frac{60}{200}$$

$$= .3$$

So $\quad (Y - 15) = .3(X - 14)$

$\quad Y - 15 = .3X - 4.2$

336

Y = 10.8+ .3X

When X = 30 than Y = 10.8 + .3(30) = 19.8

## REGRESSION EQUATION OF Y ON X:

$(Y - \overline{Y}) = b_{xy} (X - \overline{X})$

Where byx = $\dfrac{N\sum dxdy - \sum dx \sum dy}{N\sum dx^2 - (\sum dx)^2}$

$= \dfrac{10 (6) - (40) (0)}{10 (25) - (0)^2}$

$= \dfrac{60}{250}$

$= .24$

So      $(Y - 15) = .24 (X - 14)$

$Y - 15 = .24X - 3.36$

Y = 11.64+ .24X

Coefficients of Correlation

r = $\sqrt{bxy \times byx}$  r

$= \sqrt{.3 \times .24}$  $r = \sqrt{.072}$

r = .268

**Example 5.** From the following data find out which equation is equation X on Y and which equation is equation Y on X. Also find $\overline{X}$, $\overline{Y}$ and r.

        3X + 2Y − 26 = 0

        6X + Y − 31 = 0 **Solution:**

To find $\overline{X}$ and $\overline{Y}$, we will solve following simultaneous equations

        3X + 2Y = 26 .............................................. (i)

        6X + Y = 31 .............................................. (ii)

Multiply equation (i) with 2, we get

        6X + 4Y = 52 .............................................. (iii)

Deduct equation (ii) from equation (iii)

                6X + 4Y = 52

                <u>-6X - Y = -31</u>

                    3Y = 21 Y

                = 7

Or $\overline{Y}$ = 7.

Put the value of Y in Equation (i), we get

$3X + 2(7) = 26$

$3X + 14 = 26$

$3X = 12$

$X = 4$ _

or $X = 4$

Let $3X$

$+ 2Y =$

$26$ be

regressi

on

equation

X on Y

$3X = 26$

$- 2Y$

$X = \dfrac{26}{3} - \dfrac{2Y}{3}$

So $b_{xy} = -\dfrac{2}{3}$

Let $6X + Y = 31$ be regression equation Y on X

$Y = 31 - 6X$

So $b_{yx} = -6$

As $r = \sqrt{bxy \times byx}$

$r = -\sqrt{-\left(\dfrac{2}{3}\right) \times (-.6\ )}$

$r = -2$, but this is not possible as value of r always lies between $-1\ and\ +1$. So, our assumption is wrong and equation are reverse.

Let $6X + Y = 31$ be regression equation X on Y

$6X = 31 - Y$

$X = \dfrac{31}{6} - \dfrac{1Y}{6}$

So $b_{xy} = -\dfrac{1}{6}$

Let $3X + 2Y = 26$ be regression equation Y on X

$2Y = 26 - 3X\ Y$

$= \dfrac{26}{2} - \dfrac{3X}{2}$

So $b_{yx} = -\frac{3}{2}$

As $r = \sqrt{bxy \times byx}$

$r = -\sqrt{-\left(\frac{1}{6}\right) \times -\left(\frac{3}{2}\right)}$ )r = $-.5$, which is possible. So,

our assumption is right.

So,

```
Y = 7;
X = 4;
X on Y   is X = 31/6 - 1/6 Y

Y on X is Y = 26/2 - 3/2 X
r = -.5
```

---

## 10.13 TEST YOUR UNDERSTANDING (D)

---

1. Find both regression equations:

| X | 6 | 2 | 10 | 4 | 8 |
|---|---|---|----|---|---|
| Y | 9 | 11 | 5 | 8 | 7 |

2. From following estimate the value of Y when X = 30 using regression equation.

| X | 25 | 22 | 28 | 26 | 35 | 20 | 22 | 40 | 20 | 18 | 19 | 25 |
|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Y | 18 | 15 | 20 | 17 | 22 | 14 | 15 | 21 | 15 | 14 | 16 | 17 |

3. Fit two regression lines:

| X | 30 | 32 | 38 | 35 | 40 |
|---|----|----|----|----|----|
| Y | 10 | 14 | 16 | 20 | 15 |

Find X when Y = 25 and find Y when X = 36.

4. Find out two Regression equations on basis of the data given below:

|  | X | Y |
|---|---|---|
| Mean | 65 | 67 |
| Standard Deviation (S.D.) | 2.5 | 3.5 |
| Coefficient of Correlation | .8 | |

5. In a data the Mean values of X and Y are 20 and 45 respectively. Regression coefficient $b_{yx} = 4$ and $b_{xy}$ 1/9. Find

   a. coefficient of correlation

   b. Standard Deviation of X, if S.D. of Y = 12

   c. Find two regression lines

6.    You are supplied with the following information. Variance of X = 36 12X – 51Y + 99 = 0 60X – 27Y = 321.

Calculate

(a)    The average values of X and Y

(b)    The standard deviation of Y and

7.    T
he lines of regression of Y on X and X on Y are Y = X + 5 and 16X = 9Y + 4 respectively

Also σy=4 Find $\overline{X}$ , Y , σx and r.

8.    G
iven :

$$\Sigma X = 56 , \Sigma Y = 40 , \Sigma X^2 = 524$$

$$\Sigma Y^2 = 256 , \Sigma XY = 364 , N = 8$$

   (a) $find the regression equatiopn of X on Y$

**Answers**

      1. X = 16.4 – 1.3Y, Y = 11.9 - .65X

      2.  18.875

      3.  Y = .46X – 1.1, X = .6Y + 26, Value of Y = 15.46, Value of X = 40.25

4. Y = 1.12X – 5.8, X = .57Y +26,81
5. .67, 2, Y= 4X – 35 and X = 1/9 Y +15
6. Mean of X = 13, Mean of Y= 17, S.D of Y = 8
7. Mean of X = 7, Mean of Y= 12, S.D of X = 3, r= .75,
8. X = 1.5Y - 0.5, r = .977

## 10.14 LET US SUM UP

- **Regression is an useful tool of forecasting.**
- **With help of regression we can predict the value of can find the value of X if value of Y is given or value of Y if value of X is given.**
- **It creates the mathematical linear relation between two variables X and Y, out of which one variable is dependent and other is independent.**
- **In this we find out two regression equations.**
- **Regression can be linear or non linear.**
- **It can be simple or multiple.**
- **Regression is based on the principle of Least Squares.  • We can also find out correlation coefficient with help of regression coefficients.**

## 10.15 KEY TERMS

- **REGRESSION:** Regression createsthe mathematical linear relation between two variables X and Y, out of which one variable is dependent and other is independent.
- **SIMPLE REGRESSION**: When there are only two variables under study it is known as a simple regression. For example we are studying the relation between Sales and Advertising expenditure.
- **MULTIPLE REGRESSION:** The study of more than two variables at a time is known as multiple regression. Under this, only one variable is taken as a dependent variable and all the other variables are taken as independent variables.
- **TOTAL REGRESSION:** Total regression analysis is one in which we study the effect of all the variables simultaneously.
- **PARTIAL REGRESSION:** In the case of Partial Regression one or two variables are taken into consideration and the others are excluded.
- **LINEAR REGRESSION:**When the functional relationship between X and Y is expressed as the first degree equations, it is known as linear regression. In other words,

when the points plotted on a scatter diagram concentrate around a straight line it is the case of linear regression.

- **NON-LINEAR REGRESSION**: On the other hand if the line of regression (in scatter diagram) is not a straight line, the regression is termed as curved or non-linear regression.
- **LEAST SQUARE METHOD**: According to the Least Square method, regression line should be plotted in such a way that sum of square of the difference between actual value and estimated value of the dependent variable should be least or minimum possible.

## 10.16 REVIEW QUESTIONS

18. What is Regression. What are uses of Regression.
19. What is relation between Regression and correlation.
20. Explain different types of regressions.
21. How two regression lines are determined under direct method.
22. Explain various methods of finding regression equations.
23. What are limitations of regression analsis.
24. What are properties of regression coefficients.

## 10.17 FURTHER READINGS

1. J. K. Sharma, *Business Statistics,* Pearson Education.
2. S.C. Gupta, *Fundamentals of Statistics,* Himalaya Publishing House.
3. S.P. Gupta and Archana Gupta, *Elementary Statistics,* Sultan Chand and Sons, New Delhi.
4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.HillPublishing Co.

# B. COM (DIGITAL)
## SEMESTER II

### COURSE: BUSINESS MATHEMATICS AND STATISTICS

### UNIT 11 – INDEX NUMBERS

**STRUCTURE**

11.0 Objectives

11.1 Introduction

11.2 History of Index Numbers

11.3 Meaning of Index Numbers

11.4 Features of Index Numbers

11.5 Uses of Index Numbers

11.6 Limitations of Index Numbers

11.7 Problems in construction of Index Numbers

11.8 Different types of Index Numbers

11.9 Different Methods of Index Numbers

11.10 Simple Aggregative Method

      11.10.1 Uses of Simple Aggregative Method

      11.10.2 Limitations of Simple Aggregative Method

11.11 Simple Price Relative Method

      11.10.1 Uses of Simple Price Relative Method

      11.10.2 Limitations of Simple Price Relative Method

11.12 Test Your Understanding - A

11.13 Weighted Aggregative Method

      11.13.1 Laspeyre's Method

      11.13.2 Paasche's Method

      11.13.3 Dorbish and Bowley Method

      11.13.4 Fisher's Method

      11.13.5 Mashal Edgeworth Method

      11.13.6 Walsch Method

      11.13.7 Kelly's Method

11.14 Weighted Price Relative Method

      11.14.1 Uses of Weighted Price Relative Method

      11.14.2 Limitations of Weighted Price Relative Method

11.15 Test of Consistency for Index Numbers

      11.15.1 Unit Test.

      11.15.2 Time Reversal Test

      11.15.3 Factor Reversal Test

      11.15.4 Circular Test

11.16 Cost of Living Index or Consumer Price Index

      11.16.1 Uses of Consumer Price Index.

      11.16.2 Construction of Consumer Price Index.

      11.16.3 Aggregate Expenditure Method

## 11.0 OBJECTIVES

**After studying the Unit, students will be able to**

- Define what are index numbers.
- Describe the uses of Index numbers.
- Understand how index numbers are prepared.
- Understand uses of Index numbers.
- Apply your knowledge in construction of simple index numbers. • Familiarize yourself with the concept of Consumer Price Index numbers.

## 11.1  INTRODUCTION

Human life is dynamic and hardly there is anything which remains same over a period of time. whether it is price of goods, Population of the country, Industrial Production, Import and Exports of the country, everything changes with the passage of time. It is the tendency of human that he wants to measure the changes that are taking place over a period of time. Now he question arise that how we can measure these changes that are taking place. Index number is one such a statistical tool which can help us in measuring these changes.

## 11.2  HISTORY OF INDEX NUMBERS

An index number is a statistical tool that measure the changes in the data over the period of time. Index number is not a new tool used in statistics, rather the use of index numbers is very old. As per available records, index number was first time constructed in the year 1764 by an Italian named Carli. In his index number, Carli compared the prices of the Year 1750 with the price level of the year 1500. Though normally index numbers are used for measuring the change in price over a period of time, but hardly there is any area in Economics or Commerce where Index numbers are not used. Tere are different types of index numbers that are used in economics such as Industrial Production Index , Agricultural Production Index and Population Index etc.

## 11.3  MEANING OF INDEX NUMBER

An index number is a device with help of which we can measure the relative change in one variable over a period of time. Normally while preparing the index number, we compare the current prices of a product with the price of some past period known as base year. The index number of the base year is mostly taken as 100. Few definitions of index numbers given by different experts are as follows:

**According to Croxton and Cowden,** "Index numbers are devices for measuring differences in the magnitude of a group of related variables."

**According to Maslow,"**Index number is a numerical value characterising the changes in complex economic phenomenon over a period of time or space."

**According to A.L. Bowley**, "A series of index numbers reflects in its trend and fluctuations the movements of some quantity to which it is related."

**According to Spiegel,** "An Index number is a statistical measure designed to show changes in a variable, or a group of related variables with respect to time, geographic location, or other characteristics such as income, profession etc."

## 11.4 FEATURES OF INDEX NUMBER

1. Index numbers are specialised type of average. Normally used measures of average like Mean Median and Mode can be used for two or more different series, if their units are same. In case units of two series are different, these cannot be represented by normal average, However, Index number can help in this situation.
2. Normally index numbers are represented in percentage. However, the % sign is not used while showing index numbers.
3. Index numbers gives the effect of change over a period of time or the change that is taking place in two different locations.
4. Index numbers measure that change which is not capable of measurement normally in quantitative figures. For example we cannot measure the change in cost of living directly, but Index numbers can help us in this situation.

## 11.5 USES OF INDEX NUMBERS

1. Index number is a very powerful tool of economic and business analysis. We often call index number as 'Barometer of the Economy'. With the help of Index Number we can see pulse of the economy.
2. Index number is a very helpful tool in planning of activities and formulation of business policy.

3. With the help of index numbers, economists try to find out trends in prices, production, import and exports etc.
4. Index number shows the cost of living over a period of time. This also helps government in fixing the wage rate of the labour. 5. Index number also helps us in calculation of Real National Income of the country.

## 11.6 LIMITATIONS OF INDEX NUMBERS

1. As index numbers are based on sample data, these can give only approximate result not the accurate result.
2. Index number normally deals with one variable, so it is not possible to calculate a single index for all the economic activities.
3. There is not a single standard method of calculating index. Different experts calculate index in their own way.
4. Index number are special types of average, it does not deal with all the situations. 5. Finding the appropriate base period is very difficult in construction of index number.

## 11.7 PROBLEMS IN CONSTRUCTION OF INDEX NUMBERS

1. **PURPOSE OF INDEX NUMBERS**:   The first step in construction of index number is to decide the purpose of preparing the Index Number. As there is no single purpose index, so we must decide the objective of index very carefully.
2. **SELECTION OF BASE YEAR**: The selection of base period is most important step in preparation of index number. Best base period is the period with which we can find accurate change in the variable.   Following are some of the guidelines that must be kept in mind while selecting the base period.
   * The period selected as base period should be normal one. There must not be any problem like War, Flood, Earthquake, Economic Depression etc. in the base period.
     • The difference between base period and the current period should not be very large
   * Only that period should be taken as base period full data is available.
3. **SELECTION OF NUMBER OF ITEMS OR COMMODITIES**: The next major problem in preparation of index number is to select the number of items that will form the Index number. Following points must be kept in mind while deciding the number of items in the index numbers.
   * Only those items should be selected that represent the habits and taste of majority of customers.
   * The number of items selected should not be very large or very small.
   * Only those items should be selected that are available in standard quantity.

- Only those items must be selected that were available in base period as well as current period.
4. **SELECTION OF SOURCE OF DATA:** As in index numbers, we compare current variables with the variables of past periods, the source from which data is collected must be authentic one. In case of non authentic data, it will give wrong picture.
5. **PRICE QUOTATIONS:** The prices of the commodities differs from place to place, It is very important to select that price which represent majority of places. Further while preparing index number we may take wholesale prices or retail prices in consideration.
6. **SELECTION OF THE AVERAGE:** There are different types of averages, like Arithmetic Mean, Geometric Mean, Harmonic Mean, Median and Mode that can be used in preparation of index number. ee must select appropriate average in preparation of index number based on our objective.
7. **SELECTION OF APPROPRIATE WEIGHT:** The next major problem in preparation of index number is to assign weight to the different items. All the items of the data under consideration are not equally important, some items may be more important and some items may be less important. So, more weight must be assigned to important items while preparing the index number. Now the problem is that how to assign weights to the items. Normally we take quantity of the items consumed as weight in Index Number.
8. **SELECTION OF APPROPRIATE FORMULA:** There are a number of formula that can be used for preparing index numbers. for example Laspeyer's method. Bowle Method and Fisher Method etc. Each method has its own advantages and limitations. so must be selected very carefully.

## 11.8 DIFFERENT TYPES OF INDEX NUMBERS
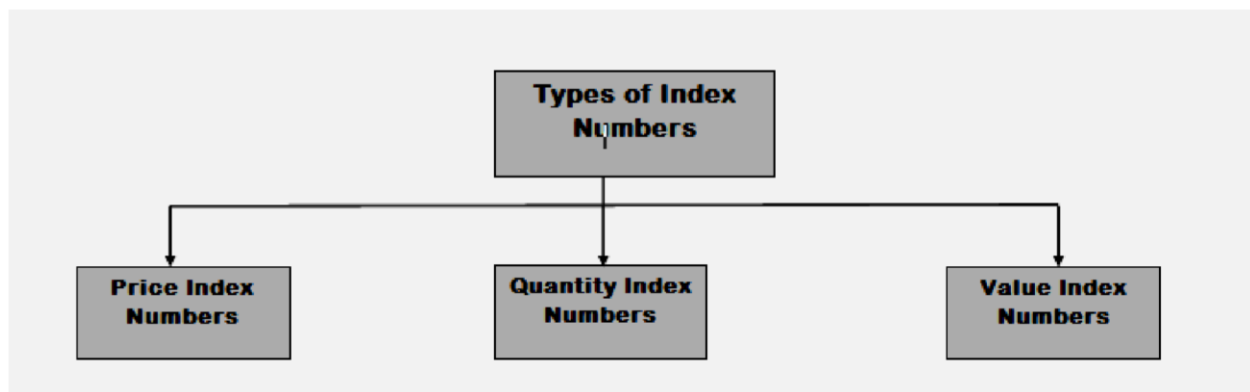


1. **PRICE INDEX NUMBERS**: These index numbers are used for measuring the change in prices of the commodities over a period of time. In other words we can say that these index numbers find the change in value of money over a period of time. These index numbers are most popular index number. These Index numbers may be based on Wholesale Price Index or Retail Price Index.
2. **QUANTITY INDEX NUMBERS**: The Quantity or Volume Index Numbers measure the change in quantities used by people over a period of time. under these index numbers,

we calculate change in physical quantity of goods produced, consumed or sold over a period of time. There are different types of quantity index numbers such as Agricultural Production Index Number, Industrial Production Index Number, Export Import Index Number etc.

3. **VALUE INDEX NUMBERS**: Value Index Numbers compare the change in total value over period of time. These index numbers takes into consideration both prices and quantity of the product while finding the change over a period of time. These Index Numbers are very useful in finding consumption habits of the consumers.

## 11.9 DIFFERENT METHODS OF INDEX NUMBERS

As we have already discussed, Index number is a device that shows that changes in price over a f period of time. Now a question arise that how to calculate the index number. The re are a number of methods for preparing the index numbers. Following chart shows various methods preparing index numbers.
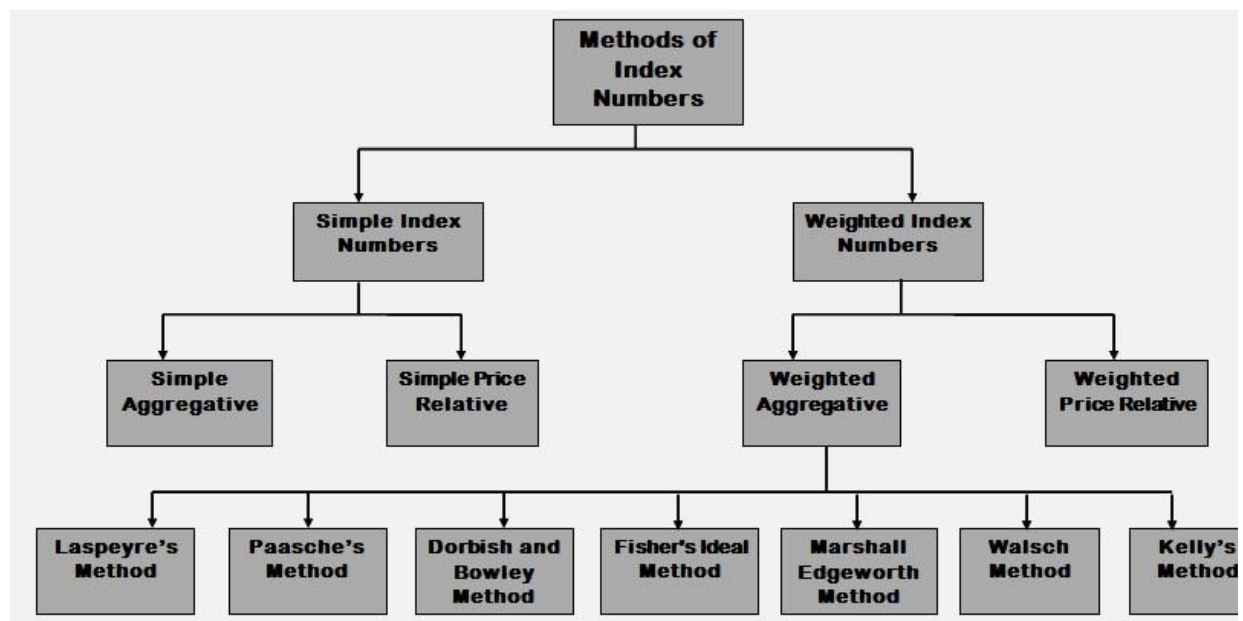


## 11.10 SIMPLE AGGREGATIVE METHOD

This is one of the old and simple method of finding the index number. Under this method we calculate the index number of a given period by dividing the aggregate of all the prices of the current year with the the aggregate of all the prices of the base year. After that we multiply the resultant figure with 100 to find the index number. Following are the steps:

1. Decide the base year.

2. Add all the prices of base year for all available comodities, it is denoted by $\sum P_0$.

   3. Add all the prices of base year for all available comodities, it is denoted by $\sum P_1$.

4. Use following the formula for calculating index number under this method:

$$P_{01} = \frac{\sum P_1}{\sum P_0} \times 100$$

Where

P01 – Price Index Number of Current Year

$\sum P_1$ – Aggregate of Prices of Current Year
$\sum P_0$ – Aggregate of Prices of Base Year

**Example 1. Construct Simple Aggregative Index number of the year 2020by taking the base as prices of 2015.**

| Commodity | Price of the Year 2015 | Price of the Year 2020 |
|-----------|------------------------|------------------------|
| Wheat | 20 | 26 |
| Sugar | 40 | 34 |
| Oil | 60 | 120 |
| Pulses | 80 | 140 |

**Solution:**

Price Index (Year 2015 taken as the base year)

| Commodity | Price of the Year 2015 $P_0$ | Price of the Year 2020 $P_1$ |
|-----------|------------------------------|------------------------------|
| Wheat | 20 | 26 |
| Sugar | 40 | 34 |
| Oil | 60 | 120 |
| Pulses | 80 | 140 |
| | $\sum P_0 = 200$ | $\sum P_1 = 320$ |

    Price Index ( $P_{01}$) $= \frac{\sum P_1}{\sum P_0} \times 100 = \frac{320}{200} \times 100 = 160$

    Price index shows that prices have increased by 60% in 2020 than 2015.

**11.10.1 MERITS OF SIMPLE AGGREGATIVE METHOD**

1. This method is simple to calculate.
2. This method is very simple to understand.
3. This method does not need much mathematical calculations

**11.9.2 LIMITATIONS OF SIMPLE AGGREGATIVE METHOD**

1. This method does not give change in price over a period of time.
2. Prices of different commodities are measured in different units like some are measured in Kilograms where as other in Meters etc. It creates problems in calculation.
3. This method is influenced by unit of measurement.

4. This method ignore the relative importance of the item.
5. This method use only Arithmetic mean as a tool for calculating index number. Other measures of average like Geometric mean or median etc. cannot be used in this method.
6. Index number in this method is influenced by magnitude of the price.

## 11.11 SIMPLE PRICE RELATIVE METHOD

This method is a bit improvement over the simple aggregative method. Simple aggregative method is affected by the magnitude of the price of the item. However, this method is not affected by magnitude of the price of item. Further, in this method it is not necessary to use Arithmetic mean as average rather we can use any method of finding average, such as Arithmetic mean, Geometric mean, Median, Mode etc. However, normally we prefer to use Arithmetic mean in this case. Following are the steps of this method:

1. Decide the base year.
2. Calculate the price relative of current year for each commodity by dividing current Prices $(P_1)$ with base year price $(P_0)$ using the following formula $\frac{P_1}{P_0} \times 100$
3. Find sum of all the price relatives so calculated.
4. Divide the sum or price relatives with number of items to get index number by using the following formula:

$$P_{01} = \frac{\sum \frac{P_1}{P_0} \times 100}{N}$$

### 11.11.1 MERITS OF SIMPLE PRICE RELATIVE METHOD:
1. This method is very simple to calculate and understand.
2. This method is not affected by the magnitude of price of a particular item.
3. This method is not affected by unit of measurement of the item.
4. This method is not necessarily based on Arithmetic Mean, we can use other averages like Geometric Mean, median etc also. 5. Equal weights are provided to each item.

### 11.11.2 LIMITATIONS OF SIMPLE PRICE RELATIVE METHOD:
1. Selection of average is a difficult task in this method.
2. If it is to be calculated using Geometric Mean, than calculation is very difficult. 3. It does not consider which item is used more and provide equal weights to all items.

**Example 2. Construct Simple Price Relative Index number of the year 2020by taking the base as prices of 2015.**

| Commodity | Price of the Year 2015 | Price of the Year 2020 |
|-----------|------------------------|------------------------|
| Wheat | 20 | 26 |
| Sugar | 40 | 34 |
| Oil | 60 | 120 |

| | Pulses | 80 | 140 |
|---|---|---|---|

**Solution:**

Price Index (Year 2015 taken as the base year)

| Commodity | Price of the Year 2015 $P_0$ | Price of the Year 2020 $P_1$ | Price Relative $\frac{P_1}{P_0} \times 100$ |
|---|---|---|---|
| Wheat | 20 | 26 | $\frac{26}{20} \times 100 = 130$ |
| Sugar | 40 | 34 | $\frac{34}{40} \times 100 = 85$ |
| Oil | 60 | 120 | $\frac{120}{60} \times 100 = 200$ |
| Pulses | 80 | 140 | $\frac{140}{80} \times 100 = 175$ |
| | | | $\sum \frac{P_1}{P_0} \times 100 = 590$ |

$$\text{Price Index } (P_{01}) = \frac{\sum \frac{P_1}{P_0} \times 100}{N} = \frac{590}{4} = 147.50$$

Price index shows that prices have increased by 47.5% in 2020 than 2015.

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## 11.12 TEST YOUR UNDERSTANDING (A)

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1. Calculate Index number for 2015 taking 2011 as base using Simple Aggregative Method and Simple Average of Relatives Method:

| Items | Price 2011 | Price 2015 |
|---|---|---|
| A | 350 | 510 |
| B | 45 | 40 |
| C | 77 | 156 |
| D | 37 | 47 |
| E | 10 | 12 |

2. Find index using simple average of price relative using 2017 as base.

| Items | Price 2017 | Price 2019 |
|---|---|---|
| A | 15 | 30 |
| B | 18 | 24 |
| C | 16 | 20 |

| D | 14 | 21 |
|---|----|----|
| E | 25 | 35 |
| F | 40 | 30 |

3. Find simple aggregative index

| Items | $P_0$ | $P_1$ |
|-------|-------|-------|
| Oil | 60 | 70 |
| Pulses | 70 | 60 |
| Rice | 50 | 40 |
| Sugar | 40 | 40 |

**Answers**

1.      **147.4, 132.84**
2.      **137.22**
3.      **95.45**

## 11.13 WEIGHTED AGGREGATIVE PRICE INDEX

Simple Aggregative methods of Index Numbers assume that all the items of Index Number are equally important. There is no item which is more important than other. So, this method provide equal weightage to all items. However, in practical life it is not true. Some items carry more importance than other items, for example in human's life expenditure on food carries more importance than expenditure on entertainment. So, we have weighted method of index numbers which considers relative importance of the item also.

Weighted Aggregative Method is one such method. This method is more or less same as Simple Aggregative Method but main difference is that is also considers relative weights of the items also. Generally the quantity of the item consumed is considered as weight in this case. There are many methods of calculating Weighted Aggregative Price Index which are discussed as follows:

### 11.13.1 LASPEYRE'S METHOD:

This method was suggested by Mr. Laspeyre in 1871. Under this method base year quantities of the various products are assumed as weight for preparing the index numbers. The following steps may be used:

1. Multiply Prices of the base year ($P_0$) with the quantities of the base year ($Q_0$) for every commodity.
2. Add the values calculated in step 1, the sum is denoted as $\sum P_0 Q_0$
3. Multiply Prices of the current year ($P_1$) with the quantities of the base year ($Q_0$) for every commodity.
4. Add the values calculated in step 3, the sum is denoted as $\sum P_1 Q_0$.
5. Use following formula for calculating index number:

$$P_{01} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$$

## 11.13.2 PAASCHE'S METHOD:

This method was suggested by Mr. Paasche in 1874. Under this method current year quantities of the various products are assumed as weight for preparing the index numbers. The following steps may be used:

1. Multiply Prices of the base year $(P_0)$ with the quantities of the current year $(Q_1)$ for every commodity.
2. Add the values calculated in step 1, the sum is denoted as $\sum P_0 Q_1$
3. Multiply Prices of the current year $(P_1)$ with the quantities of the current year $(Q_1)$ for every commodity.
4. Add the values calculated in step 3, the sum is denoted as $\sum P_1 Q_1$.
5. Use following formula for calculating index number:

$$P_{01} = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100$$

## 11.13.3 DORBISH AND BOWLEY'S METHOD:

This method is based on both Lasypeyre's Method and Paasche's Method, that's why this method is also known as L-P formula. Under this method we calculate the index number by taking the arithmetic mean of the formula given by Laspeyre and Paasche. So, following formula is used in case of the Dorbish and Bowley Method:

$$P_{01} = \frac{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} + \frac{\sum P_1 Q_1}{\sum P_0 Q_1}}{2} \times 100$$

## 11.13.4 FISHER'S IDEAL INDEX METHOD:

This method was suggested by Prof Irving Fisher and it is assumed as one of the best method of constructing the Index Number. That's why this method is also called Ideal Index Number. This method is based on both Lasypeyre's Method and Paasche's Method, but instead of taking arithmetic mean of the both formulas, Fisher used the geometric mean on the formula given by Laspeyre and Paasche. So, following formula for calculating Fisher's ideal Index number:

$$\sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100$$

Fisher's Method is called ideal index number due to following reasons:

1. This method use geometric mean as base which is perhaps best average for constructing Index numbers.

2. This method considers both quantities of base year as well as current year as weight.
3. This method satisfies both the time reversal and factor reversal test. 4. It is comprehensive method and cover all values of data i.e $P_0$, $Q_0$, $P_1$, $Q_1$ etc.

## 11.13.5 MARSHAL EDGEWORTH INDEX METHOD:

Like the Fisher's method, this method also use the quantities of base as well as current year as weight. Under this method arithmetic mean of the quantity of base and current year is assumed as weight. This method is comparatively simple than Fisher's method as it does not use complex concept of Geometric mean. Following is the formula of this method.

$$P_{01} = \frac{\sum P_1(Q_0 + Q_1)}{\sum P_0(Q_0 + Q_1)} \times 100 \text{ or}$$

$$\frac{\sum P_1 Q_0 + \sum P_1 Q_1}{\sum P_0 Q_0 + \sum P_0 Q_1} \times 100$$

## 11.13.6 WALSCH INDEX METHOD:

This method also use the quantities of base as well as current year as weight. Under this method Geometric mean of the quantity of base and current year is assumed as weight. Following is the formula of this method.

$$P_{01} = \frac{\sum P_1 \sqrt{Q_0 \times Q_1}}{\sum P_0 \sqrt{Q_0 \times Q_1}} \times 100$$

## 11.13.7 KELLY'S INDEX METHOD:

This method was contributed by Truman Kelly. Under this method particular weights are fixed for each period and that are uses in index number. That's why this method is also called aggregative index with fixed weighs. Following formula is used in this method:

$$P_{01} = \frac{\sum P_1 Q}{\sum P_0 Q} \times 100$$

**Example 3. Construct Weighted Aggregative Index number of the year 2020 by taking the base as prices of 2015 using Laspeyre, Paasche, Dorbish & Bowley, Fisher, Marshal Edgeworth and Kelly's method.**

| Item | Price of the Year 2015 | Quantity of the Year 2015 | Price of the Year 2020 | Quantity of the Year 2020 |
|------|------------------------|---------------------------|------------------------|---------------------------|
| A | 6 | 50 | 10 | 56 |
| B | 2 | 100 | 2 | 120 |
| C | 4 | 60 | 6 | 60 |
| D | 10 | 30 | 12 | 24 |

| E | 8 | 40 | 12 | 36 |
|---|---|----|----|----|

**Solution:**

| Item | $P_0$ | $Q_0$ | $P_1$ | $Q_1$ | $P_0Q_0$ | $P_0Q_1$ | $P_1Q_0$ | $P_1Q_1$ |
|------|-------|-------|-------|-------|----------|----------|----------|----------|
| A | 6 | 50 | 10 | 56 | 300 | 336 | 500 | 560 |
| B | 2 | 100 | 2 | 120 | 200 | 240 | 200 | 240 |
| C | 4 | 60 | 6 | 60 | 240 | 240 | 360 | 360 |
| D | 10 | 30 | 12 | 24 | 300 | 240 | 360 | 288 |
| E | 8 | 40 | 12 | 36 | 320 | 288 | 480 | 432 |
| | | | | | $\sum P_0Q_0 =$ **1360** | $\sum P_0Q_1 =$ **1344** | $\sum P_1Q_0 =$ **1900** | $\sum P_1Q_1 =$ **1880** |

1. Laspeyre's Method:

$$P_{01} = \frac{\sum P_1Q_0}{\sum P_0Q_0} \times 100 = \frac{1900}{1360} \times 100 = 139.71$$

2. Paasche's Method:

$$P_{01} \frac{\sum P_1Q_1}{\sum P_0Q_1} \times 100 = \frac{1880}{1344} \times 100 = 139.88$$

3. Dorbish and Bowley's Method:

$$P_{01} = \frac{\frac{\sum P_1Q_0}{\sum P_0Q_0} + \frac{\sum P_1Q_1}{\sum P_0Q_1}}{2} \times 100$$

$$= \frac{\frac{1900}{1360} + \frac{1880}{1344}}{2} \times 100 = \frac{2.796}{2} = 139.79$$

4. Fisher's Ideal Index Method:

$$\sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100$$

$$= \sqrt{\frac{1900}{1360} \times \frac{1880}{1344}} \times 100 = \sqrt{1.9543} \times 100 = 139.79$$

5.  Marshal Edgeworth Index Method:

$$\frac{\sum P_1 Q_0 + \sum P_1 Q_1}{\sum P_0 Q_0 + \sum P_0 Q_1} \times 100$$

$$= \frac{1900 + 1880}{1360 + 1344} \times 100 = \frac{3780}{2704} \times 100 = 139.79$$

6.  Walsch Index Method:

| Item | $P_0$ | $Q_0$ | $P_1$ | $Q_1$ | $\sqrt{Q_0 \times Q_1}$ | $P_1\sqrt{Q_0 \times Q_1}$ | $P_0\sqrt{Q_0 \times Q_1}$ |
|------|-------|-------|-------|-------|-------------------------|----------------------------|----------------------------|
| A | 6 | 50 | 10 | 56 | 52.9 | 529 | 317.4 |
| B | 2 | 100 | 2 | 120 | 109.5 | 219 | 219.0 |
| C | 4 | 60 | 6 | 60 | 60.0 | 360 | 240.0 |
| D | 10 | 30 | 12 | 24 | 26.8 | 321.6 | 268.0 |
| E | 8 | 40 | 12 | 36 | 37.9 | 454.8 | 303.2 |
| | | | | | | $\sum P_1\sqrt{Q_0 \times Q_1}$ = 1884.8 | $\sum P_0\sqrt{Q_0 \times Q_1}$ = 1347.6 |

$$P_{01} = \frac{\sum P_1\sqrt{Q_0 \times Q_1}}{\sum P_0\sqrt{Q_0 \times Q_1}} \times 100 = \frac{1884.8}{1347.6} \times 100 = 139.08$$

**Example 4. Construct Weighted Aggregative Index number using Laspeyre, Paasche, Dorbish & Bowley and Fisher, method.**

| Item | Price of the Base Year | Expenditure of the Base Year | Price of the Current Year | Expenditure of the Current Year |
|------|------------------------|------------------------------|---------------------------|---------------------------------|
| A | 2 | 40 | 5 | 75 |
| B | 4 | 16 | 8 | 40 |
| C | 1 | 10 | 2 | 24 |
| D | 5 | 25 | 10 | 60 |

**Solution:**

We know that Expenditure = Price × Quantity

So Quantity $= \frac{Expenditure}{Price}$

| Item | $P_0$ | $Q_0$ | $P_1$ | $Q_1$ | $P_0Q_0$ | $P_0Q_1$ | $P_1Q_0$ | $P_1Q_1$ |
|------|-------|-------|-------|-------|----------|----------|----------|----------|
| A | 2 | 20 | 5 | 15 | 40 | 30 | 100 | 75 |
| B | 4 | 4 | 8 | 5 | 16 | 20 | 32 | 40 |
| C | 1 | 10 | 2 | 12 | 10 | 12 | 20 | 24 |
| D | 5 | 5 | 10 | 6 | 25 | 30 | 50 | 60 |
| | | | | | $\sum P_0Q_0$ = 91 | $\sum P_0Q_1$ = 92 | $\sum P_1Q_0$ = 202 | $\sum P_1Q_1$ = 199 |

1. Laspeyre's Method:

$$P_{01} = \frac{\sum P_1Q_0}{\sum P_0Q_0} \times 100 = \frac{202}{91} \times 100 = 221.98$$

2. Paasche's Method:

$$P_{01} \frac{\sum P_1Q_1}{\sum P_0Q_1} \times 100 = \frac{199}{92} \times 100 = 216.39$$

3. Dorbish and Bowley's Method:

$$P_{01} = \frac{\frac{\sum P_1Q_0}{\sum P_0Q_0} + \frac{\sum P_1Q_1}{\sum P_0Q_1}}{2} \times 100$$

$$= \frac{\frac{202}{91} + \frac{199}{92}}{2} \times 100 = \frac{4.3828}{2} = 219.14$$

4. Fisher's Ideal Index Method:

$$\sqrt{\dfrac{\sum P_1Q_0}{\sum P_0Q_0} \times \dfrac{\sum P_1Q_1}{\sum P_0Q_1}} \times 100$$

$$= \sqrt{\dfrac{202}{191} \times \dfrac{199}{92}} \times 100 = \sqrt{4.8015} \times 100 = 219.12$$

## 11.14 WEIGHTED PRICE RELATIVE METHOD

This method almost similar to simple price relative method. However, simple price relative give equal importance to all items under consideration. But in our life, all items do not carry equal importance. Some item are more important or on some items we spend more amount. Change in price of some items affect us more than change in price of some other items. So, we have weighted price relative method. This method is similar to simple price relative method but also assigns weights to the items. Further, in this method it is not necessary to use Arithmetic mean as average rather we can use any method of finding average, such as Arithmetic mean, Geometric mean, etc. However, normally we prefer to use Arithmetic mean in this case.

Following are the steps of this method:

1. Decide the base year.
2. Calculate the price relative of current year for each commodity by dividing current Prices ($P_1$) with base year price ($P_0$) using the following formula $\dfrac{P_1}{P_0} \times 100$.
3. Find the weights of the items to be assigned.
4. Multiply price relative so calculated with the weights and find out the product of both.
5. Find sum of product so calculated.
6. Find sum of the weights assigned.
7. Divide the sum of the weighted price relatives with sum of weights to get index number by using the following formula:

$$P_{01} = \dfrac{\sum W \dfrac{P_1}{P_0} \times 100}{\sum W}$$

### 11.14.1 MERITS OF WEIGHTED PRICE RELATIVE METHOD:

1. This method is very simple to calculate and understand.
2. This method is not affected by the magnitude of price of a particular item.
3. This method is not affected by unit of measurement of the item.
4. This method is not necessarily based on Arithmetic Mean, we can use other averages like Geometric Mean, median etc also. 5. Weights are assigned according to importance of the items.

### 11.14.2 LIMITATIONS OF WEIGHTED PRICE RELATIVE METHOD:

1. Selection of average is a difficult task in this method.
2. If it is to be calculated using Geometric Mean, than calculation is very difficult.
    3. Selection of weights is a difficult task.

**Example 5. Construct Weighted Price Relative Index number of the year 2020 by taking the base as prices of 2015.**

| Commodity | Price of the Year 2015 | Price of the Year 2020 | Weights |
|---|---|---|---|
| Wheat | 20 | 26 | 40 |
| Sugar | 40 | 34 | 5 |
| Oil | 60 | 120 | 3 |
| Pulses | 80 | 140 | 2 |

**Solution:**

Price Index (Year 2015 taken as the base year)

| Commodity | Price of the Year 2015 $P_0$ | Price of the Year 2020 $P_1$ | Price Relative $\frac{P_1}{P_0} \times 100$ | Weights (W) | Weighted Price Relatives $W \frac{P_1}{P_0} \times 100$ |
|---|---|---|---|---|---|
| Wheat | 20 | 26 | $\frac{26}{20} \times 100 = 130$ | 40 | 5200 |
| Sugar | 40 | 34 | $\frac{34}{40} \times 100 = 85$ | 5 | 424 |
| Oil | 60 | 120 | $\frac{120}{60} \times 100 = 200$ | 3 | 600 |
| Pulses | 80 | 140 | $\frac{140}{80} \times 100 = 175$ | 2 | 350 |
| | | | | $\Sigma W = 50$ | $\Sigma W \frac{P_1}{P_0} \times 100 = 6575$ |

Price Index ( $P_{01}$ ) = $\dfrac{\Sigma W \frac{P_1}{P_0} \times 100}{\Sigma W} = \dfrac{6575}{50} = 131.50$

Price index shows that prices have increased by 31.5% in 2020 than 2015.

## 11.15 TESTS OF CONSISTENCY FOR INDEX NUMBERS

There are a number of methods through which index numbers can be calculated. Each method has its own merits and demerits. Now a question is that which of these method can be treated as best. In order to find out which method is better than others, there are four tests. If any index number satisfies these test we may consider the index number to be ideal one.

## 11.15.1 UNIT TEST:

Unit test says that any index number can be treated as ideal only if it is free from the unit in which quantity is measured. Whether prices are quoted for single item or for dozen items, the index number must not be affected by the same. Only simple average of price relative method satisfies this condition.

## 11.15.2 TIME REVERSAL TEST

This test was suggested by Fisher. According to this test, an ideal index number is one which works both ways that i.e. backward and forward. So if index is prepared by taking old period as base year and new period as current year it comes to be 200 it means prices in current period are doubled. Now say reverse is done, new period is taken as base and old period is taken as current year, this test says that index should be 50 which means earlier prices were half of current prices. In other words we can say that following condition should be satisfied

$$\boxed{P_{01} \times P_{10} = 1}$$

Following is the formula of time reversal test in different cases:

1. **LASPEYRE'S METHOD:**

$$P_{01} \times P_{10} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_0 Q_1}{\sum P_1 Q_1} \neq 1$$

This method does not satisfy time reversal test.

2. **PAASCHE'S METHOD:**

$$P_{01} \times P_{10} = \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times \frac{\sum P_0 Q_0}{\sum P_1 Q_0} \neq 1$$

This method does not satisfy time reversal test.

3. **DORBISH AND BOWLEY'S METHOD:**

$$P_{01} \times P_{10} = \frac{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} + \frac{\sum P_1 Q_1}{\sum P_0 Q_1}}{2} \times \frac{\frac{\sum P_0 Q_1}{\sum P_1 Q_1} + \frac{\sum P_0 Q_0}{\sum P_1 Q_0}}{2} \neq 1$$

This method does not satisfy time reversal test.

4. **FISHER'S IDEAL INDEX METHOD:**

$$P_{01} \times P_{10} = \sqrt{\overline{\frac{\sum P_1Q_0}{\sum P_0Q_0} \times \frac{\sum P_1Q_1}{\sum P_0Q_1}}} \times \sqrt{\overline{\frac{\sum P_0Q_1}{\sum P_1Q_1} \times \frac{\sum P_0Q_0}{\sum P_1Q_0}}} = 1$$

This method satisfies time reversal test.

## 5. MARSHAL EDGEWORTH INDEX METHOD:

$$P_{01} \times P_{10} = \frac{\sum P_1Q_0 + \sum P_1Q_1}{\sum P_0Q_0 + \sum P_0Q_1} \times \frac{\sum P_0Q_1 + \sum P_0Q_0}{\sum P_1Q_1 + \sum P_1Q_0} = 1$$

This method satisfies time reversal test.

## 6. WALSCH INDEX METHOD:

$$P_{01} \times P_{10} = \frac{\sum P_1\sqrt{Q_0 \times Q_1}}{\sum P_0\sqrt{Q_0 \times Q_1}} \times \frac{\sum P_0\sqrt{Q_1 \times Q_0}}{\sum P_1\sqrt{Q_1 \times Q_0}} = 1$$

This method satisfies time reversal test.

### 11.15.3 Factor Reversal Test (F.R.T.)

This test was also suggested by Fisher. According to this test, an ideal index number is one which does not give inconsistent result if we change price with quantity and quantity with price. According to this test when we multiply change in price with change in quantity the ratio must be equal to total change in value.

$$\boxed{P_{01} \times Q_{01} = \frac{\sum P_1Q_1}{\sum P_0Q_0}}$$

Following is the formula of factor reversal test in different cases:

## 1. LASPEYRE'S METHOD:

$$P_{01} \times Q_{10} = \frac{\sum P_1Q_0}{\sum P_0Q_0} \times \frac{\sum Q_1P_0}{\sum Q_0P_0} \neq \frac{\sum P_1Q_1}{\sum P_0Q_0}$$

This method does not satisfy factor reversal test.

## 2. PAASCHE'S METHOD:

$$P_{01} \times Q_{10} = \frac{\sum P_1Q_1}{\sum P_0Q_1} \times \frac{\sum Q_1P_1}{\sum Q_0P_1} \neq \frac{\sum P_1Q_1}{\sum P_0Q_0}$$

This method does not satisfy factor reversal test.

### 3. DORBISH AND BOWLEY'S METHOD:

$$P_{01} \times Q_{10} = \frac{\dfrac{\sum P_1 Q_0}{\sum P_0 Q_0} + \dfrac{\sum P_1 Q_1}{\sum P_0 Q_1}}{2} \times \frac{\dfrac{\sum Q_1 P_0}{\sum Q_0 P_0} + \dfrac{\sum Q_1 P_1}{\sum Q_0 P_1}}{2} \neq \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

This method does not satisfy factor reversal test.

### 4. FISHER'S IDEAL INDEX METHOD:

$$P_{01} \times Q_{10} = \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times \sqrt{\frac{\sum Q_1 P_0}{\sum Q_0 P_0} \times \frac{\sum Q_1 P_1}{\sum Q_0 P_1}} = \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

This method satisfies factor reversal test.

### 5. MARSHAL EDGEWORTH INDEX METHOD:

$$P_{01} \times Q_{10} = \frac{\sum P_1 Q_0 + \sum P_1 Q_1}{\sum P_0 Q_0 + \sum P_0 Q_1} \times \frac{\sum Q_1 P_0 + \sum Q_1 P_1}{\sum Q_0 P_0 + \sum Q_0 P_1} = \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

This method does not satisfy factor reversal test.

### 6. WALSCH INDEX METHOD:

$$P_{01} \times Q_{10} = \frac{\sum P_1 \sqrt{Q_0 \times Q_1}}{\sum P_0 \sqrt{Q_0 \times Q_1}} \times \frac{\sum Q_1 \sqrt{P_0 \times P_1}}{\sum Q_0 \sqrt{P_0 \times P_1}} = \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

This method does not satisfy factor reversal test.

**Example 6. Construct Weighted Aggregative Index number using Laspeyre, Paasche, and Fisher method also check whether these satisfy T.R.T. and F.R.T or not**

| Item | Price of the Base Year | Qty. of the Base Year | Price of the Current Year | Qty. of the Current Year |
|---|---|---|---|---|
| A | 30 | 7 | 40 | 5 |
| B | 40 | 12 | 60 | 8 |
| C | 60 | 10 | 50 | 15 |
| D | 30 | 15 | 20 | 18 |

**Solution:**

We know that Expenditure = Price × Quantity

So Quantity = $\dfrac{Expenditure}{Price}$

| Item | $P_0$ | $Q_0$ | $P_1$ | $Q_1$ | $P_0Q_0$ | $P_0Q_1$ | $P_1Q_0$ | $P_1Q_1$ |
|---|---|---|---|---|---|---|---|---|
| A | 30 | 7 | 40 | 5 | 210 | 150 | 280 | 200 |
| B | 40 | 12 | 60 | 8 | 480 | 320 | 720 | 480 |
| C | 60 | 10 | 50 | 15 | 600 | 900 | 500 | 750 |
| D | 30 | 15 | 20 | 18 | 450 | 540 | 300 | 360 |
| | | | | | $\sum P_0Q_0 =$ 1740 | $\sum P_0Q_1 =$ 1910 | $\sum P_1Q_0$ = 1800 | $\sum P_1Q_1$ = 1790 |

**1. LASPEYRE'S METHOD:**

$$P_{01} = \frac{\sum P_1Q_0}{\sum P_0Q_0} \times 100 = \frac{1800}{1740} \times 100 = 103.45$$

Time Reversal Test

$$\frac{\sum P_1Q_0}{\sum P_0Q_0} \times \frac{\sum P_0Q_1}{\sum P_1Q_1} = \frac{1800}{1740} \times \frac{1910}{1790} \neq 1$$

It does not satisfies time reversal test.

Factor Reversal Test

$$\frac{\sum P_1Q_0}{\sum P_0Q_0} \times \frac{\sum Q_1P_0}{\sum Q_0P_0} = \frac{1800}{1740} \times \frac{1910}{1740} \neq \frac{1790}{1740}$$

It does not satisfies facto reversal test.

**2. PAASCHE'S METHOD:**

$$P_{01} \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times 100 = \frac{1790}{1910} \times 100 = 93.72$$

Time Reversal Test

$$= \frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times \frac{\sum P_0 Q_0}{\sum P_1 Q_0} = \frac{1790}{1910} \times \frac{1740}{1800} \neq 1$$

It does not satisfies time reversal test.

Factor Reversal Test

$$\frac{\sum P_1 Q_1}{\sum P_0 Q_1} \times \frac{\sum Q_1 P_1}{\sum Q_0 P_1} = \frac{1790}{1910} \times \frac{1790}{1800} \neq \frac{1790}{1740}$$

It does not satisfies facto reversal test.

## 3. FISHER'S IDEAL INDEX METHOD:

$$\sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times 100$$

$$= \sqrt{\frac{1800}{1740} \times \frac{1790}{1910}} \times 100 = \sqrt{.96948} \times 100 = 98.462$$

Time Reversal Test

$$= \sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times \sqrt{\frac{\sum P_0 Q_1}{\sum P_1 Q_1} \times \frac{\sum P_0 Q_0}{\sum P_1 Q_0}} \neq 1$$

$$= \sqrt{\frac{1800}{1740} \times \frac{1790}{1910}} \times \sqrt{\frac{1910}{1790} \times \frac{1740}{1800}} = 1$$

It satisfies time reversal test.

Factor Reversal Test

$$\sqrt{\frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times \frac{\sum P_1 Q_1}{\sum P_0 Q_1}} \times \sqrt{\frac{\sum Q_1 P_0}{\sum Q_0 P_0} \times \frac{\sum Q_1 P_1}{\sum Q_0 P_1}} = \frac{\sum P_1 Q_1}{\sum P_0 Q_0}$$

$$\sqrt{\frac{1800}{1740} \times \frac{1790}{1910}} \times \sqrt{\frac{1910}{1740} \times \frac{1790}{1800}} = \frac{1790}{1740}$$

It satisfies facto reversal test.

### 11.15.3 CIRCULAR TEST

Circular test was given by Wester Guard. This test is like Time Reversal test but applied to more number of years. According to this test if data of the different periods is compared by shifting the base, we should be able to get the index of any period by correlating the different base periods used. Symbolically

$$= \frac{P_1}{P_0} \times \frac{P_2}{P_1} \times \frac{P_3}{P_2} = 1$$

Only Simple Aggregative, Simple Geometric Mean of price relatives and Kelly's index meet this criteria.

## 11.16 COST OF LIVING INDEX NUMBER OR CONSUMER PRICE INDEX NUMBER

The price index discussed so far now are general wholesale price index that shows the change in general price level in the economy. These index numbers does not show that how these changes in prices are affecting the life and expenditure of a common consumer. These index numbers does not reflect that how cost of living of the consumer is changing over a period of time. For this purpose we have different index numbers known as Cost of Living Index Numbers or Consumer Price Index Numbers. These index numbers are not based on wholesale prices rather these are based on retail prices. Consumers belonging to different sections have different pattern of consumption, for example rich people have different pattern of consumption than poor people. Similarly, people of different region have different consumption pattern, for example consumption pattern of person living in Delhi is different from consumption pattern of person living Tamil Nadu. So, normally different consumer price index are prepared for different section of people or the people living in different regions of the country. We can define cost of living index as:

*It is an index that shows the effect of changes in prices of various goods and services on purchasing power of particular set of persons during a particular period.*

It is a weighted index number and generally the expenditure done on particular set of commodities is taken as weight while preparing index number.

### 11.16.1 Uses of Consumer Price Index Numbers

1. These index numbers measure the change in cost of living so these are helpful in fixation of wages and salary.
2. The index numbers are very useful for government in formulation of the policy specially related to poor people.
3. As there is inverse relation between inflation and value of money, these index numbers are helpful in determining the value of money.
4. These index number help the economic analyst in analysis of various markets.
5. These Index help us to determine the effect of change in prices on the living standard of the people in different geographical regions.

## 11.16.2 CONSTRUCTION OF CONSUMER PRICE INDEX

1. **SCOPE AND COVERAGE:** Before preparation of these index numbers, we must decide scope and coverage of these index numbers. We have to decide the region to be covered and the section of people to be covered.
2. **ENQUIRY OF FAMILY BUDGET**: Next step is to find family budget that means, expenditure incurred by different families on different commodities. For this purpose adequate number of families must be included.
3. **SELECTION OF BASE YEAR**: This is important task. Base year is the year with which we would compare our current prices. Only in normal year should be taken as base year.
4. **OBTAINING PRICE QUOTATIONS**: This is very important but difficult task. For preparing index number we have to collect data of the prices. As prices of different commodities are different at various places, it is difficult to get this data.
5. **SELECTION OF SUITABLE WEIGHTS:** Next step is to decide the weights that are to be assigned while constructing the index number. Different weights can be assigned, for example we may consider quantity consumed as weight or we may take expenditure incurred as the weight.
6. **SELECTION OF METHOD**: Last step in if cost of living index is to select the method. Normally two methods are applied for this purpose that are Aggregate Expenditure Method and Family Budget Method.

## 11.16.3 AGGREGATE EXPENDITURE METHOD

This method is similar to Lespeyre's method. In this, quantity of base year is taken as weight. Following are steps of this method:

1. Take the prices of base year and multiply it with quantities of base year.
2. Add up the amount calculated in step 1 to find aggregate expenditure of base year.
3. Multiply the prices of current year with quantities of base year.
4. Add up the amount to get expenditure of current year.
5. Divide the expenditure of current year with the expenditure of base year and multiply the result with 100 to find the index number. Following is the formula.

$$\text{Consumer Price Index (Agrregate Expenditure Method)} = \frac{\Sigma P_1 Q_0}{\Sigma {}_0 Q_0} \times 100$$

### 11.16.4 FAMILY BUDGET METHOD:

In this method budget of a family is studied for finding the index number. Following are the steps of this method:

1. Calculate price relative by dividing current prices with the base year $\frac{P_1}{P_0}$ and such relatives are denoted by R.

2. Calculate expenditure of base year ($P_0 Q_0$), this is done by multiplying prices of base ($P_0$) year with quantities of base year ($Q_0$).
3. This expenditure is taken as weight and is represented by W.
4. Find the total expenditure that is $\Sigma W$.
5. Multiply the relative with the weights and find the product (RW).
6. Calculate the sum of the product calculated above ($\Sigma RW$).
7. Divide the sum so obtained with the total of weights to obtain index number. Following is the formula.

$$\text{C nsumer Price Index (Family Budget Method)} = \frac{\Sigma RW}{\Sigma W} \times 100$$

**Example 7: From the following data find out consumer price index number for the year 2020 taking 2018 as base by using (i) the aggregate expenditure method, and (ii) the family budget Method**

| Commodities | Quantity 2018 | Price in 2018 (Rs.) | Price in 2020 (Rs.) |
|---|---|---|---|
| A | 6 Kg | 11.50 | 12.00 |
| B | 6 Kg | 10.00 | 16.00 |
| C | 1 Lt | 12.00 | 18.00 |
| D | 6 Kg | 16.00 | 20.00 |
| E | 4 Kg | 4.00 | 3.00 |
| F | 1 Kg | 40.00 | 30.00 |

Solution:

| Commodities | Quant ties 2018 | Prices in 2018 | Prices in 2020 | $P_1 Q_0$ | $P_0 Q_0$ |
|---|---|---|---|---|---|

|   | $Q_0$ | $P_0$ | $P_1$ |  |  |
|---|---|---|---|---|---|
| A | 6 | 11.50 | 12.00 | 72 | 69 |
| B | 6 | 10.00 | 16.00 | 96 | 60 |
| C | 1 | 12.00 | 18.00 | 18 | 12 |
| D | 6 | 16.00 | 20.00 | 120 | 96 |
| E | 4 | 4.00 | 3.00 | 12 | 16 |
| F | 1 | 40.00 | 30.00 | 30 | 40 |
|   |   |   |   | $\sum P_1 Q_0$ = 348 | $\sum P_{01} Q_0$ = 293 |

C. P. I (Agrregate Expenditure Method) $= \dfrac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100 = \dfrac{348}{293} \times 100 = 118.77$

| Commodities | Quantity Consumed $Q_0$ | Price in 2018 | Price in 1983 | $\text{Pi}$ -----x 100 Po | $P_0 Q_0$ W | RW |
|---|---|---|---|---|---|---|
|  |  | $P_0$ | $P_1$ | R |  |  |
| A | 6 | 11.50 | 12.00 | 104.35 | 69 | 7200.15 |
| B | 6 | 10.00 | 16.00 | 160.00 | 60 | 9600.00 |
| C | 1 | 12.00 | 18.00 | 150.00 | 12 | 1800.00 |
| D | 6 | 16.00 | 20.00 | 125.00 | 96 | 12000.00 |
| E | 4 | 4.00 | 3.00 | 75.00 | 16 | 1200.00 |
| F | 1 | 40.00 | 30.00 | 75.00 | 40 | 3000.00 |
|  |  |  |  |  | $\sum W =$ 293 | $\sum RW =$ 34800.15 |

C. P. I (Family Budget Method) $= \dfrac{\sum RW}{\sum W} \times 100 = \dfrac{34800.15}{293} \times 100 = 118.77$

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**11.17 TEST YOUR UNDERSTANDING (B)**

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1. Find Laspeyre, Paasche and Fisher Index from following

| Item | Price of the Base Year | Qty of the Base Year | Price of the Current Year | Qty of the Current Year |
|---|---|---|---|---|
| A | 12 | 20 | 15 | 25 |

| | | | | |
|---|---|---|---|---|
| B | 10 | 8 | 16 | 10 |
| C | 15 | 2 | 12 | 1 |
| D | 60 | 1 | 65 | 1 |
| E | 3 | 2 | 10 | 1 |

2. Calculate Laspeyre, Paasche, Bowley, Fisher, Marshal and Edgeworth price Index from following

| Item | Qty of of the Base Year | Expenditure of the Base Year | Qty of the Current Year | Expenditure of the Current Year |
|---|---|---|---|---|
| A | 10 | 120 | 12 | 156 |
| B | 50 | 700 | 40 | 600 |
| C | 15 | 240 | 25 | 475 |
| D | 12 | 216 | 15 | 240 |

3. Calculate Laspeyre, Paasche, Fisher, Marshal and Edgeworth price Index from following

| Item | Price 2015 | Qty 2015 | Price 2017 | Qty 2017 |
|---|---|---|---|---|
| A | 5 | 100 | 6 | 150 |
| B | 4 | 80 | 5 | 100 |
| C | 2.5 | 60 | 5 | 72 |
| D | 12 | 30 | 9 | 33 |

4. Calculate index by using Weighted price relative method

| Item | Price 2015 | Price 2017 | W |
|---|---|---|---|
| A | 10 | 12 | 10 |
| B | 15 | 19 | 15 |
| C | 20 | 25 | 8 |
| D | 25 | 28 | 12 |

5. Apply Laspeyre, Paasche and Fisher Method on the following data and check whether these methods satisfy Time Reversal and Factor Reversal Test or not

| Item | $P_0$ | $Q_0$ | $P_1$ | $Q_1$ |
|---|---|---|---|---|
| A | 5 | 15 | 5 | 5 |
| B | 7 | 5 | 4 | 3 |
| C | 8 | 6 | 6 | 10 |
| D | 3 | 8 | 3 | 4 |

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6. From the following data find out consumer price index number for the year 2020 taking 2018 as base by using (i) the aggregate expenditure method, and (ii) the family budget Method

| Commod ities | Quantity 2018 | Price in 2018 (Rs.) | Price in 2020 (Rs.) |
|---|---|---|---|
| A | 100 | 8 | 12 |
| B | 25 | 6 | 7.5 |
| C | 10 | 5 | 5.25 |
| D | 20 | 48 | 52 |
| E | 25 | 15 | 16.5 |
| F | 30 | 9 | 27 |

Answers:

1. Laspeyre - 129.09, Paasche – 130.13, Fisher 129.61
2. L = 106.35, P = 107.06, B = 106.72, F = 106.75, M & E = 106.7
3. L = 118.05, P = 119.18, F = 118.61, M & E = 118.68
4. 120.97
5. L= 85.165, P = 86.232, F = 85.697, only Fisher method satisfy both test. 6. 142.13

## 8.14 LET US SUM UP

- **Index number shows change in variable over a period of time.**
- **Price index shows change in price in current year in comparison to base year.**
- **Normally the base of index is taken as 100.**
- **There are different types of index like price index, quantity index, value index.**
- **Index number can be prepare without assigning weights or after assigning weights.**
- **Popular weighted aggregative index are Laspeyre, Paasche, Bowley, Fisher, Marshal Edgeworth and Kelly.**
- **There are test to check consistency of the index number.**
- **Only Fisher index satisfy Time Reversal and Factor Reversal tests.**
- **Consumer price index shows change in cost of living of the consumer.**

## 8.15 KEY TERMS

- **INDEX NUMBERS:** An index number is a device with help of which we can measure the relative change in one variable over a period of time. Normally while preparing the index number, we compare the current year variable with the variable of as base year. The index number of the base year is mostly taken as 100

- **PRICE INDEX NUMBERS:** These index numbers are used for measuring the change in prices of the commodities over a period of time. In other words we can say that these index numbers find the change in value of money over a period of time. These index numbers are most popular index number. These Index numbers may be based on Wholesale Price Index or Retail Price Index.

- **QUANTITY INDEX NUMBERS:** The Quantity or Volume Index Numbers measure the change in quantities used by people over a period of time. Under these index numbers, we calculate change in physical quantity of goods produced, consumed or sold over a period of time. There are different types of quantity index numbers such as Agricultural Production Index Number, Industrial Production Index Number, Export Import Index Number etc.

- **VALUE INDEX NUMBERS:** Value Index Numbers compare the change in total value over period of time. These index numbers takes into consideration both prices and quantity of the product while finding the change over a period of time. These Index Numbers are very useful in finding consumption habits of the consumers.

- **TIME REVERSAL TEST:** This test was suggested by Fisher. According to this test, an ideal index number is one which works both ways that i.e. backward and forward. In other words we can say that following condition should be satisfied: $P_{01} \times P_{10} = 1$

- **FACTOR REVERSAL TEST (F.R.T.):** This test was also suggested by Fisher. According to this test, an ideal index number is one which does not give inconsistent result if we change price with quantity and quantity with price. According to this test when we multiply change in price with change in quantity the ratio must be equal to total change in value. $P_{01} \times Q_{01} = \dfrac{\sum P_1 Q_1}{\sum P_0 Q_0}$.

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## 8.16 REVIEW QUESTIONS

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1. What are index numbers? What are its uses?
2. Explain problems faced in construction of index numbers.
3. What are different types of Index numbers.
4. Explain different steps in construction of index numbers.
5. What are different methods of construction of index numbers?
6. Explain Simple Aggregative Index numbers. What are its Merits and Limitations?
7. What are Simple Price Relative Index numbers? What are its Merits and Limitations?
8. Explain Weighted Aggregative Index numbers. What are its Merits and Limitations?
9. What are Weighted Price Relative Index numbers? What are its Merits and Limitations?
10. What are tests of consistency of index numbers. Give various tests of consistency.

11. Explain Time Reversal and Factor Reversal Test.

12. Why Fisher's Index is known as Ideal Index Number.

13. What are cost of living index. Give its methods of construction.  14. What are consumer price index numbers? What are its uses.

## 8.19 FURTHER READINGS

1. J. K. Sharma, *Business Statistics,* Pearson Education.

2. S.C. Gupta, *Fundamentals of Statistics,* Himalaya Publishing House.

3. S.P. Gupta and Archana Gupta, *Elementary Statistics,* Sultan Chand and Sons, New Delhi.

4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.

# B. COM (DIGITAL)

## SEMESTER II

## COURSE: BUSINESS MATHEMATICS AND STATISTICS

## UNIT 12 – TIME SERIES ANALYSIS

**STRUCTURE**

12.0 Objectives

12.1 Introduction

12.2 Definition of Time Series

12.3 Essential conditions of Time Series Analysis

12.4 Advantages of Time Series Analysis

12.5 Components of Time Series Analysis

12.6 Secular Trend

    12.6.1 Features of Secular Trend

    12.6.2 Uses of Secular Trend

12.7 Seasonal Variations

    12.7.1 Features of Seasonal Variations

    12.7.2 Uses of Seasonal Variations

12.8 Cyclical Variations

    12.8.1 Features of Cyclical Variations

    12.8.2 Uses of Cyclical Variations

## 12.0 OBJECTIVES

**After studying the Unit, students will be able to**

- Define the Meaning of Time series Analysis.
- Distinguish different types fluctuations in the time series analysis.
- Understand how time series analysis is useful for forecasting.
- Apply various methods of time series in prediction of trends.

## 12.1 INTRODUCTION

One of the important functions of business managers is to make forecast about the future. This forecasting helps them in making the business decisions. There are many Statistical Techniques that helps a business manager in forecasting of the future. Time series analysis is one such technique. This technique is not only used by Business managers, rather other persons interested in forecasting also use this technique like economists etc. Time series analysis is a tool with help of which we try to predict the future values on the basis of data available with us. For example if we have data of sales of a company for last 10-12 years and we want to predict the likely sale of the company for the next year, we can do so using time series analysis. Following are few examples of time series analysis:

- A series of data related to production of goods, prices of goods or consumption level of goods.
- Data related to the rainfall or temperature of a region.
- The data related to sales profit etc of any business firm.
- The data related to exports and imports of the country.
- The data related to population, birth rate or death rate in a country.

## 12.2 DEFINITION OF TIME SERIES

In time series we collect the data related to statistical observations and place such data in chronological order, that means in the order of occurrence of these observations. On the basis of these observations we can try to predict the future values of the observation. Following is the definition of time series analysis:

According to Ya-Lun-Chou "A time series may be defined as a collection of readings belonging to different time periods of some economic variable or composite of variables".

According to W.Z. Hirsch "The main objective in analyzing time series is to understand, interpret and evaluate change in economic phenomena in the hope of more correctly anticipating the course of future events".

## 12.3 ESSENTIAL CONDITIONS OF TIME SERIES ANALYSIS

1. Time series analysis must consist of those values that are homogenous in nature for example the sales data of every year must be in same quantities like in kilograms. If sales of some years are given in quantity and other are given in value, then we cannot apply time series analysis.
2. The data present must be in reference to time only. So, out of two variables given, one variable should be time. For example if relation between Price and Demand is given it is not time series.
3. The data must be arranged in chronological order.

4. The data must be available for long period of time at least 10 to 12 years.
5. We must try to keep the equal gap between two periods.
6. If the gap between the periods is not equal and some values are missing, we should try to find out those values using the interpolation.
7. The data must have some relation with the time. For example if we are measuring average marks of the students nn a class, it is not related to time.

## 12.4 ADVANTAGES OF TIME SERIES ANALYSIS

1. Time series analysis helps us in understanding the past behaviour of the phenomenon.
2. It help us in predicting the future course of action.
3. It helps us in understanding that how values are changing with the passage of time.
4. With help of time series, we can isolate impact of various factors like seasonal factors, cyclical factors or other irregular changes in the data.
5. With help of time series, we can find deviations between the actual achievements and the expected achievements.

## 12.5 COMPONENTS OF TIME SERIES

A large number of forces are there that affect the data. For example if the sales of a company are changing with the passage of time, there are many forces responsible for it. We can classify these forces basically into four categories known as components or elements of the time series. Following are these components:
1. Secular Trend
2. Seasonal variations
3. Cyclical variations
4. Irregular variations

## 12.6 SECULAR TREND

The word secular is taken from latin word 'Saeculum', which means a 'Generation'. So, as the names suggests, secular Trends are long-term Trends which normally occurs over it period of 15 to 20 years. Sometime, these trends may show upward results and other time it may show downward results. For example we can see that number of persons who are travelling by air is increasing over a period of time. Similarly, we can see that infant mortality rate in the country is

decreasing over a period of time. These both are secular trend but one trend is showing upward result and other trend is showing downward result.

## 12.6.1 FEATURES OF SECULAR TREND

Following are the characteristics of secular trends:

1. These Trends are related to long period of time.
2. These trends result of factors that are more or less stable in nature. For example the taste of people change of Technology takes time and does not happen overnight. 3. These Trends may show upward, downward or stable results.



| Upward Trend | Downward Trend | Stable Trend |
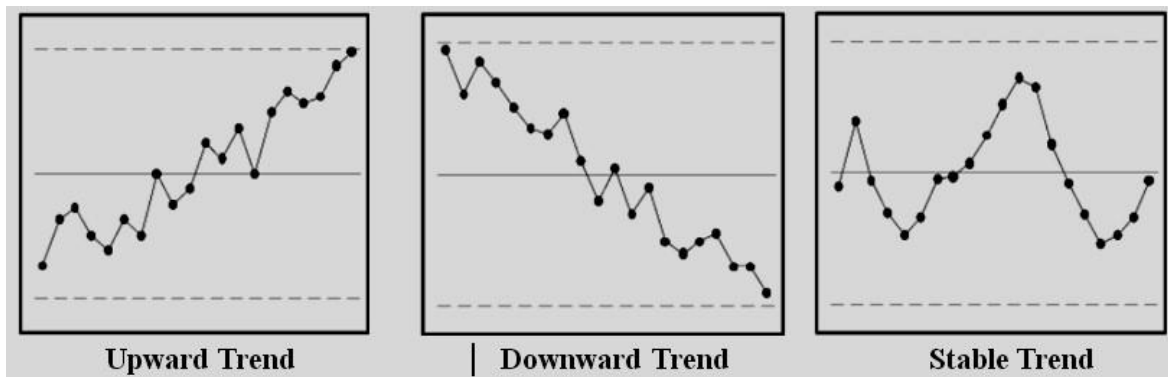
4. These trends may be linear or nonlinear in nature. Linear Trends are those Trends which change proportionately with the passage of time and these are presented in a graph as a straight line. Non linear friends are those which does not change proportionately, so when we draw these trends on a graph paper, these are not in a straight line.



Linear Trend          Non-Linear Trend
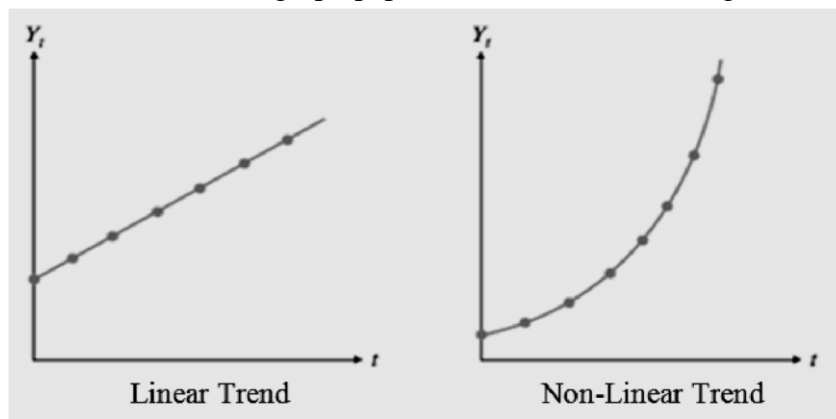
## 12.6.2 USES OF SECULAR TREND

Following are the benefits of studying secular trends:

1. As these trends are long-term, these help us in understanding direction of change. We can find whether phenomenon is increasing, decreasing or is stable with the passage of time.
2. These Trends can help us in predicting the future.
3. Secular Trends can help us in comparing two or more series and we can see which series is changing more rapidly.

4. It can be used extrapolation of the future values. 5. With the help of this trend, we can also study impact of other components of time series.

## 12.7 SEASONAL VARIATIONS:

Seasonal variations are short term variations. These variations occur regularly and their trend is repetitive. These variations may occur on yearly basis, half yearly basis, monthly basis, weekly basis or any other time period basis. There may be many reasons of these variations but these variations generally occur due to following two reasons:

1. **CLIMATIC CONDITIONS**: Sometime seasonal variations take place due to climate change. We can see that there are climatic cycle occur during the year. This climatic cycle also effect on many things like sales of company, consumption pattern etc. For example in rainy season sale of umbrellas increase, in summer season sale of air conditioners increase and similarly during the winter season sale of woolen clothes increase. These variations take place every year.

2. **CUSTOMS AND TRADITIONS**: Sometime seasonal variations take place due to customs and traditions. For example in India is tradition of purchasing new items in the household at the time of Diwali festival. So this is also seasonal variation which take place every year.
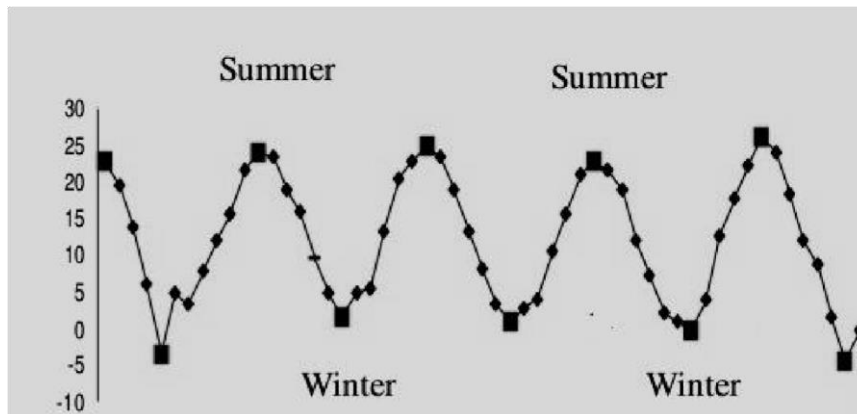


## 12.7.1 FEATURES OF SEASONAL VARIATIONS
Following are characteristics of seasonal variations:

1. These variations are short duration variations.
2. These variations repeat periodically.
3. It may have both upward and downward trend, for example in winter sale of woolen garments increase but at the same time sale of soft drinks decrease.
4. These variations may occur on yearly, quarterly monthly or weekly basis.
5. As these variations are repetitive and short duration in nature, these are comparatively easy to analyse.

## 12.7.2 USES OF SEASONAL VARIATIONS

Following are the uses of seasonal variations

1. Analysis of these variations is very important for business in planning their production schedule. Business can decide its production according to the seasonal variations.
2. Seasonal variations are useful for consumers also as they can plan their purchases according to the season. They know in advance which season is coming, so they can purchase items related to that season.
3. Seasonal variations also help consumers in making a bargain. Consumers may get off season items at lower price.
4. These variations help us in separating the effect of cyclical and irregular variations.
5. Business can use seasonal variations in many decisions like purchasing, inventory control, recruitment of employees, advertising etc. 6. These variations help us in making short term forecast.

## 12.8 CYCLICAL VARIATIONS

As the term 'cycle' suggest, these variations are recurrent variations. These variations are long Run variations and shows the recurring pattern of rise and decline. These variations are also known as oscillating movements. These variations do not have any fix duration. Sometime one cycle may be complete in 2-3 years, but some other time it may takes 7-8 years to complete. For example a business cycle is cyclical variation that has four phases Boom, recession, depression and recovery.
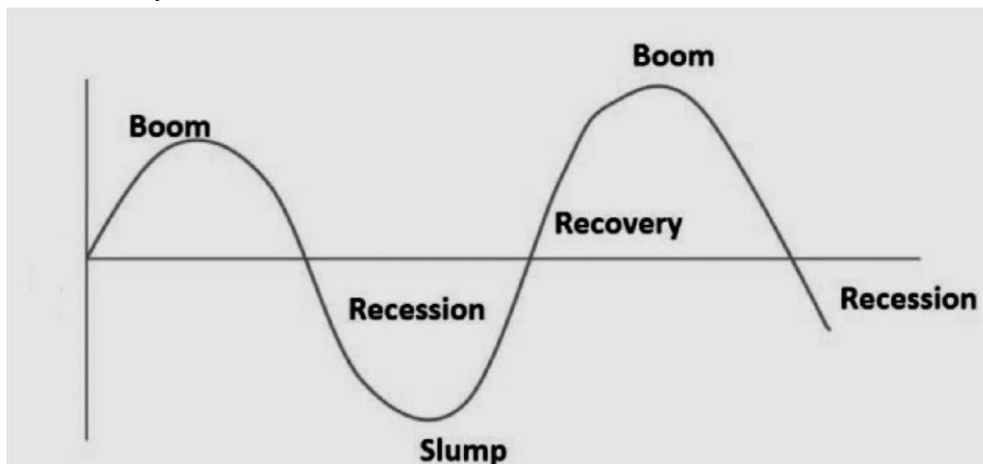


## 12.8.1 FEATURES OF CYCLICAL VARIATIONS

Following are features of cyclical variations:

1. Normally these occur over a long period that is more than 1 year.
2. There is no fixed duration of these variations, time one cycle is completed in 3 years but some other time it may take 7 years.

3. These variations are oscillating in pattern. 4. These are comparatively more difficult to measure.

## 12.8.2 USES OF CYCLICAL VARIATIONS

Following are uses of cyclical variations

1. Cyclical variations can help business in Planning its strategy. Business can plan strategy according to Boom or depression in the market.
2. Analysis of these variations can help business in predicting the turning points of cyclic variations.
3. Analysis of these variations can help business planning stabilization policies like diversification etc.
4. Analysis of these variations can help us in finding irregular variations.
5.

## 12.9 IRREGULAR VARIATIONS

From the name of these variations, it is clear that these variations do not have any definite pattern and are irregular in nature. These variations do not have any fixed time period and occur due to accidental or random factors like strike, floods, pandemic, war, earthquakes etc.

### 12.9.1 FEATURES OF IRREGULAR VARIATIONS

Following are features of irregular variations.

1. These variations do not have any fixed pattern.
2. Mostly these variations are short duration.
3. These variations are very difficult to predict. 4. These occur due to random or accidental such as floods quake war etc.

## 12.10 DE-COMPOSITION OF TREND

As we have discussed above that any time series data comprise of various components namely Secular trend, seasonal variations, cyclical variations or irregular variations. In the time series Analysis we try to identify various components of time series separately. This can be done by measuring the impact of one component while we keep other component constant. This process of finding each of the element of time series separately is known as De-composition of time series. There are many models which are normally used to analyze the time series. These are:

### 12.10.1 ADDITIVE MODEL:

This model of decomposition assumes that the four elements of time series are not dependent on each other and does not affect each other. Each trend operate independently. So if we have to measure overall trend of the time series, it is combination of all the four elements. By adding effect of all the elements we can get the overall time series trend. Mathematically we can say that

$$Y=T+S+C+I$$

**Shortterm fluctuations= Y − T= S+C+I**

**Cyclical and Irregular Fluctuation = Y − T − S = C+I**

**Irregular Fluctuation = Y − T − S− C = I**

where

Y = time series value,

T = Secular Trend Variations,

S = Seasonal Variations,

C = Cyclical Variations and

I = Irregular Variations.

Though in additive model we assume that all the elements operates independently, but in reality it is not true as all the elements have significant effect on each other and this is the major limitation of additive model.

## 12.10.2 MULTIPLICATIVE MODEL:

The Multiplicative model are based on the assumption that all the components of the time series are related to each other and have significant effect on each other. So, if we want to calculate overall trend, it cannot be calculated by simply adding the four components. Rather it is multiple                              effect of all the four elements. So according to this model overall trend is

$$Y=T \times S \times C \times I$$

**Short term fluctuations** $= \dfrac{Y}{T} = S \times C \times I$

**Cyclical and Irregular Fluctuation** $= \dfrac{Y}{T \times S} = C \times I$

**Irregular Fluctuation** $= = \dfrac{Y}{T \times S \times I} = I$

Here it is important to mention that the values of S, C and I are not absolute values rather these are relative variations and these are expressed in relative change or some indices.

## 12.10.3 DIFFERENCE BETWEEN ADDITIVE MODEL AND MULTIPLICATIVE MODEL

| Sr. No. | Additive Model | Multiplicative Model |
|---------|----------------|----------------------|

| 1 | It is based on the assumption that all elements of time series are independent of each other. | It is based on the assumption that all elements of time series are dependent o each other. |
|---|---|---|
| 2 | Under this model the overall trend can be found by adding the four elements. | Under this model the overall trend can be found by multiplying the four elements. |
| 3 | Under this model absolute values of the four elements are taken for calculating overall trend. | Under this model relative values of the four elements are taken for calculating overall trend. |

## 12.11 MEASUREMENT OF TREND

Trend means the direction or tendency of series of data over a long period of time. We want to know that whether the values are increasing over a period of time, decreasing over a period of time or these are stable over a period of time. This is known as Trend. We generally assume that the past behaviour of the data will continue in future as well, so finding the trend could help us in predicting the future. There are four methods of finding the trend which are as follows:

- Free hand graphic method
- Semi average method
- Moving average method
- Method of least square

## 12.12 FREE HAND GRAPHIC METHOD

This is the simplest method of finding the trend and is very flexible in nature. This method is also known as 'free hand curve fitting method'. Following are the steps of finding trend under this method:

1. In the graph paper line chart is to be drawn.
2. For this purpose time is taken on x-axis whereas values are taken on y axis.
3. Plot all the given values in the graph paper.
4. Then we join all the points in the graph paper to show the actual value.
5. After that smooth straight line is drawn which pass through middle of the actual values drawn. 6. This line is the trend line.

### 12.12.1 POINTS TO BE CONSIDERED IN DRAWING FREE HAND GRAPHIC METHOD

Following are precautions that be taken while drawing trend line

1. We must try to draw smooth line.

2. We must try that number of points above the line and the number of points below the line should be equal.
3. If there are cycles in the data, number of cycles above the line and number of cycles below the line should be equal.
4. We must try that trend line should pass through middle of the points.
5. We should try to keep sum of vertical distance between trend line and the points nearly zero, that means we must try to have minimum deviation.

## 12.12.2 MERITS OF FREE HAND GRAPHIC METHOD

Following are the benefits of graphic method
1. It is simple to draw
2. It does not need any calculations
3. This is very flexible method and is not affected by the fact that data is linear on or non linear. 4. An experienced statistician can use this tool very effectively.

## 12.12.3 LIMITATIONS OF FREE HAND GRAPHIC METHOD

1. This is very crude method.
2. This method is very subjective and there are chances of personal biasness.
3. It needs lot of experience to draw this chart.
4. With the change in scale of graph there is change in trend also.

**Example 1: Fit the straight line graphic curve from the following data:**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Sale | 70 | 95 | 106 | 82 | 92 | 110 | 130 | 144 | 100 | 112 | 156 |

**Solution:**



382
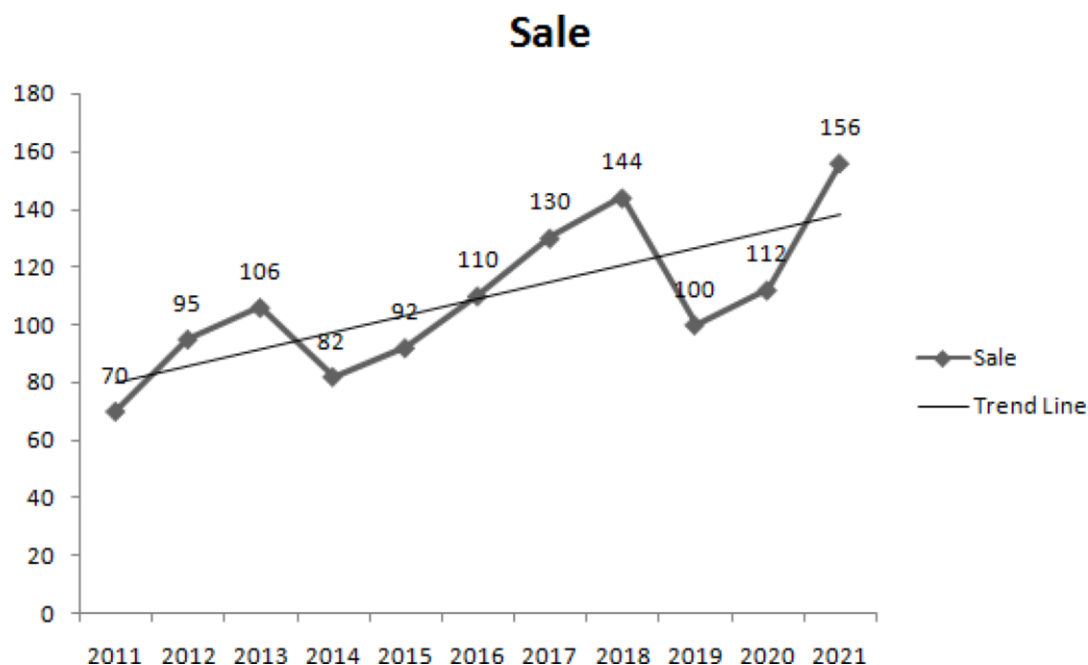
From the above graph we can predict any value with the help of trend line.

## 12.13 TEST YOUR UNDERSTANDING (A)

**1.** Following is the data of Harshit Ltd. draw a straight trend line using free hand graphic method.

| Year: | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|
| Sales (in '000 kg): | 20 | 22 | 24 | 21 | 23 | 25 | 23 | 26 | 24 |

**2.** On basis of following data fit straight trend line using free hand graphic method.

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Production | 64 | 82 | 97 | 71 | 78 | 112 | 115 | 131 | 88 | 100 | 146 |

## 12.14 SEMI AVERAGE METHOD

Semi average method is second method of finding the trend line. This is an objective method and is not merely based on guesswork. Under this method it is very easy to find trend line. Following are the steps of semi average method:

1. Divide the series in two equal parts, for example if there are 10 values take 5 values in each part.
2. In case of number of values are in odd number, middle value may be left and remaining values can be divided into two parts. For example if there are 11 values, 6th value may be left and will have two parts having five values each.
3. Find the Arithmetic mean of both the parts.
4. These arithmetic means are called semi averages.
5. Now these semi averages are plotted in the graph as points against middle of each time period for which these have been calculated.
6. Join the points to find out straight line Trend.

## 12.14.1 MERITS OF SEMI AVERAGE METHOD
1. This is simple and easy to draw.
2. This is objective method and does not suffer from limitation of biasness.
3. As the line drawn is extendable on both sides we can predict future values also.

## 12.14.2 LIMITATIONS OF SEMI AVERAGE METHOD
1. This method is useful only for Linear trends. 2. This method is based on Arithmetic mean which is not a perfect average.

**Even Number of Years**

**Example 3 : From the data given below find semi average trend line and also find out trend values.**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|------|
| Sale '000' | 80 | 61 | 76 | 73 | 62 | 50 | 45 | 65 | 55 | 35 |

**Solution**

As the number of years is even, we have got two blocks of five years each. Now we will find arithmetic mean of these two blocks and will write against middle of the block.

| 2017 | 45 | |
|------|----|----|
| 2018 | 65 | $= \frac{50+45+65+55+35}{5} = \frac{250}{5} = 50$ |
| 2019 | 55 | |
| 2020 | 35 | |

For finding the trend in the graph 70 is plotted against year 2013 and 50 is plotted against the year 2018.

| Year | Sale '000' | Semi Average |
|------|------------|--------------|
| 2011 | 80 | |
| 2012 | 61 | |
| 2013 | 76 | $= \frac{80+61+76+73+62}{5} = \frac{350}{5} = 70$ |
| 2014 | 73 | |
| 2015 | 62 | |
| 2016 | 50 | |
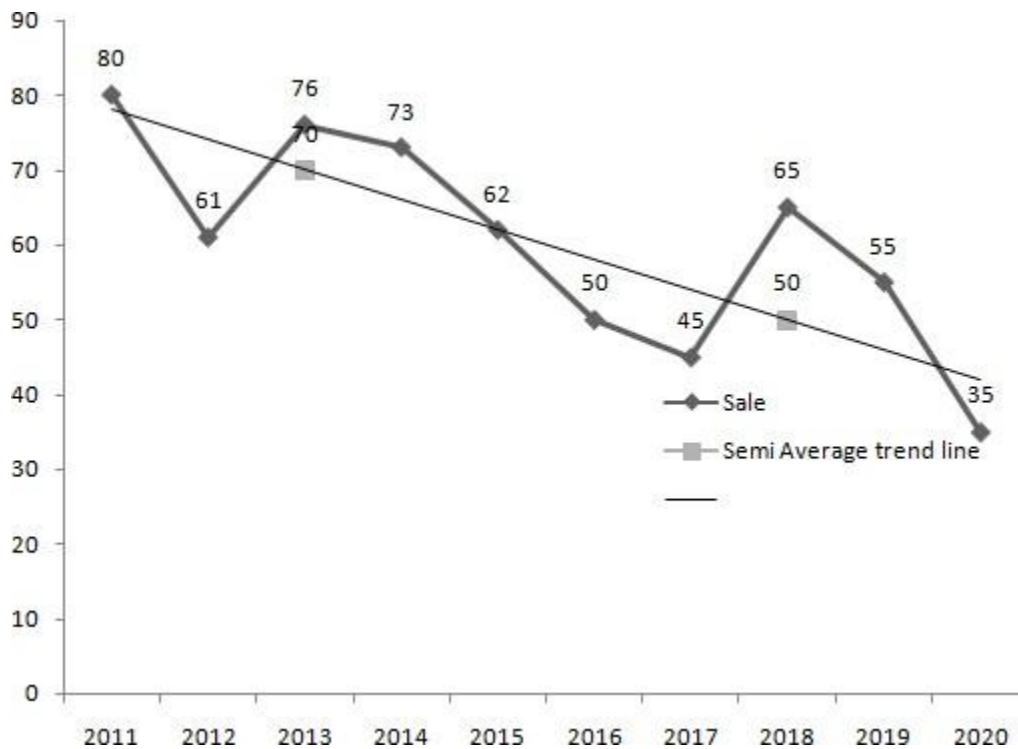
384

$$\text{Annual increment} = \frac{\textit{Difference in Semi Average values}}{\textit{Difference in two years to which Semi Average belongs}}$$

$$\text{Annual increment} = \frac{50-70}{2018-2013} = \frac{-20}{5} = -4$$

As we can see from the above data that semi average is showing downward trend so this annual increment will be deducted to semi average of 2013 onwards. For finding the values of the years before 2013 it will be added to the value every year. So trend values are:

| Year | Actual Sale '000' | Trend Sale '000' |
|---|---|---|
| 2011 | 80 | 78 (74+4) |
| 2012 | 61 | 74 (70+4) |
| 2013 | 76 | 70 |
| 2014 | 73 | 66 (70-4) |
| 2015 | 62 | 62 (66-4) |
| 2016 | 50 | 58 (62-4) |

| Year | | |
|------|------|------|
| 2017 | 45 | 54 (58-4) |
| 2018 | 65 | 50 (54-4) |
| 2019 | 55 | 46 (50-4) |
| 2020 | 35 | 42 (46-4) |

**Odd Number of Years**

**Example 4: From the data given below find semi average trend line and also find out trend values.**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|------|------|------|------|------|------|------|------|------|------|------|------|
| Sale '000' | 70 | 96 | 108 | 82 | 94 | 110 | 128 | 142 | 98 | 112 | 150 |

**Solution:**

As the number of years is odd, the middle year 2016 is left and we have got two blocks of five years each. Now we will find arithmetic mean of these two blocks and will write against middle of the block.

| Year | Sale '000' | Semi Average |
|------|------|------|
| 2011 | 70 | |
| 2012 | 96 | |
| 2013 | 108 | $= \frac{70+96+108+82+94}{5} = \frac{450}{5} = 90$ |

| | |
|---|---|
| 2014 | 82 |
| 2015 | 94 |
| 2016 | 110 |
| 2017 | 128 |
| 2018 | 142 |
| 2019 | 98 |
| 2020 | 112 |
| 2021 | 150 |

$$= \frac{128+142+98+112+150}{5} = \frac{630}{5} = 126$$

For finding the trend in the graph 90 is plotted against year 2013 and 126 is plotted against the year 2019.
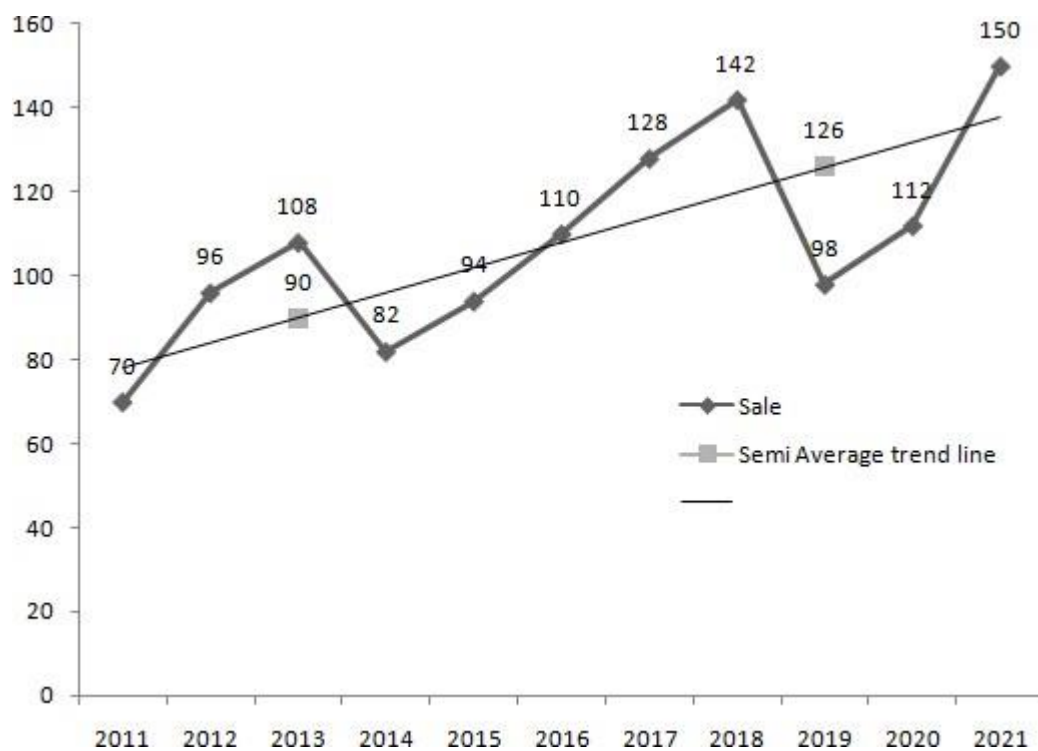


$$\text{Annual increment} = \frac{Difference\ in\ Semi\ Average\ values}{Difference\ in\ two\ years\ to\ which\ Semi\ Average\ belongs}$$

$$\text{Annual increment} = \frac{126 - 90}{2019 - 2013} = \frac{36}{6} = 6$$

As we can see from the above data that semi average is showing upward trend so this annual increment will be added to semi average of 2013 onwards. For finding the values of the years before 2013 it will be deducted from value every year. So trend values are:

| Year | Actual Sale '000' | Trend Sale '000' |
|------|------|------|
| 2011 | 70 | 78 (84-6) |
| 2012 | 96 | 84 (90-6) |
| 2013 | 108 | 90 |
| 2014 | 82 | 96 (90+6) |
| 2015 | 94 | 102 (96+6) |
| 2016 | 110 | 108 (102+6) |
| 2017 | 128 | 114 (108+6) |
| 2018 | 142 | 120 (114+6) |
| 2019 | 98 | 126 (120+6) |
| 2020 | 112 | 132 (126+6) |
| 2021 | 150 | 138 (132+6) |

## 12.15 TEST YOUR UNDERSTANDING (B)

### 1. FROM THE PRODUCTION OF MAHANTA LTD FIT A STRAIGHT LINE TREND USING SEMI AVERAGE METOD:

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|------|------|------|------|------|------|------|------|------|
| Prdocution ('000 Units) | 200 | 210 | 218 | 192 | 204 | 216 | 224 | 228 |

Also predict value of 2020.

### 2. FIT STRAIGHT LINE TREND USING SEMI AVERAGE METHOD

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|------|------|------|------|------|------|------|------|

| Sales (in thousand units) | 101 | 106 | 114 | 110 | 109 | 115 | 112 |
|---|---|---|---|---|---|---|---|

## 3. SALES OF ABHINAV ARE GIVEN, FIT A STRAIGHT LINE TREND USING SEMI AVERAGE METOD:

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|
| Sales ('000 Units) | 80 | 90 | 92 | 83 | 94 | 99 | 92 |

Also predict value of 2021.

**Answers**

**1. 230**

**3. 84**

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## 12.16 MOVING AVERAGE METHOD

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Under this method we try to find out trend line using the concept of moving average. For this, first of all we decide the period for which moving average is to be calculated, for example we can take 3 year moving average, 4 years moving average, 5 year moving average or so on.

Following are the steps in this method

1. First of all decide the length of period for which moving average will be taken.
2. Calculate the moving average of first group starting with first item.
3. After that find out moving average of second group leaving the first item.
4. Repeat this process until moving average is calculated for all the groups ending with last item.
5. Write the first moving average in front of the middle item of the group.
6. Repeat this process till all the moving averages are placed front of middle item of the group.
7. In case, even number of years are taken as period of moving average, the moving average is placed in middle of the period and then average of the adjacent averages are placed against mid item.

## 12.16.1 ADVANTAGES OF MOVING AVERAGE

1. This method is easy to adopt.
2. It is flexible method and any period can be taken as moving average upon the period of cyclical Trend.
3. This method is free from bias.
4. Moving average reduce the impact of cyclical variations.

5. This method is not only useful for measurement of trend but could also help in finding seasonal, cyclical and irregular variations.

## 12.16.2 LIMITATIONS OF MOVING AVERAGE METHOD

1. This method cannot be used for predicting the future values.
2. We cannot calculate trend for all the years as items beginning and some items at the end are lost.
3. It is very difficult to decide the period of moving average.
4. This Method is greatly affected by presence of extreme values.
5. This method is not useful we are estimating non linear Trend.

**Odd period Moving Average**

**Example 5: Calculate 3 yearly and 5 yearly moving averages for the following data:**

| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Sales | 52 | 49 | 55 | 49 | 52 | 57 | 54 | 58 | 59 | 60 | 52 | 48 |

**Solution:**

Following are the steps for 3 yearly moving average

1. Fist, compute the total of value of first three years ( 2009, 2010, 2011) and place the three year total against the middle year 2010.
2. Now, leaving the first year's value, add up the values of the next three years (2010, 2011, 2012) and place the three year total against the middle year 2011.
3. Repeat the process till last year's value i.e. 2020 is taken up.
4. Now divide the three year's total by 3 to get the average and place it in the next column. All these value represent the required trend values for the given year.
5. Same process can be repeated for 5 yearly moving average.

| Year | Sale | 3 Year Moving Total | 3 Year Moving Average | 5 Year Moving Total | 5 Year Moving Average |
|------|------|---------------------|-----------------------|---------------------|-----------------------|
| 2009 | 52 | | | | |
| 2010 | 49 | 156 | 52 | | |
| 2011 | 55 | 153 | 51 | 257 | 51.4 |
| 2012 | 49 | 156 | 52 | 262 | 52.4 |
| 2013 | 52 | 158 | 52.7 | 267 | 53.4 |
| 2014 | 57 | 163 | 54.1 | 270 | 54 |
| 2015 | 54 | 169 | 56.3 | 280 | 56 |
| 2016 | 58 | 171 | 57 | 288 | 57.6 |
| 2017 | 59 | 177 | 59 | 283 | 56.6 |
| 2018 | 60 | 171 | 57 | 277 | 55.4 |

| 2019 | 52 | 160 | 53.3 | | |
|------|----|----|------|--|--|
| 2020 | 48 | | | | |

**Even period Moving Average:**

**Example 6 : Calculate 3 yearly and 5 yearly moving averages for the following data:**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------|------|------|------|------|------|------|------|------|------|------|
| Sales | 250 | 260 | 275 | 300 | 290 | 310 | 318 | 325 | 350 | 340 |

**Solution:**

Following are the steps for 4 yearly moving average

1. Fist, compute the total of value of first four years ( 2011, 2012, 2013, 2014) and place the fouryear total in between $2^{nd}$ and $3^{rd}$ year i.e. between 2012 and 2013..
2. Now, leaving the first year's value, add up the values of the next four years (2012, 2013, 2014, 2015) and place the total b 2011 between 2013 and 2014.
3. Repeat the process till last year's value i.e. 2020 is taken up.
4. Now divide the four year's total by 4 to get the average and place it in the next column. All these value represent the required trend values for the given year.
5. Divide the first two four yearly average by 2 to get the required trend values corresponding to the given years as shown in the table:

| Year | Value | 4 ly Total | Year 4 Yearly Average | Trend Value |
|------|-------|-----------|------------------------|-------------|
| 2011 | 250 | | | |
| 2012 | 260 | 1085 | | |
| 2013 | 275 | | 271.25 | 276.25 |
| | | 1125 | 281.25 | |
| 2014 | 300 | | | 287.5 |
| | | 1175 | 293.75 | |
| 2015 | 290 | | | 299.12 |
| | | 1218 | 304.5 | |
| 2016 | 310 | | | 307.63 |
| | | 1243 | 310.75 | |
| 2017 | 318 | | | 318.25 |
| | | 1303 | 325.75 | |
| 2018 | 325 | | | 329.5 |
| | | 1333 | 333.25 | |
| 2019 | 350 | | | |

| 2020 | 340 |
|------|-----|

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## 12.17 TEST YOUR UNDERSTANDING (C)

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**1. Calculate 3 yearly moving averages for the following data:**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|------|
| Sales | 11200 | 12300 | 10600 | 13400 | 13800 | 14500 | 11600 | 14300 | 13600 | 15400 |

**2 Calculate 5 yearly moving averages for the following data:**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|------|
| No. of Employees | 332 | 317 | 357 | 392 | 402 | 405 | 410 | 427 | 405 | 438 |

**3 Calculate 4 yearly moving averages for the following data:**

| Year | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Value | 100 | 105 | 115 | 90 | 95 | 85 | 80 | 65 | 75 | 70 | 75 | 80 |

**Answers**

1.  11366.7, 12100, 12600, 13900, 13300, 13466.7, 13166.7, 14433.3

2.  360, 374.6, 393.2, 407.2, 409.8, 417

3.  101.875, 88.75, 91.875, 84.375, 78.75, 74.375, 71.875, 73.125

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## 12.18 LEAST SQUARE METHOD

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This is most scientific and popular method of finding the trend line. Under this method the lines of best fit is drawn as the lines trend.. These lines is known as the lines of the best fit because, with help of these lines we can make the estimate of the values of variable according to the different time period. According to the Least Square method, trend line should be plotted in such a way that sum of square of the difference between actual value and estimated value of the dependent variable should be least or minimum possible. Mathematically this line is represented by

$$Yc = a + bX$$

Where Yc – Computed Trend Value

<center>X – Independent Variable represented by time a</center>
<center>& b – Constants</center>

## 12.18.1 DIRECT METHODS TO ESTIMATE TREND LINE

Following are steps for finding trend line with help of Direct Method:

3. Take the problem with two variable with X variable as time and other variable for which trend is to be computed like sales, population etc represented by Y.
4. Assume first year as base year and put the value '0' against it.
5. Now put value 1 against second year, 2 against third year and so on till all the years are covered.
6. Now find the values of $\sum X$, $\sum X^2$, $\sum XY$ from the given values.
7. Put these values in following equation: $\sum Y = na + b\sum X$

$$\sum XY = a\sum X + b\sum X^2$$

8. Solve these equations simultaneously and find the values of 'a' and 'b'.
9. Put value of 'a' and 'b' in trend equation $Yc = a + bX$. 10. Now this trend equation can be used for finding the trend values.

**Example 7. The data of sales of Alpha Ltd is given for last 9 years. On the basis of the data find trend value of the year 2021 using the method of least square.**

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|------|------|
| Sales '000' | 10 | 12 | 15 | 20 | 30 | 40 | 50 | 60 | 70 |

**Solution:**

| Year | X | Sales (Y) | X² | XY |
|------|---|-----------|-----|-----|
| 2012 | 0 | 10 | 0 | 0 |
| 2013 | 1 | 12 | 1 | 12 |
| 2014 | 2 | 15 | 4 | 30 |
| 2015 | 3 | 20 | 9 | 60 |
| 2016 | 4 | 30 | 16 | 120 |
| 2017 | 5 | 40 | 25 | 200 |
| 2018 | 6 | 50 | 36 | 300 |
| 2019 | 7 | 60 | 47 | 420 |
| 2020 | 8 | 70 | 64 | 560 |
| | $\sum X = 36$ | $\sum Y = 307$ | $\sum X^2 = 204$ | $\sum X Y = 1702$ |

This is given by $Y = a + bX$ where $a$ and $b$ are the two constants which are found by solving simultaneously the two normal equations as follows :

$\sum Y = na + b\sum X$

$\sum XY = a\sum X + b\sum X^2$

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Substituting the given values in the above equations we get,

307 = 9a + 36b ................................................................ (i)

1702 = 36a + 204b .......................................................... (ii)

Multiplying the eqn. (i) by 4 we get

1228 = 36a + 144b .......................................................... (iii)

Subtracting the equation (iii) from equation (ii) we get,

1702 = 36a + 204b

-1228 = -36a - 144b

474 = 60b

or b = 7.9

Putting the above value of b in the eqn. (i) we get,

307 = 9a+ 36(7.9) or 9a

=307- 284.4 or

a = 2.51

Thus, a = 16, and b = 1.6

Putting these values in the equation $Y = a + bX$ we get

**Y = 2.51+ 7.9X**

So if we want to calculate the trend value of the year 2021 the value of X will be 9 (as 2012 is our base year and its value is 0), the value of Y will be

**Y = 2.51+ 7.9 (9) = 73.61**

### 12.18.2 SHORT CUT METHOD

In the direct method we take starting year as the base year. But in case we take the middle period as base yare we can save lot of time and calculation because when middle period is take as the base period the value of $\sum X$ will be 0, hence the two simultaneous equations will become very easy in that case.

Equation (i)        $\sum Y = na + b\sum X$

If $\sum X = 0$ than $\sum Y = na$

$a = \dfrac{ZY}{n}$

Equation (ii)        $\sum XY = a \sum X + b\sum X^2$

If $\sum X = 0$ than $\sum XY = b\sum X^2$

$b = \dfrac{ZXY}{\sum K^2}$

**Odd number of Years**

**Example 8. The data of sales of Mahesh and Co is given for last 7 years. On the basis of the data find trend line using the method of least square and find trend value of 2021.**

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|------|------|------|------|------|------|------|------|

| Sales '000' | 672 | 824 | 967 | 1204 | 1464 | 1758 | 2057 |
|---|---|---|---|---|---|---|---|

**Solution:**

Since the number of years is odd, 2017 is taken as base year with value 0 and one year is taken as one unit.

| Year | X | Sales (Y) | X$^2$ | XY |
|---|---|---|---|---|
| 2014 | -3 | 672 | 9 | -2016 |
| 2015 | -2 | 824 | 4 | -1648 |
| 2016 | -1 | 967 | 1 | -967 |
| 2017 | 0 | 1204 | 0 | 0 |
| 2018 | 1 | 1464 | 1 | 1464 |
| 2019 | 2 | 1758 | 4 | 3516 |
| 2020 | 3 | 2057 | 9 | 6171 |
| | $\sum X = 0$ | $\sum Y = 8946$ | $\sum X^2 = 28$ | $\sum XY = 6520$ |

**As $\sum X$ is 0, we can apply short cut method** a

$$= \frac{\sum Y}{n} = \frac{8946}{7} = 1278$$

$$\frac{\sum XY}{\sum K^2} = \frac{6520}{28} = 232.9$$

b=

Putting these values in the equation $Y = a + bX$ we get

**Y = 1278+ 232.9 X**

So if we want to calculate the trend value of the year 2021 the value of X will be 4 (as 2017 is our base year and its value is 0), the value of Y will be **Y = 1278+ 232.9 (4) = 2209.6**

**Odd number of Years**

**Example 9. The data of sales of Abhilasha Ltd is given for last 8 years. On the basis of the data find trend line using the method of least square and find trend value of 2021.**

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Sales '000' | 80 | 90 | 92 | 83 | 94 | 99 | 92 | 104 |

**Solution:**

Since the number of years is even, so will take the origin as mid point of 2016 and 2017 and further for sake of simplicity we one year is taken as two units (6 Month as 1 unit).

| Year | X | Sales (Y) | X$^2$ | XY |
|---|---|---|---|---|
| 2013 | -7 | 80 | 49 | -560 |
| 2014 | -5 | 90 | 25 | -450 |
| 2015 | -3 | 92 | 9 | -276 |
| 2016 | -1 | 83 | 1 | -83 |

| 2017 | 1 | 94 | 1 | 94 |
|---|---|---|---|---|
| 2018 | 3 | 99 | 9 | 297 |
| 2019 | 5 | 92 | 25 | 460 |
| 2020 | 7 | 104 | 49 | 728 |
| | $\sum X = 0$ | $\sum Y = 734$ | $\sum X^2 = 168$ | $\sum XY = 210$ |

**As $\sum X$ is 0, we can apply short cut method**

$$a = \frac{ZY}{n} = \frac{7346}{8} = 91.75$$

$$\frac{ZXY}{\sum K^2} = \frac{210}{168} = 1.25$$

$$b=$$

Putting these values in the equation $Y = a + bX$ we get
**Y = 91.75+ 1.25 X**

So if we want to calculate the trend value of the year 2021 the value of X will be 9 (as mid of 2016 and 2017 is our base year and 1 year is taken as 2 units), the value of Y will be **Y = 91.75+ 1.25 (9) = 103**

### 12.18.3 MERITS OF LEAST SQUARE METHOD
1. There is no subjectiveness in this method as it is based on mathematical calculations.
2. This method is known as method of best fit, reason being the sum of deviations between trend and actual values is zero and sum of square of deviations is least.
3. This method can predict future values, that thing is not possible in moving averate.
4. This method gives us annual growth or decline rate also. The value of 'b' in the equation is growth of decline rate. If 'b' is positive than it is growth and if it is negative than it is decline. 5. It is based on all the values of the data.

### 12.18.4 LIMITATIONS OF LEAST SQUARE METHOD:
1. This method involves lot of mathematical calculation, so is difficult for a layman.
2. This method finds trend value only and seasonal, cyclical and irregular variations are completely ignored.
3. If a new value is added to the data, we have to make the complete calculations once again.

**12.19 TEST YOUR UNDERSTANDING (D)**

**1. These are the number of salesmen working in Alpha Ltd:**

| Year | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| Salesmen | 28 | 38 | 46 | 40 | 56 | 60 |

Fit straight line trend using method of least squares.

**2 Fit a straight line trend by Method of least square and estimate the exports of 2021 using the short cut method :**

| Year | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| Exports | 15 | 20 | 24 | 29 | 35 | 45 | 60 | 85 |

**3 Determine the equation of straight line which best fits the following data**

| Year | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|
| Value | 620 | 713 | 833 | 835 | 810 | 745 | 726 | 806 | 861 |

**4 Determine the equation of straight line which best fits the following data**

| Year | 2001 | 2002 | 2004 | 2006 | 2007 |
|---|---|---|---|---|---|
| Sales 'Lacs' | 5 | 8 | 12 | 20 | 25 |

**5 Determine the equation using method of least square from number of accidents from the following data and find trend values also.**

| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|
| Accidents | 38 | 40 | 65 | 72 | 69 | 60 | 87 | 95 |

**Answers**

1. **Y = 44.67 + 2.97 X**

2. **Y = 39.125 + 4.517 X; value of 2021 – 79.778**

3. **Y = 709.51 + 15.65 X**

4. **Y = 14 + 3.23 X (taking 2004 as year of origin.**

5. **Y = 65.75 + 3.667 X (taking 2004.5 as year of origin).**

**Trend Values 40.081, 47.415, 54.749, 62.083, 69.417, 76.751, 84.085, 91.419**

## 12.20 LET US SUM UP

- **Time series analysis is a situation where there are two variables in the problem and out of that one variable is necessarily the time factor.**
- **This analysis is very useful tool for forecasting.**
- **With passage of time there are fluctuations in the items.**
- **These fluctuations are mainly due to four factors called components of time series.**
- **These components are Secular trend, seasonal variations, cyclical variations and irregular variations.**
- **There are two models of time series, these are additive models and multiplicative models.**
- **For finding secular trend we can apply four methods that are Free hand graphic method, Semi Average Method, Moving Average Method and Method of Least Square.**

## 12.21 KEY TERMS

- **TIME SERIES:** In time series we collect the data related to statistical observations and place such data in chronological order, that means in the order of occurrence of these observations. On the basis of these observations we can try to predict the future values of the observation.
- **SECULAR TREND:** Secular Trends are long-term Trends which normally occurs over it period of 15 to 20 years. Sometime, these trends may show upward results and other time it may show downward results.
- **SEASONAL VARIATIONS:** Seasonal variations are short term variations. These variations occur regularly and their trend is repetitive. These variations may occur on yearly basis, half yearly basis, monthly basis, weekly basis or any other time period basis. These may occur due to climatic condition or due to customs and traditions.
- **CYCLICAL VARIATIONS** . These variations are long Run variations and shows the recurring pattern of rise and decline. These variations are also known as oscillating movements. These variations do not have any fix duration. Sometime one cycle may be complete in 2-3 years, but some other time it may takes 7-8 years to complete for example Trade cycles.
- **IRREGULAR VARIATIONS:** From the name of these variations, it is clear that these variations do not have any definite pattern and are irregular in nature. These variations do

not have any fixed time period and occur due to accidental or random factors like strike, floods, pandemic, war, earthquakes etc.

- **ADDITIVE MODEL OF TIME SERIES:** This model of decomposition assumes that the four elements of time series are not dependent on each other and does not affect each other. Each trend operate independently. So if we have to measure overall trend of the time series, it is combination of all the four elements.
- **MULTIPLICATIVE MODEL:** The Multiplicative model are based on the assumption that all the components of the time series are related to each other and have significant effect on each other. So, if we want to calculate overall trend, it is multiple effect of all the four elements.

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## 12.22 REVIEW QUESTIONS

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1. What is time series? Give its significance and limitations.
2. What are components of time series?
3. Give different types of trends in time series.
4. Give multiplicative and additive models of time series.
5. What is free hand curve method?
6. What is semi average method of time series?
7. How predictions are made using method of least square.
8. What is moving average trend. How it is determined.
9. Give various methods of estimating trend along with their respective merits and limitations.

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## 12.22 FURTHER READINGS

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1. J. K. Sharma, *Business Statistics,* Pearson Education.
2. S.C. Gupta, *Fundamentals of Statistics,* Himalaya Publishing House.
3. S.P. Gupta and Archana Gupta, *Elementary Statistics,* Sultan Chand and Sons, New Delhi.
4. Richard Levin and David S. Rubin, *Statistics for Management,* Prentice Hall of India, New Delhi.
5. M.R. Spiegel, *Theory and Problems of Statistics,* Schaum's Outlines Series, McGraw HillPublishing Co.

# JAGAT GURU NANAK DEV
# PUNJAB STATE OPEN UNIVERSITY, PATIALA

**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

**The Motto of the University**

## (SEWA)

**SKILL ENHANCEMENT**     **EMPLOYABILITY**     **WISDOM**     **ACCESSIBILITY**

**B.Com. (Hons.)**
**Accounting and Taxation**
**Semester - II**

## Course Name: ENGLISH COMPULSORY
## Course Code: EC1B31204T

**ADDRESS: C/28, THE LOWER MALL, PATIALA-147001**
**WEBSITE: www.psou.ac.in**

**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY PATIALA**

**(Established by Act No.19 of 2019 of Legislature of the State of Punjab)**

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**JAGAT GURU NANAK DEV**

**PUNJAB STATE OPEN UNIVERSITY PATIALA**

**(Established by Act No.19 of 2019 of Legislature of the State of Punjab)**

# PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open University of the State, entrusted with the responsibility of making higher education accessible to all especially to those sections of society who do not have the means, time or opportunity to pursue regular education.

In keeping with the nature of an Open University, this University provides a flexible education system to suit every need. The time given to complete a programme is double the duration of a regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skillbased and employability-enhancing education. The study material provided in this booklet is self instructional, with self-assessment exercises, and recommendations for further readings. The syllabus has been divided in sections, and provided as units for simplification.

The Learner Support Centres/Study Centres are located in the Government and Government aided colleges of Punjab, to enable students to make use of reading facilities, and for curriculum-based counselling and practicals. We, at the University, welcome you to be a part of this institution of knowledge.

Prof. G. S. Batra,

Dean Academic Affairs

# B.COM (HONS.)
## (Accounting and Taxation)
### MULTIDISCIPLINARY COURSE (MDC-2): ENGLISH COMPULSORY

### Semester-II
### EC1B31204T: ENGLISH COMPULSORY-1

MAX.MARKS: 100
EXTERNAL: 70
INTERNAL: 30
PASS: 35%

**Objective:  Total Credits: 4**

The course, giving glimpses from diverse literary forms such as poetry, fictional and nonfictional prose, is designed to equip the learners with critical thinking, to help impart the contextualised acquisition of new vocabulary and to promote creative writing. The grammatical concepts are also introduced to facilitate learners' understanding of the functional value of grammar in real-life communicative situations.

**Course Outcomes:**

| | |
|---|---|
| CO 1: | To introduce learners to diverse literary forms, including poetry, fiction, and non-fiction prose, to foster critical thinking skills |
| CO 2: | To facilitate contextualized acquisition of new vocabulary through exposure to various literary genres |
| CO 3: | To encourage creative writing by providing opportunities for expression within the framework of different literary forms |
| CO 4: | To integrate grammatical concepts to enhance learners' understanding of the practical applications of grammar in everyday communication |

### Section A

**Block I: Poetry:** All the World's a Stage by William Shakespeare
Ring Out Wild Bells by Alfred Lord Tennyson
The Soul's Prayer by Sarojini Naidu
The Road Not Taken by Robert Frost

**Block II: Prose**: The Last Leaf by O. Henry The
Doctor's Word by R.K. Narayan
Why I want a Wife by Judy Brady
My Financial Career by Stephen Leacock

## Section B

**Grammar and Composition**

**Block III:** Sentence structures, Word Classes: Nouns, Pronouns, Adjectives, Verbs, Adverbs, Prepositions and Linking Words, Functional English: Thanking Someone and Responding to Thanks, Apologizing and Responding to Apology, Making Requests and Responding to Requests.

**Block IV:** Development of Story: This is a piece of guided composition. Candidates shall develop a story from a given outline of 3-4 lines. The outline shall consist of brief hints regarding the beginning, middle and end of the story. The length of the story shall be of 150- 200 words. The following may be regarded as a sample outline:

Son falls into bad company…………. disobeys his parents ................. loses interest in studies ………… father decides to bring the son back to the right path ................. gives him a few apples ………… places a rotten apple among the good ones .................. after a few days the good apples also become rotten ................. son understands that one rotten apple spoils all the apples ………… tries to mend his ways ………… gets transformed… ............ moral.

**Suggested Readings:**
- Best, Wilfred D. The Students' Companion. Harper Collins Publishers, 2020.
- Eastwood, John. Oxford Practice Grammar. OUP, 2000.
- Murphy, Raymond. Intermediate English Grammar. 2nd Edition. Cambridge University Press.
- Rani, D Sudha, TVS Reddy, D Ravi, and AS Jyotsna. A Workbook on English Grammar and Composition. Delhi: McGraw, 2016.

## INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER:
- The syllabus prescribed should be strictly adhered to.
- The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
- Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
- The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
- The duration of each paper will be three hours.

## INSTRUCTIONS FOR THE CANDIDATES:
Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C.  They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA**
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# B.COM (HONS.)
## (Accounting and Taxation)
## Semester-II

### EC1B31204T: ENGLISH COMPULSORY-I
### COURSE COORDINATOR AND EDITOR: MR. GURSANDESH SINGH

### SECTION A

| UNIT NO: | UNIT NAME |
|---|---|
| UNIT 1 | **POETRY**: ALL THE WORLD'S A STAGE BY WILLIAM SHAKESPEARE; RING OUT WILD BELLS BY ALFRED LORD TENNYSON |
| UNIT 2 | **POETRY:** THE SOUL'S PRAYER BY SAROJINI NAIDU; THE ROAD NOT TAKEN BY ROBERT FROST |
| UNIT 3 | **PROSE:** THE LAST LEAF BY O. HENRY; THE DOCTOR'S WORD BY R.K. NARAYAN |
| UNIT 4 | **PROSE:** WHY I WANT A WIFE BY JUDY BRADY ; MY FINANCIAL CAREER BY STEPHEN LEACOCK |

### SECTION B

| UNIT NO: | UNIT NAME |
|---|---|
| UNIT 5 | **GRAMMAR:** SENTENCE STRUCTURES |
| UNIT 6 | **WORD CLASSES-I:** NOUNS, PRONOUNS AND ADJECTIVES |
| UNIT 7 | **WORD CLASSES-II:** VERBS AND ADVERBS |
| UNIT 8 | **WORD CLASSES-III:** LINKING WORDS AND PREPOSITIONS |
| UNIT 9 | **FUNCTIONAL ENGLISH:** THANKING, APOLOGISING AND REQUESTING |
| UNIT 10 | **WRITING SKILLS:** DEVELOPMENT OF STORY |

# B.COM (HONS.)
## (Accounting and Taxation)

**SEMESTER-II**
**COURSE: ENGLISH COMPULSORY-1**

**UNIT-1: ALL THE WORLD"S A STAGE**
**RING OUT WILD BELLS**

## STRUCTURE

## 1.1 OBJECTIVES

**After reading this lesson you will be able to**

- Differentiate between both the literary ages of the poets

- Review the biography of the poets
- Appraise both the poems
- Revise the prescribed poetry
- Choose the right answers from the text
- Develop your own understanding in terms of reading poetry
- Plan your intertextual or mix-media readings

## 1.2 INTRODUCTION

Dear Learners, this lesson will introduce you to the two masterpieces in poetry written by William Shakespeare and Alfred Lord Tennyson respectively. With the study of ‗All‗s the World a Stage‗ from As You Like It and, ‗Ring Out, Wild Bells‗ from In Memoriam, we bridge the two different eras in the History of English Literature, one that marks the beginning of the exuberant era of Renaissance and the other 19th century that brings in the Victorian poise and morality.

## 1.3 MEET WILLIAM SHAKESPEARE

Nearly four centuries after his death, the works of William Shakespeare continue to delight readers and audiences around the world. In fact, Shakespeare‗s writings are more widely read and more often quoted than any other work ever written, aside from the Bible. Yet, while Shakespeare‗s literature endures, we know very little about the man himself—the most celebrated and talented English poet and dramatist of all time. The little information we do have about Shakespeare‗s life has been pieced together from anecdotes, gossip, clues found in his poems and plays, legal documents, entries in the public record, and the memorials and reminiscences of his fellow writers. Unfortunately, there are no biographical portraits of Shakespeare from his own era.

### 1.3.1 Shakespeare‟s Early Life

So, what do we know of Shakespeare, the man? He was born on April 23, 1564, in the small town of Stratford-upon-Avon, which is about one hundred miles from London. His father, John Shakespeare, was a prosperous glovemaker, butcher, and tradesman who also filled several local government positions, including high bailiff (the equivalent of mayor). His mother, Mary Arden, was the daughter of a wealthy landowner. William was the third of at least eight children born to this prosperous couple. He was their first boy and the first child to survive past childhood. He likely attended the local grammar school, studying Latin and classical literature. When Shakespeare was about thirteen, however, his father started to lose his social standing and to have serious financial problems. Shakespeare had to leave school, perhaps to help support the family. The different types of work he did remain unknown, but according to the accounts of John Aubrey, at some point Shakespeare worked as a butcher and, ―when he killed a calf, he would do it in high style and make a speech.‖ At the age of eighteen, Shakespeare married a twenty-six-year-old local woman named Anne Hathaway and began a family of his own. The couple had a daughter, Susanna, and twins, Hamnet and Judith. Sadly, Hamnet died at the age of eleven.

1

### 1.3.2 Shakespeare Seeks His Fortune

Sometime between the birth of his twins in 1585 and his first notably successful play in 1592, Shakespeare moved to London to pursue a career in the theatre. He did not move his family with him, however. According to poet William Davenant, Shakespeare arrived without friends or money. What's more, his first ―theatre job‖ actually consisted of simply holding the horses of theatre-goers—which would be like parking cars at a theatre today. Nevertheless, his competence at this job, and at making clever conversation with the people coming and going, attracted the attention of the theatre's actors. Thinking him witty enough to improve a few of their plays (revising plays to add scenes or bring them up to date was a common practice at the time), the actors recommended him for the job. If Davenant's tale is true, this is how Shakespeare got his chance to write for the stage—and to act small parts as well.

### 1.3.3 Success in the Theatre

The production of Henry VI in 1592 appears to have been Shakespeare's first theatrical success. After this, he wrote and published two long narrative poems, which became immediate favourites: Venus and Adonis and The Rape of Lucrece. These works he dedicated to a newfound patron and friend, the young Earl of Southampton. When, in 1594, this young earl reached the age of maturity—and thus gained access to his fortune—he expressed his thanks for these dedications and his devotion to Shakespeare by giving the author the gift of a large sum of money. This money enabled Shakespeare to become a partial owner of a theatre company, the Lord Chamberlain's Men. As part-owner, Shakespeare became the main playwright for the troupe. By 1598 the group had performed twelve of Shakespeare's plays, earning him enough of a profit to enable him to purchase several theatre buildings and a large estate for his family in Stratford—although he continued to live primarily in London.

By 1599 the thirty-five-year-old playwright was producing two plays a year—and drawing tremendous audiences as well as critical acclaim. A literary handbook of the time calls Shakespeare ―most excellent‖ in both comedy and tragedy and ―the most passionate among us to bewail and bemoan the perplexities of love.‖ Shakespeare's greatest creative period had just begun at this point. Between 1601 and 1607, he wrote the tragic masterpieces Hamlet, Othello, Macbeth, and King Lear. He also wrote comedies that were darker and more complex than his previous works. Yet even Shakespeare's finest plays, though much admired by his contemporaries, had less literary status than his narrative and lyrical poems. During

Shakespeare's lifetime, his reputation as a great writer was based mainly on his nondramatic poems and on his sonnets. Shakespeare published his sonnets in 1609—although he had written and circulated the bulk of them in handwritten form in the 1590s (probably at about the same time he wrote his two long poems). Then, in 1610, Shakespeare moved back to Stratford, where he lived comfortably as a semi-retired gentleman, writing fewer plays than before. Among these was a supreme romance, The Tempest, in which the main character's farewell speech is generally looked upon as also being Shakespeare's good-bye to writing and perhaps even to life. He died on his fifty-second birthday in 1616.

### 1.4 READING FOCUS

What do you already know about Shakespeare's songs and sonnets?

*Record the information* in your notebook as to what have you read on Shakespeare from the lesson and other books, write any lines you remember, themes covered, or facts you recall about the sonnet form.

*Setting a Purpose:* Read on to discover more about Shakespeare's song and his philosophy of theatre and life.

### 1.5 BUILDING BACKGROUND

#### 1.5.1 Sonnet Subjects

Shakespeare popularized the English sonnet (a poem of 14 lines) which made significant changes to Petrarch's model of writing sonnet **poetry**. In 1609 his collection of 154 sonnets was published. The sonnet was introduced into English by Italian sonneteers Thomas Wyatt and

Surrey in the early 16th century. Shakespeare's poems explored more than the typical theme of a young man pining for love. For example, Sonnet 116 describes true love as a permanent feeling that does not lessen when the physical beauty of one's beloved begins to fade. Shakespeare's sonnets fall into three groups. Sonnets 1-126 concern a handsome young man whom the speaker urges to marry and have children. Sonnets 127-152 concern a —dark lady,‖ a woman who attracted both the poet and the young man. The final two sonnets are English versions of Greek poems and have no real connection to the rest of the sequence. No one knows for certain who the handsome youth and dark lady were, but it is believed that the man was W.H. Shakespeare's patron. In reality, the characters might simply have been figments of Shakespeare's fertile imagination.

#### 1.5.2 Shakespeare's Songs

Shakespeare's plays contain some of the finest songs ever written. Music was important to Elizabethan audiences, so Shakespeare used songs to help heighten the mood in his plays. —Fear No More the Heat o' the Sun‖ is a song from the play Cymbeline (act 4, scene 2). Two princes recite the dirge over the body of their sister Imogen, whom they believe to be dead. —Blow,

Blow, Thou Winter Wind‖ is from the comedy As You Like It (act 2, scene 7). It is sung by Amiens, an exiled courtier. As You Like It contains more songs than any of Shakespeare's other plays. The most famous one _All the World's a Stage' is prescribed in our syllabus.

### 1.6 PRESCRIBED TEXT „ALL THE WORLD"S A STAGE"

Speech: All the World's a Stage

(from As You Like It, spoken by melancholic Jaques in act 2, scene 7 (_Seven Ages of Man' speech) to Duke Senior and his companions in the Forest of Arden)

All the world's a stage,

And all the men and women merely players;

They have their exits and their entrances;

And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms;
And then the whining school-boy, with his satchel
And shining morning face, creeping like snail
Unwillingly to school. And then the lover, Sighing
like furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths, and bearded like the pard,
Jealous in honour, sudden and quick in quarrel, Seeking
the bubble reputation
Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lin'd,
With eyes severe and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and slipper'd pantaloon,
With spectacles on nose and pouch on side;
His youthful hose, well sav'd, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion; Sans
teeth, sans eyes, sans taste, sans everything.

### 1.7 **BRIEF ABOUT THE POEM**
This poem is an excerpt from his play As You Like It. The poem compares the world to a stage and life to a play, and catalogues seven stages in a man's life: infant, schoolboy, lover, soldier, justice, aging man, and finally facing imminent death. The poem suggests that each stage in a man's life calls upon him to play another role. The opening line, __All the world's a stage'' was said to adorn the Globe Theatre.

### 1.8 **GLOSSARY**
- merely = just, only
- time = here, a life or lifetime
- part = here, a character in a play or drama
- ages = here, periods of time
- infant = a young child

- mewling = a small weak noise that a cat makes (in modern English, ‚to mew') □ puking = being sick, vomiting
- satchel = a shoulder bag that children sometimes use to carry books to school
- sighing = here, sighing with sexual pleasure
- furnace = an object which contains a fire, used for heating
- woeful = unhappy (old-fashioned English)
- ballad = a slow love song
- mistress = means female lover but it can also mean a woman in charge
- eyebrow = the row of small hairs above someone's eye
- oaths = promises
- pard = a large cat, such as a leopard (old-fashioned English)
- jealous in honour = here, jealous means that someone takes care of something very carefully- so the young man takes great care of his honour, his reputation as a good man
- sudden and quick in quarrel = ‚quarrel' is a slightly old-fashioned word for an argument; ‚sudden' here means unpredictable - so in an argument this young man might suddenly and become violent
- Seeking the bubble reputation = a bubble is empty, so by ‚seeking the bubble reputation,' Shakespeare means that the man does things that make him look good even if they are pointless
- Even in the cannon's mouth = a ‚cannon' was a large gun, and it's ‚mouth' was at the front -so the man seeks his reputation even if it means standing in front of guns, i.e. going to war or getting in fights
- justice = here, a judge or magistrate - so someone very respected
- round belly = belly means ‚stomach' - so a ‚round belly' is a large or fat man's stomach!
- good capon lin'd = ‚to line' means to fill something at the edges (e.g. ‚line a tin for baking a cake') and ‚capon' was chicken to eat - so the man was fat from eating good chicken
- wise saws = wise sayings or phrases (old-fashioned English)
- instances = examples (as in ‚for instance')
- lean and slipper'd pantaloon = ‚lean' meant ‚thin;' a slipper is what people wear indoors; a ‚pantaloon' meant an old man - so this describes a thin old man who stays inside
- pouch = a small bag for carrying money
- hose = tights, thin trousers that men wore in Shakespeare's time
- well sav'd = kept carefully
- a world too wide = much too big
- shrunk shank = 'to shrink' means to grow smaller, and a ‚shank' is a piece of meat cut from a leg of an animal - so the man's legs have grown narrower with age
- manly = if someone is ‚manly' they have characteristics people traditionally admire in men, e.g. being strong and brave

- Turning again toward = becoming again
- treble = a treble is the higher part of a piece of music - so Shakespeare is referring to a boy's high voice
- pipes = a musical instrument that makes a high sound
- eventful = full of activity, containing lots of events
- history = here, a kind of play that talks about events in the past
- second childishness = being like a child again (in modern English, we sometimes talk about a ‗second childhood')
- mere = here, absolute or complete (old-fashioned use)
- oblivion = if someone is ‗oblivious' they don't know what is happening around them, and if they live in ‗oblivion' they are completely forgotten by other people ☐ Sans = without (this is French for ‗without')

## 1.9 **EXPLANATION**

All the World's a Stage opens with comparing the world to a stage and all the men and women to merely its players (Actors and Actresses). All these people have different routes and timings to enter this stage and have different exits to go out. They enter this stage when they are born and leave this stage when they die. Similarly, every person, during his lifetime plays many parts. These parts are called seven ages. Every player plays seven roles during his life. In fact, human beings play their parts in life as characters play their role on stage. Shakespeare says that each human being performs seven parts in this small drama on the stage of the world.

The first stage is that of an infant when he is helpless in his mother's arms. He merely pukes in the nurse's arms. He makes his entry as a baby who is fully dependent upon others. The first stage ends when the infant grows into a school child.

In the second role, he is a child who goes ―creeping like a snail unwillingly to school.‖ He is innocent. He is not willing to learn. He wants freedom. For learning, he must lose his childish liberty. The third stage brings before us the lover who sings woeful ballads for his beloved. In the youthful age when man is full of energy and might, he does everything to please his beloved. Even this shift of life, filled with merrymaking and joyous songs, passes so quickly as well.

The fourth stage is soldier, and this stage portrays the man as a soldier or a fighter fighting for the nation. His beard depicts all those strange oaths that he takes to protect his country and all the men and women living in it. No doubt he quarrels, but he also maintains his dignity to create and develop his reputation in front of others around him. Here man seeks fame though it is temporary and short lived. He endangers his life for it. It alludes how man goes to every extreme for temporary success, as success is always temporary. This is perhaps the toughest stage in his life. Then comes the fifth stage, where he turns into justice, the one who knows what is good and what is right. At this stage, he is perhaps the best person to approach to find out who is correct and who is wrong. He has round belly. He cites modern instances.

In sixth age, man becomes very weak. He keeps pouch with him. He wears warm hoses. Man's shank (ankle) has shrunk. ―His big manly voice is turning again towards childish treble.‖ His voice is not clear due to loss of teeth.

In the last stage, the condition of man becomes very miserable. Now he has grown very old and weak. The last stage comes for him to go through oblivion, that is forgetfulness. No matter how hard he tries to remember things, he is just not able to. When he enters in this stage, he changes from his old age to the oldest one. This is a strange stage of life. In this period all the life which has been previously full of strange events, comes to an end. Man becomes child once again. This is like his second childhood. In this stage he is childish as well as childlike. At this stage he forgets almost everything. His memory becomes very weak. He loses teeth, eyesight and taste. He is without everything. This is the stage in which he completes the drama of his life and leaves the stage of this world for the next. Thus, Shakespeare pictures the seven stages of a man's life in the poem _All the World's a Stage.'

The speech is rich in detail and imagery. Jaques paints miniature portraits of each of the stages of man's life highlighting the ridiculous, helpless, or ineffectual aspects of each stage. The baby is __mewling and puking,'' while the schoolboy whines as he is forced to attend school against his will. The lover's sentiments are made to seem absurd and extreme, as he sadly sings of __his mistress' eyebrow.'' The soldier seems to live in isolation from society and friendship, __full of strange oaths'' as if belonging to a secret guild, and he is guided by negative, aggressive emotions like jealousy and anger; even when faced with the prospect of death, __in the cannon's mouth'' he still gives priority to his reputation. The justice's belly is understood to be lined with capon—a castrated rooster, which serves as another symbol of the impotence of living creatures—because judges were often bribed with capons. As a judge, meanwhile, both his physical appearance and his intellectual state—he is __full of wise saws and modern instances'' that is, he does not truly think independently—show him to be fulfilling his function in society without much thought or ability. Jaques's closing descriptions of the pantaloon and of the senile old man offer a vivid picture of every man's descent into obscurity: the pantaloon finds his body and his voice alike shrinking, while the final stage __is second childishness and mere oblivion.'' Thus, in Jaques's view, not only does man pass through a number of predictable stages but also within each stage the depth of his person is no greater than that of a stock character in a play, meriting a psychological description of a few lines at most.

The __Seven Ages of Man'' speech is left to numerous interpretations, but its insistence that all men are simply following the scripts of their lives—as co-written by Fortune and Nature—is thought provoking. The references to acting, roles, and theatre in As You Like It may best be interpreted in the context of the play as contrasted with the pastoral life. The characters of As You Like It, coming from the upper echelons of the court, would have been accustomed to civilization's comforts; while speaking with Corin, Touchstone regrets the absence of certain aspects of that courtly life, namely the abundances of society and food. Other characters function better than Touchstone in the forest milieu in that they are more willing or more able to __play the roles'' of forest dwellers. In making frequent reference to the conventions of dramaturgy, Shakespeare assists his urban crowds to lose themselves in the ethereal theatre of the Forest of Arden.


## 1.10 SUMMARY

All the World's a Stage compares the world to a stage and all the men and women have their roles to play. People enter this stage when they are born and leave this stage when they die. The

various roles that every person during his lifetime plays are called as seven ages. The seven ages consist of infant, then school going child, lover, soldier, judge, old person, and nearing death extreme old age which is also called as a second childhood. All the stages have their own strengths and weaknesses, but second childhood is the most weak stage/role in the life of a human being.

## 1.11 ANALYZING POETRY

**\* Recall and Interpret**

      1.   What is the world compared to?

      2.   What are the seven stages of man‗s life? 3. What do ‗exits‗ and ‗entrances‗ refer to?

**\* Evaluate and Connect**

4. How is life similar to the theatre according to Shakespeare?

5. What characteristics would you associate with the stage of a soldier?

6. Explain the line ‗the lean and slippered pantaloon.‗

7. Compare and contrast the first and the seventh stage of life in a human being‗s life.

## 1.12 READING FURTHER

To learn more about Shakespeare, try these resources:

1.    Collection: An Oxford Anthology of Shakespeare, edited by Stanley Wells, is divided into chapters such as ―Love,‖ ―Friendship,‖ and ―Politics.‖

2.    Biography: How Shakespeare Spent the Day, by Ivor Brown, contains interesting information about the London theatre of Shakespeare‗s day.

3.    Listening: Ages of Man: Readings from Shakespeare is a memorable collection of speeches and sonnets delivered by actor Sir John Gielgud.

## 1.13 MEET ALFRED, LORD TENNYSON

Tennyson was born in 1809. Not an average child, he produced a six-thousand-line epic poem by the age of twelve. He also wrote poems in the styles of Alexander Pope, Sir Walter Scott, and John Milton before his teen years. Throughout his life, Tennyson would turn to poetry whenever he felt troubled. As he said in one of his poems, ―for the unquiet heart and brain, / A use in measured language lies.‖ Tennyson had great need of such solace. His father, a clergyman, had a long history of mental instability. When Tennyson‗s grandfather considered the clergyman unfit to take over the family dynasty—thereby virtually disinheriting him—Tennyson‗s father turned to drugs and alcohol. He often took out his bitter disappointment on the family. On more than one occasion, he threatened to kill Tennyson‗s older brother Frederick.

At age eighteen, Tennyson joined his older brothers at Cambridge University. Although he was painfully shy, his poetry brought him to the attention of an elite group of students known as ―The

Apostles.‖ Thriving on their affection and support, Tennyson gained confidence in his abilities. His closest friend was Arthur Henry Hallam, a brilliant and popular student who later became engaged to Tennyson‗s sister. While Tennyson was at Cambridge, he published Poems, Chiefly Lyrical, and he went to Spain with Hallam and other Apostles to aid in the unsuccessful revolt against Ferdinard VII.

In 1831 Tennyson left Cambridge to be with his father, whose health was failing. After his father‗s death, Tennyson decided to pursue a career in poetry rather than return to school. His early volumes of poetry drew mixed reviews, however, and Tennyson was hurt by some of the harsher criticism. Then, in 1833, he learned that Arthur Hallam had died suddenly of a stroke. Tennyson fell into a deep depression, saying, ―I suffered what seemed to me to shatter all my life so that I desired to die rather than live.‖ Although he continued to write poetry, he did not publish anything for nearly a decade; however, he wrote some of his most significant poems during this period.

When he was thirty-two, Tennyson brought out a new book of poems. This time, almost all of the reviews were positive. Fame came in 1850 with the publication of In Memoriam A. H. H., a long cycle of poems about his grief over the loss of Hallam. That same year, Queen Victoria appointed Tennyson to succeed William Wordsworth as poet laureate. Finally confident about his future, Tennyson married Emily Sellwood, a woman whom he had met and become engaged to fourteen years earlier.

For the rest of his life, Tennyson enjoyed remarkable prestige. His books could be found in the home of nearly every English reader, and many people considered him a spokesman for the Victorian age. His gruff manner and striking appearance added to his mystique. In 1883 Tennyson accepted the title of baron, becoming the first poet ever to be ennobled for his work. Upon his death in 1892, he was buried near Browning and Chaucer in the Poet‗s Corner at Westminster Abbey.

## 1.14 Reading Focus

*Journal* your response to the question how do memories of the past affect your present life?

*Write* down your symbolical wish full of hope for the New Year wishing for a new beginning.

*Setting a Purpose* Read the following poem to find out how the speaker draws upon experiences from the past.

## 1.15 BUILDING BACKGROUND „IN MEMORIAM"

In Memoriam A. H. H. Tennyson was deeply shaken by the news of Arthur Hallam‗s death in 1833, who was his friend and his sister‗s fiancé. He died suddenly at the age of twenty-two. Within a few days he wrote an elegy (a poem of mourning or lament) about this loss. He continued writing elegies over the next seventeen years, exploring not only his personal grief but also the larger issues of life and death. Eventually he collected these poems under the title In

Memoriam A. H. H. Tennyson once described the work as a series of —short swallow-flights of song.‖ He wrote: —It must be remembered that this is a poem, not an actual biography. The different moods of sorrow as in a drama are dramatically given, and my conviction that fear, doubt, and suffering will find answer and relief only through faith in a God of Love.‖ According to legend, the inspiration for the poem came when Tennyson, staying in the vicinity of Waltham Abbey, heard the Abbey Church bells clanging in the wind on a stormy night. As a child in the large family of an impoverished country Church rector, Tennyson would have seen and perhaps experienced many of the features of society that he wrote about in Ring Out, Wild Bells.

## 1.16 PRESCRIBED TEXT „RING OUT, WILD BELLS"

Ring out, wild bells, to the wild sky,
  The flying cloud, the frosty light:
  The year is dying in the night;
Ring out, wild bells, and let him die.

Ring out the old, ring in the new, Ring,
  happy bells, across the snow:
  The year is going, let him go;
Ring out the false, ring in the true.

Ring out the grief that saps the mind
  For those that here we see no more;
  Ring out the feud of rich and poor, Ring
in redress to all mankind.

Ring out a slowly dying cause,
  And ancient forms of party strife;
  Ring in the nobler modes of life, With
sweeter manners, purer laws.

Ring out the want, the care, the sin,
  The faithless coldness of the times;
  Ring out, ring out my mournful rhymes
But ring the fuller minstrel in.

Ring out false pride in place and blood,
  The civic slander and the spite;
  Ring in the love of truth and right, Ring
in the common love of good.

Ring out old shapes of foul disease;
  Ring out the narrowing lust of gold;

Ring out the thousand wars of old, Ring
in the thousand years of peace.

Ring in the valiant man and free,
  The larger heart, the kindlier hand;
  Ring out the darkness of the land,
Ring in the Christ that is to be.

### 1.17 GLOSSARY

- Feud= fight
- Redress= means ―remedy‖ or ―relief‖
- Party strife= means antagonism or a dispute between sides or factions.

### 1.18 EXPLANATION

For centuries, shortly before midnight on New Year‘s Eve many of England‘s parish churches on the stroke of midnight, begin the ancient ritual of ringing out the old year and ringing in the new.

The sentiments expressed in Tennyson‘s poem Ring Out, Wild Bells still resonate almost two hundred years after it was first published. The poem speaks of bringing relief from grief, about casting aside everything that was sad and bad about the year that has passed and makes fervent wish that the better aspects of human nature will emerge in the future. This poem is canto 106 from In Memoriam.

The imagery of the ringing of the Church bells on New Year‘s Eve is an evocation of Tennyson‘s view of what needs to be wrung out of society and what needs to be ushered in with the New Year. The continuous rhythm and repetition reflect the rhythmic sound of church bells when tolled both for the dead and to call people to prayer. This rhythm is not suggestive of the joyful peals that ring out on celebratory occasions, but the poem drives in a passionate message. This frequent repetition suggests the fervency of the wishes expressed by the poet.

It is a stormy night when the poem was penned. According to local legend, the nearby church bells were swinging wildly in the wind when Tennyson was inspired to write this poem. The year is dying (it is New Year‘s Eve) and the poet is ready to put the year and the grief that he has experienced at the death of a friend behind him.

In the first ten lines of the poem Tennyson alludes to the death of his friend Arthur Henry Hallam. The suggestion is that the time has come to put an end to grieving and move on the stage of acceptance of death - to let him go because grief saps the mind. The suggestion is that with the end of the year comes the time for a new beginning.

The Lines 11-20 seem to be Tennyson‘s expression of his political philosophy, written in the context of Britain‘s socio-economic and political situation in the mid-nineteenth century. The Kingdom is divided along sharp class boundaries into those who are rich and those who are poor. This is the cause of much conflict. It is time to redress the ills of society, for it to become kinder, more equal, and just.

The times are faithless and harsh, and Tennyson is hoping that his lines, expressing his hopes for the future will be echoed in the chiming of the New Year bells. He hopes that more powerful voices than his own - the fuller minstrel, will bring about positive social change.

Lines 21-24 are an exposition of the theme of equality and justice. Class divisions in society are exemplified in ―false pride in place and blood.‖ Both those who have inherited high social positions and those who occupy civic positions are at fault. Tennyson‘s New Year wish, emphasised by the repetition of the words Ring in at the beginning of both lines 23 and 24, is that nobler characteristics will emerge in the future.

Lines 25-28 express a wish that the bells will usher out greed and war and bring a thousand years of peace. The final stanza, number eight, summarizes what has gone before. Everything bad about the past must be discarded and the poet hopes for a future in which life is lived in accordance with true Christian values. He wishes the tolling bells ring out all abuses and evils, and ring in all good, and the various blessings which he enumerates on the land of England.

## 1.19 SUMMARY

The poem by Tennyson was written after the death of his friend Arthur Hallam. It is an elegy and speaks of ringing in relief from grief, about casting aside everything that was sad and bad about the year that has passed and makes fervent wish that the better aspects of human nature will emerge in the future. The poem not is a sad rememberance of poet‘s beloved friend who was a good human being but also brings about the class divisions of the English society of the Age. It also speaks about positive social change in the light of following and uplifting Christian values.

## 1.20 ANALYZING POETRY

**\* Recall and Interpret**

1. During what time of year does canto 106 of In Memoriam take place? What does this time symbolize, or represent, to the speaker?

2. How is ‗Ring Out, Wild Bells‘ elegiac?

3. What is the historical context of the poem ‗Ring Out, Wild Bells?

**\* Evaluate and Connect**

4. What is the main theme of ‗Ring Out, Wild Bells‘?

5. What do you learn about the society of England after reading ‗Ring Out, Wild Bells‘?

6. ‗Ring out the old, ring in the new.‘ What does ‗old‘ and ‗new‘ refer to in the poem?

7. Why do you think the poet is asking the happy bells to ring?

## 1.21 SUGGESTED READING

If you want to read more by or about Tennyson, you might enjoy the following works:

1.    Poetry: Tennyson‘s Poetry, edited by Robert W. Hill Jr., contains an annotated selection of Tennyson‘s poems as well as early responses and critical essays about his work.

2.    Biography: Tennyson, by Peter Levi, gives a detailed and insightful account of Tennyson‘s life.

# B.COM (HONS.)
## (Accounting and Taxation)
### SEMESTER-II
### COURSE: ENGLISH COMPULSORY-1

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**UNIT-2: THE SOUL"S PRAYER;**
**THE ROAD NOT TAKEN**

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<u>**STRUCTURE**</u>

**2.1 Objectives**

**2.2 Introduction to Sarojini Naidu**

**2.2 The Soul"s Prayer**

    **2.2.1 "The Soul"s Prayer": Text**

    **2.2.2 Theme or central idea of the poem**

    **2.2.3 Summary of the poem**

    **2.2.4 Explanation with reference to the context**

    **2.2.5 Glossary**

    **2.2.6 Important questions**

**2.3 Introduction to Robert Frost**

**2.4 The Road Not Taken**

    **2.4.1 "The Road Not Taken": Text**

    **2.4.2 Central idea of the poem**

    **2.4.3 Summary**

    **2.4.4 Explanation with reference to the context**

    **2.4.5 Glossary and Notes**

    **2.4.6 Important questions**

**2.5 Check your Progress**

**2.6 Suggested Readings**

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## 2.1 OBJECTIVES:
- To learn about the life and important works of Sarojini Naidu and to enable the students to understand the poem ―The Soul's Prayer‖
- To introduce the students to Robert Frost and his poetry and to discuss in detail the poem ―The Road Not Taken‖.

## 2.2 INTRODUCTION TO SAROJINI NAIDU:

Sarojini Naidu was born on February 13, 1879 in Hyderabad. She was the eldest daughter of a Bengali Brahmin, Dr. Aghorenath Chattopadhyay, a scientist and a philosopher, who was the first Principal of Nizam College, Hyderabad. Her mother Varada Sundari Devi was also a Bengali poetess. Sarojini Naidu was brought up in a refined atmosphere and she received her formal education at King's College, London and Girton College, Cambridge on a scholarship awarded to her by the Nizam of Hyderabad. After her return to India at the age of nineteen, she married a South Indian, Dr. Muthyala Govindarajulu Naidu.

She participated actively in the Indian Nationalist Movement. Her contribution to the Freedom Movement led her to become the first Indian woman President of the Indian National Congress. In addition to being an Indian Independence activist and a well known poet, she also became the first woman governor of an Indian state (Uttar Pradesh) in free India. She was a notable English poet and her well known collections of poetry are *The Golden Threshold* (1905), *The Bird of Time* (1912), *The Broken Wing* (1917), *The Sceptred Flute* (1943) and *The Feather of the Dawn* (1961). In 1914, she was elected a fellow of the Royal Society of Literature. Her first anthology, *The Golden Threshold* (1905) won her the title of ―Bulbul-e-Hind‖ or ―Bharat Kokila‖. Thus she is also known as the Nightingale of India. She died of a heart attack on March 2, 1949 at Lucknow, Uttar Pradesh.

## 2.3 THE SOUL"S PRAYER:

―The Soul's Prayer‖ by Sarojini Naidu first appeared in her collection of poems, *The Bird of Time* published in 1912. The poem represents the metaphysical ruminations of Sarojini Naidu as her soul endeavours to communicate with God. The invocation begins with all the innocence of a child's pride as the poetess pleads to God to enlighten her on the innermost laws of Life and Death. She wants to learn about the twin-sided aspects of Life.

### 2.3.1 "The Soul"s Prayer: Text

> In childhood's pride I said to Thee:
> ‗O Thou, who mad'st me of Thy breath,
> Speak, Master, and reveal to me
> Thine inmost laws of life and death.
>
> ‗Give me to drink each joy and pain

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Which Thine eternal hand can mete,
For my insatiate soul would drain
Earth's utmost bitter, utmost sweet.

Spare me no bliss, no pang of strife,
Withhold no gift or grief I crave,
The intricate lore of love and life
And mystic knowledge of the grave.'

Lord, Thou didst answer stern and low:
Child, I will hearken to thy prayer,
And thy unconquered soul shall know
All passionate rapture and despair.

Thou shalt drink deep of joy and fame,
And love shall burn thee like a fire,
And pain shall cleanse thee like a flame,
To purge the dross from thy desire.

So shall thy chastened spirit yearn
To seek from its blind prayer release,
And spent and pardoned, sue to learn
The simple secret of My peace.

I, bending from my sevenfold height,
Will teach thee of My quickening grace,
Life is a prism of My light,
And Death the shadow of My face.'

### 2.3.2 Central idea of the poem:

―The Soul's Prayer‖ by Sarojini Naidu is a lyrical poem with autobiographical overtones. It presents the poet's mystic vision dealing with problems of life and death. It is written in the form of dialogue between the poet and God. The poet is eager to learn about the laws of life and death. She prays to God to satisfy her insatiate soul. In response to her prayer, God discloses to her that pleasure and pain, life and death are both a part of His creation and are delivered by His will. Spirituality is one of the dominant themes in Sarojini Naidu's poetry. She got her spiritual inspiration from the Persian Sufis and Hindu Philosophy.

### 2.3.3 Summary of the poem:

The poem ―The Soul's Prayer‖ deals with the poet's mystic vision as she tries to disentangle the questions of life and death. In childlike innocence, the poet pleads to God to unravel the secret of

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life and death. The poem is in the form of an imaginary conversation between the poet and God. It reflects Sarojini Naidu's faith in God as she prays to the Almighty to reveal to her the metaphysical aspect of life and existence and explain to her —the inmost laws of life and death‖. The poet regards herself as an innocent child of God and takes pride in having born from His —breath‖. She expresses her deep desire to know about the mysteries of life and death. The poet urges God to speak to her. She requests God to make her acquainted with the inmost laws of Life and Death.

In her prayer, she asks not just for the joys of life but also pleads to God to grant her strength to bear the pain and grief which life may bring to her. She wants to experience both happiness and sorrow as welcome blessings from above. She wants to feed her hungry soul with the utmost joys and utmost sorrows. She craves for the —mystic knowledge of the grave‖ that still remains unexplored.

In response to her prayer, God assures her that He would listen to her prayers. He ascertains that her soul would experience all passionate rapture and unmatched despair. She feels God's response to be stern but down-to-earth. She acknowledges a sense of security and protectiveness in the intricate and intimate bond that she shares with God.

He assures her that she will immensely experience happiness and fame. She will be consumed by the passion of love. At the same time, her soul would be cleansed by the fire of pain. Just like a flame performs the act of purgation of the environment in which it burns, pain will cleanse the poet's soul. It will remove the worthlessness from her desire and purify her spirit. Her —chastened spirit‖ will long for salvation and peace. After her soul has been satiated by both these extremes, it will now seek release from its blind prayer. At that moment, the soul will surrender to God and place its infinite faith in Him. In that state, the —simple secret‖ of God's peace will be mastered by the soul. God, bending from his —sevenfold height‖ will acquaint the poet with His grace and glory.

The soul will finally know that life is but a prism of His light. Here light symbolizes purity. Just like a prism refracts light and scatters it by causing a spectrum of colours, similarly, God's white light enters into the realm of the earth and fills our life with different hues. Another truth that is revealed is that death is inevitable. It is the shadow of His face and is unavoidable in order to bring about meaningful change and creation.

### 2.3.4 Explanation with reference to the context:

> *In childhood's pride I said to Thee:*
> *O Thou, who mad'st me of Thy breath,*
> *Speak, Master, and reveal to me Thine*
> *inmost laws of life and death.*

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**Reference to the Context**:

These are the opening lines of the poem ―The Soul's Prayer‖ by ‗the Nightingale of India', Sarojini Naidu. In this lyrical poem, the poet indulges in an imaginary conversation with God. She prays to God to answer the intricate questions related to life and death.

**Explanation**:

In these lines, the poet prays to God in childlike innocence. She takes pride in the fact that she has been created by God Himself and He is her master. She urges God to answer her mystic questions related to life and death. She wants to know about the laws of life and death which God has hidden from humanity.

> ‗*Give me to drink each joy and pain*
> *Which Thine eternal hand can mete,*
> *For my insatiate soul would drain Earth's*
> *utmost bitter, utmost sweet.*

**Reference to the Context:**

These lines have been taken from Sarojini Naidu's poem, ―The Soul's Prayer‖. The poet in her prayer is in an imaginary conversation with God. She wants to know about the complex laws of life and death.

**Explanation:**

In the above lines, the poet says that she though she wants to experience each joy of life, she does not want to be deprived of pain. She wants to taste everything bitter and sweet in order to satisfy her soul. She prays to God to give her every joy and pain that He can give her. She is eager to experience the varied joys and pains of life.

> ‗*Spare me no bliss, no pang of strife,*
> *Withhold no gift or grief I crave,*
> *The intricate lore of love and life*
> *And mystic knowledge of the grave.*'

**Reference to the Context:**

These lines have been culled from the poem ―The Soul's Prayer‖ by Sarojini Naidu. It is a spiritual poem in which the poet is praying to God to satisfy her hunger to know about the secrets of life and death.

**Explanation:**

In these lines, Naidu pleads to God that He should not hide any blessing or any pain from her. She strongly desires to taste every bliss and strife. She does not want God to hold back any gift or grief. She wants God to reveal to her the complex ideas of life and the unknown knowledge of the grave.

*Lord, thou didst answer stern and low:*
*_Child, I will hearken to thy prayer,*
*And thy unconquered soul shall know*
*All passionate rapture and despair.*

**Reference to the context:**

These lines occur in Sarojini Naidu's poem, —The Soul's Prayer‖. It is a lyrical poem in which Naidu is in conversation with Almighty. She prays for the awakening of her soul to the complex issues of life and death.

**Explanation:**

In the above mentioned lines, God responds to the prayer of the poet. He answers her prayer in a low but strict voice. He assures her that He would listen to her prayer. He promises her that her unvanquished soul shall experience all ecstasy and sadness.

*_Thou shalt drink deep of joy and fame,*
*And love shall burn thee like a fire,*
*And pain shall cleanse thee like a flame,*
*To purge the dross from thy desire.*

**Reference to the context:**

These lines occur in Sarojini Naidu's poem —The Soul's Prayer‖. In this poem, the poet in conversation with God prays to Him to unravel the intricate lore of life and death. Interestingly, God answers her prayer and promises to satisfy her desires.

**Explanation:**

In response to Naidu's prayer, God assures her that she will enjoy every joy and fame to the utmost. At the same time, love shall consume her like a fire. Her soul will be cleansed by the pain she will experience just like a flame which purges its surroundings. It will purify her and remove the worthless desires. Thus pain will perform the act of purification. The rituals of fire represent purity and peace.

*_So shall thy chastened spirit yearn*
*To seek from its blind prayer release,*
*And spent and pardoned, sue to learn*
*The simple secret of My peace.*

**Reference to the context:**

These lines are a part of the poem —The Soul's Prayer‖ written by Sarojini Naidu. It is a lyrical poem which presents the conversation between the poet and God. God's response to the poet's prayer leads her to the answers she seeks from Him. **Explanation:**

God answers the poet's prayer and tells her that her purified soul would yearn to be rid of the blind prayer. She would seek to be released from that state. In other words, the soul would

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desire to be delivered after it is spent and excused. Thus it would begin to learn the simple secrets of God's peace.

*I, bending from my sevenfold height,*
*Will teach thee of My quickening grace,*
*Life is a prism of My light,*
*And Death the shadow of My face.'*

**Reference to the context:**

These are the closing lines of Sarojini Naidu's lyrical and autobiographical poem, ―The Soul's Prayer‖. In this poem, the poet reflects the spiritual aspects of her own life. She prays to God to guide her to understand the intricacies of life and death. God answers her prayer and satisfies her soul. **Explanation:**

The lines under reference are a part of God's response to Naidu's prayer. He assures her that He will show the poet His grandeur and glory by bending from His seven fold height. In the end, He reveals to her that life is a prism of His light through which various colours can be seen. Likewise, death is the shadow of His face and is inevitable.

**2.3.5 Glossary**

 **mads‟t:** made

 **thee:** you

• **childhood‟s pride:** innocence of childhood

• **reveal:** disclose

 **thine:** your

 **mete:** give

• **inmost laws…death:** most secret rules of life and death

• **eternal:** immortal, forever

• **insatiate:** hungry, not satisfied

• **bliss:** blessing

• **pang:** a sudden sharp pain

• **strife:** conflict

 **withhold:** hold back

 **intricate:** complex

• **mystic:** spiritual apprehensions of truth beyond human intellect

• **stern:** strict

 **hearken:** listen

• **rapture:** a feeling of intense pleasure or joy

• **despair:** hopelessness, anguish

• **purge:** purify

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- **dross:** worthless
- **chastened:** purified, cleansed
- **sue:** plead, implore

### 2.3.6 Important questions

1) Reflect on the theme of the poem ‚The Soul's Prayer' by Sarojini Naidu.
2) Summarize the ideas contained in the poem ‚The Soul's Prayer'. 3) Discuss the treatment of life and death in the poem ―The Soul's Prayer‖.

## 2.4 <u>INTRODUCTION TO ROBERT FROST:</u>

Robert Lee Frost was born on March 26, 1874 in San Francisco, California, U.S. He is a widely celebrated American poet of the twentieth century, well known for his depictions of rural life of New England, colloquial speech and realistic poetry. Some of his famous poems are ―The Road Not Taken‖, ―Stopping by the Woods on a snowy evening‖, ―Mending Wall‖, ―After Apple

Picking‖, etc. He published many books of poetry which include *A Boy's Will* (1912), *North of Boston* (1914), *Mountain Interval* (1919) *and New Hampshire (1938).* He attended several schools but never got a degree, though sixteen honorary degrees were conferred upon him. During his life, he won four Pulitzer prizes for poetry, the only person so far to achieve this honour. Frost's poetry is deeply rooted in American life and idiom. He died on January 26, 1963.

## 2.5 <u>THE ROAD NOT TAKEN:</u>

The poem ―The Road not Taken‖ was first published in Frost's collection *Mountain Interval and Later Collections.* It is one of the most popular poems of Robert Frost. It is a beautiful lyric which combines ―inner lyric vision and the outer contemplative narration‖. The problem of decision-making or making choices is a significant theme in Frost's poetry, and it is also the theme of this poem. It reflects on those situations in a man's life when he has to choose only one out the two options available to him.

### 2.5.1 The Road Not Taken: Text

Two roads diverged in a yellow wood,
And sorry I could not travel both
And be one traveler, long I stood
And looked down one as far as I could
To where it bent in the undergrowth;
Then took the other, as just as fair,
And having perhaps the better claim,
Because it was grassy and wanted wear;
Though as for that the passing there
Had worn them really about the same,

And both that morning equally lay In
leaves no step had trodden black.
Oh, I kept the first for another day! Yet
knowing how way leads on to way, I
doubted if I should ever come back.

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I—
I took the one less traveled by, And
that has made all the difference.

### 2.5.2 Central Idea of the poem:

The poem describes the predicament of a traveller who at one point of his journey has to choose a single path at the diversion of the road. While he wants to travel both the paths, he is unable to do so as he can choose only one of them. That fact that there is no coming back makes the decision even more difficult. This situation is symbolic of the choices a human being has to make in his life. The choices we make are ultimately responsible for our future.

### 2.5.3 Summary:

The poem begins with a traveller, probably the poet himself, standing at a point where two roads diverged into a yellow wood. He found himself in a difficult situation as he was unable to decide which path to take. He felt sorry that he could not travel both the roads at the same time. He stood there in order to decide which road to take. He stared at one of the roads as far as he could see and saw it bend under the bushes. Then he decided to take the other one which he thought had a better claim because it was grassy and not many people had travelled on it. The former had been worn out by many travellers.

That morning, when the traveller stood there, both the roads seemed to be equally untrodden. Both of them were covered with leaves and it was difficult to tell one from the other. He kept the first road for another day knowing well how one road led on to the other. Somewhere deep in his mind, he also acknowledged the fact that he might never return to travel on the first road.

The last stanza of the poem suggests the idea that many years later when the traveller would look back in retrospect to see whether he had made the right choice, he would regret that he had not chosen the other path. Had he chosen the other road, his life would have been different. Hence, the poem conveys the message that it is the choices we make in our life that make all the difference.

### 2.5.4 Explanation with reference to the Context:

*Two roads diverged in a yellow wood,*
*And sorry I could not travel both*
*And be one traveler, long I stood*

*And looked down one as far as I could*
*To where it bent in the undergrowth;*

**Reference to the context:** These are the opening lines of the poem, ―The Road Not Taken‖ by the renowned American poet, Robert Frost. It is a lyrical poem in which the poet talks about the difficulty of making choices in life. He suggests that this problem is universal as every human being encounters this predicament at some point in his life.

**Explanation:**

In these lines, the poet describes a traveller who is unable to decide which road to take as he stands at a diversion on a road on which he has been travelling. He is regretful that he cannot travel both the roads. He observed the roads and found that one of them bent in the bushes far away.

*Then took the other, as just as fair,*
*And having perhaps the better claim,*
*Because it was grassy and wanted wear;*
*Though as for that the passing there*
*Had worn them really about the same,*

**Reference to the context:**

These lines have been taken from Robert Frost‘s poem ―The Road Not Taken‖. The poem is suggestive of the human limitation of making choices in life. Everyone is a traveller and has to make a difficult choice when he has similar options.

**Explanation:**

In these lines, the poet reveals that after a lot of contemplation, he decided to travel on the road which was less trodden. This road had a better claim to be chosen. It was overgrown with grass and needed more travellers. So he decided to choose that road.

*And both that morning equally lay In*
*leaves no step had trodden black.*
*Oh, I kept the first for another day! Yet*
*knowing how way leads on to way, I*
*doubted if I should ever come back.*

**Reference to the context:**

These lines occur in the poem ―The Road Not Taken‖ written by the American poet, Robert Frost. The poet discusses the problem of choosing one option over the other. It is a difficult task and there is no turning back once the decision is made.

**Explanation:**

In these lines, the poet expresses his difficulty of choosing between the two roads that diverged into the forest. That morning, both the roads looked the same to the poet as they were covered with leaves, although after clear examination the poet had observed that one of them was less

trodden. He chose the one overgrown with grass and left the other one for another day. He knew well that once he had made a choice, he will never be able to return. He realized how the choice of one road would lead him to further choices. He was not sure that he he would ever come back.

*I shall be telling this with a sigh*
*Somewhere ages and ages hence:*
*Two roads diverged in a wood, and I—*
*I took the one less traveled by,*

<div align="right"><em>And that has made all the difference.</em></div>

**Reference to the context:**

These are the concluding lines of the poem, ―The Road Not Taken‖ by Robert Frost. The poem suggests that the act of making a choice leaves one nostalgic and regretful about what has been left behind. A human being is made by the choices he makes.

**Explanation:**

These lines reflect the state of mind of the poet years after he had chosen the less trodden road. He sighs at the decision he had made. He regrets having taken the road he took. He still longs for the other road and feels that had he made the other choice, his life would have been different. The choices we make in our present decide our future.

**2.5.5 Glossary and notes diverged:**

separated, divided **just as fair:**

equally good or attractive

**yellow wood:** represents the autumn season in which the poem is set

**wanted wear:** not much used (here travelled) **trodden:** walked on

**sigh:** a deep audible breath expressing regret

**2.5.6 Important Questions:**

1. Discuss the significance of title of the poem, ―The Road Not Taken‖.
2. Summarize in your words the ideas contained in the poem, ―The Road Not Taken‖. 3. Discuss the theme of the poem, ―The Road Not Taken‖.
4. Write a note on the dilemma of choice in the poem, ―The Road Not taken‖.

**2.6 CHECK YOUR PROGRESS:**

1) What is the speaker's wish in the poem ―The Soul's Prayer‖ and what is the response she receives?
2) Who is the poet speaking to in the poem ―The Soul's Prayer?
3) Does God listen to the poet's prayer in ―The Soul's Prayer‖?
4) According to the poem ―The Soul's Prayer‖, how will the poet's spirit be chastened?
5) Explain the lines,―Life is a prism of My Light,

<div align="center">And Death the shadow of My face‖</div>

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6) How are the two roads different as described in the poem ―The Road Not Taken‖?

7) Why does the traveller choose the less travelled road?

8) What is the message conveyed by the poem ―The Road Not Taken‖? 9) Why is there a feeling of regret in the speaker's mind in the poem ―The Road Not Taken‖?

## 2.7 SUGGESTED READINGS:

- Faggen, Robert. Ed. *The Cambridge Companion to Robert Frost.* U.S: Cambridge University Press, 2006. Print.

- Souza, De Eunice. *Early Indian Poetry in English: An Anthology: 1829-1947*. Oxford University Press, 2005. Print.

- Iyengar, K.R.S. Indian Writing in English. New Delhi: Sterling, 1994. Print.

- Lathem, Edward Connery. Eds. The Poetry of Robert Frost: The Collected Poems, Complete and Unabridged by Robert Frost. New York: H Holt, 1979. Print.

- Prasad, H. M. *Indian Poetry in English*. New Delhi: Sterling, 1992. Print.

# B.COM (HONS.)

## SEMESTER-II

## COURSE: ENGLISH COMPULSORY-1

### UNIT-3: THE LAST LEAF;
### THE DOCTOR"S WORD

<u>STRUCTURE</u>

**3.1 Objectives**

**3.2 Life and Works of O. Henry**

**3.3 The Last Leaf**

      **3.3.1 Detailed Summary**

      **3.3.2 Major Themes**

      **3.3.3 Character Analysis**

      **3.3.4 Situational irony in the story "The Last Leaf"**

      **3.3.5 Title of the story "The Last Leaf" by O Henry**

      **3.3.6 Glossary and Notes**

      **3.3.7 Questions for Practice**

**3.4 Life and Works of R. K. Narayan**

**3.5 The Doctor"s Word**

      **3.5.1 Detailed Summary**

      **3.5.2 Theme**

      **3.5.3 Character Sketch of Dr. Raman**

      **3.5.4 Friendship of Dr. Raman and Gopal**

      **3.5.5 Ending of the story "The Doctor"s Word"**

      **3.5.6 Glossary**

      **3.5.7 Questions for Practice**

**3.6 Check your Progress**

**3.7 Suggested Readings**

**3.1 <u>OBJECTIVES:</u>**

● To make the students acquainted with the life and important works of O. Henry and understand in detail the various aspects of the story ―The Last Leafǁ.

● To develop an understanding about the life and works of R.K. Narayan and attempt a summary and analysis of the story, ―The Doctor's Wordǁ.


**3.2 <u>LIFE AND WORKS OF O. HENRY</u>**

O. Henry was the pen name of the widely celebrated American short story writer, William Sydney Porter. He used a number of other pen names like S.H. Peters, James L. Bliss, T.B.

Dowd, and Howard Clark but O. Henry became most popular. He was born in North Carolina in United States in 1862. He was a prolific writer who wrote many short stories. His stories are

known for their surprise endings. Most of his stories are set in the early twentieth century and many of them are set in New York, though some of them are set in villages as well. They usually feature characters with blue-collar jobs, such as policemen and waitresses. Some of his well known stories are ―The Gift of the Magi‖, ―The Ransom of Red Chief‖, ―The Cop and the Anthem‖, ―A Retrieved Reformation‖, etc. The prestigious annual award, the O. Henry Award is named after him. This award is given to outstanding short stories. The O. Henry House and O. Henry Hall (now owned by Texas State University System), both in Austin, Texas, are named for him. Many schools in Texas have also been named after him. He has several collections of short stories to his credit. The most famous among them are *The Four Million* (1906), *Roads of Destiny* (1909) and *Waifs and Strays* (1917). In addition to this, he also wrote a novel titled *Cabbages and Kings* (1904), and many works of non- fiction.

### 3.3 THE LAST LEAF:

The story ―The Last Leaf‖ was first published in 1907 in O. Henry‘s collection of short stories, *The Trimmed Lamp and other Stories*. It is set in a village named Greenwich where the pneumonia epidemic had spread. The story ―The Last Leaf‖ was one among the many stories of O. Henry that were adapted by the 1986 Indian anthology television series, *Katha Sagar*. The famous Bollywood film Lootera (2013) is also based on this story. ―The Last Leaf‖ narrates the story of an old artist who saves the life of his neighbour, a young girl, dying of pneumonia. He induced in her the will to live which made the girl pull through.

### 3.3.1 Detailed Summary:

The story opens with a description of the mazy streets of Greenwich village to the west of Washington Square. The place was preferred by artists who often found it suitable for their lodging as it offered rooms with good light at a low cost. Two young artists, Sue and Johnsy lived at the top of a building with three floors. Sue belonged to Maine and Johnsy came from California. Both of them had similar likings and tastes in art, food and fashion, so they became good friends.

They had met in spring. By winter, an epidemic hit New York. Pneumonia caught a large population in its grip. Johnsy also became grievously ill with pneumonia. All day, Johnsy lay in her bed staring through the window at the wall of the house next to hers. The doctor told Sue that Johnsy had bleak chances of survival as she had lost the will to live. He explained to her that his medicines do no good to patients who have no desire to live. He inquired about the reason of her hopelessness. Sue told the doctor about Johnsy‘s unfulfilled wish to go to Italy and paint a picture of the Bay of Naples.

The doctor advised Sue to give hope to Johnsy.

Johnsy, though disheartened, sat beside Johnsy and tried to liven her up. She learnt about Johnsy‘s obsession with the leaves falling from a vine outside Johnsy‘s window. An increasingly fatalistic Johnsy had started believing that as the last leaf on the vine falls, she will also die.

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Sue asked Johnsy not to be superstitious and commands her to go to sleep. She goes down to discuss her friend's condition with an old artist who lived in the same building. Behrman, who was a sixty year old painter had never found success in life. He always spoke of creating a masterpiece, but never found inspiration to create one. He was a drunkard but always had a sense of responsibility towards the two young women living upstairs. Sue discusses Johnsy's superstitious belief with Behrman who denounces Johnsy's foolishness. When Sue came back upstairs that night, she found that Johnsy was fast asleep. Sh lowers the window shade so that Johnsy would not have a look at the leaves that were falling fast.

In the morning, Johnsy requested Sue to lift up the window shade in order to see if all the leaves were gone. Miraculously, one leaf still remained attached to the vine in spite of the night's storm. Johnsy expressed her belief that the leaf will surely fall by night and then she too will die. She kept staring at the leaf but it doesn't fall. Surprisingly, she asked Sue for some broth. She had now come to believe that the leaf was there to remind her that it was a sin to wish to die. At the doctor's next visit, he announced that Johnsy's chances of living had now improved. He also told Sue that she must visit Behrman whose condition was critical due to pneumonia. However, the next day, the old painter passed away but Johnsy was now out of danger. That afternoon, Sue went to Johnsy's room and comforting her told her that Behrman had died. The janitor had told her that two days ago, Behrman stayed out in the rain all night with a lantern, a ladder, and a palette with green and yellow paints on it.

Sue inquired of Johnsy if she ever wondered why the last leaf never moved despite all the wind. It was because the other night Behrman had painted it after the actual last leaf fell. He fell sick that night and subsequently died of pneumonia. He had finally made his masterpiece.

**3.3.2 Major Themes**

a) **Willpower:** Willpower emerges as a major theme in the story, ―The Last Leaf‖. The doctor announces that in spite of his treatment, there were hardly any chances of Johnsy's survival as she had lost her willpower. He tells Sue that he can never save a patient who has no willingness to live. The loss of this will made her decide that she too would go with the last leaf of the creeper. But the last leaf painted by the old painter exploited Johnsy's superstitious belief and made her live.

b) **Art:** All the major characters of the story aspire to become great artists. Johnsy and Sue have come to New York to pursue their careers in art. Even old Behrman, who considers himself a failure, aims to create a masterpiece before he dies. His artistic intervention extends Johnsy's life. In painting the last leaf, Behrman fulfils his wish of making a masterpiece.

c) **Superstition:** Johnsy's superstition is also an important theme in the story. She believes her fate to be tied to the ivy leaves. She hopes to die with the falling of the last leaf on the vine outside her window. Superstitious thoughts pervade her mind because she is weakened by

illness. Though her mind is soon changed by the steadiness of the painted last leaf, the falling of the actual last leaf did cause a death (of Behrman).

### 3.3.3 Character analysis

a) **Johnsy:** Johnsy is the protagonist of the story. The story revolves around her. She had come to New York with the dream of becoming a great artist and painting the Bay of Naples one day. With the onset of pneumonia epidemic in California, she also contracts the disease and becomes so weak that she loses all hope of recovery. With sickness and pain, she became so hopeless that she started believing that she would die when the last leaf from the ivy vine outside her window drops. But she is saved by the art of Behrman, an old painter and a drunkard, who paints his masterpiece which appears to be a real leaf to Johnsy. As the leaf stays on the vine in spite of the storm, Johnsy comes to believe that she will also live and her health starts improving.

b) **Sue:** Sue is the housemate and a friend of Johnsy. She had also come to New York to make a career. She is an artist and earns a living by drawing illustrations for magazines. She is a good human being. Just as she cares for her friend in her sickness, she is pained at the death of Behrman. As she discusses Johnsy's condition with Behrman, she provides him with a source of inspiration to create his masterpiece.

c) **Behrman:** Behrman is an old painter who lives in the basement apartment of the building in which Sue and Johnsy live. He is above sixty years of age, is weak and has a long, grey beard. All his life, he kept speaking about making a masterpiece, but never actually made it. He feels a sense of responsibility towards Sue and Johnsy. When he comes to know about Johnsy's state of despair, he paints an ivy leaf on the wall on which Johnsy's life depended and she believed that she would die when the last leaf falls. He saves Johnsy's life by creating his masterpiece but himself got the disease and died two days later.

d) **The doctor**: The doctor appears in the story to indicate the health of Johnsy. He feels helpless in treating Johnsy when she lost the desire to live. He later becomes hopeful when Johnsy starts recovering because the last leaf never fell. He is an important character because he reveals the truth about Behrman' s last leaf by informing about his sickness to Sue.

### 3.3.4 Situational irony in the story "The Last Leaf"

Situational irony is a literary technique in which an expected outcome does not happen, but its opposite happens. Situational irony requires one's expectations to be thwarted. It is also sometimes called an irony of events. The outcome can be tragic or humorous, but it is always unexpected. The first instance of situational irony in the present story is that contrary to Johnsy and Sue's expectations, when they raise the window shade, they discover that one ivy leaf had

survived the stormy night. The characters' and the readers' expectations are undermined by the miraculous persistence of the leaf.

Another case is when the story opens, we see the imminent death of Johnsy, but by the end of the story, Johnsy lives and Behrman, who saved her life by painting the last leaf died.

In yet another instance of situational irony, Behrman was finally able to produce his masterpiece before his death. Ironically, the great work of art that he always talked about was created by him when no one had expected.

### 3.3.5 Title of the story "The Last Leaf" by O Henry

There cannot be perhaps more appropriate title of the story than ―The Last Leaf‖. The word ―last‖ reflects the main idea of the story. The last leaf holds significance from the very beginning till the end. Initially, it seemed to be the symbol of death for Johnsy as she had assumed to die with the fall of the last leaf. But the same ―last leaf‖ became her saviour. The leaf painted by Behrman never fell, so Johnsy never died in the story. It emerged as the hope of survival and remianed the central point in the story.

From being associated with ailment and depression in the beginning, it conveys the message of hope, courage and optimism in the later part of the story. The last leaf saves the life of the protagonist, Johnsy and fulfils Behrman's lifelong dream to paint a masterpiece. However, the last leaf on the ivy vine saves one person's life but results in the death of the other as Behrman contracts pneumonia because of staying out in the rain and storm all night, painting the last leaf.

### 3.3.6 Glossary and Notes
- ◆ **Quaint:** attractive and unusual, belonging to the past
- ◆ **Greenwich village:** a place lying on the west side of Manhattan in New York City, an attraction for artists
- ◆ **Prowl:** move around restlessly as if in search of something
- ◆ **Chicory:** a flowering plant of the dandelion family used for making salads. It is also used for making medicines.
- ◆ **Pneumonia**: lung inflammation caused by bacterial infection.
- ◆ **Serrated:** having a jagged edge, saw like
- ◆ **Fancy:** whim, notion

### 3.3.7 Important questions :
1) Compare and contrast the characters of Sue and Johnsy.
2) Draw a character sketch of Behrman.
3) Discuss the aptness of the title of the story ―The Last Leaf‖.
4) Comment on the surprise ending of the story, ―The Last Leaf‖.
5) Behrman has a dream. What is it? Does it come true?
6) Discuss the major themes of the story,‖The Last Leaf‖.

7) What is the significance of willpower in the story? 8) Critically analyse the story, ―The Last Leaf‖.

## 3.4 <u>LIFE AND WORKS OF R. K. NARAYAN:</u>

R. K. Narayan (full name: Rasipuram Krishnaswami Iyer Narayanaswami) is a well known Indian writer. He is widely known for his literary works set in the fictional South Indian town of Malgudi. He wrote 29 novels and a number of short stories set in Malgudi. He was among the pioneers of Indian English literature along with Mulk Raj Anand and Raja Rao. His fiction has the authenticity of lived experience and is illuminated by flashes of irony and humour. His autobiographical books like Swami and Friends, The Bachelor of Arts and The English Teacher are among some of his best works. His novel The Guide won him the Sahitya Academy Award and was also made into a successful film. Narayan was nominated to the upper house of the Indian Parliament for a six-year term starting in 1989, for his contributions to Indian literature. In 2001, he was awarded the Padma Vibhushan, India's second-highest civilian honour.

R.K. Narayan was born on October 10, 1906 in Madras and died at the age of 94 on May 13, 2001. His brother R. K. Laxman (1920-2005) was a well known cartoonist.

## 3.5 <u>THE DOCTOR‟S WORD :</u>

―The Doctor's Word‖ is a short story from the collection of ―Malgudi Days‖ by R K Narayan published in 1943.

(All of you might have visited a doctor at some point in your life. What qualities do you expect in a doctor? Should he be stern and curt or polite and friendly?

Think about it. )

―The Doctor‘s Word‖ by R. K. Narayan is also a story about a doctor who was much respected by his patients. He had a strict countenance and didn‘t speak much. He was very straightforward in his verdict about whether the patient would live or not. However, when it came to his childhood friend, Gopal, he could not speak the truth about his bleak chances of living. Contrary to his expectation, his friend survived and how his word saved his friend‘s live remained an enigma to the doctor for the rest of his life.

### 3.5.1 Detailed Summary:

The story ―The Doctor‘s Word‖ by R. K.Narayan opens with the description of the protagonist of the story, Dr. Raman. He was a very able doctor, respected near and far. People valued his opinion and paid a heavy visiting fee of twenty five rupees for his advice and prescription. There was one problem though, that they went to him only when the patient was on his last legs. His opinion about the patient‘s chances of survival was compared to a judge‘s verdict. The patient‘s life depended on his words. He was of the opinion that agreeable words could never save a patient, so he never told lies. At the same time, if he felt that the patient‘s life could be saved, he would not rest till he had done so.

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Gopal was a childhood friend of Dr. Raman. Despite the busy schedule, Dr. Raman never failed to spare some time for his friend whenever he came to meet him. One day, when he saw Gopal's son waiting for him outside his room at his clinic, it occurred to him that it had been months that Gopal had visited him. Gopal's son told him that his father had been very ill and needed the attention of Dr. Raman. He had been on bed for more than one and a half month now.

Dr. Raman rushed to his friend's house and observed that his friend's condition was beyond recovery. He got anxious. He started Gopal's treatment but he was not sure that he would be able to save him. He performed a surgery but his heart was very weak. Gopal's wife wanted to know if he would live. The suspense was unbearable. Dr. Raman advised Gopal's wife to go to the neighbour's house leaving her eldest son behind as the patient needed rest.

The feeble, bed-ridden Gopal asked Dr. Raman in a weak, low voice whether he was going to be alright or not. He was keen to know his condition because he wanted to sign his will before he died, in order to avoid any disputes regarding property. If he died without signing the will, it would ensue a lot of trouble. The doctor was in a fix. In case he shared the fact about the meagre chances of his survival, it would mean pronouncing Gopal's death as his word was deemed to be final. He was afraid that Gopal would die if he came to know about it. So he decided to hide the truth. For the first time in his life, he had lied to a patient and done —a piece of acting before the patient, simulated a feeling and concealed his judgement‖. It was not in his nature to whitewash but he assured Gopal that he was going to live. Since Dr. Raman was believed to be honest and truthful, so Gopal was relieved. He instructed Gopal's wife to give him a few spoons of glucose and brandy every few minutes.

He left Gopal's house with a heavy heart. On his way home, he stopped at the hospital to tell his assistant that Gopal might collapse anytime. However, next morning, when he went to Gopal's house, he found his pulse satisfactory. He was surprised that Gopal had survived the attack and now he would live to be ninety. He had turned the corner. But how his word proved to be true remained a mystery to him throughout his life.

**3.5.2 Theme:**
—The Doctor's Word‖ captures the dilemma that a doctor faces when he is treating his patients. In addition to the treatment prescribed by the doctor, a patient's well being depends much on the hope that the doctor provides. In most cases, the patient's life and death depend upon the doctor's word. In this story, R.K.Narayan shows how a doctor's word saves the life of a patient. A little hope given by a doctor to even a very critical patient can make his will power strong. Dr. Raman believed that sweet words and consolation can never save a patient's life who was sure to die. However, he could not help telling a lie when it came to his childhood friend, Gopal. His false hope strengthened his willpower and made him survive. Thus, the doctor's word saved his life. In addition to this, the themes of honesty and friendship can also be found in this story.

### 3.5.3 Character Sketch of Dr. Raman:

Dr. Raman is a major character in R.K. Narayan's *Malgudi Days.* In the story, ―The Doctor's Word‖, Dr. Raman is a very experienced and competent doctor. He is known for his ―curt truthfulness‖ and honesty in treating his patients. His visiting fee was very high because of which the people visited him when the patient was on his last legs. Dr. Raman did not believe in whitewashing. His opinion was really valued. The patient's life depended on his words. He never gave false assurance to the patient because he never believed that a patient could be saved with ―comforting lies‖ and ―agreeable words‖. However, if he saw the slightest sign of hope, he would leave no stone unturned to save him.

However, when it came to treating his childhood friend, Gopal, Dr. Raman was caught in a fix. He wanted his friend to live but could hardly see any chances of his survival. Dr. Raman was a devoted and sincere friend. In spite of his busy schedule, he never failed to spare time for his friend. Today, he could not see him dying. Gopal's family looked up to him for positive response, but even after performing an operation, he didn't expect Gopal to live beyond a few hours. He lacked courage to tell the truth to his family.

When Gopal himself asked him about his chances of survival, he had to tell a lie in order to keep up his spirits. He gave him false assurance that his heart was ―absolutely fine‖ and he was going to live. Gopal believed him as Dr. Raman had never told a lie. In the end, his words worked wonders as Gopal was saved and was sure to live for the next forty years.

### 3.5.4 Friendship of Dr. Raman and Gopal:

Gopal and Raman were childhood friends. As kids, they spent most of their time together. Their friendship stood for more than forty years. After getting married, they got busy with their families and professions. Still, they found time for each other and would occasionally dine together, and talk about each other's life. It was a classic friendship which was untouched by time and circumstances. When Dr. Raman got to know about Gopal's illness, he was pained to see his dearest friend in bed. For the first time in his life, he went against his principles and did a bit of acting to keep Gopal hopeful of his survival. Gopal trusted his friend and was able to recover.

### 3.5.5 Ending of the story "The Doctor"s Word":

There is a sting in the tail at the end of the story. It is very interesting as Dr. Raman expects Gopal to be dead when he visits his house in the morning. However, when he discovers that Gopal is still alive and recovering, he can't figure things out. The night before, he had lied to his friend to keep Gopal's mind relaxed. Gopal's life hung on his words. He trusted his friend's opinion. In the end, Dr. Raman is still a man of his word though he does remain puzzled as to how Gopal survived through the night.

### 3.5.6 Glossary:
- **ominous:** threateningly inauspicious

- **wavering:** flickering
- **verdict:** an official judgement made in court
- **glimpsed:** to look at something or someone for a very short times
- **wrested:** forcibly pull from a person's grasp
- **curt:** short and rude
- **soothing:** comforting

 **arena:** field

 **Mopped:** wiped (with a cloth)

 **wrapped:** covered

 **sizzled:** made a sound

 **apologetic:** being sorry
- **whimpered:** made soft crying noises
- **gleamed:** shone brightly

 **perspiration:** sweat

 **giddy:** dizzy
- **ruminated:** thought about
- **sternly:** strictly
- **evasive:** trying to avoid something
- **implored:** requested

 **wailing:** sobbing

 **bewilderment:** uneasiness

 **agitated:** troubled

 **beckoned:** called

 **collapse:** to lose consciousness 
**simulate:** imitate, fake (v)

### 3.5.7 Important questions:
1) Why did the patients visit Dr. Raman only when they were hopeless?
2) Draw a character sketch of Dr. Raman?
3) Justify the title of the story, ―The Doctor's Word‖.
4) Write a note on the friendship of Dr. Raman and Gopal. 5) How was Gopal saved?

### 3.6 CHECK YOUR PROGRESS:
1) Who is the author of the story, ―The Last Leaf‖?
2) What was the doctor's initial prognosis for Johnsy's survival?
   3) Why is the doctor so pessimistic when he assesses Johnsy?
4) According to the doctor, what was the cure of Johnsy's illness?

5) What is Behrman's masterpiece?
6) How did Sue try to revive Johnsy's interest in things around her?
7) What does Johnsy hope to paint one day?
8) Who is the narrator of the story ―The Last Leaf‖?
9) Why was Dr. Raman's judgement valued by people in the story‖The Doctor's Word‖?
10) How long had Gopal been in bed?
11) Who went to call Dr. Raman to attend on Gopal?
12) What did the doctor advice Gopal's wife?
13) What important task did Gopal want to do before his death?
14) Do you think it is right for a doctor to give false hope to his patients?
15) Compare and contrast the theme of will power in the two stories, ―The Last Leaf‖ and ―The

Doctor's Word‖.


### 3.7 SUGGESTED READINGS:

- Cerf, Bennett and Van H. Cartmell. Eds. *The Best Short Stories of O. Henry.* Modern Library, 1994. Print.
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- Trivedi, H. C. and N.C. Soni. ―Short Stories of R.K. Narayan‖. *Indian Literature.* 16.3(4) July- December, 1973. pp 165-179. <https://www.jstor.org/stable/24157228>
- Venugopal, C.V. *The Indian Short Story in English: A Survey.* Bareilly, India: Prakash Publications, 1975. Print.
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# B.COM (HONS.)

# (Accounting and Taxation)
# SEMESTER-II

## COURSE: ENGLISH COMPULSORY-1

## UNIT-4: WHY I WANT A WIFE
## MY FINANCIAL CAREER

**STRUCTURE**

**4.1 Objectives**

**4.2 Introduction**

**4.3 Meet Judy Brady**

**4.4 Reading Focus**

**4.5 Building Background**

**4.6 Prescribed Text „I Want a Wife"**

**4.7 Brief about the Text**

**4.8 Explanation**

**4.9 What does a Wife Do?**

**4.10 Summary**

**4.11 Analyzing Prose**

**4.12 Reading Further**

**4.13 Meet Stephen Leacock**

**4.14 Reading Focus**

**4.15 Building Background**

**4.16 Prescribed Text „My Financial Career"**

**4.17 Explanation**

**4.18 Analyzing Prose**

**4.19 Summary**

**4.20 Reading Further**

## 4.1 OBJECTIVES

**After reading this lesson you will be able to**
- Appraise both the prose
- Revise the prescribed prose
- Choose the right answers from the text
- Develop your own understanding in terms of themes discussed
- Plan your intertextual or mix-media readings

## 4.2 INTRODUCTION

Dear Learners, this lesson aims to introduce you to prose in form of a manifesto and an anecdote.

‗I Want a Wife' is a 70s Feminist Manifesto by Judy Brady and ‗My Financial Career' is a humorous anecdote by Stephen Leacock.

## 4.3 MEET JUDY BRADY

Judith (Judy) Brady was born in San Francisco in 1937 to parents Mildred Edie and Robert Alexander Brady. She was a well-known feminist and activist, who passed away in San Francisco on May 14th, 2017. She graduated from the University of Iowa with a B.F.A. in 1962. It was in Iowa she met her husband, James Syfers, and they moved to San Francisco in 1963. As a full-time housewife and mother of two young daughters, Judy became a prominent figure in the West Coast Women's Liberation Movement.

She wrote the iconic piece ‗Why I Want A Wife,' which was published in the first edition of MS magazine in 1972 and has been republished countless times in books and textbooks across the country. She was also active in the movement to legalize abortion.

In the early seventies she went to Cuba with the Venceremos Brigade, a deeply meaningful experience for her and she returned to Cuba in later years. In the early 80s she was one of thousands of Americans who travelled to Nicaragua to see its revolution in process. Her experience in both countries expanded her vision and deepened her commitment to social and economic justice.

Judy eventually divorced and took full time work as a secretary to support her family. She developed breast cancer in her forties and subsequently expanded her activism to the political context and environmental causes of cancer. Her book ―1 in 3: Women Confront An Epidemic,‖ published in 1991, emphasized the root environmental causes of cancer in modern industrial capitalism, rather than blaming the victim as an individual.

## 4.4 READING FOCUS

What do you know about matrimony?

***Read*** about husband-and-wife roles from any sociology book and observe the same in your surroundings.

*Make a list* of the things that an Indian wife is expected to do.

*Setting the purpose* Read on feminist movements and find jokes and memes on husband wife relationship.

## 4.5 BUILDING BACKGROUND

The second wave of the feminist movement in the United States began during early 1960's and lasted throughout late 1970's. The purpose of the feminist movement was to have a right to vote and have the same equal rights as male citizens. Judy Brady's essay ‗I Want A Wife' first appeared in the Ms. Magazine's inaugural issue in 1971. The genre of the article is a classic piece of feminist humour and is depicted as satirical prose. The table of contents read ―Ms. is devoted to today's women considered as full human beings.‖ This was one of the shortest pieces in the magazine and still turned out to be one of the most durable. She had written it as a speech for a rally in San Francisco the previous year. Brady read the piece at a rally celebrating the 50th anniversary of women's right to vote in the U.S., obtained in 1920.

This prose very well relates to an anecdote in an office during lunch hours two men were having a rich splurge of lunch. One of them suddenly looks at the next table at her woman colleague who was eating biscuits with tea; and asks, ―Ma'am haven't you got your lunch today?‖ And the woman answers with tongue in her cheek ―No, Because I don't have a wife like you two.‖ This anecdote not only builds whole background but sums up the prose; rather also leads to a debate that will set your mind thinking.

## 4.6 PRESCRIBED TEXT „I WANT A WIFE"

‗I Want a Wife,' the Timeless '70s Feminist Manifesto

By Judy Brady

I belong to that classification of people known as wives. I am A Wife. And, not altogether incidentally, I am a mother.

Not too long ago a male friend of mine appeared on the scene fresh from a recent divorce. He had one child, who is, of course, with his ex-wife. He is obviously looking for another wife. As I thought about him while I was ironing one evening, it suddenly occurred to me that I, too, would like to have a wife. Why do I want a wife?

I would like to go back to school so that I can become economically independent, support myself, and, if need be, support those dependent upon me. I want a wife who will work and send me to school. And while I am going to school I want a wife to take care of my children. I want a wife to keep track of the children's doctor and dentist appointments. And to keep track of mine, too. I want a wife to make sure my children eat properly and are kept clean. I want a wife who will wash the children's clothes and keep them mended. I want a wife who is a good nurturant attendant to my children, who arranges for their schooling, makes sure that they have an adequate social life with their peers, takes them to the park, the zoo, etc. I want a wife who takes care of the children when they are sick, a wife who arranges to be around when the children need special care, because, of course, I cannot miss classes at school. My wife must arrange to lose time at work and not lose the job. It may mean a small cut in my wife's income from time to time, but I

guess I can tolerate that. Needless to say, my wife will arrange and pay for the care of the children while my wife is working.

I want a wife who will take care of my physical needs. I want a wife who will keep my house clean. A wife who will pick up after me. I want a wife who will keep my clothes clean, ironed, mended, replaced when need be, and who will see to it that my personal things are kept in their proper place so that I can find what I need the minute I need it. I want a wife who cooks the meals, a wife who is a good cook. I want a wife who will plan the menus, do the necessary grocery shopping, prepare the meals, serve them pleasantly, and then do the cleaning up while I do my studying. I want a wife who will care for me when I am sick and sympathize with my pain and loss of time from school. I want a wife to go along when our family takes a vacation so that someone can continue to care for me and my children when I need a rest and change of scene.

I want a wife who will not bother me with rambling complaints about a wife's duties. But I want a wife who will listen to me when I feel the need to explain a rather difficult point I have come across in my course of studies. And I want a wife who will type my papers for me when I have written them.

I want a wife who will take care of the details of my social life.

When my wife and I are invited out by my friends, I want a wife who will take care of the babysitting arrangements. When I meet people at school that I like and want to entertain, I want a wife who will have the house clean, will prepare a special meal, serve it to me and my friends, and not interrupt when I talk about things that interest me and my friends. I want a wife who will have arranged that the children are fed and ready for bed before my guests arrive so that the children do not bother us.

And I want a wife who knows that sometimes I need a night out by myself.

I want a wife who is sensitive to my sexual needs, a wife who makes love passionately and eagerly when I feel like it, a wife who makes sure that I am satisfied. And, of course, I want a wife who will not demand sexual attention when I am not in the mood for it. I want a wife who assumes the complete responsibility for birth control, because I do not want more children. I want a wife who will remain sexually faithful to me so that I do not have to clutter up my intellectual life with jealousies. And I want a wife who understands that my sexual needs may entail more than strict adherence to monogamy. I must, after all, be able to relate to people as fully as possible.

If, by chance, I find another person more suitable as a wife than the wife I already have, I want the liberty to replace my present wife with another one. Naturally, I will expect a fresh, new life; my wife will take the children and be solely responsible for them so that I am left free.

When I am through with school and have a job, I want my wife to quit working and remain at home so that my wife can more fully and completely take care of a wife's duties.

My God, who wouldn't want a wife?

## 4.7 BRIEF ABOUT THE PROSE

Judy Brady in 70s wrote her tongue-in-cheek essay, _I Want a Wife,' using irony to address the issue of gender inequality. Laced with irony and humour it grabs the readers' attention and projects the judgment of a man's perspective on gender roles. In this essay Brady aims to

convince her readers to look objectively at a man's viewpoints and expectations of what he thinks a wife is and what she should be. Brady skilfully uses clear arguments, repetition of key words and stylish language to make her essay strong and convincing. Looking at the social construct and the advantages at the hands of husbands she declares as a wife that she too needs a wife.

## 4.8 EXPLANATION

The prose illustrates a male's perspective of women in the 70s that is very much the norm today even. It also brings about the irony that existed between a man's expectations of women and what was expected of him. Through ironical statements she projects the lack of empathy men had towards their wives in regard to needs and desires. She indicates the irony of the social conditioning that a wife has to contribute more to a marriage as if the whole onus to run the relationship is on her. Highlighting the real picture, the prose showcases low value or lack of importance of a woman in a marriage.

There is no second thought that the portrayal is accurate of the attitudes toward gender roles at that time and even in the contemporary times; now there has been lot of change now inclusive of women voting rights, right to education and financial independence. Judy says in the beginning paragraphs that she is a wife and mother and establishes her credibility and also reveals her own subjection to the discrimination and exploitation within a marriage ―I belong to that classification of people known as wives. I am A Wife, not altogether incidentally, I am a mother.‖

Brady's essay shows how hegemonically women are almost treated and made to believe as superhuman in the sheer magnitude of responsibilities required to be a wife and mother, yet as implied in the essay that is very much reflection of the real world that through the dictatorship of the gender roles, women are considered the inferior sex and also exploited on the account of labelled as a superwoman!

Judy points out that the roles of wife are unfair to the role of husband, and that there is an obvious difference, inequality, between the roles of husband and wife. She feels agonized by the disparities in the household work and by the fact that the work done by wife goes unnoticed. Brady demonstrates her point by giving examples of some household chores that are commonly performed by wife ―I want a wife who will have the house clean, keep my clothes clean, ironed, mended, replaced when need be, and who will see to it that my personal things are kept in their proper place so that I can find what I need the minute I need it.‖ After listing all the numerous outrageous tasks, she concludes the article with tongue in cheek emotional statement, ―My God, who wouldn't want a wife?‖

Judy through her essay is trying to suggest to the readers that these expectations and these stereotypes of roles of women, should stop. She develops her argument and brings out the unfairness of roles of women. Her constant phrase ―I want a wife to…‖ stimulates the emotions within readers, which in turn, might encourage people to introspect and then act. The reason she wrote it as a manifesto for the people to read it was because she wanted people to understand that the role of women is demoralizing to them. Brady classifies in this prose what a wife is through husband's eyes. Through this she wittily brings out the husband's selfishness and laziness, and his wish to be ―left free‖ from any responsibility or accountability. She wants women to stop immediately acting as ‗slaves.' It is only women who can save themselves against

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stereotypes and gender bias in our society. Women need to step up, say no, and not be privy of the activities that are distributed in terms of compartmentalized gender roles.

Brady uses rhetoric which involves three audience appeals: Ethos, Pathos, and Logos. In the very beginning of the prose her credibility as a wife and a mother is established. It is her personal experience that shows that she really knows about her subject and was herself into the role of being a wife. She in a fed-up tone enlists numerous _jobs' that are expected of a wife. She believes people will introspect will feel the need to bring about a change or will get agitated. She bring about the routine stresses of everyday life in a woman's life and the exaggerated expectations of husbands from their wives. The concluding line ―My God, who wouldn't want a wife?‖ says it all and is quite emotional and poignant. With this her aim also is to discourage men from taking advantage of their wives. She logically argues that more is expected out of a woman in almost all the marriages. She is not against women contributing to making of a home but argues against the inequality of men and women. She also brings about inequality in gender roles. It is thus a satire that men can never be seen capable of un-biological tasks that women are obliged, expected, conditioned, and even forced to perform.

## 4.9 WHAT DOES A WIFE DO?

Women play the role of ―wife‖ by doing many helpful things for husbands as well as children born out of marriage without making anyone realize.

The desired wife tasks included:

- Work to support us so I can go back to school
- Take care of the children, including feeding them and nurturing them, keeping them clean, taking care of their clothes, taking care of their schooling and social life
- Keep track of doctor and dentist appointments
- Keep my house clean and pick up after me
- See to it that my personal things are where I can find them when I need them
- Take care of the babysitting arrangements
- Be sensitive to my sexual needs
- But do not demand attention when I am not in the mood □ Do not bother me with complaints about a wife's duties

## 4.10 SUMMARY

The prose opines satirically on the male's perspective of women in the 70s. The very same notion is present in the Indian society till date. It also brings about the irony that existed between a man's expectations of women and what was expected of him. A woman has a long list of roles and tasks delineated for her including home chores, accountability and responisbility on the home front, role of a doting sane wife and a caring multitasking mother; whereas a man is just responsible for the money he earns and can get an excuse if he is unable to fulfill his other roles as he is under great pressure to earn bread and all his roles are taken care of by his wife.

## 4.11 ANALYZING PROSE

**\* Recall and Interpret**

1. What is ‗I want a wife all about‘?

2. What do you feel for Judy after reading the prose?

3. What is the reason to think that Judy is a creditable author?

**\* Evaluate and Connect**

4. What is the role of a wife?

5. Why does Judy want a wife?

6. What is the difference between a wife and a husband‘s role as per the prose? 7. What makes ‗I want a wife‘ prose persuasive and convincing for the readers?


## 4.12 READING FURTHER

For more understanding on the prose section:

1.      Check out Milan Kunc‘s painting Cupid And Psyche, 1995, Oil
on Canvas available online and brainstorm.

2.      Read Rebecca Solnit‘s essay ‗Men Explain Things to Me.‘ 3.
Pick up few readings from Nivedita Menon‘s ‗Seeing like a Feminist.


## 4.13 MEET STEPHEN LEACOCK

Stephen P. H. Butler Leacock was a Canadian teacher, writer and humourist born in 1869 in England. He was also a writer, political scientist, and humourist. He is known for his light humour along with criticisms of people‘s follies. He was the most widely read English speaking world between 1915 and 1925. My Financial Career is a humorous story by Stephen Leacock with a humorous content. The story My Financial Career is an interesting story catching the humour. It accounts Leacock‘s painfully embarrassing experience of the bank.


## 4.14 READING FOCUS

What do you know about satire, farce, burlesque, comedy?

***Read*** about character writings emerging as satire in 18<sup>th</sup> century England.

***Make a list*** of the things that can embarrass you.

***Setting the purpose*** Try and remember your own personal or someone else‘s awkward moment, that may have brought out humour, uneasiness, or drama.


## 4.15 BUILDING BACKGROUND

My Financial Career humorously presents a person‘s first experience in the bank. The narrative focuses on the tension and stupid actions that happened in the bank. There is much fun and laughter when the narrator makes a clown of himself through his words and behaviour. The way he describes people working in the bank is not only exaggerated but interesting as well.

## 4.16 PRESCRIBED TEXT „MY FINANCIAL CAREER"

When I go into a bank I get rattled. The clerks rattle me; the wickets rattle me; the sight of the money rattles me; everything rattles me.

The moment I cross the threshold of a bank and attempt to transact business there, I become an irresponsible idiot.

I knew this beforehand, but my salary had been raised to fifty dollars a month and I felt that the bank was the only place for it.

So I shambled in and looked timidly round at the clerks. I had an idea that a person about to open an account must needs consult the manager.

I went up to a wicket marked "Accountant." The accountant was a tall, cool devil. The very sight of him rattled me. My voice was sepulchral.

"Can I see the manager?" I said, and added solemnly, "alone." I don't know why I said "alone." "Certainly," said the accountant, and fetched him.

The manager was a grave, calm man. I held my fifty-six dollars clutched in a crumpled ball in my pocket.

"Are you the manager?" I said. God knows I didn't doubt it.

"Yes," he said.

"Can I see you," I asked, "alone?" I didn't want to say "alone" again, but without it the thing seemed self-evident.

The manager looked at me in some alarm. He felt that I had an awful secret to reveal.

"Come in here," he said, and led the way to a private room. He turned the key in the lock.

"We are safe from interruption here," he said; "sit down."

We both sat down and looked at each other. I found no voice to speak.

"You are one of Pinkerton's men, I presume," he said.

He had gathered from my mysterious manner that I was a detective. I knew what he was thinking, and it made me worse.

"No, not from Pinkerton's," I said, seeming to imply that I came from a rival agency. "To tell the truth," I went on, as if I had been prompted to lie about it, "I am not a detective at all. I have come to open an account. I intend to keep all my money in this bank."

The manager looked relieved but still serious; he concluded now that I was a son of Baron Rothschild or a young Gould.

"A large account, I suppose," he said.

"Fairly large," I whispered. "I propose to deposit fifty-six dollars now and fifty dollars a month regularly."

The manager got up and opened the door. He called to the accountant.

"Mr. Montgomery," he said unkindly loud, "this gentleman is opening an account, he will deposit fifty-six dollars. Good morning."

I rose.

A big iron door stood open at the side of the room.

"Good morning," I said, and stepped into the safe. "Come out," said

the manager coldly, and showed me the other way.


I went up to the accountant's wicket and poked the ball of money at him with a quick convulsive movement as if I were doing a conjuring trick.

My face was ghastly pale.

"Here," I said, "deposit it." The tone of the words seemed to mean, "Let us do this painful thing while the fit is on us."

He took the money and gave it to another clerk.

He made me write the sum on a slip and sign my name in a book. I no longer knew what I was doing. The bank swam before my eyes.

"Is it deposited?" I asked in a hollow, vibrating voice.

"It is," said the accountant. "Then

I want to draw a cheque."

My idea was to draw out six dollars of it for present use. Someone gave me a chequebook through a wicket and someone else began telling me how to write it out. The people in the bank had the impression that I was an invalid millionaire. I wrote something on the cheque and thrust it in at the clerk. He looked at it.

"What! are you drawing it all out again?" he asked in surprise. Then I realized that I had written fifty-six instead of six. I was too far gone to reason now. I had a feeling that it was impossible to explain the thing. All the clerks had stopped writing to look at me.

Reckless with misery, I made a plunge.

"Yes, the whole thing."

"You withdraw your money from the bank?"

"Every cent of it."

"Are you not going to deposit any more?" said the clerk, astonished.

"Never."

An idiot hope struck me that they might think something had insulted me while I was writing the cheque and that I had changed my mind. I made a wretched attempt to look like a man with a fearfully quick temper.

The clerk prepared to pay the money.

"How will you have it?" he said.

"What?"

"How will you have it?"
"Oh"—I caught his meaning and answered without even trying to think—"in fifties."

He gave me a fifty-dollar bill.

"And the six?" he asked dryly.

"In sixes," I said. He gave it me

and I rushed out.

As the big door swung behind me I caught the echo of a roar of laughter that went up to the ceiling of the bank. Since then I bank no more. I keep my money in cash in my trousers pocket and my savings in silver dollars in a sock.

## 4.17 **EXPLANATION**
Once the narrator of the passage visits the bank, and he informs us that whenever he goes to the bank, he feels nervous. The bank, the clerks, the wickets, and the sight of the money everything creates horror in the mind of the narrator. As soon as he enters the bank, he becomes an irresponsible idiot as he cannot control his nerves. The narrator is physically ‗rattling' as he enters the bank. It is as though he is afraid of what he has to do (lodge/deposit money). We can suspect that the fear is driven by the narrator's lack of trust in the bank.

The narrator wanted to open a bank account because his salary had been raised to fifty dollars a month. So, he thought that the bank was the right place for it. He does not wish to part with his money but knows that he has to as for him the sum of money he has is too large to keep. The narrator is shown quite naive as well as nervous who believes that for opening a bank account one must meet manager rather than meeting the accountants. No one in the bank eschews his confusion. The narrator met the accountant and asked him if he could see the manager alone. He did not know why he said alone, and murmurs to himself that ‗alone' was not to be used. But he eventually ends up using the word ‗alone' twice which creates suspicion.

 Leacock exaggerates not only his own behaviour inside the bank but also the description of the accountant in the bank by describing him as a ‗tall, cool, devil.' The accountant led him to the manager. The narrator asked him whether he was the manager and if he could see him alone. The manager looked at him in some alarm. He felt that the narrator had an awful secret to reveal. So, he took him in a private room so that they were away from the public view.

The manager looking at the narrator's mysterious manner, thought that he might be a detective. So, he asked the narrator whether he was one of Pinkerton's men. The narrator replied that he was not from Pinkerton's; he came from a rival agency. He said that he was not a detective at all.

He had come to open an account. He intended to keep all his money in that bank. The manager looked relieved but still serious. He concluded that he must be a very rich man, a son of Baron Rothschild or a young Gould. The manager asked the narrator if he wanted to deposit a large amount. But when he learnt that the narrator wanted to deposit only fifty-six dollars, his behaviour changed and he instructed the accountant to open the account. The manager expected that the narrator was quite rich contrary to the reality and gets cold in his approach. After

realising that the narrator is a man of no importance the bank manager ignores him and directs him elsewhere and bids him goodbye.

After leaving the manager's room Leacock accidently stepped out into the safe instead of going out of the manager's room. Then he rolled his fifty-six dollars in the shape of a ball and pushed it at the accountant without realizing that he required some money for his routine stuff. The irony is that Leacock at that very moment wanted to withdraw six dollars for the present use out of the whole sum deposited. Instead of writing six, he foggy headed wrote fifty-six and gave the cheque to the clerk. The clerk asked him if he was withdrawing the entire amount and not going to deposit any more. The narrator agreed with him and said never. Narrator's actions might look ridiculous but afterwards he has full command over himself when he is about to withdraw the whole amount. He is completely disappointed with the ruthless and non-cooperative behaviour of the bank people. The clerk prepares to pay him. He asked him how he would have it. The narrator replied that he wanted in fifties. He took the money and rushed out. Thereafter, he kept his cash in trouser pockets and silver dollars in a sock. Since then, the narrator never visited the bank. When the narrator left the bank the people in the bank laugh at him which suggests that they may consider themselves better than the narrator. Rather than accepting that the narrator is afraid. Those in the bank lack the ability to empathize with the narrator.

Thus, the financial career of the narrator came to a premature end because of the lack of care from the people in the bank and his own shyness, pride. At no stage in the story there is a personal touch being administered by any of the people employed by the bank. It is as though all concerned look at the narrator as being a problem rather than being an asset to the bank. The bank does after all need the narrator's money in order to make a profit but doesn't treat him with the respect one would expect a new customer to receive. Thus, the narrator also projects the discrimination at the end of banks on account of rich and poor. He is pitting the individual against the institutions as for the bank narrator's money is a meagre sum, but for the narrator his whole richness is his monthly salary. Leacock brings out the theme of anxiety, fear, trust, confusion, identity and conflict.

## 4.18 SUMMARY

The prose is about the narrator's nervous visit to the bank. All the people and the dynamics of the banking system creates horror in the mind of the narrator. As soon as he enters the bank, he becomes an irresponsible idiot as he cannot control his nerves. He witnesses the change in the treatment of the banker's towards people who bring bank the business in terms of huge deposits vis-a-vis a person who has no money or is low on deposits. He is completely disappointed with the ruthless and non-cooperative behaviour of the bank people. Finally rather than making the full deposit he withdraws the complete amount and carries it back home stealthily by putting the same in his trouser pocket and his socks as he has no trust on the people around.

#### 4.19 ANALYZING PROSE

**\* Recall and Interpret**

1. What light do the following expression throw on Leacock's state of mind when he entered the bank; looked timidly round, shambled in?

2. Why did the manager come to think that Leacock had an awful secret to reveal?

3. What was the attitude of the manager towards Leacock on hearing that he wished to deposit only 56 dollars in the bank?

**\* Evaluate and Connect**

4. Write at least two blunders Leacock committed after leaving the manager's office? What do you get to know about his character from his behaviour?

5. After the misadventure in the bank where did Leacock keep his money?

6. Give as many examples as you can to show that Leacock was feeling completely lost in the bank all the time he was there.

7. Do you think that the prose ‗My Financial Career' highlights the rift between the poor and the rich?

#### 4.20 READING FURTHER

For more understanding on the prose section:

1. Go through ‗The Oxford Book of Humorous Prose: From William Caxton to P. G. Wodehouse: A Conducted Tour.'

2. Explore the book ‗If Life Is A Bowl Of Cherries What Am I Doing In The Pits' by Erma Bombeck.

3. Read Scaachi Koul's ‗One Day We'll All Be Dead And None Of This Will Matter.'

# B.COM (HONS.)
## (Accounting and Taxation)

### SEMESTER-II
### COURSE: ENGLISH COMPULSORY-1

## UNIT-5: SENTENCE STRUCTURES

### STRUCTURE

**5.1 Objectives**

**5.2 Introduction**

**5.3 What is a Sentence?**

**5.4 Types of Sentences (on the Basis of Function)**

**5.5 Types of Sentences (on the Basis of Structure)**

**5.6 Basic Pattern of Sentences**

**5.7 Let Us Sum Up**

**5.8 Unit End Exercises**

**5.9 Answers to Exercises**

**5.10 References and Suggested Readings**


**5.1 OBJECTIVES**

After a careful reading of the unit, you will be able to
- identify and explain different parts of a sentence;
- identify and explain different types of sentences;
  - construct different types of sentences; 
  identify the basic sentence patterns.


**5.2 INTRODUCTION**

In this unit, first of all, we will learn about different types of sentences on the basis of their functions and structures. We will touch on simple, complex, compound and compound-complex sentences. Our focus will be on the basic sentence patterns to help you see the skeleton behind the body of written statements. We hope that this unit will provide you with the framework for the clear written expression of your ideas. Please note that we have explained key grammar concepts in plain English for your convenience. We are sure that you will find this unit very interesting and easy.

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We have prepared some exercises for you. Please complete these before moving on to the answers provided by us at the end of the unit.

We think that you should buy a good dictionary. A good dictionary is a lifelong friend. The author of this lesson personally uses *Oxford Advanced Learner's Dictionary* (English to English) and *Cambridge Advanced Learner's Dictionary* (English to English). Many English-English, English-Hindi and English-Punjabi dictionaries are easily available in bookstores. With a good dictionary you can do the following:

- look up the meaning of an English word
- check the spelling of a word
- find out grammatical information about a word
- find the synonym or antonym of a word
- look up the collocations of a word
- check the part of speech of a word
- learn how to pronounce a word ☐ find examples of the use of a word

## 5.3 WHAT IS A SENTENCE?

‗Sentence' is a set of words arranged in a proper order to express a meaningful statement, question, thought or command. A typical sentence has a verb. For example:

- What **is** your name?
- You **are** a good boy.
- **Do** not **walk** on the table. ☐ **May** you live long!

You can see that the above-mentioned sentences are different from one another as far as their functions are concerned. The first sentence is interrogative; the second sentence is declarative; the third sentence is imperative; the fourth sentence is exclamatory.

## 5.4 TYPES OF SENTENCES (ON THE BASIS OF FUNCTION)

- Declarative
- Imperative
- Interrogative ☐ Exclamatory

Declarative sentences state, affirm or declare something. They end with a period. For example:

- The principal will check on the students who are said to be involved in unlawful activities.
- I have stood first in the class. ☐ It is one of the best movies I have ever seen.

Imperative sentences are used to order, direct, advise or request. They end with a period or an exclamation mark. For example:

- Get out! ☐ Leave the room when she comes.

We use interrogative sentences to ask questions. Such sentences end with a question mark. For example:
- Have you visited Patiala?
- Am I speaking to Ashu? ☐ Had they been punished?

Exclamatory sentences show strong emotions of joy or sorrow, or they express wishes. They end with an exclamation mark. For example:

- What a beautiful vase it is!
- Hurrah! We have won the match! ☐ May you get good marks!

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**Check Your Progress**

**Question**: Read the sentences given below and write what type of sentences they are (on the basis of their function):

   i.   Please give me a glass of water. ii. You should not speak loudly. iii. I have won the competition. iv. She has won the competition! v. Have you ever been to Delhi?

  vi.   Where do you live?

  vii.   Keep silence.

**Answer**:

   i.   Please give me a glass of water. (Imperative Sentence) ii. You should not speak loudly. (Imperative Sentence) iii. I have won the competition. (Declarative Sentence) iv. She has won the competition! (Exclamatory Sentence)

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| | v. vi. | Have you ever been to Delhi? (Interrogative Sentence) |
| | vii. | Where do you live? (Interrogative Sentence) |
| | | Keep silence. (Imperative Sentence) |

## 5.5 TYPES OF SENTENCES (ON THE BASIS OF STRUCTURE)

This is not the only way to look at sentences. Sentences can be analysed on the basis of their structure. There are four types of sentences on the basis of their structure:

1. Simple Sentences
2. Compound Sentences
3. Complex Sentences
4. Compound-Complex Sentences

☐ Simple Sentence

A simple sentence has an **independent clause**; it comprises a **subject** and a **predicate**.

☐ Compound Sentence

A compound sentence includes two or more independent clauses that are joined by a coordinating conjunction. There is no dependent clause.

• Complex Sentence

In a complex sentence, there is one **main clause (independent clause)** and at least one **subordinate clause (dependent clause)**. Irrespective of the fact that the subordinate clause has its subject and predicate, it remains dependent on the main clause for its complete meaning.

• Compound-Complex Sentence

A compound-complex sentence has two or more independent clauses and one or more dependent clauses.

Before we proceed, it is important to understand some new terms that have been highlighted in the brief explanations given above.

**Knowledge Capsule**
**Clause:** A clause has a subject and a verb. It may or may not stand on its own. If it stands

on its own, it means it is also a sentence. If it does not, it is a part of another sentence.

**A simple sentence** is an independent clause, which has a subject and a verb. It does not have any other sentence or clause dependent on it. For example:

- I play.
- He goes to school.
- They believe in God.

**A compound sentence** is formed by combining two independent clauses. For example:

  ☐ I am working hard, **and** I am going to win this competition.

It is notable that when independent clauses are joined, they require a coordinating conjunction between them. In the above-mentioned example, ‗and' is a coordinating conjunction. Conjunctions are linking words (Refer to the unit titled ‗Linking Words and Prepositions' for more information.).

**A complex sentence** is formed when a dependent clause is joined to an independent clause. The dependent clause can come either at the beginning or the end of the sentence.

For example:

- I will eat food when I reach home.
- When I reach home, I will eat food.

**A compound-complex** sentence contains at least two independent clauses (like a compound sentence) and at least one dependent clause (like a complex sentence). For example:

  ☐ **Since I am a language teacher**, my friends expect me to speak perfectly, and my students expect me to write perfectly.

(**NB** This part of the lesson gives an introduction to different types of sentences on the basis of their structure. You will read about the same in detail in another term. Do not worry if you have any questions. We are always there to help you.)

## 5.6 Basic Pattern of Sentences

In the English language, sentences follow specific grammar patterns. If you learn these patterns, you will be able to improve your writing skills. In fact, these patterns will help you improve your basic understanding of the language. Try to identify the patterns in a variety of sentences in your day-to-day communication. It will enhance your ability to use those patterns. Let us now learn about the basic sentence patterns:

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1) SV (Subject + Verb) Example: I play.

2) SVA (Subject + Verb + Adjunct) Example: He slept peacefully.

3) SVC (Subject + Verb + Complement) Example: Her eyes are beautiful.

4) SVO (Subject + Verb + Object) Example: I have cooked food.

5) SVOA (Subject + Verb + Object + Adjunct) Example: I played football at university. 6) SVOC (Subject +Verb + Object + Complement) Example: The food made her sleepy. 7) SVOO (Subject + Verb + Object + Object) Example: He sent me a gift.

It's time to learn about three new terms: Adjunct, Object and Complement.

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**Knowledge Capsule**

**Adjunct**

Adjuncts are marginal elements in a sentence. They can be removed without any damage to the basic sentence structure. In other words, even when an adjunct is omitted, the sentence still remains grammatically acceptable. For example:

a. I love him.
b. I love him immensely.
c. I love him a great deal.

In sentences b and c, _immensely' and _a great deal' are adjuncts. If these words are dropped, the basic sentence pattern/structure remains unaffected. Adjuncts are expressions of place, time, direction, etc. Most common adjuncts are adverbs or adverbial phrases, particularly adverbs of place, time and manner. Find below some examples of adjuncts:

**Time Adjuncts (Adverbs of Time)**

• I met him **yesterday**. ☐ I slept **in the morning**.

**Manner Adjuncts (Adverbs of Manner)**

• I completed the task **carefully**. ☐ He walks **like a ghost**.

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**Place Adjuncts (Adverbs of Place)**

- I saw him **there**.

- I slept **on the floor**.

**Frequency Adjuncts (Adverbs of Frequency)**

- I **often** go to Delhi.
- **Usually**, she goes to a temple.

**Reason Adjuncts (Adverbs of Reason)**

- **As it is my birthday**, I will throw a party.
- Expect the tent to leak **because it has been in my garage for 30 years.**

**Object**

‗Subject' and ‗object' are very easy concepts. You have already learnt about the subject. Let us take a few examples to revise it. ―I eat food.‖ In this sentence, ‗I' is a subject and ‗food' is an object (Notably, ‗food' is the name of something. So, it is also a noun.). Pay attention to the following sentence: ―He met me.‖ In this sentence, ‗He' is a subject, and ‗me' is an object (‗He' and ‗me' are also pronouns.). The word(s) denoting the person or thing about which something is said is (are) called the subject of the sentence. Can you identify subjects in the following sentences?

- We work hard.
- Ram goes to school.
- The woman will prosper.

‗We', ‗Ram' and ‗the woman' are the subjects of their respective sentences. Now, let us consider some examples of objects.

- I eat food.
- I write a letter.
- He met me.

‗Food', ‗letter' and ‗me' are the objects in the above-mentioned sentences. On the basis of these examples, some of you may tend to think that

- objects come after verbs. For example, ‗food' follows ‗eat'; ‗letter' follows ‗write'; ‗me' follows ‗met'. **You are right!**
- every word that comes after a verb in a sentence is an object. **No. It is not true.** Let us take one example to clarify it.

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I live in Jalandhar.

You may think that ‚Jalandhar' is an object, as it comes after ‚live' (Verb). To know whether a word following a verb is an object or not, we ask two questions: ―What‖ and ―Who/Whom‖.

If my answer is ―I live in Jalandhar‖, what will be your question? Your question will be:

―Where do you live?‖ So, ‚Jalandhar' in ―I live in Jalandhar‖ responds to ―Where‖ (But not ―What‖ and ―Who/Whom‖!). So, it is not an object. Let us take one more example: He runs slowly.

If my answer is ―He runs slowly.‖ What will be your question?

Your question will be: ―How does he run?‖ Here, ‚slowly' responds to ―How‖ (But not ―What‖ and ―Who/Whom‖!). So, ‚slowly' in this sentence is not an object.

I am quite sure that you have understood the concept of ‚object'. Can you make questions to see whether there are any objects in the following sentences:

- I eat food. (What do you eat?)
- I write a letter. (What do you write?)
- He met me. (Whom did you meet?)

As you can see, ‚food' responds to ‚what'; ‚letter' responds to ‚what'; ‚me' responds to ‚whom'. The object is the thing that is directly or indirectly receiving the action that was performed by the subject.

Direct and Indirect Objects: There are two types of objects in the English language: direct and indirect. A direct object takes or receives the action of the verb. In other words, the direct object is acted upon by the subject of the sentence.
For example:

  He sent me a letter.
(‚Sent' [verb] is used for ‚letter'. In other words, ‚letter' receives the action of the verb ‚sent'. So, the direct object in this sentence is ‚letter' and the indirect object is ‚me'.)

**Complement**
Complement refers to a word or words that are required to complete the meaning of an

expression/clause. Complements are one of the five major elements of clause structures. The other four are subject, verb, object and adjunct. Complement is the part of a sentence which is regulated by the verb. It usually comes in the second half of the sentence. Unlike adjuncts, complements are not optional. They are essential to convey the complete

meaning of the sentence. For example:

- *Maths* (Subject) is **difficult**. (Subject complement)
- Practice makes *Maths* (object) **easy**. (Object complement)

A complement is normally a noun or an adjective. The verb is usually ‗be' or ‗become'-type (like become, turn, seem, look, etc.) in sentences with complements.

According to *Cambridge Advanced Learning Dictionary*, ―In clauses with linking verbs (be, seem, become), complements which follow the verb and which add information about the subject are called subject complements: Sheila is a nurse. (adding information about Sheila)

All of them seemed surprised.

Complements which add more information about an object are called object complements:

He makes me very angry. (adding information about me).

Complements and adjuncts are different. A complement is necessary in order to complete the meaning. An adjunct is not necessary, and adds extra information.‖

(Source: https://dictionary.cambridge.org/grammar/british-grammar/complements )

Now, let us read the patterns of sentences again in the light of our understanding of adjuncts, complements and objects.

### 1) SV (Subject + Verb)
SV is the most basic sentence structure. All the other structures have this basic structure in them.
Examples:
- I/ play.
- He/ studies.
- They/ walk.
- You/ laugh.
- We/ sleep.
- The child/ runs.
- The mother/ is working.

- He/ cried.
- They/ were weeping.

## 2) SVA (Subject + Verb + Adjunct)

An adjunct, which supplies further detail about actions, events and states, can be added to the basic SV structure. Adjuncts are most often optional elements that provide information related to manner, time, location or cause. Consider the following examples:

- He/ ran/ very fast. [Adjunct of manner]
- I/ came/ in the morning. [Adjunct of time]
- They/ live/ in Patiala. [Adjunct of location/place]
- She/ died/ since you left her. [Adjunct of cause] Some More Examples:
- He/ slept/ peacefully.
- They/ came/ to the wedding.
- The Principal/ comes/ suddenly. ⬜ She/ is going/ away.
- The inspection team/ came/ late.
- He/ slept/ last night.
- You/ wept/ in a second-hand bookshop.
- Ram/ went/ to temple.

## 3) SVC (Subject + Verb + Complement)

You have read about Subject and Complement. There is a fundamental difference between an object and a complement. The difference is that the subject and the object refer to different things, whereas the subject and the complement **(in a SVC clause)** refer to the same thing. Consider the following example: Subject/ Verb/ Object I/ play/ cricket.

In this clause, the subject is a person (―I‖) and the object is a game (―cricket‖), i.e. they are not the same. In contrast, the subject and the complement refer to the same thing. For example:

Subject/ Verb/ Complement
Raj/ looks/ sad.

In this clause, the complement (―sad‖) makes a reference to the same person as the subject (Raj), i.e. it is Raj who is sad. Pay attention to some other random examples:
⬜ Her eyes/ are /beautiful.

- They/ are/ intelligent.
- I/ am/ a doctor.
- He/ became/ a policeman.
- She/ is/ a player.
- Ram‘s mother/ is/ a nurse.
- She/ is/ an Indian.
- He/ turned/ pale.
- The tea/ is getting/ cold.
- It/ was/ a very pleasant talk.

**4) SVO (Subject + Verb + Object)**

The basic sentence structure SV may become SVO with the addition of an object. Some verbs may take objects and some verbs do not take objects. For example: There is no object in the following sentence: ―I sleep.‖ (SV). However, there is one object (‗cricket') in the following sentence: ―I play cricket.‖ (SVO).

In the English language, SVO is a common structure. Pay attention to the following example:

―I write a lesson.‖ The subject of the clause (the thing or person performing the action) is ―I‖; the verb, which describes the particular action, is ―write‖, and the object (the thing undergoing the action) is ―a lesson‖.

Always remember that all verbs are not capable of taking objects. Only transitive verbs can have objects. ‗Transitive' means ‗passing over'. In the case of transitive verbs, an object is needed. Intransitive verbs do express actions but without any specific object on which the action is being done. If there is no object, the sentence is intransitive.

For example:

*Ram sleeps.*

This sentence tells us about the action (sleep) of the subject (Ram), but there is no specific object for the action. On the other hand, a transitive verb requires an object to receive the action.

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**Check Your Progress**

**Question**: Can you think of some verbs which act as:

    i. Transitive verbs ii. Intransitive verbs

    iii. Both transitive and intransitive verbs **Answer**:

**Examples of Sentences with Transitive Verbs (SVO)**

    ⬜ I **bought** a cake.

- He **loves** children.
- They **annoyed** me.
- Roy **threw** a stone.
- I **caught** the ball.
- They **invited** me.
- He **cuts** vegetables.
- She **likes** me.
- The **boy** stole a bike.

**Examples of Sentences with Transitive Verbs (SV)**

    ⬜ She **laughs**. ⬜ They **go**.

- He **walked**.
- The child **will sleep**.

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- He **complains**.
- The sparrows **chirruped**.
- He **fainted**.
- They **have arrived**. □ The old man **died**.

**Examples of Verbs that Act as Transitive Verbs as well as Intransitive Verbs in Sentences**

- I will **play**. (intransitive)
- I will **play** the guitar. (transitive)
- He **sings**. (intransitive)
- He **sings** a song. (transitive)
- They **can speak**. (intransitive)
- They **speak** English. (transitive)
- We **won**! (intransitive)
- We **won** the match. (transitive)

**5) SVOA (Subject + Verb + Object + Adjunct)**

Sometimes, we can add an adjunct to the SVO structure. Adjuncts, as you know, are discretionary elements that supply extra information related to manner, time, location and so on. Consider the following examples: Subject/Verb/Object/Adjunct

They/ have written/ an essay/ neatly.

In this utterance the adjunct function is represented by the adverb ―neatly‖. This adjunct provides additional information regarding the manner in which the subject ―they‖ carry out an action on the object ―an essay‖. Pay attention to the following random examples:

- My sister/ wrote/ the poem/ quickly. [Adjunct of manner]
- I/ met/ him/ yesterday. [Adjunct of time]
- I/ cleaned/ the car/ in the parking. [Adjunct of location/place]

**Check Your Progress**

**Question**: Can you identify the type of adjuncts in the following sentences:
- The CEO stated his policy clearly.
- We attended the meeting yesterday.
- The company organized a function in the ground.
- People throw a lot of garbage on the road.
- I met him regularly. ?

**Answer**:
- The CEO stated his policy **clearly**. [Adjunct of manner]
- We attend the meeting **yesterday**. [Adjunct of time]
- The company organized a function **in the ground**. [Adjunct of location]

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> • People throw a lot of garbage **on the road**. [Adjunct of location/place] ☐ I met him **regularly**. [Adjunct of frequency]

## 6) SVOC (Subject +Verb + Object + Complement)

We can add a complement to the SVO structure. In grammar, a complement is a word, phrase or clause that is necessary to complete the meaning of a given expression. If the complement is removed from a sentence, the sentence cannot convey a complete sense. When a complement fills the same position as the object in the SVO structure, then the complement refers to the same thing as the subject (We have already discussed it.). However, the complement refers to the same thing as the object when it follows the object. For example:

Subject/Verb/Object/Complement

The news/ made/ her/ sad.

It is clear in this example that the complement (―sad‖) refers to the same thing/person as the object (her), i.e. it is ―her‖ who is ―sad‖ and not ―the news‖ that is ―sad‖. Other examples include:

- The parents/ named/ the child/ Shabd.
- The committee/ elected/ Dr. Deepti/ their leader.
- They/ made/ me/ captain.
- They/ elected/ me/ president.
- The news/ made/ his name/ popular.
- She/ made/ him/ happy.
- She/ got/ her shoes/ wet.
- England/ declared/ me/ a jew. ☐ He/ made/ his son/ a doctor.

## 7) SVOO (Subject + Verb + Object + Object)

You have already learnt about direct and indirect objects. When two objects are included in a clause, a distinction is made between the direct object and the indirect object. The direct object is the thing or person undergoing an action, being talked about and so on, and the indirect object is the thing/person which/who is the recipient or beneficiary of the action. In this structure, direct and indirect objects are added to the SVO structure.

**Check Your Progress**

**Question**: Can you identify direct and indirect objects in the following sentences:

- I hit the ball.
- My mother bought me a necklace.
- I told him a story.

**Answer**:

- I hit the ball (direct object).
- My mother bought me (indirect object) a necklace (direct object).

> • I told him (indirect object) a story (direct object).

Consider the following example: ―He sent me a gift.‖ In this sentence, the verb ―sent‖ is for ―the gift‖. It means ―the gift‖ was sent and not ―me‖ was sent. ―Me‖ is the beneficiary of the action. So, ―the gift‖ is the direct object and ―me‖ is the indirect object in the sentence. Pay attention to the following examples:

- I/ wish/ you/ a very happy birthday.
- She/ gave/ him/ a book.
- I/ sent/ her/ a gift.
- He/ sold/ me/ his car.
- I/ gave/ my wife/ a car.
- My father/ showed/ me/ his collection.
- My mother/ gave/ me/ some money.
- The doctor/ prescribed/ her/ medicine.
- The CEO/ offered/ me/ a job.

## 5.7 LET US SUM UP

Words combine in a proper order to make a meaningful sentence. It is important to understand sentence structures to communicate effectively.

On the basis of their functions, sentences can be declarative, interrogative, imperative and exclamatory. A sentence that states, affirms or declares something is called a declarative sentence. A sentence that asks a question is called an interrogative sentence. A sentence that expresses some command, advice, request or entreaty is called an imperative sentence. An exclamatory sentence makes a statement that conveys strong emotions or excitement.

On the basis of their structures, sentences can be categorized as simple, compound, complex and compound-complex sentences. A simple sentence has a subject and a predicate. A compound sentence contains two or more independent clauses. A complex sentence contains one main clause and one or more dependent clauses. A compound-complex sentence has two or more independent clauses and at least one dependent clause.

Most sentences in English are constructed using the following basic sentence patterns:

1) SV (Subject + Verb)
2) SVA (Subject + Verb + Adjunct)
3) SVC (Subject + Verb + Complement)
4) SVO (Subject + Verb + Object)
5) SVOA (Subject + Verb + Object + Adjunct)

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6) SVOC (Subject +Verb + Object + Complement) 7) SVOO (Subject + Verb + Object + Object)

## 5.8 UNIT END EXERCISES

**I. Identify the following sentences on the basis of their functions:**

    a.   The teacher has distributed the question papers.

    b.   Did you come to my home yesterday?

    c.   I stood first in the class.

    d.   Do you like Accounts and English?

    e.   Hurrah! We have won the match.

    f.   Always work hard.

    g.   Do not argue with your elders.

**II. Give two examples of each of the following types of sentences:**

a. Simple Sentences

b. Compound Sentences

c. Complex Sentences

d. Compound-Complex Sentences

**III. Identify the following sentences on the basis of their structures:**

a. Ram works hard.

b. Ram works hard, and he makes a lot of money.

c. Ram will make a lot of money if he works hard.

d. If Ram works hard, he will make a lot of money, and he will build his house.

**IV. Identify the sentence structures of the following sentences:**

    a.   I finished the work.

    b.   I gave him a bat.

    c.   I met him yesterday.

    d.   This made me happy.

    e.   He laughed.

    f.   He speaks loudly.

    g.   He is tall.

## 5.9 ANSWERS TO EXERCISES I.

    **a.** Declarative Sentence

    **b.** Interrogative Sentence

    **c.** Declarative Sentence

    **d.** Interrogative Sentence

    **e.** Exclamatory Sentence

**f.** Imperative Sentence

**g.** Imperative Sentence

**II.**

a. Simple Sentences
   i.      I love coffee.
   ii.     He slept on the couch.

b. Compound Sentences
   i.     She won the prize, and she celebrated her victory.
   ii.    He is very rich, but he is very stingy.

c. Complex Sentences
   i.     Although he was wealthy, he was unhappy. ii.
   She left the house when he insulted her.

d. Compound-Complex Sentences
   i.     I left my wallet at home, so I used my ATM card when I went to the shopping mall.
   ii.    My boss yelled at me, so I quit because I was hurt.

**III.**

Simple Sentence

Compound Sentence

Complex     Sentence    Compound-
Complex Sentence

**IV.**

a. I finished the work. (SVO)

b. I gave him a bat. (SV indirect O direct O)

c. I met him yesterday. (SVOA)

d. This made me happy. (SVOC)

e. He laughed. (SV)

f. He speaks loudly. (SVA)

g. He is tall. (SVC)

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# B.COM (HONS.)

## (Accounting and Taxation)

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## UNIT-6: WORD CLASSES-1: NOUNS, PRONOUNS AND ADJECTIVES

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## STRUCTURE

**6.1 Objectives**

**6.2 Introduction**

**6.3 Nouns**

**6.4 Pronouns**

**6.5 Adjectives**

    **6.5.1 Position of Adjectives**

    **6.5.2 Order of Adjectives**

    **6.5.3 Types of Adjectives**

    **6.5.4 Comparison of Adjectives**

**6.6 Let Us Sum Up**

**6.7 Unit End Exercises**

**6.8 Answers to Exercises**

**6.9 References and Suggested Readings**

### 6.1 OBJECTIVES

After a careful reading of the unit, you will be able to ○ define and provide examples of nouns, pronouns and adjectives; ○ identify and explain different types of nouns, pronouns and adjectives; ○ use nouns, pronouns and adjectives.

### 6.2 INTRODUCTION

Modern English grammar normally refers to four major word classes: nouns, verbs, adjectives and adverbs. The other word classes include prepositions, pronouns, determiners, conjunctions and

interjections. In this unit, first of all, we will learn about different types of nouns. Then, we will study pronouns and adjectives.

Please note that we have explained nouns, pronouns and adjectives in plain English for your convenience. We have given examples from our day-to-day life so that you can learn grammar in context. We hope that you will find this unit very interesting and easy.

This unit is broadly divided into three parts: Nouns, Pronouns and Adjectives. We have prepared some exercises for you. Please complete these before moving on to the answers provided by us at the end of the unit.

## 6.3 NOUNS

Nouns are words used to name people, animals, places, things and abstract ideas.
The highlighted words in the following sentences are nouns:

- **Hari** and **Seeta** are **friends**. ☐ This is my **dog**. ☐ My **cat**'s name is **Tom**.
- The **Jungle** is dense.
- I live in **Patiala**.
- I love **grammar**. ☐ Do you have a **pen**?

‗Noun' is one of the eight parts of speech in the English language. Nouns can be classified as:

- Proper Nouns
- Common Nouns
- Collective Nouns
- Material Nouns

We can also classify nouns on the basis whether they are countable or uncountable:
- Countable Nouns Vs. Uncountable Nouns

We can also classify nouns on the basis whether they can be perceived using one of the five senses (i.e., taste, touch, sight, hearing, smelling) or not:
- Concrete Nouns Vs. Abstract Nouns

Proper nouns refer to specific names of people, organizations, things, etc. To simplify it, let us consider some examples. It is a holiday today when I am writing this lesson. Notably, this day has a specific name, i.e. ‗Sunday'. We can say that the specific name of this day, i.e. ‗Sunday' is an example of proper nouns. Let us take one more example. Do you have a pet at home? If yes, does that pet have a name? I have a dog named Tyson. Tyson is a specific name. Similarly, my friend has a dog named Tuffy. Tyson and Tuffy are two examples of proper nouns. Have you noticed something common about ‗Sunday', ‗Tuffy' and ‗Tyson'? All these proper names start with a capital letter irrespective of the fact where they occur in a sentence. The Taj Mahal, Jalandhar, Parker Pen, Khaitan fan, the Tribune, etc. are some examples of proper nouns.

Let us go back to the example related to ‚Sunday'. Each weekday has its specific name. For example, Monday, Tuesday and Wednesday. All these are examples of proper nouns. However, Monday, Tuesday and Wednesday are related to one another because they belong to one category, i.e. all of these are days. Similarly, Tuffy and Tyson are related to each other because they belong to the same category, i.e. they are ‚dogs'. ‚Dog' and ‚Day' are examples of common nouns. Always remember that a common noun does not refer to one person or thing in particular, but it is common to any and every person or thing of the same kind. Let us take one more example for clarity. India is the specific name of our country; Bangladesh is the name of another country. ‚India' and Bangladesh are examples of proper nouns, whereas ‚country' is an example of common nouns.

Imagine if there are many dogs in my room. Can I use one word to refer to their group? Yes, I can say ‚a pack of dogs'. ‚Pack' is an example of **collective nouns**. A collective noun refers to a group or collection of similar individuals, considered as one complete whole. For example, a group of owls is called ‚parliament'. Similarly, a group of pandas is known as ‚embarrassment'. Is it not interesting? A list of common collective nouns is given below:

Committee
Army
Herd
Public
Staff
Team
Flock
Gang
Class

| Proper Name | Common Name | Collective Noun |
|---|---|---|
| Sohan (Name of a man) | Man (The category to which Shabd belongs) | Group (Referring to many men as a whole/unit) |
| Sakshi | Girl (The category to which Sakshi belongs) | Group (Referring to many girls as a whole/unit) |
| Captain Vikram Batra | Soldier | Army |
| Sachin Tendulkar | Player | Team |
| Nakul Kundra | Teacher | Staff |

Let us take some examples of proper nouns, common nouns and collective nouns:

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Have you seen a hammer? It is made of iron. What about an ice cream, which is made of milk? ‗Iron' and ‗milk' are examples of material nouns. A material noun denotes the matter or substance of which things are made. I wear a ring, which is made of silver. Now you know that ‗silver' is an example of material nouns. Some common material nouns are *oil*, *water*, *rice* and *silk*.

You know that your mother loves you so much. But can you quantify your mother's love? Can you say that your mother loves you 200 kgs or 200 kms? Of course, you cannot do it. Love can be felt through her actions and gestures. You cannot quantify it. The idea of love is in your mind. You interpret some of her gestures and words as a token of her love for you. Or, in other words, these gestures and words are the manifestations of love. ―Love‖ is an example of abstract nouns. If something which is a creation of the mind and seen only with the mental eye, it is called an abstract noun. Let us take another example. There is a bunch of flowers on my study table. These flowers are beautiful. A friend of mine does not find these flowers beautiful. The idea of beauty is in our minds; it is not there outside in the material form. Shakespeare rightly says that beauty lies in the eye of the beholder. ‗Beauty' is another example of abstract nouns. You cannot touch ‗beauty', but you can touch a flower. ‗Flower' is a concrete noun. What do you think about iron, rice, milk and furniture? You can experience this group of nouns with your senses: you can see/smell/touch/taste them. One more thing, you might be surprised that ‗iron' and ‗rice' are material nouns. How can they be concrete nouns? One noun can belong to a number of categories. ‗Iron' and ‗rice' are material nouns (as things are made of them) as well as concrete nouns (as we can touch them).

Do you remember my dog, Tyson? I have **one** dog. I can count the number of dogs in my locality. However, all nouns are not countable. For example, can you count love, English (the language), laughter, advice, behaviour, violence and progress? Can you say ‗two laughters' or ‗three advices'? You do not use such expressions, as they are grammatically unacceptable.

Countable nouns are the names of objects, people, etc. that we can count—

## Knowledge Capsule

**Nouns** are the words that name people, places, animals, things, ideas and emotions. **Proper nouns** are the special or specific names of people, animals, places, objects and events. They always begin with a capital letter. For example: Ram, Microsoft, Crompton and Lamborghini Diablo. **Common nouns** are names of people, animals, places or things of the same kind. For example: student, computer, fan and car. **A collective noun** is the name given to a group of people, animals or things of the same kind, spoken of as one whole. For example: army (of soldiers), swarm (of bees), bunch (of keys), team (of players) and bouquet (of flowers). **Material nouns** refer to a material or substance from which things are made, such as silver, gold, iron, cotton, diamond and plastic. We can also classify nouns on the basis whether they are countable or uncountable. **Countable nouns** are names of items/things/people that can be counted. They may be singular or plural. For example: tree, trees, bus, buses, boy and boys. **Uncountable nouns** are names of items/things that cannot be counted. For example: sugar, water, oil, juice and sky. We can also classify nouns on the basis whether they can be perceived using one of the five senses (i.e., taste, touch, sight, hearing, smelling) or not. **Concrete nouns** are those that we can perceive with one of our five senses— we can see, hear, touch, smell or taste them. For example: flower, car, toy, ball and keys. **Abstract nouns** refer to ideas and concepts that cannot be sensed on a physical level, but are sensed on a mental or emotional level. For example: love, beauty and hate.

**Check Your Progress**

**Question 1**: Fill in the blanks with suitable nouns and mention the types of nouns:

    i.       I have a large____of stamps.

    ii.     There was a_____of bees in my garden. iii.

      ___is the sixth month of the year. iv.    The Taj

      Mahal is in_____.

    v.     Chandigarh is the capital of____.

    vi.    One who attends a school is known as a_____.

    vii.   _____ are kept on the table.

**Answer**:

   i. I have a large **collection** of stamps. (Collective noun) ii.   There

was a **swarm** of bees in my garden. (Collective noun) iii.   **June**

is the sixth month of the year. (Proper noun) iv.   The Taj

Mahal is in **Agra**. (Proper noun)

   v.     Chandigarh is the capital of **Punjab**. (Proper noun) vi.   One

who attends a school is known as a **student**. (Common noun) vii.

   **Books** are kept on the table. (Common noun)

for example, pen, apple and girl. Uncountable nouns are the names of things which we cannot

**Question 2: Choose the most suitable option.**

| | Nouns are _____ |
|---|---|
| (a.) | words that refer to people, places, or things |
| (b.) | words that can replace other nouns to make sentences less repetitive, including I, what, you, none, etc |
| (c.) | words that express strong emotion such as Wow! or Ouch! |
| (d.) | Words that refer to what is happening now |

**Answer**: (a.)

count— for example, milk, oil, sugar, gold and honesty. They mainly denote abstract things and substances.

## 6.4 PRONOUNS

Do you remember any essays you learnt in your pre-primary school? Let me take a very simple one to refer to in the context of our next topic, i.e. pronouns: ‗My Best Friend'. How would you write an essay on ‗My Best Friend'? Would you write it in the following way?

**Ram is my best friend. Ram reads in my class. Ram works hard. Ram always gets good marks. Ram is very punctual.**

Would you start every sentence with the name of your best friend? No. You would write your essay as follows:

**Ram is my best friend. He reads in my class. He works hard. He always gets good marks. He is very punctual.**

You can see that Ram (proper noun) is used in the first sentence to refer to a particular person. In the following sentences, ‗Ram' is replaced with ‗He'. ‗He' is an example of pronouns. Thus, a pronoun is a word which is used instead of a noun. Since a pronoun is used instead of a noun, it must be of the same number, gender and person as the noun it stands for. For example, for Geeta and Hari, we will use the pronoun ‗they'; for Geeta ‗she'; for Hari ‗he'.

Pronouns can be of different types:

- Personal Pronouns
- Reflexive and Emphatic Pronouns
- Demonstrative Pronouns
- Reciprocal Pronouns
- Interrogative Pronouns
- Relative Pronouns
- Distributive Pronouns  Possessive Pronoun

Let us go back to our first example. The example refers to a person, i.e. Ram, and ‗he' has replaced ‗Ram' in the second sentence. ‗He' is a third-person pronoun. If I write something about me, shall I say: ―My name is Nakul. **He** is a teacher.‖? **That is wrong.** The correct pronoun should be a first-person pronoun, i.e. ‗I': ―My name is Nakul. **I** am a teacher.‖ Similarly, If I am to speak about you (the reader/student), I will use a second-person pronoun. For example, ―I am writing this lesson for <u>you</u>.‖ First-person pronouns refer to the speaker (*I*, *we*, *me* and *us*); second-person pronouns refer to the person or people spoken to

(*you*); third-person pronouns refer to another person or thing (she, he, they, etc.). Personal pronouns stand for the three persons, i.e. first person, second person and third person.

| | | | | | **Person** | **Singular** | **Plural** |
|---|---|---|---|---|---|---|---|
| | | | | Subject | Object | Subject | Object |
| First Person | I | Me | We | Us | | | |
| Second Person | You | You | You | You | | | |
| Third Person | He, She, It | Him, Her, It | | | They   Them | | |

> **A pronoun** is a word used in place of a noun. Pronouns include *I, me, we, us, you, he, him, her, it, they, them, them, mine, ours, yours, his, hers* and *theirs*. **Personal pronouns** are used in place of the names of persons, animals and things.

**Check Your Progress**
**Question**: **Choose the most suitable option.**
―What did she ask you to do?‖ What is ‗she' in this sentence?
a)      Conjunction
b)      Preposition
c)      Pronoun
d)      Noun
**Answer:** (c)

Sometimes when a student appears in an interview, he/she is asked to introduce himself/herself. It is often seen that some students start their introduction with a sentence like the following: ―Myself is Ayra/Arun.‖ Dear students, this sentence is grammatically unacceptable. ‗Myself' is a pronoun, which never comes at the beginning of a sentence. Pay attention to the following two sentences to understand how ‗myself' can be used in sentences:

*   I myself will do the work. ☐ I saw myself in the mirror.

In the first sentence, I am emphasizing that I will do the work. I am implicitly laying stress on the point that I will do the work of my own without anyone's help or contribution. Here, ‗myself' is used as an emphatic pronoun. In the second sentence, the action of ‗seeing' reflects back on me (myself). [On the contrary, in ‗I kicked the ball', the action of ‗kicking' is transferred to an object and does not come back to me. But if I say ―I kicked myself, the action comes back to me.‖]. Here, ‗myself' is used as a reflexive pronoun. In simple words, we can say that a reflexive pronoun is used to show the person (or thing) does something to himself/herself (itself). It is

important to note that this pronoun refers to the same person, i.e. the subject. It is called ‗reflexive pronoun' because the action of the subject reflects upon itself.

| Person | Singular | Plural |
|---|---|---|
| 1 st | myself | ourselves |
| 2 nd | yourself | yourselves |
| 3rd | Himself, herself, itself | themselves |

Some examples of reflexive and emphatic pronouns are as follows:

- I **myself** did not meet him. (Emphatic pronoun)
- He painted the picture **himself**. (Emphatic pronoun)
- I hurt **myself**. (Reflexive pronoun)
- They insulted **themselves**. (Reflexive pronoun)

> **Emphatic and reflexive pronouns:**
> Reflexive and emphatic pronouns are words like *myself, yourself, himself, herself, itself, ourselves, yourselves* and *themselves*. A pronoun is a reflexive one if the action of the subject reflects upon the doer. Emphatic pronouns, on the other hand, are used to just emphasize the action of the subject.

> **Check Your Progress**
> **Question**: ―Now onwards, I myself will do it and become an IAS officer.‖ What is ‗myself' in this sentence?
> a)      Emphatic pronoun
> b)      Reflexive pronoun
> c)      Personal pronoun
> d)      Demonstrative pronoun **Answer:** (a)

When I bought my first water filter, I did not know how to use it. I contacted the company that had manufactured it. Within two days, a salesman came to my house to DEMONSTRATE how their water filter worked. He said, ―Sir, **this** is the best filter in the world.‖ Similarly, when I was to buy a new car, a salesman came to give me a demo (**demonstration**). He showed me the car and said: ―**That**'s the best car in the world.‖ ‗This' and ‗that' are examples of demonstrative pronouns, as they point out the objects which they refer to. Have a look at the following sentences:

- **This** is a list of the rules.

- **That** looks boring.
- **These** are exceptionally bright students.
- **Those** are difficult questions to answer.

When **this**, **that**, **these** and **those** are used as pronouns, they are called demonstrative pronouns.

> **Demonstrative pronouns** point out a person or thing. There are four demonstrative pronouns: this and that (for singular words) and these and those (for plural words).

Once when I came back home, I realized that someone had stolen my dog. Of course, I did not know the culprit was. ‗Someone' refers to a person I do not exactly know who he/she is. ‗Someone' is an example of indefinite pronouns.

Here is a list of indefinite pronouns:

Anybody, anyone, anything, everybody, everything, everyone, nobody, no one, nothing, somebody, someone, something, many and several

An indefinite pronoun refers to a person or thing only in a general way (Not ‗definite'!). For example,

**One** should do one's duty.

**All** are busy with their work.

**A few** remained there to tell the story of their misfortune.

> **Indefinite pronouns** are used when referring to something non-specific (e.g., ‗everyone' or ‗everything') or something unknown (e.g., ‗someone' or ‗something').

I love to spend time in the company of kids. I love to share my mind and heart with them. I think God manifests through them on earth. I love my son and he reciprocates my love. I can say that we love each other. ‗Each other' is an example of reciprocal pronouns. ‗Each other' is used to refer to a reciprocal action between two persons. If more than two persons are involved in a similar situation, we use ‗one another'. For example, there are five members in my family. We love one another.

‗Each other' and ‗one another' are called reciprocal pronouns. They are used to say that people do the same thing, feel the same way or have the same relationship.

> **Reciprocal pronouns** express a mutual relationship or action. In English, we use ‗each other' and ‗one another' for this purpose.

I have told you that there are five members in my family. Each has a very important role to play in my life. In the preceding sentence, I have used the word ‗each' to refer to every single person in the group, one at a time. ‗Each' is an example of distributive pronouns. Distributive pronouns distribute attention to each unit in a group. They are always singular and are, therefore, followed by a verb in the singular form. ‗Each', ‗either' and ‗neither' are examples of distributive pronouns.

> **A distributive pronoun** considers members of a group separately, rather than collectively.

Today, I was surprised to see a beautiful vase on my table. I was almost sure that my wife had bought it for me. Nevertheless, I asked her, ―Who has brought this vase?‖ In this sentence, ‗who' is used for my wife (a person), whose name is Sakshi. ‗Sakshi' (being a name) is a noun and if I use any word that stands for/replaces it, that word will be a pronoun. ‗Who' is a pronoun in the above-mentioned sentence. Since ‗who' is used to ask a question, it is an interrogative pronoun. We use interrogative pronouns to ask questions. These pronouns are: **who**, **which**, **whom**, **what** and **whose**. These are also known as wh-words. Questions using these are called wh-questions:

- o **Who** met with an accident last night? o **Which** is your pen? o **Whom** do I ask for at the desk? o **What** did you do when the water supply was interrupted?
- o **Whose** are these books?

The **interrogative pronouns** *who*, *whom* and *whose* are used to refer to people. The interrogative pronouns *which* and *what* are used to refer to things.

|        | Subject        | Object         | Possessive |
|--------|----------------|----------------|------------|
| People | Who            | Whom           | Whose      |
| Things | Which<br>What  | Which<br>What  |            |

> **Interrogative pronouns:**
> Interrogative pronouns are pronouns that ask questions. An interrogative pronoun takes the place of the unknown information the question asks about.
>
> The five main interrogative pronouns in English are:
> *what* (subject or object pronoun that asks about a thing)
> *which* (subject or object pronoun that asks about a person or thing)
> *who* (subject pronoun that asks about a person) *whom* (object pronoun that asks about a person) *whose* (possessive pronoun that

| asks about a person) |
| --- |

I really respect my friend who has bought a painting for me. Here, ‗who' is a pronoun, as it is used for a person/my friend (noun). I would like to draw your attention to the fact that ‗who' in the first sentence is not used to ask questions. So, it is not an interrogative pronoun. It is used to introduce a relative clause. Relative clauses tell us more about people and things:

My brother, **who has done PhD in English**, is going abroad.

This is the house **that my grandfather built in 1947**. We

use:

- *who* and *whom* for **people**

- *which* for **things**

- *that* for **people or things**.

*Cambridge Advanced Learner's Dictionary* draws our attention to the point why *where*, *when* and *why* are not relative pronouns even when we use them to make relative clauses:

―In informal language, we often use *where*, *when* or *why* to introduce defining relative clauses instead of *at which*, *on which* or *for which*.‖

| *where* | places | *I know <u>a restaurant</u> **where** the food is excellent.* |
| --- | --- | --- |
| | | *(… a restaurant at which the food is excellent)* |
| *when* | times | *There isn't <u>a day</u> **when** I don't feel rushed off my feet.* |
| | | *(… a day on which I don't feel rushed …)* |
| *why* | reasons | *Do you know <u>the reason</u> **why** the shop is closed today?* |
| | | *(… the reason for which the shop is closed …)* |

(Source: https://dictionary.cambridge.org/grammar/british-grammar/relative-pronouns)

―Where‖ is considered a relative adverb. It replaces ―in which‖/ ―at which‖. In other words, it is not a replacement for the relative pronoun ―which‖. Similarly, ―when‖ and ―why‖ do not qualify to be called relative pronouns.

> **A relative pronoun** is a word that introduces a dependent (or relative) clause and connects it to an independent clause.

The pen with which I am writing this lesson is not my pen. This is Ram‗s pen. In other words, I can refer to it as ‗a pen of Ram‘/ ‗a pen of his‘. ‗His‘ is an example of possessive pronouns, as ‗his‘ stands for ‗Ram‘, a noun. Possessive pronouns show that something/someone belongs to someone/something. Always remember that possessive pronouns do show ownership, but they do not come before nouns or in noun phrases [we cannot say ‗mine pens‘, ‗hers pens‘, etc.]. They stand alone. A list of some possessive pronouns is as follows:

*Mine*, *ours*, *yours*, *his*, *hers*, *its* and *theirs*

(‗His‘ is a possessive pronoun as well as a possessive adjective. Consider the following sentence: ‗His life is full of fun.‘ Here, ‗his‘ in ‗his life‘ is a possessive adjective. Now consider another example: ‗This is my pen so that one must be his.‘ In this sentence, ‗his‘ is a possessive pronoun.)

For example:

- The house on the corner is <u>ours</u>.
- Did you know that the book is <u>mine</u>?
- They shall finally have what is <u>theirs</u>.
- The dog is <u>hers</u>.
- The bag is <u>his</u>.

‗Ram‘ is used in the above-mentioned example to make you understand how ‗his‘ stands for ‗Ram‘. Usually, when a living being owns something, we use an apostrophe (‘) and ―s‖. And when a non-living thing ―owns‖ something, we use ―of‖. For example:

- Nakul‗s pen
- The cap of the pen

So, we should use ‗Ram‗s pen‘ while referring to the pen. Or, we can say: ―The pen is his.‖ But do

> **A possessive pronoun** shows possession, belonging or ownership. Examples: *mine, yours*, and *theirs*.

**Check Your Progress**

**Question:** Underline the pronouns in the sentences given below and write what type they are.

  i.   The watch is hers.
  ii.  We ourselves will do this work. iii.   I
saw myself in the mirror. iv.      Who
broke this slate?
  v.   I met Ram, who is my classmate. vi.
       Eat either of these two apples. vii.
       These are our clothes. viii.    Never
abuse others.
  ix.  She is sleeping.
  x.   What is your father?
  xi.  Whom did you see yesterday? xii. Tell me the name of the child whom you want
to help. xiii. Each of you can dance. xiv. One should do one's duty.
  xv.          We love each other.

**Answer:**
  i.   The watch is **hers** (Possessive pronoun).
  ii.  **We** (Personal pronoun) **ourselves** (Emphatic pronoun) will do this work.
  iii. I saw **myself** (Reflexive pronoun) in the mirror. iv. **Who** (Interrogative pronoun)
broke this slate?
  v.   **I** (Personal pronoun) met Ram, **who** (Relative pronoun) is wearing a blue
          shirt. vi.     Eat **either** (Distributive pronoun) of these
two apples. vii.      **These** (Demonstrative pronoun) are our
clothes. viii.        Never abuse **others** (Indefinite pronoun). ix.
       **She** (Personal pronoun) is sleeping.
  x.   **What** (Interrogative pronoun) is your father?
  xi.  **Whom** (Interrogative pronoun) did **you** (Personal pronoun) see yesterday? xii.
       Tell me (Personal pronoun) the name of the child **whom** (Relative pronoun)
       **you** (Personal pronoun) want to help.
  xiii.        **Each** (Distributive pronoun) of **you** (Personal pronoun) can dance.
  xiv.         **One** (Indefinite pronoun) should do **one"s** (Indefinite pronoun) duty.
  xv.          **We** (Personal pronoun) love **each other** (Reciprocal pronoun).

not use the expression: _the pen of Ram'.


## 6.5 ADJECTIVES


_Pen' is the name of an object, so it falls into the category of nouns. I have two pens. One is black and another is blue. _Black' and _blue' are the qualities of the pens (noun), and they are examples of adjectives.

All of us have different qualities that make us unique as well as different from others. Someone may be fair or dark; someone may be slim or fat; someone may be tall or short. Fair, dark, slim, fat, tall and short are also examples of adjectives. Adjectives are the words which show or describe the quality of a noun/pronoun, i.e. the appearance, colour, size, nature of the thing, place or person indicated in the noun. We may say that adjectives give us more information about nouns and pronouns.


- Raj Lakshmi is a beautiful girl. (The adjective _beautiful' describes the noun _girl'.)
- Raj Kumar is a handsome boy. (The adjective _handsome' describes the noun _boy'.)

**Check Your Progress**

**Question: Choose the most suitable option.**

|  | Adjective is |
|---|---|
| (a.) | a noun that receives the action in the sentence, such as —Susie went to the store‖ where —store‖ is the object |
| (b.) | something that indicates ownership, such as _mine' |
| (c.) | a word or words that modify a noun. For instance, _bright', _great', or _soft' |
| (d.) | a word that refers to people, places, or things |

**Answer:** (c)

### 6.5.1 Position of Adjectives
- A **rich** man left his wallet here.  He is **rich**.

In these sentences, _rich' acts as an adjective. In the first sentence, it occurs before the noun _man' and describes it. On the other hand, in the second sentence, it occurs after the verb _is' and semantically refers back to the subject _he'. In the first sentence, _rich' is an attributive adjective, and in the second sentence, it is a predicative adjective.

An attributive adjective comes before a noun and qualifies it or classifies it. For example:
- An **innocent** man shouted at me.
- The government has given us the **golden** opportunity to take the exam again.
   **Dry** cough has caused a number of problems.

A predicative adjective comes after a verb and semantically refers back to the subject. For example,

- Shabd looked **innocent.**
- Ayra is **happy**. ☐ Anadhi is **young**.

Most adjectives can act as attributive adjectives as well as predicative adjectives. For example:
He is **handsome**. A **handsome** boy looked at me.

However, there are some adjectives that occur either as predicative adjectives or attributive adjectives. Some examples of those adjectives that occur as attributively only are as follows:

- He is my **former** colleague. (We cannot say: My colleague is former.)
- He is my **elder** brother. (We cannot say: My brother is elder.)
- Let us attend **remedial** classes. (We cannot say: The classes are remedial.)

The following are a few examples of those adjectives which are used only predicatively:

- I am **afraid**. (We cannot say: He is an afraid boy.)
- She is **asleep**. (We cannot say: She is an asleep girl.)

| Check Your Progress |
| --- |
| **Question: Can you specify predicative and attributive adjectives in the following sentences?** |

 i.  The pretty girl smiled at me.
 ii.  I am happy.
 iii.  He opened the wooden door.
 iv.  The grapes are green.
 v.  You look tired.
 vi.  She was carrying a heavy suitcase.
 vii.  This bomb is dangerous.
 viii.  Hari was the eighth participant.
 ix.  This vicious crime was committed by a mad man.
 x.  He lives in a big house.

**Answer:**
 i.  The pretty girl smiled at me. (Pretty: attributive adjective)
 ii.  I am happy. (Happy: predicative adjective)
 iii.  He opened the wooden door. (Wooden: attributive adjective)
 iv.  The grapes are green. (Green: predicative adjective)
 v.  You look tired. (Tired: predicative adjective)

| vi. | She was carrying a heavy suitcase. (Heavy: attributive adjective) |
| vii. | This bomb is dangerous. (Dangerous: predicative adjective) |
| viii. | Hari was the eighth participant. (Eighth: attributive adjective) |
| ix. | This vicious crime was committed by a mad man. (Vicious, Mad: attributive adjectives) |
| x. | He lives in a big house. (Big: attributive adjective) |

- The boy is **ready**. (We cannot say: He is a ready boy.)

## 6.5.2 Order of Adjectives

**Let us take one example: "I love new white pants." Can I say: "I love white new pants." ?**
No! That sounds quite odd. Adjectives are usually placed in the following order:

**Opinion + Size + Quality + Shape + Age + Colour + Origin + Material + Type + Purpose**

**For example:**

It is a long, wide, metal brush. (Size + Shape + Material)
Panettone is a round, Italian, bread-like Christmas cake. (Shape + Origin + Type)

She was a beautiful, tall, thin, old, grey-haired Indian woman. (Opinion + Size + Quality + Age + Colour + Origin)

## 6.5.3 Types of Adjectives

- Adjectives of Quality (Descriptive adjective)
- Adjectives of Number (Numeral adjective)
- Adjectives of Quantity
- Possessive Adjective
- Demonstrative Adjective
- Interrogative Adjective
- Distributive Adjective

I have a black dog. It is very faithful. ‗Black' and ‗faithful' describe the dog (noun); they are adjectives. [Remember that adjectives are the words that describe nouns and pronouns.] Adjectives of quality (Descriptive adjective) are those adjectives that show what quality or in what state persons or things are (they tell us ‗what kind')—for example, a faithful dog, a black dog, a brave boy, a careful student and an industrious workman.

I have two pens and five books. ‗Two' and ‗five' are examples of Adjectives of number (numeral adjectives), which denote:

      (i)      how many persons or things are referred to (they tell us ‗how many') or

      (ii)      in what order a person or thing stands (they tell us ‗in what order').

Numeral adjectives can be of two types: Definite and Indefinite adjectives. A definite adjective denotes an exact number, whereas an indefinite adjective refers to an indefinite number (without saying precisely what the number is). Some examples are given below:

| Definite | Indefinite |
|---|---|
| Five pens | All men |
| Ten boys | No men |
| First person | Many men |
| Third Bus | Several men |

The definite numerical adjectives ‗five' and ‗ten' tell us about the number of pens and boys respectively (‗how many'), whereas ‗first' and ‗third' refer to the order of ‗person' and ‗bus' respectively. Those definite numeral adjectives that show ‗how many' persons or things (For example, one, two, three, four, etc.) are called cardinals, and those definite numeral adjectives that show ‗the serial order' in which a person or thing stands (For example: first, second, third, etc.) are called ordinals.
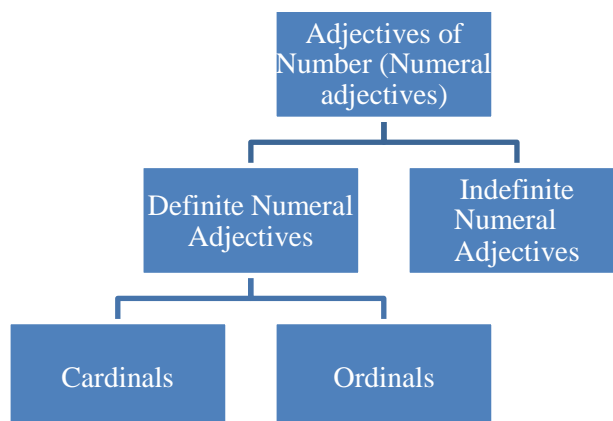


I know that you are quite confused to see ‗all', ‗many' and ‗several' as examples of indefinite numeral adjectives when we have studied them as indefinite pronouns. These words can be used as adjectives as well as pronouns. Their usage decides whether they occur as adjectives or pronouns.

The words that are used to describe nouns are adjectives, whereas the words that replace nouns are pronouns.

All

As a pronoun: <u>All</u> can relax.

Here, ‚all' stands for all the members of a group/ people.

As an adjective: <u>All</u> men will go.

Here, ‚all' tells us about ‚men' (noun), i.e. all (not one or two) men will go. It gives us more information about ‚men' (noun).

(Have you noticed that ‚all' as a pronoun occurs alone, and it as an adjective is followed by a noun [men]?)

Many

As a pronoun: We were hoping to sell our old books, but <u>many</u> were not in good condition. As an adjective: He said goodbye to his <u>many</u> friends.

Several

As a pronoun: Not any one drug will suit or work for everyone and sometimes <u>several</u> may have to be tried.

As an adjective: It took <u>several</u> days for the package to arrive.

My father gifted me a new set of books on my birthday. However, there isn't <u>enough</u> space in my book almirah. In the preceding sentence, ‚enough' is an example of Adjectives of quantity, which answer the question ‚how much' but do not indicate the quantity in definite numbers. The chief adjectives of this class are: **much**, **little**, **no**, **some**, **any**, **enough**, **sufficient**, **half**, **all**, **whole** and **half**.

| Possessive Adjective | Possessive Pronoun |
|---|---|
| Possessive adjectives are used to show that someone/something belongs to or is connected in some way with someone or something. | Possessive pronouns are used to show that something/someone belongs to someone/something. |

| | |
|---|---|
| **When** the words *my*, *his*, *her*, *its*, *our*, *your* and *there* are **used attributively before a noun**, they are called possessive adjectives. For example: My friend, your book and their house. | The words *mine*, *his*, *hers*, *its*, *ours*, *yours* and *theirs* are called possessive pronouns.<br><br>(‗His' is a possessive pronoun as well as a possessive adjective. Consider the following sentence: ‗His life is full of fun.'<br><br>Here, ‗his' in ‗his life' is a possessive adjective. Now consider another example: ‗This is my pen so that one must be his.' In this sentence, ‗his' is a possessive pronoun.)<br><br>Always remember that possessive pronouns do show ownership, but they do not come before nouns or in noun phrases. **They stand alone**. |
| For example:<br><br>• <u>Our</u> house is on the corner.<br>• Did you know that it is <u>my</u> book?<br>• They shall finally have <u>their</u> property.<br>• It is <u>her</u> dog.<br>• It is <u>his</u> bag. | For example:<br><br>• The house on the corner is <u>ours</u>.<br>• Did you know that the book is <u>mine</u>?<br>• They shall finally have what is <u>theirs</u>.<br>• The dog is <u>hers</u>.<br>• The bag is <u>his</u>. |
| They are adjectives because they give us extra information about nouns/pronouns. For example, <u>our</u> house is on the corner.<br>In this sentence, ‗our' comes before the noun ‗house' and gives us some information about the house that | They are pronouns because they stand for or replace nouns. For example, the pen with which I am writing this lesson is not my pen. This is Ram's pen. In other words, I can refer to it as ‗a pen of Ram'/ ‗a pen of |

| | |
|---|---|
| it is not owned by someone else but by us. | his'. \_His' is an example of possessive pronouns, as \_his' stands for/replaces \_Ram', a noun.<br><br>[\_A pen of Ram' is used in the above-mentioned example to make you understand how \_his' stands for \_Ram'. Usually, when a living being owns something, we use an apostrophe (') and \_s'. When a non-living thing \_owns' something, we use \_of'.] |

The words \_some', \_enough', \_all', \_no' and \_none' can function as adjectives of number as well as adjectives of quantity depending upon the context.

- If the noun is material or abstract, the adjective is quantitative. For example, I can see <u>enough</u> juice in the jug. (Quantitative adjective).
- If the noun is common, then the adjective is numeral. For example, <u>Enough</u> students have taken admission this year (Numeral adjective).

Let us take some examples:

- I have <u>no</u> idea about the risks involved in it. (Quantitative adjective)
- <u>No</u> man was allowed there. (Numeral adjective)

Now you are to read about Possessive Adjectives, Interrogative Adjectives, Distributive Adjectives and Demonstrative Adjectives. Since you have already read about Possessive Pronouns, Interrogative Pronouns, Distributive Pronouns and Demonstrative Pronouns, you already understand the spirit behind the four pertinent words, i.e. \_possessive', \_demonstrative', \_distributive' and \_interrogative'.

Possessive: To show a sense of ownership.
Demonstrative: To point out the objects being referred to.
Distributive: To distribute attention to each unit in a group.
Interrogative: To ask questions.

Let us study these words in the context of adjectives and pronouns:

| Demonstrative Adjectives | Demonstrative Pronouns |
|---|---|

| | |
|---|---|
| When I bought my first water filter, I did not know how to use it. I contacted the company that had manufactured it. Within two days, a salesman came to my house to DEMONSTRATE how their water filter worked. He asked me, ―Sir, is this filter not working?‖ Similarly, when I was to buy a new car, a salesman came to give me a demo (demonstration). He showed me the car and said: ―That car is the best in this segment.‖ ‗This‘ and ‗that‘ are examples of demonstrative adjectives, as they point out the objects which they refer to. | When I bought my first water filter, I did not know how to use it. I contacted the company that had manufactured it. Within two days, a salesman came to my house to DEMONSTRATE how their water filter worked. He said, ―Sir, this is the best filter in the world.‖ Similarly, when I was to buy a new car, a salesman came to give me a demo (demonstration). He showed me the car and said: ―That is the best car in the world.‖ ‗This‘ and ‗that‘ are examples of demonstrative pronouns, as they point out the objects which they refer to. . |
| A demonstrative adjective modifies the noun and is always followed by the noun. (It always comes before the noun.)<br>For example, *this* filter, *that* car, *this* segment. | Nouns are not used with demonstrative pronouns.<br>For example, *this*, *that*. |
| Have a look at the following sentences:<br>• <u>This</u> food is good.<br>• <u>That</u> scooter is old.<br>• <u>These</u> tables are antique.<br>• <u>Those</u> boys are clever. | Have a look at the following sentences:<br>• <u>This</u> is a list of the rules.<br>• <u>That</u> looks boring.<br>• <u>These</u> are exceptionally bright students.<br>• <u>Those</u> are difficult questions to answer. |
| When ‗this‘, ‗that‘, ‗these‘ and ‗those‘ are used as adjectives, they are called demonstrative adjectives. | When ‗this‘, ‗that‘, ‗these‘ and ‗those‘ are used as pronouns, they are called demonstrative pronouns. |
| They are adjectives because they give us extra information about nouns/pronouns. For example:<br><u>Those</u> boys are clever.<br>In this sentence, ‗those‘ comes before the noun ‗boys‘ and gives us some information about the boys and makes it clear that ‗those‘ boys are clever (not ‗these‘!) | They are pronouns because they stand for or replace nouns. For example: <u>These</u> are exceptionally bright students.<br>In this sentence, ‗these‘ does not come with any noun. In fact, it stands for or represents the noun ‗students‘. |

There are four demonstratives in the English language—this, that, these and those—and they can appear in sentences as demonstrative pronouns and/or demonstrative adjectives. *This* and *That* are used with singular nouns, and *these* and *those* are used with plural nouns.

Distributive adjectives and pronouns show that the persons or things named are taken separately or in separate lots. They are ‗each', ‗every', ‗either' and ‗neither'.

| Distributive Adjectives | Distributive Pronouns |
|---|---|
| I have told you that there are five members in my family. Each member has a very important role to play in my life. In the preceding sentence, I have used the expression ‗each member' to refer to every single person in the group, one at a time. ‗Each' in ‗each member' is an example of distributive adjectives. Distributive adjectives distribute attention to each unit in a group. They are always singular and are, therefore, followed by a verb in the singular form. ‗Each', ‗every', ‗either' and ‗neither' are examples of distributive adjectives. | I have told you that there are five members in my family. Each has a very important role to play in my life. In the preceding sentence, I have used the word ‗each' to refer to every single person in the group, one at a time. ‗Each' is an example of distributive pronouns. Distributive pronouns distribute attention to each unit in a group. They are always singular and are, therefore, followed by a verb in the singular form. ‗Each', ‗either' and ‗neither' are examples of distributive pronouns. |
| Distributive adjectives are modifying words that are followed by nouns. For example: each member | Distributive Pronouns are used as either the subject or object in a sentence. **They stand alone** and are never followed by nouns. For example: each |
| For example:<br>• Take this medicine every four hours.<br>• You should take neither side.<br>• Every man wanted to win the race.<br>• Take either side, whichever you prefer. | For example:<br>• Each of these pictures is beautiful.<br>• We may take either of these two pens.<br>• Neither of them speaks well.<br>• Each of those boys goes to school. |

Interrogative adjectives and pronouns are used to ask questions.

| Interrogative Adjectives | Interrogative Pronouns |
|---|---|
| Interrogative adjectives modify nouns by asking questions. They are *whose*, *what* and *which*. | Interrogative pronouns help us ask questions and at the same time do the work of nouns they stand for. They are |

| | *who*, *which*, *whom*, *what* and *whose*. |
|---|---|
| **For example:** | **For example:** |
| • Whose laptop is this? | • Who took my umbrella? |
| • What scooter has she opted for? | • Whom did you meet? |
| • Which way is Devi Mandir? | • What is that noise? |
| • Which name have you liked? | • What did they eat? |

**Knowledge Capsule**

**Adjectives** are words that describe nouns or pronouns. They remain the same for singular and plural nouns and pronouns. **Adjectives of quality** (Descriptive adjectives) show the kind and quality of a person or thing.

**Adjectives of number** (Numeral adjectives) show the number or serial order of persons or things. **Adjectives of quantity** show how much (quantity) of a thing is meant. **Possessive adjectives** modify nouns by showing possession or ownership. **Demonstrative adjectives** point out which person or thing is meant. **Interrogative adjectives** are used to ask questions. **Distributive adjectives** refer to each one of a number. An Adjective used to refer to each and every person, thing separately is called **Distributive adjective**.

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**Check Your Progress**

**Question: Identify the adjectives in the following sentences and state their kind.**

1. Jalandhar is a big city.
2. I ate some rice.
3. The foolish man spilled some milk on the floor.
4. She has five pens.
5. June is the sixth month of the year.
6. The teacher appreciated every boy.
7. Neither accusation is true.
8. Those girls are her friends.
9. A lazy boy is still sleeping.
10. Could you please add more sugar to my tea?
11. These cows are white.
12. Each boy took his seat.
13. Which slate is yours?
14. Our books are in the bag.
15. Whose purse is that?

**Answer:**

1. Jalandhar is a big city. ‗Big' is an adjective of quality.

2. I ate some rice. ‗Some' is an adjective of quantity.

3. The foolish man spilled some milk on the floor. ‗Foolish' is an adjective of quality. ‗Some' is an adjective of quantity.

4. She has five pens. ‗Five' is an adjective of number.

5. June is the sixth month of the year. ‗Sixth' is an adjective of number.

6. The teacher appreciated every boy. ‗Every' is a distributive adjective.

7. Neither accusation is true. ‗Neither' is a distributive adjective. ‗True' is an adjective of quality.

8. Those girls are her friends. ‗Those' is a demonstrative adjective. ‗Her' is a possessive adjective.

9. A lazy boy is still sleeping. ‗Lazy' is an adjective of quality.

10. Could you please add more sugar to my tea? ‗More' is an adjective of quantity.

11. These cows are white. ‗These' is a demonstrative adjective. ‗White' is an adjective of quality.

12. Each boy took his seat. ‗Each' is a distributive adjective.

13. Which slate is yours? ‗Which' is an interrogative adjective.

14. Our books are in the bag. ‗Our' is a possessive adjective.

15. Whose purse is that? ‗Whose' is an interrogative adjective.

### 6.5.4 Comparison of Adjectives

There are three degrees of comparison:

- Positive degree: He is tall.
- Comparative degree: He is taller than his brother.
- Superlative degree: He is the tallest among his brothers and sisters.

| Positive | Comparative | Superlative |
|---|---|---|
| Sweet | Sweeter | Sweetest |
| Young | Younger | Youngest |
| Happy | Happier | Happiest |
| Easy | Easier | Easiest |
| Thin | Thinner | Thinnest |
| Hot | Hotter | Hottest |
| Beautiful | More Beautiful | Most Beautiful |
| Difficult | More Difficult | Most Difficult |
| Good | Better | Best |
| Bad | Worse | Worst |

The positive degree denotes the existence of some quality. It is used in isolation (without any comparison). However, if there is any comparison between two persons or things, the comparative degree is used to denote a higher degree of quality than the positive. The superlative degree shows the highest/best/lowest/worst in the group.

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**Check Your Progress**

**Question: Supply the proper form of the Adjectives:**

1. Good: How is your sister feeling after her operation? Is she _____?

2. Bad:   It is one of the___movies I have ever seen.

3. Tall: He is _____ than his brother.

4. Great: Shakespeare is the_____writer of all times.

5. Slow: This machine is__than the other machine.

6. Beautiful: It is the_____painting of the town.

7. Light: Silver is__than gold.

8. Precious: Diamonds are_than gold.

9. Old: He is the___man in our locality.

10: Rich: He is a___man.

**Answer:**

1. How is your sister feeling after her operation? She was in pain yesterday. Is she better?

2. It is one of the worst movies I have ever seen.

3. He is taller than his brother.

4. Shakespeare is the greatest writer of all times.

5. This machine is slower than the other machine.

6. It is the most beautiful painting of the town.

7. Silver is lighter than gold.

8. Diamonds are more precious than gold.

9. He is the oldest man in our locality.

10: He is a rich man.

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## 6.6 LET US SUM UP

Nouns are the words used for names of persons, places, things or ideas. They can be categorized as
- Proper Nouns

- Common Nouns
- Collective Nouns
- Material Nouns
- Countable Nouns Vs. Uncountable Nouns
- Concrete Nouns Vs. Abstract Nouns

We use pronouns in place of nouns and noun phrases. Pronouns can be of different types:
- Personal Pronouns
- Reflexive and Emphatic Pronouns
- Demonstrative Pronouns
- Reciprocal Pronouns
- Interrogative Pronouns
- Relative Pronouns
- Distributive Pronouns
- Possessive Pronoun

Adjectives give us more information about people, animals or things represented by nouns and pronouns. They can be of the following types:
- Adjectives of Quality (Descriptive adjective)
- Adjectives of Number (Numeral adjective)
- Adjectives of Quantity
- Possessive Adjective
- Demonstrative Adjective
- Interrogative Adjective
- Distributive Adjective

## **6.7 UNIT END EXERCISES**
**Exercise-I**

Read the following sentences and identify the types of nouns in the following sentences:
1. The Ganges is a famous river in India.
2. We live in a village.
3. The jury hated it.
4. Oil is used in it.
5. Gold is very costly.
6. We should love children.
7. Ram lives in Jalandhar.

**Exercise-II**
Read the following sentences and identify the types of pronouns in the following sentences:
1. We are playing.

2. I slapped <u>myself</u> for wasting my time.
3. I <u>myself</u> cleaned the house.
4. <u>Few</u> know of his reality.
5. <u>Each</u> of the boys has revived a gift.
6. Naresh and Nirmal like <u>each other</u>.
7. The book, <u>which</u> I bought on Sunday, is lost.
8. <u>Who</u> has won the prize?

## Exercise-III
Read the following sentences and identify the types of adjectives in the following sentences:
1. I have <u>five</u> pens.
2. I have a <u>blue</u> pen.
3. The <u>seventh</u> boy in the row is <u>intelligent</u>.
4. <u>Many</u> pens were kept on the table.
5. <u>My</u> books are in the bag.
6. <u>Whose</u> books are these?
7. <u>Every</u> person wanted to win the race.
8. <u>These</u> men are working hard.

## 6.8 ANSWERS TO EXERCISES

### Exercise-I

1. The Ganges (proper noun), River (common noun), and India (proper noun)
2. Village (common noun)
3. Jury (collective noun)
4. Oil (material noun, concrete noun)
5. Gold (material noun, concrete noun)
6. Children (common noun)
7. Ram (proper noun), Jalandhar (proper noun)

### Exercise-II

1. <u>We</u> are playing. (Personal Pronoun)
2. I slapped <u>myself</u> for wasting my time. (Reflexive Pronoun)
3. I <u>myself</u> cleaned the house. (Emphatic Pronoun)
4. <u>Few</u> know of his reality. (Indefinite Pronoun)
5. <u>Each</u> of the boys has revived a gift. (Distributive Pronoun)

6. Naresh and Nirmal like <u>each other</u>. (Reciprocal Pronoun)
7. The book, <u>which</u> I bought on Sunday, is lost. (Relative Pronoun)
8. <u>Who</u> has won the prize? (Interrogative Pronoun)

## **Exercise-III**

1. I have <u>five</u> pens. (Definite Numeral Adjective-Cardinal)
2. I have a <u>blue</u> pen. (Descriptive adjective)
3. The <u>seventh</u> boy in the row is <u>intelligent</u>. (Definite Numeral Adjective- Ordinal), (Descriptive adjective)
4. <u>Many</u> pens were kept on the table. (Indefinite Numeral Adjective)
5. <u>My</u> books are in the bag. (Possessive Adjective)
6. <u>Whose</u> books are these? (Interrogative Adjective)
7. <u>Every</u> person wanted to win the race. (Distributive Adjective)
8. <u>These</u> men are working hard. (Demonstrative Adjective)

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# **B.COM (HONS.)**
## **(Accounting and Taxation)**
### **SEMESTER-II**
### **COURSE: ENGLISH COMPULSORY-1**

### **UNIT-7: WORD CLASSES-II: VERBS AND ADVERBS**

**STRUCTURE**

**7.1 OBJECTIVES**

After a careful reading of the unit, you will be able to

define and provide examples of verbs and adverbs; 

identify and explain different types of verbs and adverbs; 

use verbs and adverbs.

## 7.2 INTRODUCTION

Modern English grammar normally refers to four major word classes: nouns, verbs, adjectives and adverbs. The other word classes include prepositions, pronouns, determiners, conjunctions and interjections. In this unit, first of all, we will learn about different types of verbs. Then, we will study adverbs.

Please note that we have explained verbs and adverbs in plain English for your convenience. We have given examples from our day-to-day life so that you can learn grammar in context. We hope that you will find this unit very interesting and easy.

This unit is broadly divided into two parts: Verbs and Adverbs. We have prepared some exercises for you. Please complete these before moving on to the answers provided by us at the end of each part of the unit.

## 7.3 VERB

It is a word which says what a subject **is**, what it **does** or what is **possesses**. For example:

He **goes.**

I      **sleep.**

They  **walk**

We **run.**

He **is** intelligent.

I **have** five pens.

In other words, a verb is a word used for saying something about some person or thing; it conveys an action (drink, walk, eat, write), an occurrence (happen, become), a possession (has, have) or a state of being (be, exist, stand). We can broadly divide verbs into two categories: **Action Verbs and Auxiliary**.

**Verbs**

- **Action Verbs**
  - Transitive Verbs
  - Intransitive Verbs
- **Auxiliary**
  - Be (am, are, is, was, were, been and being)
  - Have (has, have, had)
  - Do (do, did, done)
  - Modals (will, would, shall, should, can, could, may, might, must )
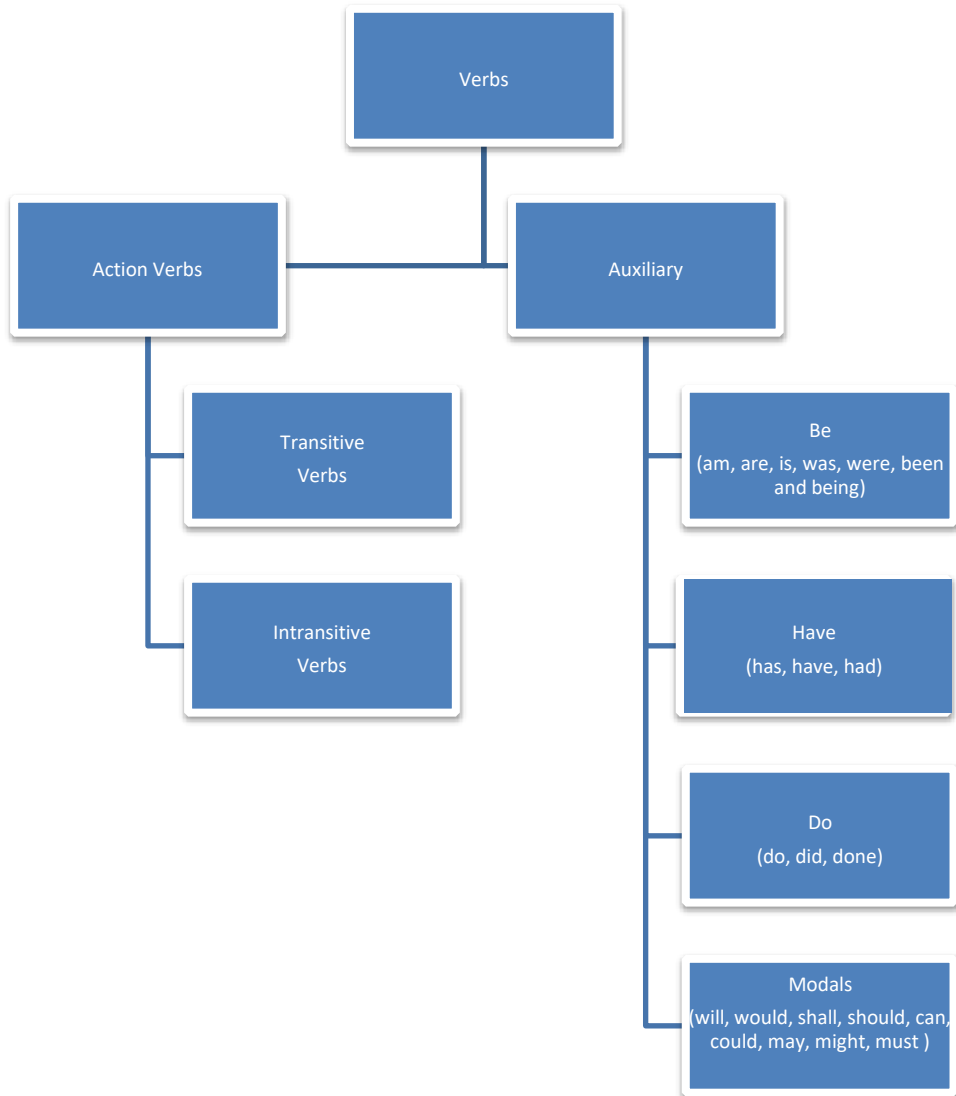
**Check Your Progress**

**Question: Choose the Most Suitable Option.**

Which of the following is not a type of verbs?

a)      Intransitive

b)      Transitive

c)      Emphatic

d)      Action

**Answer: (c)**

## 7.4 ACTION VERBS

These verbs refer to what the subject is doing in the sentence. To identify an action verb, a simple question can be asked: ‗**What is the subject** *doing?*‗ For example:

*I am writing this lesson.*

The subject here is ‗*I*‗, and **what is** ‗*I*‗ **doing?** I **am writing**. Hence, ‗**writing**‟ **is an** action verb.

There are two types of Action Verbs: Transitive Verbs and Intransitive Verbs

### 7.4.1 Transitive Verbs

A verb can be described as transitive or intransitive based on whether it requires an object to communicate a complete thought or not. ‚Transitive' means ‚passing over'. In the case of transitive verbs, an object is needed (You can read about the object in the unit titled ―Sentence Structures.‖). In other words, a transitive verb requires an object to receive the action. For example:

*Ram* is **playing football**.

Here the verb is „**playing**" and the subject is *Ram.*

If we form the question - **what is** *Ram playing***?**

The answer is- **football**. Thus, we see that there was a specific object on which the action of **playing** was being done.

### 7.4.2 Intransitive Verbs

These verbs do express actions but without any specific object on which the action is being done. If there is no object, the sentence is intransitive. For example:

*Ram sleeps.*

This sentence tells us about the action (sleep) of the subject (Ram), but there is no specific object for the action.

**NB: To learn how verbs are used in sentences, you should read tenses in the lesson titled "Development of Story" and basic sentence structures in the lesson titled "Sentence Strcture".**

You learnt forms of verbs during your school days. Let us revise some major forms of verbs:

| Verb (V1) First Form of Verb | Past Tense (V2) Second Form of Verb | Past Participle (V3) Third Form of Verb |
|---|---|---|
| arise | arose | arisen |
| arrange | arranged | arranged |

| | | |
|---|---|---|
| arrive | arrived | arrived |
| ask | asked | asked |
| awaken | awakened | awakened |
| behave | behaved | behaved |
| beat | beat | beaten |
| become | became | become |
| begin | began | begun |
| belong | belonged | belonged |
| bet | bet | bet |
| bid (to offer) | bid | bid |
| bid (to order, invite) | bade | bidden |
| bind | bound | bound |
| bite | bit | bitten |
| bleed | bled | bled |
| blow | blew | blown |
| break | broke | broken |
| breed | bred | bred |
| bring | brought | brought |
| buy | bought | bought |
| call | called | called |
| cast | cast | cast |
| catch | caught | caught |
| choose | chose | chosen |
| cling | clung | clung |
| come | came | come |
| creep | crept | crept |
| cut | cut | cut |
| deal | dealt | dealt |
| dig | dug | dug |
| do | did | done |
| draw | drew | drawn |

| | | |
|---|---|---|
| drink | drank | drunk |
| drive | drove | driven |
| eat | ate | eaten |
| fall | fell | fallen |
| feed | fed | fed |
| feel | felt | felt |
| fight | fought | fought |
| find | found | found |
| flee | fled | fled |
| fly | flew | flown |
| forbid | forbade | forbidden |
| forget | forgot | forgotten |
| forgive | forgave | forgiven |
| forsake | forsook | forsaken |
| freeze | froze | frozen |
| get | got | got (or gotten) |
| give | gave | given |
| go | went | gone |
| grow | grew | grown |
| hang (to suspend) | hung | hung |
| hang (to execute) | hanged | hanged |
| have | had | had |
| hear | heard | heard |
| hide | hid | hidden |
| hit | hit | hit |
| hold | held | held |
| hurt | hurt | hurt |
| keep | kept | kept |
| kick | kicked | kicked |
| kill | killed | killed |

| | | |
|---|---|---|
| know | knew | known |
| lay | laid | laid |
| lead | led | led |
| leave | left | left |
| lend | lent | lent |
| let | let | let |
| lie | lay | lain |
| lose | lost | lost |
| make | made | made |
| mean | meant | meant |
| meet | met | met |
| mistake | mistook | mistaken |
| overcome | overcame | overcome |
| pay | paid | paid |
| put | put | put |
| quit | quit | quit |
| read | read | read |
| ride | rode | ridden |
| ring | rang | rung |
| rise | rose | risen |
| run | ran | run |
| say | said | said |
| see | saw | seen |
| seek | sought | sought |
| sell | sold | sold |
| send | sent | sent |
| set | set | set |
| shake | shook | shaken |
| shed | shed | shed |
| shut | shut | shut |
| sing | sang | sung |
| sink | sank | sunk |

| | | |
|---|---|---|
| sit | sat | sat |
| slay | slew | slain |
| sleep | slept | slept |
| speak | spoke | spoken |
| speed | sped | sped |
| spend | spent | spent |
| spin | spun | spun |
| split | split | split |
| spread | spread | spread |
| spring | sprang | sprung |
| stand | stood | stood |
| steal | stole | stolen |
| stick | stuck | stuck |
| strew | strewed | strewn |
| stride | strode | stridden |
| strike | struck | struck |
| string | strung | strung |
| strive | strove | striven |
| swear | swore | sworn |
| sweep | swept | swept |
| swim | swam | swum |
| swing | swung | swung |
| take | took | taken |
| teach | taught | taught |
| tear | tore | torn |
| tell | told | told |
| think | thought | thought |
| throw | threw | thrown |
| thrust | thrust | thrust |
| weep | wept | wept |
| win | won | won |
| wind | wound | wound |

| | | |
|---|---|---|
| wring | wring | wrung |
| write | wrote | written |

**Check Your Progress**

**Question**: State whether the verbs in the following sentences are transitive or intransitive.

    i.   I **sang** a song.
    ii.  I **sang** at the school concert. iii.
         She **dances** regularly. iv.      They
    have **purchased** a bungalow. v.   We
    **cried** a lot. vi.      She **laughed** at my
    joke. vii.   You **love** coffee.
    viii.        They
    **slept**. ix.   You **ate**
    food.
    x.   I have **passed** the exam. **Answer:**
    i.   I **sang** a song. (Transitive verb) ii.     I **sang** at the school
    concert. (Intransitive verb) iii.      She **dances** regularly.
    (Intransitive verb) iv.       They have **purchased** a
    bungalow. (Transitive verb) v.     We **cried** a lot.
    (Intransitive verb) vi.        She **laughed** at my joke.
    (Intransitive verb) vii.      You **love** coffee. (Transitive verb)
    viii.        They **slept**. (Intransitive verb) ix.      You **ate**
    food. (Transitive verb)
    x.   I have **passed** the exam. (Transitive verb)


## 7.5 **AUXILIARY VERBS**

An auxiliary verb is a helping verb, which is used together with a main verb to show time and continuity. Auxiliary verbs are of four types: Be Verbs, Have Verbs, Do Verbs and Modals.

7.5.1 Be Verbs

Be verbs are used to describe or tell us the condition of people, things, places and ideas. The verb be has eight forms:

Base: be

Present Tense Forms: am, are, is

Past: was, were

-ing: being

Past        Participle:        been

Examples:

1. He is a doctor.
2. She was an IPS officer.
3. I am writing this lesson.
4. They are teachers.
5. They were playing.
6. We are late.
7. You are on time.
8. This subject is being studied by everyone.
9. We have been selected.
10. He will be playing.
11. He could be running.
12. I have been writing a letter.
13. He has been recruited.

Note: ‚Be' requires a modal before it to form a complete verb (could be running; will be slept). ‚Been' requires ‚have', ‚has' or ‚had' (have been writing; has been recruited). ‚Being' must be preceded by ‚am', ‚is', ‚are', ‚was' or ‚were' (‚is being studied') to form a complete verb.

## 7.5.2. Do Verbs

The auxiliary ‚do' is used to make negatives (do + not), to make question forms and to make the verb more emphatic.

Question Form

To make the question form of most main verbs, ‚do', ‚does' (Present simple) and ‚did' (Past simple) are followed by the subject and the main verb:

- Do you work hard?
- Did you like the previous lesson?
- Does he not play football?

Negative Form

The negative forms of the present simple and the past simple of all main verbs are made with the auxiliary do + not/ does + not/ did + not:

- I do not want him to regret his decision.
- Ram does not work hard to get good marks.
- Did you not go to school yesterday? Your school was open.

Be verb (example: He is not a doctor) and some uses of have as main verbs (example: We haven't anything for you today.) do not follow this structure.

Emphatic Form

Do, does (Present simple) or did (Past simple) are used to give extra force to the main verb in affirmative sentences.

Compare

| neutral | emphatic |
|---|---|
| I like it. | I do like it! |

| neutral | emphatic |
|---|---|
| He looks handsome. | He does look handsome. |
| I did not recognise your aunt, but I recognised your mother. | I did not recognise your aunt, but I did recognise your mother. |

7.5.3 Have Verbs

The forms of —have‖ (have, has and had) are used in the perfect tenses.

Examples:
He has slept. (Present prefect tense)
She had purchased a bungalow. (Past perfect tense)

## 7.5.4 Modals

Modals are special verbs; they behave in an irregular manner in English. They differ from main verbs like run, eat, drive, etc. They provide details about the function of the main verb that follows. They can perform a wide range of communication functions.

Here are some characteristics of modal verbs:

They never change their form. You cannot add ‗s', ‗ed' and ‗ing' to them. On the other hand, main verbs can be modified on the basis of the subject and the tense in the sentence. For example:

- They play. (correct)
- He plays. (correct)
- He played. (correct) ⬚ He was playing. (correct)

We have altered ‗play' in the above-mentioned sentences. But we cannot change/alter any modal verb. For example:

- He wills play. (Incorrect)
- He willed play. (Incorrect)
- He willing play. (Incorrect)

Modals are always followed by a bare infinitive (, i.e. without ―to‖). For example:

He will to play. (Incorrect)

He will play. (Correct)

Modals are used to express certainty, possibility, willingness, obligation, necessity and ability. You will read about modals in detail in the fourth semester of your programme. Here, I have touched on some major meanings of modal verbs.

Modals in the Present and the Past

Here is a list of modal verbs:

Can, could, may, might, will, would, shall, should, must

All modal verbs can be used in the present, but only ‗could', ‗would', ‗should' and ‗might' can be used in the past. Technically, ‗would' is the past tense of will; ‗could' is the past tense

of ‗can'; ‗might' is the past tense of ‗may'; ‗should' is the past tense of ‗shall'; ‗would' is the past tense of ‗will'.

| Present | Past |
| --- | --- |
| He says that he will work hard. | He said that he would work hard. |
| I say that I shall work hard. | I said that I should work hard. |
| He says that he may come there. | He said that he might come there. |
| He says that he can lift the bundle. | He said that he could lift the bundle. |

Some Major Meanings of Modals (in the present/ the future):

| Basic Sentence Structure: Subject + Modal Verb + First Form of Verb (Affirmative Sentences) |
| --- |

❖ **Can**
➢ **To express or inquire about willingness.**

 **Can you drive me home?**

 **Can I stay here tonight?**

➢ **In the negative form, to show inability or impossibility.**

 **We cannot help you in this situation.**

 **You cannot board the train.**

➢ **To show possibility, in the sense that an action is theoretically possible.**

 **You can stand first in the class if you work hard.**

 **It can rain today.**

➢ **To show ability**

- I can lift this bundle of books.
- I can run.

➢ **To seek permission (informal)** 
Can I use your pen?

 Can I come in?

❖ **Could**
➢ **To make a request.**

 Could I speak to Ashish? (on the phone) 
Could I apply for leave?

➤ **To identify a possibility in the present.**
- We could go to the canteen. Or, we could go to a cinema.
- We could sleep. Or, we could relax on the couch.

❖ **May**

➤ **To express possibility in the present and the future.**
- He may join our college as Principal tomorrow.
- She may go abroad next year.

➤ **In formal situations, to seek permission.**
- May I come in, Ma'am?
- May I kindly request you to grant me leave for one day?

❖ **Might**

➤ **To express possibility in the present and the future.** [Note: In this context, ‗may' and ‗might' are interchangeable. ‗May' shows slightly more possibility than ‗might'.] ⬜ He might join our college as Principal tomorrow.

⬜ She might go abroad next year.

➤ **In formal situations, to express permission, in the sense of being allowed to do something. It is politer than „may".**
- Might I be excused?
- Might I attend the meeting?

❖ **Will**

➤ **To express intention.**
- I will go to school today
- We will buy a car next year.

➤ **To make a semi-formal request.**
- Will you give me a glass of water, please?
- Will you show me some books on the history of Punjab?

➤ **For talking about the future with certainty.**
- I will see you in the evening.
- I will read this book tomorrow.

❖ **Would**

➤ **For requests.**
- Would you please come with me?
- Would you please go there?

➤ **For preferences.**
- I would like to have a cup of tea.
- Would you like to have a car or a bike?

➤ **To seek permission.**
   Would you mind letting me use your pen?

Would you mind if I borrowed your pen?

➤ **To comment on a likely truth.**
- The doorbell just rang. That would be my father!
- There is some noise in the kitchen. That would be a cat.

❖ **Shall**

‗Shall' is only used for the future time reference with ‗I' and ‗we'. It is more formal than ‗will'.

➤ **Asking for suggestions.**
- Shall we buy this shirt?
- Shall I jump onto the table?

➤ **For offering someone help.**
- Shall I help you with your luggage?
- Shall I help you write your notes?

❖ **Should**

➤ **To indicate expectation**
- You should expect him to be here any moment.
- You should receive my letter in a day or so.

➤ **To suggest or provide advice**

- You should work hard to pass this exam.
- You should prepare notes from this book

**Check Your Progress**

**Question: Fill in the blanks with suitable auxiliary verbs.**

**Choose your answers from the options given below.**

i. _____ I come in, teacher? (may, will, is, am) _____ ii. _____ you like biscuits or toffees? (may, would, is, am, are) iii. You_____ would, is, am, are) iii. _____ win the race if _____ you run fast. (can, is, am, are) iv. I We_____ speak to Mr. Manohar? (could, is, am, are, will) am, are, will)

v. _____ eat bananas. Or, we could eat oranges. (can, could, is,

vi. _____ He _____ join our company as CEO tomorrow. (is, am, are, may, has, have, may be)

vii. _____ I go to school today. (is, am, are, will, has, have, _____ may be, might be) viii. _____ you mind letting me _____ sit on your chair? (may, would, is, am, are) ix. _____ I buy this shirt? (would, shall, is, am, are, could be)

x. You work hard if you want to become an IPS officer. (should, shall, is, am, are, could be )

xi. I _____go to the office on time. (should, is, am, are, could be, might be )

xii. It is already 10 p.m.! You_be late! (should, is, am, are, could be, must )

xiii. I have seen some security guards around the park. The chief minister must be there.

xiv. I ~~two mobile~~ phones. (have, has, will, is) xv. They not work hard. (is, do, does, ~~have~~) xvi. He not speak truth. (is, do, does, have) xvii. I ~~not like mobi~~le phones. (is, do, does, have) xviii. I like coffee. (is, do, ~~does, have~~) xix. He rich. (is, do, does, have) xx. They a lot of money. (~~is, do, does~~, have) xxi. They rich. (is, are, do, does, have)

xxii. ~~They~~ living in Patiala before coming to Jalandhar. (was, were, is, are) _____

xxiii. ~~She~~ _____waiting for me for one hour. (has been, have been, is, are) _____

xxiv. ~~She~~ ~~waiting~~ for me. (has been, have been, is, are) xxv. You come late. (has be~~en, have, h~~ave been, is, are) Answer:

i. I come in, teacher? ₁(₁**M₁ay**) ii. you ~~like biscuits~~ or toffees? (**Would**)

_____

iii.                     You_win the race if you run fast. (**can**)

iv.          _____I speak to Mr. Manohar? (**Could**)

v.          _____We__ eat bananas. Or, we could eat oranges. (**could**) vi.   He

          _____       join our company as CEO tomorrow. (**may**) vii.    I

          _____       go to school today. (**will**)

viii.    ——you mind letting me sit on your chair? (**Would**) ix.

    I buy this shirt? (**Shall**)

x.       You work hard if you want to become an IPS officer. (**should**)

xi.      I go to the office on time. (**should**) xii. It is already 10 p.m.! You be late! (**must** ) xiii. I two mobile phones. (**have**) xiv. They not work hard. (**do**) xv. He not speak truth. (**does**) xvi. I not like mobile phones. (**do**) xvii. I like coffee. (**do**) xviii. He rich. (**is**) xix. They a lot of money. (**have**)

xx.      They _____ rich. (**are**)

xxi.     They _____ living in Patiala before coming to Jalandhar. (**were**) xxii. She waiting for me for one hour. (**has been**)

xxiii.  She waiting for me. (**is**)

xxiv.  You come late. (**have**)

➢ **To infer responsibility or obligation**

- We should work hard to fulfil our parents' dreams.
- I should go to the office on time.

❖ **Must**

➢ To **make** a **command**.
- You must work hard.
- You must come to see me at 5 p.m.

➢ **To make a conjecture, but with some certainty.**
- It is already 10 p.m.! You must be hungry!
- I have seen some security guards around the park. The chief minister must be there

    *Check Your Progress*
    *Question:* **Modals. Choose the more natural-sounding options.**
1.Why_I care about your problems?

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a) can
b) should

1. I__get here earlier because it was raining. a) shouldn't
   b) couldn't
2. We_____go out to that new Italian restaurant tonight. a) should
   b) must
3. Everyone who crosses the border_____show his/her passport. a) must
   b) should
4. P1: When is Raj coming here? P2: He is on the way. He _____
   be here any minute.
   a) must
   b) should
5. P1:_____my friend sleep over? P2: Yes, but he will have to   get
   permission from his parents.
   a) Can
   b) Should
6. you please try to be nicer to your brother? a) Must
   b) Could

**Answer**: 1. b 2. b 3. a 4. a 5. a 6. a 7. b

## 7.6 Adverb

**An adverb is a word that gives us information about a place, time, degree, cause or manner of a verb, an adjective, a phrase or another adverb. It answers questions such as *how*, *when*, *where*, *how much*, etc. Usually, adverbs are formed by „ly" suffix to adjectives. For example,**

Beautiful+ly= Beautifully
Intelligent+ly= Intelligently
Horrible+ly= Horribly

There are, however, many common adverbs that do not end in -ly, such as *again*, *also*, *just*, *never*, *often*, *soon*, *today*, *too*, *very* and *well*. Let us take some examples to understand adverbs. **Adverb for Verb**

In the sentence —Ram runs.‖, ‗Ram' is a noun and ‗run' is a verb. If I add ‗fast' to the sentence in question, the sentence will be: —Ram runs fast.‖

 Now the question arises- What/who is fast? Ram or his running? Of course, ‗fast' tells us the manner Ram runs. ‗Fast' is used for the verb ‗run', so ‗fast' is an adverb. But you know, as it is clear in the definition of adverbs, adverbs do not tell us only about verbs but also about adjectives, other adverbs and phrases. **Adverb for Adverb**

Ram runs fast. (Noun + Verb + Adverb)

If I add ‗very' just before ‗fast', the sentence will be: Ram runs very fast.

Here, ‗very' modifies/describes ‗fast' (adverb). A word that describes an adverb is also an adverb.

So, ‗very' is an adverb.

**Adverb for Adjective**

Pay attention to the following sentence: Bindu is intelligent. (Noun+ Be verb+ Adjective). If I add ‗very' before ‗intelligent', which is an adjective, ‗very' would be qualified to be called an adverb. Here ‗very' modifies an adjective (intelligent), unlike in the previous example where it modifies an adverb (fast).

Bindu is very intelligent. (Noun + Be verb + Adverb + Adjective)

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**Check Your Progress**

**Question 1: Complete the sentences using the adverb forms of the adjectives given in brackets:**

i. I am working on this project__. (happy) ii.    He left the room ___to avoid me. (swift)

iii.        The teacher asked me to write answers _____.

(quick) iv.        You should not shout at him__. (angry) v.
   The child smiled_____. (beautiful)

**Answer:**

i. I am working on this project happily. ii.
   He left the room swiftly to avoid me.

iii. The teacher asked me to write answers quickly.

iv. You should not shout at him angrily. v.
   The child smiled beautifully.

**Question 2: Choose the Most Suitable Option.**

|        | An adverb…                                              |
|--------|---------------------------------------------------------|
| (a.)   | adds information to the meaning of noun                 |
| (b.)   | is essential to complete the sentence                   |
| (c.)   | and an adjective are used together in a sentence        |
| (d.)   | qualifies verbs, adve¹rb¹⁴s and adjectives in sentences |

**Answer:** (d)

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### 7.7 TYPES OF ADVERBS

There are many types of adverbs:
- Adverbs of Manner
- Adverbs of Place
- Adverbs of Time
- Adverbs of Certainty
- Adverbs of Degree

- Interrogative Adverbs ☐ Relative Adverbs

## 7.7.1 Adverbs of Manner

Adverbs of manner describe the way in which something happens. They are usually placed after the main verb or the object. *Examples:*

- He sings *well.* (after the main verb)☐

- He left the place *quickly.*☐

- They shouted *loudly.*☐

- He threw the ball *swiftly.*☐

The adverb should not be put between the verb and the object. It means ‗swiftly‘ must not be between ‗threw‘ (verb) and ‗the ball‘ (object) in the above-mentioned example.

When there is more than one verb in a sentence, the location of the adverb is crucial. When an adverb follows a clause, it modifies the entire action stated by the clause.

Take note of how the following two statements change in meaning:

Pay attention to the difference in meaning between the following pair of sentences:

☐ He *quietly* asked me to eat the cake (= his direction was quiet)☐ ☐ He asked

me to eat the cake *quietly* (= the eating of the cake was to be quiet)☐

## 7.7.2 Adverbs of Place

Adverbs of place tell us *where* something happens; they are usually placed after the main verb or after the object.

*Examples:*

- I looked *everywhere*☐

- Get *out.*☐

- They were playing football *nearby.*☐

- The father took me *inside.*☐

## 7.7.3 Adverbs of Time

Adverbs of time tell us *when* an action happened, but also *for how long* and *how often.* For example:

- When: *today, tomorrow, yesterday, later, now, last year*☐

- For how long: *all day, not long, for a while, since last year, for some time*

- How often: *monthly, weekly, sometimes, frequently, never, often, yearly* ―When‖ adverbs are usually placed at the end of the sentence:

*Examples:*

- I decided to complete my homework *later*.

- I went to visit my ancestral village *last year*.

Adverbs that convey the frequency of actions are normally put before the main verb but after auxiliary verbs (such as be, have, may, must). Examples:

- I *often* visit Manish Karyana Store. (before the main verb)

- I *never* ignore my mistakes. (before the main verb)

- You must *always* fulfil your promise. (after the auxiliary *must*)

- She is *never* slow.(after the auxiliary *is*)

Some other such ‗frequency' adverbs indicate the exact number of times an action takes place and are usually placed at the end of the sentence. For example: The super-specialist doctor comes to the village dispensary village once a week.

### 7.7.4 Adverbs of Certainty

Adverbs of certainty express how certain or sure we feel about an action or event. *Certainly*, *definitely, probably, undoubtedly* and *surely* are some examples of adverbs of certainty. For example:

- He *definitely* saw me in the parking lot.

- She is *probably* in her room.

  - He is *certainly* there.

### 7.7.5 Adverbs of Degree

Adverbs of degree indicate the intensity or degree of an action, an adjective or another adverb.

Some common Adverbs of degree are as follows:

*Almost, nearly, quite, just, too, enough, hardly, scarcely, completely, very, extremely.*

For example:

- The tea was *extremely* hot.

- He has *just* arrived.
  - It is *too* good.

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### 7.7.6 Interrogative Adverbs

These adverbs are *why*, *where, how* and *when*. They are usually placed at the *beginning of a question.*

Examples:

- *Why* was he so late?

- *Where* have you gone?

- *How* are you?

- *How* much is that pen?  □   *When* does the doctor arrive?

### 7.7.7 Relative Adverbs

Relative adverbs give more information about the persons, places or objects being mentioned or discussed. The words ‚where', ‚when' and ‚why' are examples of relative adverbs. They are used to connect clauses.

***Examples:***

- That is the place *where* I met my boss for the first time.

- I cannot think about the day *when* I met with the accident.

- This is the reason *why* I am not happy.

### 7.8 SOME RANDOM EXAMPLES OF ADVERBS IN SENTENCES

Abruptly: When he saw me, he left the room abruptly.

Beautifully: She dresses beautifully.

Delicately: This vase must be handled delicately.

Delightfully: He delightfully accepted my offer.

Firmly: I firmly believe that everyone should cast their vote.

Truthfully: She truthfully answered the questions asked by her teacher.

Quickly: We have to walk quickly to reach there on time.

Wearily: After completing the project, I wearily headed to bed.

Willfully: The rich man willfully donated his property to the Krishna temple.

Briskly: My friend briskly walked to the classroom.

Brutally: The criminal was brutally murdered.

Cheerfully: They cheerfully greeted each other.

Randomly: I randomly distributed sweets.

Uneasily: He looked around uneasily.

Weirdly: He behaved weirdly at the concert.

Wholeheartedly: I wholeheartedly welcomed them.

Downstairs: I came downstairs to meet the guest.

Everywhere: They looked everywhere for their car.

Here: We will come here.

Inside: When it's raining, I like to walk inside.

Outside: When it is not raining, I like to walk outside.

Upstairs: I went upstairs to see my son who was sleeping.

Early: The CEO arrived early for the meeting.

Later: I will see you later.

Never: He never wanted me to fail in my exams.

Now: We are moving now.

Regularly: I regularly write my column.

Today: We met him today.

Tomorrow: Tomorrow, we will leave for Canada.

Yesterday: She met a doctor yesterday.

Also: They also enjoy that music.

Enough: My son is mature enough to travel alone.

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**Check Your Progress**

**Question: Underline the mistakes in the following sentences and rewrite them correctly:**

   i.   Ram works hardly. ii. Ram
hard ever works.

   iii. He ran fastly. iv.     The
rose smells sweetly.

   v.   We are bad in need of sugar. vi.
      The bride walks graceful. vii.
      You do your work careful. viii.
      She oftenly comes to see me. ix.
      I am perfect fine.

   x.   I will sure help you.

   xi. This is the place when Mahatma Gandhi was born. xii.
      They live joyful. xiii.  He handled the situation wise.

   xiv.       I wrote the letter happy.

   xv.       He seldomly comes here

**Answers:**

   i.       Ram works **hardly**. Correct: Ram works hard.

   ii.      Ram **hard** ever works. Correct: Ram  hardly ever works. (Note: When
        _hardly' is used with _ever', it means _almost never'.)

iii. He ran **fastly**. Correct: He ran fast.

iv. The rose smells **sweetly**. Correct: The rose smells sweet.

v. We are **bad** in need of sugar. Correct: We are badly in need of sugar.

vi. The bride walks **graceful**. Correct: The bride walks gracefully. vii. You do your work **careful**. Correct: You do your work carefully. viii. She **oftenly** comes to see me. Correct: She often comes to see me. ix. I am **perfect** fine. Correct: I am perfectly fine.

x. I will **sure** help you. Correct: I will surely help you.

xi. This is the place **when** Mahatma Gandhi was born. Correct: This is the place where Mahatma Gandhi was born. xii. They live **joyful.** Correct: They live joyfully.

xiii. He handled the situation **wise**. Correct: He handled the situation wisely.

xiv. I wrote the letter **happy**. Correct: I wrote the letter happily.

xv. He **seldomly** comes here. Correct: He seldom comes here.

Quite: I was quite pleased to know that my friends were there to support me.

Too: This machine is too easy to operate. Very: You are
very happy because you have learnt adverbs.


## 7.9 LET US SUM UP

Action verbs and auxiliary verbs are the two major types of verbs. There are two types of action verbs: transitive and intransitive. Intransitive verbs are the ones that do not transfer the action to objects, whereas transitive verbs show an action done on an object. Auxiliary verbs are of four types: Be verbs, Have verbs, Do verbs and Modals. Be is an irregular verb with several forms:

Present: (I) am, (he, she, it) is (you, we, they) are + -ing form: being

Past: (I, he, she, it,) was, (you, we, they) were + -ed form: been

_Have' has three forms: have, had, had. Do, does and did are known as do verbs.

Can, could, may, might, will, shall, would, should and must are modal verbs.

An adverb is a word that modifies (describes) a verb (He walks <u>slowly</u>), an adjective (He is <u>very</u> handsome.), another adverb (He walks <u>very</u> slowly.) or even a whole sentence (<u>Fortunately</u>, I had won the lottery). Adverbs can be of the following types:

Adverbs of Manner

Adverbs of Place

Adverbs of Time

Adverbs of Degree

Adverbs of Certainty

Relative Adverbs

Interrogative Adverbs

### 7.10 UNIT END EXERCISES

*Exercise-I Fill in the blank with the correct auxiliary verb from the choices presented:*

1. What _____ the men eating when you met them at night? (was, were, are, did, been)
2. I _____ always wanted to try swimming. (was, does not, have, is)
3. Where _____ you go to submit this application form? (were, been, are, did, does)
4. Why do you think he____want you to get good marks? (did not, is, has not, has been, have)
5. Ram _____ going to celebrate his birthday. (will, do not, is, did not, has)
6. Reena _____ want to go to hospital; she wants to go to the police station instead. (does not, is not, was not, has not, was not)
7. I _____like his efforts. They weren't creative. (did, have, been, did not, have not)
8. I love ice-creams, but I_like the strawberry flavour. (were not, been, do not, is, was)
9. Where _____ you heading towards last night? (were, was, is, do, did)
10. Nimisha _____ completed her work yet; she is hospitalized. (are, were, has, has not, would not)

*Exercise-II*

*Read the following sentences and mention the types of adverbs used in them:*

1. I met him in the <u>morning</u>.
2. We sat <u>lazily</u> on the floor.
3. She spoke <u>loudly</u>.
4. It is <u>extremely</u> cold today.
5. Please sit <u>patiently</u>.
6. I solved the mathematical problem <u>easily</u>.
7. I decided to celebrate my birthday <u>there</u>.
8. I will build a house <u>here</u>.
9. He laughed <u>merrily</u>.
10. You will have to complete this assignment <u>today</u>.
11. She is waiting for me <u>outside</u>.

### 7.11 ANSWERS TO EXERCISES

*Exercise-I*

*1 – were, 2 – have, 3 – did, 4 – did not, 5 – is, 6 – does not, 7 – did not, 8 – do not, 9 – were, 10 – has not* <u>*Exercise-II*</u>

1. I met him in the <u>morning</u>. (Adverb of time)
2. We sat <u>lazily</u> on the floor. (Adverb of manner)
3. She spoke <u>loudly</u>. (Adverb of manner)
4. It is <u>extremely</u> cold today. (Adverb of degree)
5. Please sit <u>patiently</u>. (Adverb of manner)
6. I solved the mathematical problem <u>easily</u>. (Adverb of manner)
7. I decided to celebrate my birthday <u>there</u>. (Adverb of place)
8. I will build a house <u>here</u>. (Adverb of place)
9. He laughed <u>merrily</u>. (Adverb of manner)
10. You will have to complete this assignment <u>today</u>. (Adverb of time)
11. She is waiting for me <u>outside</u>. (Adverb of place)

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# B.COM (HONS.)

## (Accounting and Taxation)

**SEMESTER-II**
**COURSE: ENGLISH COMPULSORY-1**

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### Unit-8: Linking Words and Prepositions

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## 8.1 OBJECTIVES

After a careful reading of the unit, you will be able to
- define linking words and prepositions;
- identify linking words and prepositions; ☐ construct sentences using linking words and prepositions in sentences.

## 8.2 INTRODUCTION

In this unit, first of all, you will learn about different types of linking words.   Then, you will study prepositions. Linking words and prepositions play a very important role in effective communication. Linking words weave sentences together to present a clear body of ideas/statements; they help your readers to follow your train of thoughts. A preposition usually indicates the temporal, spatial or logical relationship of its object to the rest of the sentence.

Please note that we have explained linking words and prepositions in plain English for your convenience. We have given examples from our day-to-day life so that you can learn grammar in context. We hope that you will find this unit very interesting and easy.

This unit is broadly divided into two parts: linking words and prepositions. We have prepared some exercises for you. Please complete these before moving on to the answers provided by us at the end of each part of the unit.

## 8.3 LINKING WORDS

Conjunctions and connectors are known as linking words, as they link or join prefixes, words, phrases and clauses. For example, _and' is a conjunction in the following sentences:

- *Pre-* **and** *Pro*-government slogans charged the atmosphere in the rally. (Joining two prefixes)
- *Ram* **and** *Sham* are good friends.     (Joining two words)
- I brush my teeth *in the morning* **and** *at night*.  (Joining two phrases)
- *He is Ram*, **and** *he is preparing for Civil Services Exams*. (Joining two clauses) Broadly speaking, conjunctions are connectors. Connectors are of four types:
1. Coordinating Conjunctions (For example: *and, so, but,* etc.)
2. Correlative Conjunctions     (For example: *neither, nor; not only, but also*, etc.)
3. Subordinating Conjunctions (For example: *if, so that, because*, etc.)
4. Conjunctive Adverbs (For example: *therefore, however,* etc.)

Remember that just a few conjunctions and conjunctive adverbs can connect individual words or phrases; the vast majority can only connect two clauses. In this lesson, we will study how conjunctions and connectors join two or more clauses so that these two clauses become one sentence. I am sure that you will find this lesson very easy, as you have already learnt different types of sentences. Compound Sentences are formed with the help of coordinating conjunctions, whereas complex sentences are formed with the help of subordinating conjunctions.

### 8.3.1 Coordinating Conjunctions
It is notable that when independent clauses are joined, they require a coordinating conjunction between them. Coordinating conjunctions include the following words: for, and, nor, but, or, yet, so. They are easy to remember if you think of the word ―FAN BOYS‖:
- **F**or (Used in the sense of because)

- **A**nd (To join or add clauses of equal status)
- **N**or (Used in the sense of ‗also not')
- **B**ut (Used to show opposite and conflicting ideas)
- **O**r (To show choices or possibilities)
- **Y**et (In the sense of ‗despite something'/‗nevertheless')
- **S**o (To show result)

When a compound sentence is written, a comma is used before the coordinating conjunction to punctuate the sentence correctly. For example:

- I put on a coat, **for** it was quite cold outside.
- He is Ram, **and** he is a doctor. ☐ I cannot sing, **nor** can I dance.
- He worked hard, **but** he could not pass his exams.
- You can go to school, **or** you can play with kids.
- You slept a lot, **yet** you were tired. ☐ You were tired, **so** you went to sleep.

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**Check Your Progress**

**Question: Fill in the Blanks.**

   i. We stayed at home watched a film. (Choose from the  following: and, but, or, so) ii. I wanted to buy a newspaper did not have enough money.

        (Choose from the following: and, but, or, so)

   iii.    I have a lot of homework to do now,____I cannot go to the

        cinema with you. (Choose from the following: and, but, or, so)

   iv.    Do you want tea__coffee? (Choose from the following: and,

        but, or, so)

   v.    I cannot eat, can I serve. (Choose from the following: and, nor, but, or, so)

**Answers**

   i.   We stayed at home and watched a film.

   ii.   I wanted to buy a newspaper but did not have enough money.

   iii.   I have a lot of homework to do now, so I cannot go to the cinema with you. iv. Do you want tea or coffee?

   v.   I cannot eat, nor can I serve.

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**8.3.2 Correlative Conjunctions**

Correlative conjunctions are used in pairs to join alternatives or equal elements; they always appear in pairs. The most common correlative conjunctions are:

Both, and

Neither, nor

Either, or

Not only, but also

Although, yet

Whether, or

Lest, should

No sooner did, than

Hardly, when

As, as [as much as, as soon as, as long as, as far as]

Parallelism should be kept in the mind while using correlative conjunctions. It means that the words following both parts of a correlative conjunction should belong to the same parts of speech. For example, if a verb follows ‗not only', then a verb should also follow ‗but also'. Let us take some examples:

- He is not only *indifferent* but also *careless*. (Both adjectives. Hence, a balanced sentence.)
- He has not only *danced* but also *sung*. (Both verbs. Hence, a balanced sentence.)
- He made up his mind to either *play* football or *cook* food. (Both verbs. Hence, a balanced sentence.)

Using different parts of speech after each part of correlative conjunctions makes the sentence imbalanced. Consider the following example:

- He is not only *indifferent* but also *behaves* in an awkward manner. (Adjective and Verb. Hence, an imbalanced sentence.)

Now, let us see how these correlative conjunctions are used in sentences:

**Both, and**: ‗Both' is paired with ‗and' to add emphasis to two coordinated elements in a sentence.

- Both he and she are my friends.
- I like both Ram and Sham.
- Both teachers and students run two miles every day.

**Neither, nor**: We use ‗neither … nor' when we are to talk about two or more things that are not true or that do not happen.

- He neither played the game himself nor allowed others to do it.
- I could neither study nor sleep.
- He neither ate the cake himself nor allowed others to eat it.

**Either, or**: We use ‗either … or' to show an unavoidable choice between alternatives.

- I could either study or sleep.
- Either Ram or Sham is a doctor. ☐ I will take either juice or coffee.

**Not only, but also**: This pair is used in the sense that ‗not only this, but also that'. This correlative conjunction presents two related pieces of information. Both pieces of information are presented as surprising or unexpected, with the second one being even more surprising than the first.

- My old father plays not only cards but also cricket.

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(Note: The subject is the same here, i.e. ‗my old father‘.) ☐

Not only my father but also my mother plays cricket.

(Note: The object is the same here, i.e. ‗cricket‘.)

**Although, yet**: ‗Although‘ means ‗in spite of‘ and ‗yet‘ means ‗nevertheless‘.

- Although he makes a lot of money, yet he always begs for monetary help.
- Although he is rich, yet he is greedy.
- Although he worked hard, yet he failed.

**Whether, or**: This pair of conjunctions is used to express a doubt or choice between alternatives

☐ I do not know whether Ram will sing or Radha will dance.

- Only God knows whether he will be rejected or selected in the interview.
- The management will decide whether the students will take their exams online or offline.
**Lest, should**: Lest is a conjunction meaning ‗for fear that‘. ‗Lest…..should‘ expresses ‗so as to prevent any possibility that‘.
- Work hard lest you should fail.
- I obeyed him lest he should be angry.
- She turned away from the window lest she should be noticed.

**No sooner did, than**: If the second event happens right after the first, we can use the structure ‗no sooner... than‘ to describe that. This pair refers to past events. This structure ‗no sooner‘ introduces the event that occurred first.

- No sooner did she reach the hospital than the doctor arrived.
- No sooner did he reach here than she left for the market.

**Hardly, when**: The idea conveyed with ‗No sooner did…than‘ can be expressed using hardly/scarcely…when.

- Hardly had she reached the hospital when the doctor arrived.
- Scarcely had he reached here when she left for the market.

**As, as**: ‗As soon as‘ conveys the same meaning which is conveyed by ‗Hardly…when‘ and ‗No sooner did…than‘.

- As soon as she reached the hospital, the doctor arrived.
- As soon as he reached here, she left for the market.

―As…as‖ pair is used in some other structures. ‗As much as‘ is for quantity; ‗as soon as‘ is for time; ‗as far as‘ is for distance/extent. ‗As long as‘ refers to ‗provided that‘/ ‗on condition that‘/ ‗length‘. ‗As well as‘ is used to include information.

- I will call you as soon as I have completed my novel.
- I am happy as long as my friend is sitting next to me during the lesson.
- I do not have as much money as you have.
- My left arm is as long as my right arm.
- I will buy a shirt as well as a bag.
- As far as I know, the teacher teaches all lessons dedicatedly.

### 8.3.3 Subordinating Conjunctions

**A complex sentence** is formed when a dependent clause is joined to an independent clause. The dependent clause can come either at the beginning or the end of the sentence. For example:

- I will eat food when I reach home.
- When I reach home, I will eat food.

I hope you have noticed that when the dependent clause is placed at the beginning of the sentence, a comma is placed after it. When the dependent clause is at the end of the sentence, a comma is not required. Some more examples are given below:

- Wait here until I come back.
- I will not come with you until you do this work.
- She behaves as if she were a queen.
- He sang when I danced.
- Although he is intelligent, he is simple.

Dependent clauses begin with subordinating conjunctions. Below are some of the most common subordinating conjunctions:

- after
- although
- as

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- because
- before
- even though
- if
- since
- though
- unless
- until
- when
- whenever
- whereas
- wherever
- while

The following list shows different types of relationships along with the connectors that indicate those relationships:

- Cause/Effect: because, since, so that
- Comparison/Contrast: although, even though, though, whereas, while
- Place/Manner: where, wherever, how
- Possibility/Conditions: if, whether, unless
- Relation: that, which, who, whom
- Time: after, as, before, since, when, whenever, while, until

(Source: https://writingcenter.unc.edu/tips-and-tools/sentence-patterns/)

**Wh-words**: The wh-word (used in the question) becomes the connective pronoun when it joins (subordinates) the question-clause to the main clause.

- Who (used to refer to a person): I know the boy who is studying in that school.
- Whom (used to refer to a person): I know the man whom I had met earlier.
- When (used to refer to time/moment): She was sleeping when I reached there.
- Which (used to refer to something/some activity): I know the city which is known as a sports hub.
- Where (used to refer to a location/place): I found my wallet where I had left it.
- How (used to refer to the manner): I wanted to know how he was performing in sports.

**Some Random Examples of Subordinate Conjunctions**

- *After* a long drive, it feels good to stretch your legs.
- Everyone was disheartened *because* their favourite shop was closed for ever.
- Rajni said *that* she had completed her work.
- I like running *because* it is the best exercise.
- Varinder stayed behind after college *because* he had a detention.
- I teach my students *when* they have a class with me.
- *Now that* the semester is over, I can take a break from college.
- *Once* you find your best friend, never take him/her for granted.
- *Whenever* we visit Jalandhar, we always enjoy Wonderland the most.
- *While* it might seem like a case study about integrity, it is actually a case study about leadership and unity.
- *If* you feel thirsty, you can take water from the kitchen.
- *While* they were singing, I was dancing.
- I am always welcomed *whenever* I go to their house.
- I was not asked my name *when* I visited the Kapoors.
- *Since* I have started working full-time in a university, I hardly find time for any part-time job.
- *Because / since / as* I worked six days a week, I could not find time to study.
- I think I should go to Vrindavan, *even though* I have recently visited the place.
- I will not leave for work *unless* you come to see me. (_unless' refers to a condition)
- I will not go to school *until* I get a new cycle. (_until' is for time. Here, it means _till the moment I get a cycle')

**8.3.4 Conjunctive Adverbs**

Michael Swan in *Practical English Usage* says, ―Conjunctions make **grammatical** and **meaning** connections: they join clauses into sentences, and show the relationship between them…Adverbials can make **meaning** connections, but they do not make grammatical connections: they do not join clauses into sentences…When an adverbial comes between two clauses, there is normally either a full stop (.) or a semi-colon (;) before it in careful writing, because the clauses are still grammatically separate.

The Minister paused briefly; **then** he started to speak.‖ (283-284)

Conjunctive adverbs are the words (or short phrases) that provide a link to a _previous' sentence or independent clause. They are used to show sequence, contrast, cause and effect and other relationships.

A list of common conjunctive adverbs and their meanings is given below:

- Also (in addition)
- Consequently (as a result)

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- Furthermore (in addition; more importantly)
- However (despite whatever amount or degree)
- Indeed (really or certainly, often used to emphasize something)
- Likewise (in the same way)
- Meanwhile (while something else is happening)
- Nevertheless (despite what has just been said or referred to)
- Nonetheless (despite what has just been said or referred to)
- Therefore (for that reason)

They can also be phrases (i.e., not just single words):
- as a result
- as a consequence
- for example
- on the contrary **Some Examples**:
- Raj did not study throughout the semester; **therefore**, he failed in the exams.
- She went to London to see him; **however**, she could not meet him.
- The thief broke into my house and stole my laptop; **in addition**, he ate the ice cream kept in the freezer.
- You are my friend; **nonetheless**, you speak ill against me in my absence.
- Reema won a lottery in the UK; **on the contrary**, her husband suffered a financial loss in India. **Important Points**

Note: some words which appear as conjunctions can also function as prepositions or adverbs. We label whether a word is a conjunction or preposition/adverb on the basis of the function it performs in a sentence. Never get confused. For example, ‗yet' can be used as a conjunction as well as an adverb.
- My results have not been declared yet. (‗yet' as an adverb)
- The old man insults me, yet I respect him for his knowledge and experience. ('yet' as a conjunction)

I would like to draw your attention to the importance of conjunctions. Without conjunctions, we will have to state every complex idea in a series of short, simplistic sentences: I like chocolates. I like almonds. I hate eggs. (Instead of one sentence: I like chocolates **and** almonds, **but** I hate eggs.)

> **Check Your Progress**
> **Question: Fill in the blanks with suitable subordinating conjunctions and**

**conjunctive adverbs.**

A. _____I called her, she was sleeping.

B. She was writing_____she was speaking to me on phone.

C. He has been ill_____he left Jalandhar.

D. I reached the station_____the train had left.

E. _____Professor reached, he went to take his class.

F. Keep your bag_____you can find it.

G. Ram passed the exam_____he had worked hard.

H. We eat salad_____ we may remain healthy.

I. You cannot pass the exams_____you work hard.

J. He speaks_____he were wise.

K. He is taller_____you are.

L. Do not over speed_____you should be fined.

M. _____you work hard, you will stand first in class.

N. We should learn tenses;_____, we should practice basic sentence structures.

O. I love running;_____, I love cycling.

P. I have loved the review;_____, I have asked my friends to read it.

Q. The man has got a job in Patiala;_____, he has decided to shift there.

R. There are many books on crime fiction;_____, none of them interests me.

S. I left for my work;_____, a visitor arrived.

T. The law does not permit drinking and driving at the same time;_____, there would be many more accidents.

**Answer:**

i. When I called her, she was sleeping.

ii. She was writing while she was speaking to me on phone.

iii. He has been ill since he left Jalandhar.

iv. I reached the station after the train had left.

v. As soon as Professor reached, he went to take his class.

vi. Keep your bag where you can find it.

vii. Ram passed the exam because he had worked hard.

viii. We eat salad so that we may remain healthy.

ix. You cannot pass the exams unless you work hard.

x. He speaks as if he were wise.

xi. He is taller than you are.

xii. Do not over speed lest you should be fined.

| | |
|---|---|
| xiii. | If you work hard, you will stand first in class. |
| xiv. | We should learn tenses; additionally, we should practice basic sentence structures. |
| xv. | I love running; also, I love cycling. |
| xvi. | I have loved the review; moreover, I have asked my friends to read it. |
| xvii. | The man has got a job in Patiala; therefore, he has decided to shift there. |
| xviii. | There are many books on crime fiction; however, none of them interests me. |
| xix. | I left for my work; then, a visitor arrived. |
| xx. | The law does not permit drinking and driving anytime; otherwise, there would be many more accidents. |

## 8.4 PREPOSITIONS

A preposition shows the relationship of a noun to the remaining part of the sentence. It literally means ‗place before'. Prepositions are of two types: Simple and Complex. Simple prepositions are single-word prepositions, whereas complex prepositions comprise two or more words.

A
| Simple Prepositions | Complex Prepositions |
|---|---|
| Examples: In, at, on, of, from, within, up | Examples: Ahead of, along with, due to |

preposition usually indicates the temporal, spatial or logical relationship of its object to the rest of the sentence. Pay attention to the following examples:

- The pan is **on** the table.
- The book is **beneath** the bench.
- I am leaning **against** the wall.
- His house is **beside** my house.
- He was attentively listening to his teacher **during** the class.
- I live **at** Lakshmi Pura, Jalandhar. ⬜ I am **in** Delhi.

Prepositions are ―little words‖, yet they pack a punch. It is important to use the correct preposition; else, you can express anything incorrectly.

### 8.4.1 Prepositions – Time

| Prepositions | Usage | Examples |
|---|---|---|
| ☐ on | • dates<br>• days of the week<br>• occasions | ▪ On 15<sup>th</sup> August 1947, India got freedom. I went to work on Monday. I did not go to work on Tuesday. On Wednesday, I was not feeling well. On this Diwali, I will buy a car. On this occasion, I express my gratitude. |
| ☐ in | • months<br>• seasons<br>• time of day (in the afternoon/evening/morning)<br>• year<br>• after a certain period of time *(when?)*<br>• *period of time (in the present/past/future)* | ▪ My results were declared in March / in summer.<br>▪ I woke up in the morning. I took tea in the evening.<br>▪ I completed my BA in 2021. India got freedom in 1947 I will get ready in an hour.<br>▪ |
| ☐ at | • for *night*<br>• for *weekend*<br>• a certain point of time *(when?)*<br>• *Day-break, Sun-set* | ▪ I was sleeping at night.<br>▪ We decided to meet at the weekend. I was<br>▪ at home at half-past six. |
| ☐ since | ▪ from a certain point of time (past till now) | ▪ I have been living in this house since 1947. |

| Prepositions | | Usage | Examples |
|---|---|---|---|
| ☐ | for | ▪ over a certain period of time (past till now) | ▪ I have been writing this book for eight years. |
| ☐ | ago | ▪ a certain time in the past | ▪ I met him five years ago. |
| **Prepositions** | | **Usage** | **Examples** |
| ☐ before | | ▪ earlier than a certain point of time | ▪ I went there before 2019. |
| ☐ to | | ▪ telling the time | ▪ It's ten to eight (7:50). |
| ☐ | past | ▪ telling the time | ▪ It's fifteen past eight (8:15). |
| ☐ | to / till / until | • marking the beginning and end of a period of time<br>• up to (the time that) | He works from Tuesday to Thursday.  They waited till 5 o'clock for you. |
| ☐ | till / until | ▪ in the sense of *how long something is going to last* | ▪ He is on leave until Monday. |
| ☐ by | | up to a certain time | ▪ I will complete the work by 8 o'clock.<br>▪ By 10 o'clock, I had eaten my dinner. |

**8.4.2 Prepositions – Place (Position and Direction)**

| Prepositions | Usage | Examples |
|---|---|---|
| | | |

| Prepositions | Usage | Examples |
|---|---|---|
| ☐ in | ▪ someone/something inside something/someone ▪ In room, building, kitchen, toilet, street, town, country, world, house, bag, book, car, taxi, picture, inside a thing, etc. | ▪ I saw a dog in the washroom. I live in Jalandhar. It is written in the book. I was sitting in the car. I saw him in a taxi. There was an ant in my mouth. ▪ He was looking slim in the picture. There is immense love in the world. I kept my pen in the bag. |
| ☐ at | ☐ for events • place where you are to do something typical (watch a film, study, work) • for small town and villages | ▪ I met him at a concert. She was dancing at the party. He was behaving in an absurd manner at the cinema. I will see you at school. We cannot sit idly at work. You will see great professors at university. I live at Laxmi Pura. He lives at Lamba Pind. |

| Prepositions | Usage | Examples |
|---|---|---|
| ☐ on | • attached<br>• being on a surface<br>• for a certain side (left, right)<br>• for a floor in a building<br>• for public transport<br>• for *television, radio, internet* | ▪ Hang the picture on the wall.<br>▪ He was sitting on the bed.<br>▪ His house was on the right.<br>▪ My office is on the second floor.<br>▪ I am on the train right now. He was on a plane.<br>▪ I saw him on TV. The news on the radio was disheartening. |
| ☐ by, next to, beside | ▪ left or right of somebody or something | ▪ He lives beside my house.<br>▪ His house is next to my office. |
| ☐ under | ▪ on the ground, lower than (or covered by) something else | ▪ My sneakers are under the table. |
| ☐ below | ▪ lower than something else but above ground | There was a big clock below the |
| Prepositions | Usage | Examples |
| | | bulb. |
| ☐ over | • covered by something else<br>• meaning *more than*<br>• getting to the other side (also *across*)<br>• overcoming an obstacle | ▪ You should put a coat over your vest.<br>▪ Only those who are over 18 years of age can watch this movie. Let us climb over the wall. |

| Prepositions | Usage | | Examples |
|---|---|---|---|
| ☐ above | ▪ higher than something else | | Can you raise your hand above your head for me, please? (Can you raise your hand higher than your head?) |
| ☐ across | ▪ getting to the other side<br>▪ | ▪ | I will see you across the road in ten minutes. |
| ☐ through | When we talk about moving from one side to another but _in something', such as long grass or a forest, we use through instead of across. | ▪ | He drove through the tunnel carefully. |
| ☐ to | • movement to person or building<br>• movement to a place or country<br>• for *bed* | ▪<br><br>▪<br><br>▪ | I am going to the cinema.<br>He is going to the USA.<br>It's time to go to bed. |
| ☐ into | ▪ enter a room / a building<br>▪ (shows motion) | ▪ | The mother ran into the kitchen. |
| ☐ towards | ▪ movement in the direction of something (but not directly to it) | ▪ | I am going towards the post office. |
| Prepositions | Usage | | Examples |
| ☐ onto | ▪ movement to the top of something | ▪ | The cat jumps onto the table |
| ☐ from | ▪ in the sense of *where from* | ▪ | A flower from the garden beautified my room. |

### 8.4.3 Other important Prepositions

| Prepositions | Usage | Examples |
|---|---|---|
| ☐ from | ▪ shows the source | ▪ This tea is from India. |
| ☐ of | • who/what does it belong to<br>• what does it show | ▪ A city of Punjab was nominated to be the best city in the competition.<br>▪ The picture of the house is amazing. |
| ☐ by | ▪ who made/ did it | ▪ *Kanthapura* is a book by Raja Rao. |
| ☐ on | • walking<br>• on bike<br>• entering a public transport vehicle | ▪ I will prefer to go there on foot. He was sitting on his bike.<br>▪ Let us get on the bus. |
| ☐ in | ▪ entering a car / Taxi | ▪ Get in the car |
| ☐ off | ▪ leaving a public transport vehicle | ▪ We must get off the train now. |
| ☐ out of | ▪ leaving a car / Taxi | ▪ He got out of the taxi. |
| ☐ by | ▪ rise or fall of something<br>▪ travelling<br>▪<br>▪ [Travelling **by** public transport like a train or a bus, but travelling **in** your | ▪ Prices have slashed by 20 percent. I will go there by bus.<br>▪ |
| Prepositions | Usage | Examples |
| | personal car] | |
| ☐ at | ▪ for *age* | ▪ She was admitted to a school at 45. |

| | | |
|---|---|---|
| □   about | ▪ for topics, meaning *what about* | ▪ There was a discussion about cybercrime. |

George Lyman Kittredge and Frank Edgar Farley in *An Advanced English Grammar with Exercises* write that several words are used as adverbs as well as prepositions. It is the function of each word in a sentence that decides whether that word is an adverb or a preposition.

| As Adverb | As Preposition |
|---|---|
| I fell *down*. | I fell *down* the rock. |
| Stand *by*! | He stood *by* the car. |
| A big dog ran *behind*. | She ran *behind* the car. |
| Keep *off*! | Keep *off* the grass. |

Other examples are: aboard, above, after, along, before, below, beneath, beside, between, beyond, ere, in, inside, on, outside, past, round, since, under, up, within, without.

(Source: https://www.gutenberg.org/files/45814/45814-h/45814-h.htm)

Some words like *for* and *notwithstanding* may be either prepositions or conjunctions.

| Prepositions | Conjunctions |
|---|---|
| This gift is *for* you. | We must leave, *for* it is late. |
| Raj is coming, *notwithstanding* the storm. | It is raining in torrents.  She will come, *notwithstanding*. |

## Some Random Examples of Prepositions  1.
   Radha went **to** her school after a long time.
2. The cat jumped **in/into** the river.
3. Are the girls still playing **in** the playground?
4. All our hopes fell **to** the ground.
5. The UFO landed **on** the ground.
6. We drove **toward**s the university. (Towards- in the direction of.) 7. We drove **to** the university. (To- to indicate a destination or direction)
8. They climbed **on** the wall.
9. My brother got **in/into** my car.
10. He was lying **on** the floor.
11. I moved the fridge **into** the kitchen.
12. Sakshi kept her books **on** the table.
13. Shall we carry **on** with our discussion?

14. I noticed that there was no water **in** my glass.
15. Sunil jumped **on / onto** the stage and danced. (Onto- to talk about direction or movement to a position on a surface)
16. There were **over** a thousand people **at** the concert.
17. We had been **on** the road (= travelling) **since** dawn and needed some rest.
18. He died **of** tuberculosis.
19. She is suffering **from** tuberculosis.
20. You should not be impatient **with** us.
21. Could I speak **to** Ashish?
22. I could not wait for him **because** I was getting late.
23. There were some vivid pictures **on** the walls.
24. She asked me **for** money.
25. I live **at** Kot Kishan Chand **in** Tanda. (_At' for a smaller place in one sentence)
26. I live **at** Tanda **in** Punjab. (_At' for a smaller place in one sentence)
27. I live in Mumbai in Maharashtra. (_In' for both places if they are considerably big)
28. My city is famous **for** its museums.
29. She was not **in** a hurry.
30. Have you ever been **to** Delhi? 31. There's a temple **behind** my office.

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**Check Your Progress**

**Question: Fill in the Blanks with Suitable Prepositions.**

 i. He usually travels_Jalandhar_train. ii. My parents have been married_twenty years.

iii. You frequently see this kind of violence_____television.      iv. The professor____India was a great English teacher.

 v. She is a student_____Jagat Guru Nanak Dev University,

Patiala.  vi.  I  prefer  tea
____coffee.

vii.  He was_____the hall.

viii.  Sakshi lives__Delhi. ix.  My  university starts__9 a.m.

 x. They live_____Rampura.  xi.  I  will see you     _ noon._____

xii.   You can find exercises _____the end of the lesson.
xiii.  The frog jumped_____the pond.
xiv.   My parents go_____the temple everyday.
xv.    He is senior_____me.
xvi.   Dr. Kundra teaches English_____me.
xvii.  I will return to Jalandhar_____Saturday.
xviii. My birthday falls_____18 June.
xix.   Pens were sold_____the milkman.
xx.    He hit_____a wonderful plan.
xxi.   The soldiers fought_____courage.
xxii.  My mother came back_____Beas yesterday.
xxiii. I have been working with this university_____2013.
xxiv.  I have been working here_____8 years.
xxv.   The dog ran_____the cat.
xxvi.  Light comes_____the sun.
xxvii. This gift is presented to me_____the company.
xxviii. The train is                  time.
xxix.  I am going_____the station. (Direction)
xxx.   I am going_____the station. (Destination)
xxxi.  Divide these mangoes_____two students.
xxxii. Divide these mangoes_____five students.
xxxiii. I saw him_____the road.
xxxiv. He was moving_____my house.
xxxv.  The sky is_____our heads.

**Answer:**
i.     He usually travels to Jalandhar by train.
ii.    My parents have been married for twenty years.
iii.   You frequently see this kind of violence on television.
iv.    The professor from India was a great English teacher.
v.     She is a student of Jagat Guru Nanak Dev University, Patiala.
vi.    I prefer tea to coffee.
vii.   He was in the hall.
viii.  Sakshi lives in Delhi.
ix.    My university starts at 9 a.m.
x.     They live at Rampura.
xi.    I will see you at noon.
xii.   You can find exercises at the end of the lesson.
xiii.  The frog jumped into the pond.
xiv.   My parents go to the temple everyday.

| | |
|---|---|
| xv. | He is senior to me. |
| xvi. | Dr. Kundra teaches English to me. |
| xvii. | I will return to Jalandhar on Saturday. |
| xviii. | My birthday falls on 18 June. |
| xix. | Pens were sold by the milkman. |
| xx. | He hit upon a wonderful plan. |
| xxi. | The soldiers fought with courage. |
| xxii. | My mother came back from Beas yesterday. |
| xxiii. | I have been working with this university since 2013. |
| xxiv. | I have been working here for 8 years. |
| xxv. | The dog ran after the cat. |
| xxvi. | Light comes from the sun. |
| xxvii. | This gift is presented to me by the company. |
| xxviii. | The train is behind/on/before time. |
| xxix. | I am going towards the station. (Direction) |
| xxx. | I am going to the station. (Destination) |
| xxxi. | Divide these mangoes between two students. |
| xxxii. | Divide these mangoes among five students. |
| xxxiii. | I saw him across the road. |
| xxxiv. | He was moving around my house. |
| xxxv. | The sky is over our heads. |

## 8.5 LET US SUM UP

Coordinating conjunctions, subordinating conjunctions, correlative conjunctions, and conjunctive adverbs are linking words. A preposition is a word that indicates the link between a noun or pronoun and other words in a sentence.

## 8.6 UNIT END EXERCISES

### Exercise-I

Choose the best word or phrase to fill the gaps:

1. Ram _____ Sham are good friends. (But / And / So)
2. He hates chocolates, __ I love them. (But / And / So)
3. _____ I am ill, _____ I cannot come to university. (But / And / So)
4. You can come with me, _____ you can go with them. (Or / Till / But)
5. I cannot come to university __ I have an urgent piece of work. (So / Because / Unless)
6. I will message you _____ I reach home. (As / And / When)

7.        _____ you submit all your assignments, you will be allowed to continue the course. (Unless / Until / As long as)

8.        I wanted to go to Goa, _____ my wife wanted to go to Manali. (So / When / Whereas)

9.        You cannot watch this movie ____ you are 18 or older. (Provided that / Unless / As)

10.       She still went to college _____ she was sick. (Even though / Until / If)

11.       Do not call me _____ you have reached there. (Until / While / As long as)

12.       _____ the bad weather, they left for work. (Because / Despite / Whereas)

13.       Wash your hands _____ you eat your breakfast. (Till / When / Before)

14.       I did not have permission to enter the mall. __, I was not allowed to see my friend who works there. (Because / As / Consequently)

15.       I like cycles, motorbikes, trains and airplanes. __, I do not like cars. (So / However / And)

16.       He could not submit his admission form because he was unable to pay the tuition fee.
          _____ , he did not apply for the scholarship. (Or / Until / In addition)

17.       _____ I was preparing notes, my sister was singing a song. (While / Until / Despite)

18.       I will like you _____ I die. (After / Unless / Till)

19.       I had my breakfast ____ I got home. (But / As Soon As / Until)

20.       _____ you do not work hard, you will not pass your exams. (If / So / As Long As)

21.       _____ we had no money, we still had a good time. (Finally / However / Although)

22.       My boss insulted me. __, I have decided to leave my job. (If / Therefore / As Long As)

23.       He is _____ a singer nor a dancer. (If / So / Not only/ Neither)

24.       He is _____ a singer but also a dancer. (If / So / Not only/ Neither)

## Exercise-II

Underline prepositions in the following paragraph:

I was very happy to see my old friend in the market. He was speaking to someone on the phone. He disconnected the call when he noticed me. He rushed to hug me. He said that he had some parcel in his bag and he was to deliver it to someone living across the river. I was really very happy to see him, and I wanted to spend some time in his company. But, he was getting late and he had to leave. I asked him to come over for dinner. He said that he would see me on Sunday at 9 pm. On that day, I was at home; I was keenly waiting for him. My friend reached my home on time. He was accompanied by his wife and two kids. I was surprised to know that his wife worked in an office which was beside my house. And my house was behind a supermarket, where they would usually come to buy grocery items. They brought a cake for me. I kept this

cake on the table and sat on a chair. I was happy to receive this gift from my friend. All of us were in a jocund mood. I told my friend that I had been living in this city since 2004 and I had been trying to know his whereabouts for ten years.

## 8.7 ANSWERS TO EXERCISES

### Exercise-I

1.        Ram _____ Sham are good friends. (and)
2.        He hates chocolates, __ I love them. (but)
3.        ____ I am ill,        I cannot come to university. (so)
4.        You can come with me,        you can go with them. (or)
5.        I cannot come to university__ I have an urgent piece of work. (because)
6.        I will message _____ I reach home. (when)
7.        you submit all your assignments, you will be allowed to continue the course. (As long as)
8.        I wanted to go to Goa, _____ my wife wanted to go to Manali. (whereas)
9.        You cannot watch this movie_ you are 18 or older. (unless)
10.       She still went to college_____ she was sick. (even though)
11.       Do not call me _____ you have reached there. (until)
12.       the bad weather, they left for work. (Despite)
13.       Wash your hands____ you eat your breakfast. (before)
14.       I did not have permission to enter the mall._, I was not allowed to see my friend who works there. (Consequently)
15.       I like cycles, motorbikes, trains and airplanes._, I do not like cars. (However)
          16. He could not submit his admission form because he was unable to pay the tuition fee.
          _____        , he did not apply for the scholarship. (In addition)
17.       I was preparing notes, my sister was singing a song. (While)
18.       I will like you _____ I die. (till)
19.       I had my breakfast___ I got home. (as soon as)
20.       you do not work hard, you will not pass your exams. (If)
21.       we had no money, we still had a good time. (Although)
22.       My boss insulted me._, I have decided to leave my job. (Therefore)
23.       He is a singer nor a dancer. (neither)
24.       He is _____ a singer but also a dancer. (not only)

### Exercise-II

I was very happy **to** see my old friend **in** the market. He was speaking **to** someone **on** the phone. He disconnected the call when he noticed me. He rushed **to** hug me. He said that he had some parcel **in** his bag and he was **to** deliver it **to** someone living **across** the river. I was really very

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happy **to** see him, and I wanted **to** spend some time **in** his company. But, he was getting late and he had **to** leave. I asked him **to** come **over** for dinner. He said that he would see me **on** Sunday **at** 9 pm. **On** that day, I was **at** home; I was keenly waiting **for** him. My friend reached my home **on** time. He was accompanied **by** his wife and two kids. I was surprised **to** know that his wife worked **in** an office which was **beside** my house. And my house was **behind** a supermarket, where they would usually come **to** buy grocery items. They brought a cake **for** me. I kept this cake **on** the table and sat **on** a chair. I was happy **to** receive this gift **from** my friend. All **of** us were **in** a jocund mood. I told my friend that I had been living **in** this city **since** 2004 and I had been trying **to** know his whereabouts **for** ten years.

## **8.8** References and Suggested Readings

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# B.COM (HONS.)

## (Accounting and Taxation)
### SEMESTER-II
### COURSE: ENGLISH COMPULSORY-1

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### UNIT-9
### FUNCTIONAL ENGLISH: THANKING, APOLOGISING, MAKING REQUESTS

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**STRUCTURE**

**9.1 Objectives**

**9.2 Introduction**

**9.3 Thanking Someone and Responding to Thanks**

**9.4 Spoken English and Role Plays**

**9.5 Apologising and Responding to Apology**

**9.6 Making Requests and Responding to Requests**

**9.7 Unit End Exercises**

**9.8 Let Us Sum Up**

**9.9 References and Suggested Readings**

## 9.1 OBJECTIVES

After a careful reading of the unit, you will be able to
- demonstrate an understanding of the expressions related to gratitude, apology and request;
- demonstrate how to respond to thanks, apologies and requests;
  ❑ hone spoken English skills through role plays.

## 9.2 INTRODUCTION

To thank is to show that you are grateful or pleased about something; to apologise means to express regret for doing anything that has caused someone difficulty or dissatisfaction; to request is to ask for something politely. In this unit, as the title of the unit suggests, we will learn how to

thank someone, how to apologise and how to make requests. In addition, we will also learn the expressions used to respond to thanks, apologies and requests. This unit mainly aims to improve your spoken English through role plays about thanks, apologies and requests.

We hope that you will find this unit very interesting and easy. We have prepared some exercises for you. Please complete these for a better understanding of the topic.

## 9.3 THANKING SOMEONE AND RESPONDING TO THANKS

When someone gives you a birthday gift, you feel so happy and you express your happiness by saying ‗thanks'. All of us are aware that we show our appreciation when we are grateful to someone. By saying thanks, we acknowledge their efforts/gestures. On a daily basis, we express our gratitude to many people for the many things they do for us. We are thankful

- when someone helps us
- when someone favours us
- when someone appreciates us
- when someone gives us a gift
- when someone makes us feel happy
- when someone gives us a compliment
- when someone gives us constructive feedback
- when someone comforts us
- when someone gives us a piece of advice

Can you think of some other situations when you express thanks to others? I am sure that there are many more such situations. Would you like to thank your family for their consistent support and love? You may say the following words to your family members over dinner: ―Dear family, I am eternally grateful to you for everything you have done for me.‖ There are a number of ways to say ‗thanks'. Let us have a look at some common expressions that we can use in our day-to-day life:

- Thank you.
- Thanks.
- Thanks a lot.
- Thank you very much.
- Thank you. That is very kind of you.
- Thank you. You are very helpful.
- Sincere thanks.
- I am indebted to you.
- I appreciate what you have done for me.
- I am grateful to you.
- I thank you from the core/bottom of my heart.

- If anyone deserves thanks, it is you.
- Thanks for being thoughtful.
- I express my gratitude to you for your consistent support and help.
- What you have done means a lot to me.
- My gratitude knows no bounds.
- How can I ever thank you enough for all you have done?
- Please accept my endless gratitude.
- Please accept my heartfelt thanks.
- You have been extremely supportive through my hard times.
- I really appreciate it.
- I want to thank you for all the support and concern.
- That was very kind of you.
- Thank you for being there for me.

How would you respond to such expressions? If someone expresses thanks to you, you are expected to respond to that gesture warmly. Let us have a look at some expressions that you can use in such situations.

- You are welcome. ☐ Not at all.
- No problem at all.
- Please, do not mention it.
- It was my pleasure.
- It was really no trouble at all.
- It was the least I could do.
- Glad to help you.
- I am always at your disposal.

Choose an appropriate expression as per the context. For example, if your teacher thanks you for your assistance in the class during the contact programme, you may give a courteous response as follows: ―I am always at your disposal, sir/ma'am.‖ Or, you may say: ―I am glad to assist you, sir/ma'am.‖ ―Not at all‖ will not make any sense in this situation.


## 9.4 SPOKEN ENGLISH AND ROLE PLAYS

Role play exercises give students an opportunity to assume the role of a person or act out a given situation. The most exciting thing about role plays is that you can pretend to be any person in any imaginary situation. For example, I can ‗become' a student, a minister, a king, a doctor, or any other person in an imaginary situation. If I am to role-play a doctor in an imaginary hospital setting, the other participant can role-play a patient or colleague. This would help us engage in a relevant contextual dialogue. If you like, you may stay in your own shoes, or you may put yourself into an imaginary situation! For example, I may participate in a role play as a teacher (This is what I am in my professional life!).

Role plays can really help you understand the use of ‗thanks expressions' in socio-cultural contexts. Broadly speaking, they can help you improve your speaking skills. In the beginning, we should practice speaking skills slowly (Something that we learn slowly remains with us for a long time. On the other hand, we tend to forget the things we learn quickly in no time. This is how we acquire a language- slowly and steadily. So, slow practice is effective.); our main purpose should be meaningful communication.

Some of you might have noticed that I have used the word ‗acquire' instead of ‗learn' in one place in the previous paragraph. We should try to acquire language skills in socio-cultural contexts. Let me simplify it. Learning a language demands an interest in and a positive attitude towards the target language in formal as well as informal situations. In formal contexts, a language is taught with systematic instructional planning. It usually involves a teacher with an individual methodology and learners with multiple personal agendas in the class. Importantly, it includes consistent evaluation and certification at the end of a course. On the other hand, learning a language in informal contexts is based on the learner's exposure to and experience with the target language in day-to-day socio-cultural situations outside the classroom. This kind of learning could be even more effective than planned instruction in terms of understanding and the retention of knowledge. When we study a language as a subject, we may learn its grammar rules and structures. However, we do not feel very confident and comfortable when we are to use that language in real-life situations. My three-year-old child can fluently speak in Punjabi (mother tongue) though he does not know any prescriptive rules of this language. It is due to his ample exposure to the mother tongue at home. So, the best way to learn a language is not to learn it through its grammatical structures and rules; I believe we should get exposure to the target language if we wish to learn it naturally and easily. We should not struggle to focus too much on rules. If you want to improve your spoken English, you should speak in English as much as you can. Do not worry about errors at all, as errors are a stepping stone to learning.

While everybody has abundant exposure to the mother tongue (in our case, Punjabi), it is not always so with the second language (in our case, English). In India, people do not get an opportunity to learn English in a ‗natural' environment. That's why, even after studying English in schools and colleges for twelve to fifteen years, many students cannot speak English accurately and fluently. We must create opportunities for students to use and practice English. Notably, role plays in English can help us hone our English speaking skills.

A roleplay takes place between two or more people who act out roles to explore a particular scenario. If you do not find a family member or friend to participate in role plays, do not worry. I always ask my students to do ‗mirror-practicing'. Just stand in front of a mirror and play both roles. It is a kind of self-talk in an imaginary situation in which you are to pretend to be two different persons who engage in a dialogue (Such a situation reminds me of monoacting in which an individual plays numerous roles in an alternate manner in the same scene); it will give you the confidence to speak English in real-life contexts.

Always remember that the English language has four basic skills: reading, writing, speaking and listening. Regretfully, many people learn English as a subject but not as communication skills. A skill can be developed through training and experience. I would like to correlate English language skills with driving skills. You may read a book on how to drive a car and learn all the

driving rules. Even when you have learned everything ABOUT driving, you cannot drive a car without attending practice and training sessions. Similarly, you can learn all the rules and structures of English, but this will not enable you to use English in your day-to-day life. English communication skills help us relook at the language as a practical skill (not as a theoretical subject!). So, if you wish to improve your English, get ample exposure to the language and use it as much as you can on a daily basis. Over a period of time, you will acquire considerable fluency and accuracy.

**Role Play-I**

Let us develop a role play out of an imaginary situation. Here, I have imagined becoming a customer and I want to say thanks to a bookseller for his wonderful services. My brother has decided to become the bookseller. (When my brother/sister is not around me, I role-play both roles in front of a mirror. The show must go on! )

BOOKSELLER: Good afternoon, Sir. What can I do for you?

CUSTOMER: Good afternoon. I would like to buy some books.

BOOKSELLER: Titles, Sir?

CUSTOMER: Raja Rao's *Kanthapura* and Mulk Raj Anand's *Untouchable*.

BOOKSELLER: Sir, we do not have these books at present. Could you please come tomorrow? By then we will arrange the books.

CUSTOMER: I have come from a faraway place. **I shall be highly thankful if you arrange them right away.**

BOOKSELLER: Sir, I will try my best. Please give me some time. Kindly have a seat.

[The BOOKSELLER gives some instructions to his assistant, who immediately leaves for the store.]

CUSTOMER: **So nice of you**.

BOOKSELLER: Not a problem at all. **I am glad that I am of some help.**

[After some time, the assistant returns with the books.]

CUSTOMER: **That is really nice!** I think both of the books are available now.

BOOKSELLER: **It is our pleasure, Sir. Thank you for giving us a chance to serve you.**
CUSTOMER: **Pleasure is all mine. You are so helpful.** I love to visit your shop. You never disappoint me.

BOOKSELLER: **Sir, we are always at your disposal.**

CUSTOMER: Please pack the books. How much rupees am I to pay?

BOOKSELLER: Two hundred and nineteen rupees. Plus taxes.

CUSTOMER: Could you gift-wrap these books? You see, it is a gift to my friend! He is going abroad tomorrow.

BOOKSELLER: I see! (Later) Here it is!

CUSTOMER: **That is very kind of you.** Bye! **Thanks again.**

BOOKSELLER: Bye, Sir. Do visit again. Have a nice day.

## 9.5 APOLOGISING AND RESPONDING TO APOLOGY

Despite our best intentions, we make mistakes in our life. It is rightly said that to err is human. When we make mistakes, we upset/hurt others. A wise person, if wrong, would not hesitate to apologise to ease the tense situation;  he/she will learn from his/her mistakes  and add rich experiences to his/her life. So, you should never let your ego dominate your mind. If you realise that you are wrong, do not hesitate or feel reluctant to apologise. It will give you greater peace of mind. Besides, it will help you build your positive image. You may ruin your relationships with friends, family, and coworkers by not apologising or apologising half-heartedly. Apologising does not make you a horrible person or a loser; it simply indicates that you give more importance to your relationship than your ego.

Sometimes, we turn a blind eye to our unjustified behaviour. In that case, the best thing is to see a situation from multiple perspectives. If someone seems to be hurt or offended, try to see the situation from their perspective. Put yourself in their place/position/shoes. When we imagine ourselves in their shoes, we will be able to predict their feelings and their behaviour, bridging the gap between the self and the other. If you want to develop long-lasting connections with people, you must learn how to apologise appropriately and truly. There are two key components to a successful apology. To begin with, it expresses the person's sorrow for their words or acts. Second, it admits that your acts, whether deliberate or not, caused harm to the person to whom you are apologising.

Can you think of some situations in which you may have to apologise? A list of such situations is given below:

- missing the deadline to submit your assignment
- arriving late to a class
- not answering emails or calls on time
- not fulfilling your promise
- forgetting to bring gifts for loved ones on special occasions
- ignoring a friend's/ family member's messages
- hurting someone unintentionally

- not attending a party
- not attending a funeral ceremony

Let us have a look at some common expressions we can use to say sorry:

- I am sorry.

(‗I am sorry' is very informal, and it is usually used to apologise for small things. You can be more expressive and say something like ―I'm terribly sorry I forgot to post your letter!‖ or ―I'm awfully sorry! I did not know this would happen.‖ To show the intensity of your remorse/regret, you can also use adverbs like *deeply*, *desperately*, *dreadfully*, *extremely*, *frightfully*, *genuinely*, *really*, *truly*, *very*, etc.)

- I do apologise for … (my stupidity)
- I must apologise for... (my strange behaviour)
- I apologise for... (coming late to the class)
- I would like to apologise for... (the inconvenience caused to you)
- I am so sorry for … (my unprofessional remark) ⬚ I should not have... (said that. I take my words back.) ⬚ It is all my fault.
- I am ashamed of... (my aggressive/unprofessional behaviour)
- Please, forgive me for... (my mistake)
- Excuse me for ... (not being able to live up to your expectations) ⬚ I am terribly sorry. I did not mean to do it.
- Pardon me. I take full responsibility.
- Please, forgive me.
- Please, accept my sincere apologies.
- I feel ashamed. It will not happen again.

If someone has suffered a material loss due to you, your verbal apology may not compensate for their loss, and they might expect you to pay for the loss. This situation helps us to evolve a general strategy that can work when we are to apologise. You may consider the following steps:

- Explicit apology and request for forgiveness (For example, I am sorry, I apologise, Excuse me, Forgive me, and Pardon me)
- Taking on responsibility (For example, I did not mean to do it.)
- Explanation or account for the offense (For example, I enthusiastically lifted the vase to feel its surface. I did not know that it was slippery.)
- Offer of repair for the offense (For example, I will buy you a new vase.)
- Promise of forbearance from similar offenses in the future (For example, I will not repeat such a mistake in the future. I will be quite careful now onwards.)

Mahatma Gandhi in his autobiography mentions that he, during his childhood, fell into bad company and took to smoking surreptitiously and he even stole money to procure funds for it. He realized his mistake soon. He wrote an apology to his father, and his father forgave him.

We should not bear grudges against others. Guru Nanak Dev ji preaches about the need for forgiveness. In Hinduism, atonement, forgiveness and expiation are the best means to self-purification. *The Bible* says that forgive others to be forgiven. Once we are mentally prepared to forgive others, we may use the following expressions to respond to apologies: ☐ That is all right.

- Never mind.
- Do not apologise.
- It does not matter.
- Do not worry about it.
- Do not mention it.
- That is OK.
- I understand it.
- You could not help it.
- Forget about it.
- No harm done.
- Forget it!

In some compelling situations, you may reject apologies. In this case, you should use very polite expressions to share your mind and heart. For example:

- Thank you for your apology. Right now, I am not in a state of mind to accept this apology. What you have done to me is very hurtful and it will take some time to heal.


**Role Play-II**

Let us develop a role play out of an imaginary situation. Here, I have imagined becomig a student and I want to say sorry to my teacher for not being able to submit my assignment by the stipulated time. My brother has decided to become the teacher. (I reiterate when my brother/sister is not around me, I role-play both roles in front of a mirror. The show must go on! ) STUDENT: Sir, **I am extremely sorry that I could not submit my assignment on time.**

TEACHER: Why did you not submit it on time?

STUDENT: Sir, my assignment was ready. However, my father fell sick, and he was hospitalized. I got very busy.

TEACHER: How is your father now?

STUDENT: He is fine.

TEACHER: Why did you not inform me about your father's hospitalisation before the last date of submission?

STUDENT: **I apologise, Sir.** I was on my toes all the time. I forgot about the assignment.

TEACHER: **It is all right.** You are the only student who could not submit his assignment on time. As per the norms, I will have to take permission from Head of the Department before accepting your assignment. Could you please give me a photocopy of your father's discharge slip for official purposes? It is to be put on record.

STUDENT: I will not be able to submit it. My father was not hospitalized. I have told a lie. I could not submit my assignment on time, as I did not find time to read the lesson. **Please accept my sincere apologies. I will not do it again. I am ashamed of my behaviour.**

TEACHER: I am disheartened to know how insensitive you are. **I will not accept your apology.** You have hurt me. I am really disappointed.

STUDENT: **Please give me a chance, Sir**. I assure you that **I will not disappoint you in the future.**

TEACHER: **That is OK.** But I would like to see your father.

STUDENT: Once again, **I am really sorry. Sir,** I will ask my father to see you.

TEACHER: OK.

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**Activity**

Imagine that you are in the following situations. What will you say to apologise? In this section, you have learnt many ‗sorry expressions'. You can choose appropriate expressions from there. Explain which expressions will not work in the following situations? Why do you say so?

- You borrowed a car and crashed it into a building.
- You lost your brother's favourite book.
- You lost the book you borrowed from the local library.
- You knocked down a child while you were riding a bicycle on a busy road.
- You forgot to wish your friend on his/her birthday.
- You have invaded the other person's space.

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## 9.6 MAKING REQUESTS AND RESPONDING TO REQUESTS

In our day-to-day life, we ask people to do something or other for us. We ask them politely and they get ready to help us readily and cheerfully on most occasions. A request is a polite way of asking people to do something. Alfred George Gardiner's essay ―On Saying Please‖ highlights the importance of courtesy and politeness in our social behaviour. Have you ever been requested to do something for someone? The following is a list of situations in which you may have to make requests:

- Requesting your friend to let you use his car in some emergency
- Requesting your friend to drive you to the railway station
- Requesting someone to help you move into your new house
- Requesting someone to let you stay at their place for a while
- Requesting your teacher to extend the deadline for the submission of projects

- Requesting your brother to lend you some money

Requests are simply cordial questions. A request is to ask, solicit or beseech someone for something you require.

- **I was wondering if you would** mind letting me use your pen.

- **I wonder if I could use your pen**.

- **Would you mind** letting me use your pen?

- **Would you mind if** I borrowed your pen?

- **Do you mind if** I use your pen?

- **Is it OK if** I use your pen?

- **Could you** lend me a pen?

- **Can I** borrow your pen?

- **Will** you give me a pen?

- **Give** me a pen.

**Expressions for Making Requests**
(From Most Formal to Least Formal)

**Expressions for Accepting Requests:**

Sure, I would be glad to… (help you.) I
would be happy to … (assist you.) Sure.
Just a moment. No problem. Of course

Certainly.

All right.

Yes, please.

**Expressions for Refusing Requests:**

Your request does not seem to be reasonable.

I do not agree with you.

I cannot comply with your request.

I am sorry, I cannot.

I am sorry. I have to turn down your request.

I had loved to, but … (my circumstances do not allow me.)

Sorry to say that …(I will not be able to accede to your request)
It sounds great, but … (I will not be able to accept your request)
I am afraid that I will not be able to help you. I can help you later
on but not right away.


**Role Play-III**

Let us develop a role play out of an imaginary situation. I will not pretend to be anyone else in this role play. It means I will speak my dialogues as Nakul. I want to request a counter clerk to help me fill up an application form. My brother has decided to become the clerk. (I reiterate when my brother/sister is not around me, I role-play both roles in front of a mirror. The show must go on! )

NAKUL: Excuse me.

COUNTER CLERK: Yes?

NAKUL: I want to fill up this application form. **Could you please help me?**

COUNTER CLERK: **Sure, I would be glad to help you.** How can I help you?

NAKUL: I do not know what is to be mentioned in column 8.

COUNTER CLERK: All right. Let me check it. (After a pause.) If your official address and home address are the same, then you are not required to mention anything here. Leave this column blank.

NAKUL: **So kind of you for your help, Sir.** Thanks.

COUNTER CLERK: **It"s my pleasure.** Sir, if your form is complete in all respects, you may submit it to me.

NAKUL: Yes, Sir. It is complete. **May I get an envelope?**

COUNTER CLERK: Of course, yes. Please have it.

NAKUL: Sir, I have put the form in the envelope. **Could you please accept the form?**

COUNTER CLERK: **Sure, Sir. By all means.**

NAKUL: **Thank you very much.**

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**Activity**

Imagine that you are in the following situations. What will you say to make a request in each situation?

You have learnt many _request expressions'. You can choose appropriate expressions from this lesson. Explain which expressions will not work in the following situations? Why do you say so?

- You need notes from your friends.
- You want your teacher to check your work.
- You want your father to buy a bike for you.
- You want a car mechanic to repair your car immediately.

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### 9.7 UNIT END EXERCISES

**Task-1**

Role-play some of the following situations with at least ten lines per conversation, paying attention to how and how often you say thanks or express your gratitude.

- Someone has helped you board the bus.
- You have enjoyed your stay in a hotel.
- Someone has helped you role-play.
- An old friend invites you to a restaurant and pays the bill. ☐ Your teacher has cleared your doubts.

**Task-II**

Role-play some of the following situations with at least ten lines per conversation, paying attention to how and how often you use ‗sorry' expressions.

- You forgot to bring medicines for your grandfather.
- You missed the deadline to submit your project.
- You accidentally broke a beautiful vase at your friend's house.
- Your words offended your friend. ☐ You ran into an elderly person.

**Task-III**

Role-play some of the following situations with at least ten lines per conversation, paying attention to how and how often you make requests.

- You have attended a presentation. Request the presenter for a copy of the PPT.
- You go to your workplace on your bike. Request your colleague to take you with him in his car during the winter season.
- Request the bank clerk to give you details about opening a new bank account. ☐ Request your friend to give his laptop to you for one day.

### 9.8 LET US SUM UP

In this unit, you have learnt the language of gratitude, apologies and requests. When someone does something for you, it is always good to show them that you appreciate the thought behind their action. We should be courteous while expressing thanks/gratitude to someone. An apology is about validating the other person's feelings when they have been hurt or wronged. It should show our regret/remorse. We should apologise in a humble way. A request is when we ask someone for something. Since we are asking someone for something, it is important to be polite. We must avoid being too direct. We should respond to thanks/gratitude, apologies and requests sincerely and genuinely.

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# BACHELOR OF Commerce (Hons.)
## (Accounting and Taxation)

## Unit-10: Development of Story

**STRUCTURE**

**10.1 Objectives**

**10.2 Introduction**

**10.3 Story**

**10.4 How Short can a Story be?**

**10.5 Tips for Writing Stories**

**10.6 Tenses**

**10.7 Developing Story Outlines into Readable Stories**

**10.8 Practice Exercises**

**10.9 Let Us Sum Up**

**10.10 Bibliography and Suggested Readings**

## 10.1 OBJECTIVES

After a careful reading of the unit, you will be able to
- define and explain the characteristics of short stories;
- develop writing skills;  develop and analyse short stories.

## 10.2 INTRODUCTION

In this unit, you will learn about the development of stories. First of all, the key elements of stories will be introduced to you. We will also look at the possible length of a story. J. C.
Nesfield's tips for writing stories are also given in this unit so that you know about the dos and don'ts of the art of short story writing. Since one of the objectives of the lesson is to develop your writing skills, we would like you to have a quick look at tenses and revise the unit named

‗Sentence Structures'. We have focused this part of the unit on tenses because we want you to ensure that you should write grammatically acceptable sentences. After looking at the grammatical aspect of writing, we will teach you how to develop a story out of an outline. Towards the end of the unit, you will find many practice exercises. Do a lot of practice. It is well said that practice makes a man perfect. It is time to unleash your creativity. Best wishes!

## 10.3 <u>STORY</u>

A brief fictional prose narrative that usually deals with only a few characters is known as Short Story. It is a self-contained unit and can be read in a short span of time. It is shorter than a novella. It is usually concerned with a single effect. The basic difference between a novel and a short story is that of their scope. The novel has a wider scope for the development of characters and themes and the employment of different narrative techniques. In a story, the incident is more important than the character. The story has one plot and a limited setting. It is interesting to note that a short story is usually narrated/told within 10,000 words. Flash fiction may range between a few words and a thousand words. Before we proceed, let us have a look at some important terms used in this paragraph:

- **Fiction**: It is a piece of creative writing that originates out of one's imagination. It is not presented as a factual account irrespective of the fact that it may have been inspired by a true story or situation. Novels, novellas and short stories fall into the fiction genre.

- **Story**: A short story is shorter and more restricted in terms of the number of characters and situations than a novella. It may have just one episode, or it may be made up of a series of incidents related to a central situation.

- **Novel**: A novel is longer than a novella. It usually has an intricate plot. There may be a subplot as well. In the novel, characters are not only revealed but also developed. The novel usually has some major characters whose physical, social, psychological, economic and/or cultural aspects are portrayed in an elaborated manner.

- **Novella**: It is longer than a short story but shorter than a novel. The long short story is sometimes referred to as a novella. It ranges from roughly fifty to one hundred pages in length.

  **Character**: A character is a person in a fictional work. In his book *Aspects of the Novel*, E. M. Forster has discussed two basic types of characters: flat characters and round characters. Flat characters are ―immediately recognizable and can usually be represented by a single sentence‖ or characteristic. They are one- or two-dimensional, simple figures, but round characters are fully developed, complex characters with a wide range of attributes. Since they develop and change the story, round characters can be called dynamic characters. A round character cannot be summed up in a sentence or two. We find both flat and round characters in stories, novels and novellas.

  In a short story, however, most characters are not fully developed due to temporal and spatial restrictions. Hence, many a time, any one aspect of a character is revealed through the development of the plot. In a story, if the role of a character is limited to breaking into a house to steal money, that character would be a flat character, and we can sum up that character in one word (burglar/thief) or in one sentence. On the other hand, the hero who

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shows a depth of personality and develops through his crisis and/or internal/external conflicts will be an example of round characters.

**Theme**: Theme is the central or dominating idea, thesis or meaning of a work. According to Ross Murfin and Supriya M. Ray, it is ―not simply the subject of a literary work, but rather a statement that the text seems to be making about that subject.‖ Example: the subject of a story may be a poor man's hardships. However, whether that poor man's struggle leads him to success or not would define the theme of the work. If the poor man overcomes his underprivileged condition with his strenuous efforts, then the work seems to tell us that a human being is the maker of their destiny. On the other hand, if the poor man does not overcome his underprivileged condition even after doing hard work and eventually dies, then the work probably wants to tell us that human beings are mere puppets in the hands of their destiny.

•   **Narrative Technique**: Narrative techniques are the methods used by an author to tell a story. The point of view is one of the narrative techniques which an author employs to tell the story from a specific perspective. ‗First person' is the *I/we* perspective. ‗Second person' is the *you* perspective. ‗Third person' is the *he/she/it/they* perspective. Let me give you three examples from my forthcoming book of short stories titled *The Whirlpool of Riddles* by Sahitya Akademi, New Delhi:

(i)   **Third Person Point of View**:

―**King Vijay** was ready to shed every last drop of **his** sweat and blood to make **his** reign a success. The time of day never mattered to **him**!

**He** always willingly looked into issues that needed **his** attention. **His** dedication and love helped **him** to win the hearts and souls of his subjects. **He** was the apple of their eye. Time swept past, and every day appeared to go by as fast as a blink. Unluckily, **his** hectic and tiring schedule ate into **his** personal life. Although sorrows upon sorrows befell him, **he** successfully managed to cloak **himself** in false gaiety. No one ever detected the miseries lying hidden deep at the core of **his** heart.‖

(―All About Cupidity‖)

**(ii)   Second Person Point of View**

―Hope to see **you** soon with my comrade. Can **you** wait?...‖

(―The Waiting Room‖)

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**(iii) First Person Point of View**

―When **I** was in the eighth standard, **I** thought that one had to wear spectacles in order to acquire a scholarly air. **My** desire to own glasses resulted from my fascination with TV actors, who had popularised them like anything. **I** prayed for poor eyesight day and night. By the next year, my wish had been granted. As the years went by, **I** realised that this boon would toss me into a waste bin. With the advent of new fashions, the characters on TV discarded glasses, but **I** could not! At this point in time, **I** was nicknamed ‗Battery' by my friends. How could **I** snatch their freedom of speech in a democratic, socialist country? **I** remained silent and worked diligently to achieve my goal.‖

(―Personal Diary‖)

- **Plot**: Plot is the sequence of interconnected events within a narrative work like a story. It is different from ‗story', as it emphasizes causality. It means the plot includes not only what happens but also why and how things happen the way they do. E. M. Forster gives an example to clarify the difference between ‗story' and ‗plot': ―The king died and then the queen died‖ is a story. But ‗the king died and then the queen died of grief' is a plot.

- **Setting**: Setting is the background against which the action of a story is presented. In other words, it is the combination of place, historical time and social milieu; it gives us the general background information about the characters and plot of a literary work. Example: a story may be set in Amritsar and it may depict the division of India in 1947.

## 10.4 HOW SHORT CAN A STORY BE?

In the hustle-bustle of life, some people do not find a lot of time to read long fiction. They prefer to read short fiction, which is nowadays popularly known as flash fiction. **Flash fiction** is the type of fiction that has less than 1000 words. Although it is quite short in length, yet it does not compromise with its structure; it has a beginning, a middle and an ending. Flash fiction can be in different forms like drabble, mini-saga, six-word stories, etc. **Postcard fiction** is exactly what it sounds like—a tale that might fit on a postcard. It is usually approximately 250 words long, although it might be as long as 500 or as short as 25. **Mini-Sagas** first appeared in a competition run by the Sunday Telegraph in 1982. A mini-saga is a story which must have exactly fifty words and a title not exceeding fifteen words. Like real stories, it has a beginning, a middle and an ending. **A drabble** is a tale that is only 100 words long (not including the title). Larry Smith, the founder of the storytelling magazine SMITH Magazine, invited his community to write their life stories in precisely six words in 2006, igniting a worldwide sensation in a short span of time.

## 10.5 TIPS FOR WRITING STORIES

In one of my short stories, the narrator aspires to become a writer and he understands that writing a creative piece of art is an agony. He says,

―Should I write a thriller? Should I write a story exposing the recruitment scam? Or, should I write the story of my unrequited love? If I write about the evils in our society, my book will be burned. I might be exiled. I might be killed. I'm afraid of democracy. Every second author points out the hardships faced by the citizens of India. Nobody suggests a solution. I'll fill my stories with solutions. I'll invoke Swami Vivekanand and request him to bless me with the wisdom and vision needed to do this.‖

<p style="text-align:center">(To be a Writer…)</p>

You should not be worried as the narrator is in the story ―To be a Writer‖. You can find a good theme everywhere. There are great writers who have written evergreen stories on a trivial thing like a lottery ticket (Anton Chekhov's ―The Lottery Ticket‖) as well as on a grave issue like the pain of the partition of India (Saadat Hasan Manto's ―Toba Tek Singh‖). Be a good observer. You will find a good theme around you. Always remember that creativity is not hereditary. All of us are capable of developing creativity to any extent.

J. C. Nesfield in *English Grammar, Composition and Usage* says,

―Bear in mind the following hints:-

1.  When you are telling a story, try to *tell it as simply and naturally as possible*.
2.  You must have *a clear idea of the various incidents of the story in your mind* before you begin to write.
3.  If you are given an *outline*, read it carefully. Note all the points. Write with a careful eye on these points all the time. *Keep as far as possible to the order in which the points are given in the outline.*
4.  Then make a start. *The opening is very important.* It should arrest the reader's attention. The best way to begin is to plunge into the story straight away.
5.  *Arrange your points in proper, natural order.* Do not jump from point to point. *Think out the proper connection between the various points of your story, so that the whole will read like a continuous narrative.*
6.  You may introduce *dialogue* here and there. Be careful to make it crisp and natural.
7.  The *conclusion is perhaps the most important of all.* An unexpected ending will help to make the story striking and memorable.
8.  Revise what you have written, and remove all mistakes in spelling, grammar and punctuation.
9.  Now give a well thought-out and suitable title or heading to your story. You may name it after the *chief point, character, or incident*. Or you may choose a *proverb* or some well-known *maxim* that the story illustrates.‖

## 10.6 <u>TENSES</u>

I think you should read the lesson named ‗Sentence Structures' once again before you try your hands at developing stories. Now, let us have a quick look at tenses. Tenses and sentence structures will help you create grammatically acceptable sentences.

- The Present - What are you currently doing?          I am eating food.
- The Past - What did you do some time back? I ate food.
- The Future - What will you do later? I will eat food.

Tenses are fundamental in the creation of sentences in the English language. The tense of a verb indicates when an event or action occurs/occurred/will occur. There are four different kinds of tenses: Simple, Perfect, Continuous and Perfect Continuous. Each of these has a present, past and future form.

❖ PRESENT TENSES

➢ <u>SIMPLE PRESENT TENSE</u>

The action is simply mentioned and there is nothing being said about its completeness. Examples: I go. I run. I play.

**STRUCTURE**

**Singular-**

He/She/It/Singulars + V1 (first form of verb) + s/es* *[Add **-**

**es** to verbs ending in:**-ss, -x, -sh, o, -ch**: *he passes, she*

*catches, he fixes, it pushes, he goes*] e.g., He eat**s** food. He

fix**es** a meeting. **Plural-**

They/We/You/I/ Plurals + V1. (They eat food. They fix a meeting.)

**Negative**

**Singular-**

 He/She/It/Singular (Subject) + Does Not + V1. (He does not eat food.)

**Plural-**

 They/We/You/I/Plural (Subject) + Do Not + V1. (They do not eat food.)

**Interrogative**

**Singular-**

Doesn't + He/She/It/Singulars (Subject) + V1 + ? (Doesn't he eat food?)

OR

Does + He/She/It/Singulars (Subject) + Not + V1 + ? (Does he not eat food?) **Plural-**

 Don't + They/We/You/I/Plural (Subject) + V1 + ? (Don't they eat food?)

OR

 Do + They/We/You/I/Plural (Subject) + Not+ V1 + ? (Do they not eat food?)

**USES**

**USE 1 Repeated Actions.** Examples: I wake up early in the morning. I go to school. I take a bath.

**USE 2 Facts or Generalizations.** Examples: The earth revolves around the sun. Salt dissolves in water.

**USE 3 Scheduled Events in the Near Future.** This tense is occasionally used to refer to scheduled events in the near future. Examples: The train leaves in the evening at 5 p.m. The prime minister goes to America next year. The school reopens in July.

**USE 4 Now (Non-Continuous Verbs).** There are a number of common non-continuous verbs that are never or rarely used with continuous forms. Example: we cannot say ‗I am liking it.'

✖  or ‗I am *loving* it.' ✖  (Present Continuous Tense), as ‗like' and ‗love' are non-continuous verbs.

It means we cannot use ‗ing' with ‗like' and ‗love'. So, we say: ‗I like it.' ✓ and ‗I love it.' ✓ (Present Indefinite Tense). Some other examples of non-continuous verbs are: believe, dislike, doubt, imagine, know, hate, prefer, realize, recognize and remember.

**PRESENT CONTINUOUS TENSE**
The action in this tense is ongoing. In other words, it is still going. Examples: I am running. I am going. I am reading.
**STRUCTURE**
**Positive-**
Singular (Noun)/He/ She/ It + Is + V1 + ing. (He is singing.)
I + Am + V1 + ing. (I am singing.)
Plural/They/We/You + Are + Not + V1+ ing. (They are singing.)
**Negative-**
Subject+ Is/Am/Are + Not + V1+ ing. (He is not singing. I am not singing. They are not singing.) **Interrogative**-
Is/Am/Are + Subject + V1+ ing +? (Is he singing? Is he not singing? Is he not singing? Are they singing? Am I singing?)

**USES**
**USE 1 Now.** Something is happening now, at this very moment. Examples: I **am writing** this lesson. You **are reading** this lesson.
**USE 2 Longer Actions in Progress Now.** To express that we are now engaged in a lengthier activity that is ongoing; nevertheless, we may not be doing it at this very moment. Example: I am

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teaching at a university. (If I say it when my friend happens to see me in a restaurant and asks about my profession.

**USE 3 Near Future.** Sometimes, this tense is used to express whether or not something will happen in the near future. Examples: I am going to meet some friends after work. I am not going **to** Delhi. Is he **coming to Jalandhar tomorrow**?

**USE 4 Repetition and Irritation with "Always".** It conveys the sense that something annoying or surprising occurs frequently. Example: He is always smoking.

➢ PRESENT PERFECT TENSE

This tense refers to the action that is complete or has ended. Example: I have passed the exams.
**STRUCTURE**
**Positive-**
He/She/It/Singular + Has + V3. (He has sung a song.)
They/We/You/Plural + Have + V3. (They have sung a song.)
**Negative-**
Subject + Has/Have + Not + V3. (He has not sung a song.)
**Interrogative-**
Has/Have + Subject + V3 + ? (Have they cooked food? Have they not cooked food? Have they not cooked food? Has he cooked food?) **USES**

**USE 1 Unspecified Time Before Now.** The Present Perfect Tense is used to express that something happened at some point in the past. It does not matter what time it happened. (Keep in your mind that we CAN use the Present Perfect with non-specific expressions like ever, never, once, many times, several times, before, so far, already, yet, etc.) In addition, we may use today, this week, this month, and so on in the Present Perfect.)

**Or**

To express past actions whose time is not mentioned and not specific. Example: Have you read *The Geeta*? (Time is not important, but the fact is important.)

**Use 2**- To indicate completed activities in the immediate past (With _just'). Example: He has just gone out.
**Use 3-** To explain previous actions when we are more concerned with the impact they have on the present than with the action itself. Example: Gopi has eaten all the biscuits (That is, There aren't any left for you.)
**Use 4**- To indicate an action that began in the past and continues up to the current moment (often with the words _since' and _for'). Examples: I have known him for seven years. I have lived in this house for five years.

## ➤ PRESENT PERFECT CONTINUOUS TENSE

It refers to the action that has been taking place for some time and it is still ongoing. Example: I have been eating. **(Eating for some time- it is understood. Time is not mentioned in this example. But the concept/sense of time is always there in the Perfect Continuous Tenses. When time is not specified, it is assumed the listener is already aware of that time.)**

**STRUCTURE**

**Positive-**

He/She/It/Singular + Has Been + V1+ing + Since/For or Recently/Lately. (He has been sleeping for six hours.)

I/They/We/You/ Plural + Have Been + V1 + ing + Since/For or Recently/Lately. (They have been sleeping for six hours.)

**Negative-**

Subject + Has/Have + Not Been + V1 + ing + Time. (He has not been sleeping for six hours. They have not been sleeping for six hours.)

**Interrogative-**

Has/Have + Subject + (Not) Been + V1 + ing + Time + ? (Has he been sleeping for six hours? Have they been sleeping for six hours? Have they not been sleeping for six hours?)


**USES**

It is important to note that the basic difference between the Present Continuous Tense and the Present Perfect Continuous Tense is of time. In the Present Perfect Continuous Tense, time is emphasized or at least under consideration.

**I have been eating.** (Eating for some time. You know when ―I‖ started eating. Focus is on time between ‗the moment ―I‖ started eating' and ‗Now.')

**I am eating.** (Eating at present. You do not know or consider when ―I‖ started eating. Focus is on ‗Now.')

Present Continuous + Time = Present Perfect Continuous

I am eating food + for two hours = I have been eating food for two hours.

## ❖ PAST TENSES

## ➤ SIMPLE PAST TENSE

The event/action is just described and assumed to have occurred in the past. Example: I spoke to him.

**Remember:** Unlike the past expressed in the Present Perfect Tense, actions/happenings expressed in the Simple Past Tense always carry a sense of time. Time may or may not be mentioned, but it is always there in the mind of the speaker. Example: He completed this task. – the Simple Past Tense- (He completed the task at some particular point of time about which the speaker is conscious)

He has completed this task. –the Present Perfect Tense (The sentence is more about the fact or information related to the completion of some activity in the past. Time is not important here.)

**STRUCTURE**

**Positive-**

He/She/they/We/You/I/It/Singular/Plural + V2 (Second form of Verb). (They ate. I slept. You went home.) **Negative-**

He/She/they/We/You/I/It/Singular/Plural + Did Not + V1. (They did not eat. I did not sleep. You did not go home.)

Remember:- V1 (First Form of Verb) is used with 'did'.

**Interrogative-**

Did + He/She/they/We/You/I/It/Singular/Plural + V1? (Did they not eat? Did they eat? Did I not eat?)

**USES**

**USE 1 Completed Action in the Past.** To show that some activity began and ended at a given period in the past, use this tense. Examples: I met him yesterday. I watched a play. (The speaker is conscious of time though he/she has not mentioned it.)

**USE 2 A Series of Completed Actions.** To list a succession of performed activities in the past, we use the Simple Past. These events occur in the order of 1$^{st}$, 2$^{nd}$, 3$^{rd}$, 4$^{th}$ and so on. Example: I **woke up early in the morning, took a bath and went to my school.**

**USE 3 Duration in Past.** It is used with a duration which started and ended in the past. Example: I studied in this school for five years.

**USE 4 Habits in the Past.** It is used for a habit that came to an end in the past. Example: He ate non-vegetarian food during his college days.

**USE 5 Past Facts or Generalizations.** Generalizations which are no longer true. Example: It was believed that the sun revolved around the earth.

➢ PAST CONTINUOUS TENSE

It refers to the activity that was continuous until a specific point in the past. Examples: I was jumping. I was celebrating my birthday.

**STRUCTURE**

**Positive-**

Singular (Noun)/He/ She/ it + Was + V1 + ing. (He was singing.)

I + Was + V1 + ing. (I was singing.)

Plural/They/We/You + Were + Not + V1+ ing. (They were singing.)

**Negative-**

Subject + Was/Were + Not + V1+ ing. (He was not singing. I was not singing. They were not singing.)

**Interrogative**-

Was/Were + Subject + V1 + ing + ? (Was he singing? Was he not singing? Was he not singing? Were they singing? Was I singing?)

**USES**

**USE 1 Interrupted Action in the Past.** It is used to demonstrate that a past activity was in progress at the time of the interruption. Example: I was driving my bike when he called me.

**USE 2 Parallel Actions.** Example: I was studying while he was making dinner.

**USE 3 Repetition and Irritation with "Always".** With words such as ―always‖ or ―constantly‖, this tense expresses the idea that something irritating or shocking frequently happened in the past. Example: He was always smoking.

➤ PAST PERFECT TENSE

Past Perfect is used to express something that happened before another action in the past.

  ⬜ I had eaten. (before I slept)/ I had slept. (before I completed the novel)/ I had played. (before I studied)

The Past Perfect Tense is also known as the ‗double past' tense. It does not have its individual existence without the Simple Past Tense.

**STRUCTURE**

**Positive-**

They/We/You/He/She/It/I/Singular/Plural + Had + V3. (They had gone home.)

**Interrogative**

Had + They/We/You/He/She/It/I/Singular/Plural + V3 + ? (Had they gone home?)

**Negative**

They/We/You/He/She/It/I/Singular/Plural + Had + Not + V3. (They had not gone home.)

**USE**

**Completed Action Before Something in the Past**. Example: The patient **had died** before the doctor came.

➤ PAST PERFECT CONTINUOUS TENSE

It is used to describe anything that began in the past and proceeded till a later stage. Examples: I had been eating (for five minutes before he went). I had been sleeping (for one hour before he came). I had been playing (for ten minutes before he met with an accident).


**STRUCTURE**

**Positive-**

They/We/You/He/She/It/I/Singular/Plural + Had Been + V1 + ing + Time. (They had been sleeping for six hours. [Before I slept])

**Interrogative**

Had + They/We/You/He/She/It/I/Singular/Plural + Been + V1 + ing + Time + ? (Had they been sleeping for six hours?)

**Negative**

Examples: They had not been sleeping for six hours. Had they not been sleeping for six hours?

**USE**

**Duration before Something in the Past.** It is used to describe a course of activity that started before a given point in the past and proceeded till that moment. This is similar to the Present Perfect Continuous, except the duration does not extend until today; instead, it ends before something else in the past. Example: They had been sleeping for two hours before the incident took place.

❖ FUTURE TENSES

➢ SIMPLE FUTURE TENSE

The Simple Future Tense is used when we plan or make a decision to do something in the future.

**STRUCTURE**

**Positive-**
Subject + Will + V1. (I will eat. I will sleep. I will play.)

**Negative-**
Subject + Will + Not + V1. (I will not play.)

**Interrogative**
Will + Subject + Not + V1 +? (Will I not play?)

**USES**

**Use 1: Promises.** Example: I will never forget you.

**Use 2: Predictions.** This tense is used for making a prediction based on experience or intuition. Example: This earthquake will cause havoc.

**Use 3: Future Habits.** Example: He will always ask for me when we are short of funds.

➢ FUTURE CONTINUOUS TENSE

The future continuous tense is used to describe an activity that will take place at a certain point in the future. The activity, however, will not be completed at this time. For instance, I will be singing at 9 a.m.

**STRUCTURE**

**Positive-**
Subject + Will + Be + V1 + ing. (I will be playing.)

**Negative-**
Subject + Will + Not + Be + V1 + ing. (I will not be playing.)

**Interrogative**
Will + Subject + Not + Be + V1 + ing? (Will I not be playing?)

**USES**

**Use 1: Future actions in progress.** Example: In an hour, I will be sleeping.

**Use 2: Guesses.** Example: Ram will be getting married very soon.

**Use 3: Questions**. It is  to make polite questions about something or somebody. Example: Will you be coming to the office before or after 10 a. m.?


➢ FUTURE PERFECT TENSE

The Future Perfect Tense expresses an action that will occur in the future before another action in the future.

**STRUCTURE**

**Positive-**

Subject + Will + Have + V3. (I will have played before 6 p.m.)

**Negative-**

Subject + Will + Not + Have + V3. (I will not have played.)

**Interrogative**

Will + Subject + Have Not + V3? (Will I have not played?)

**USES**

**Use 1: Completion of action before a specified point in the future.** Example: Before they come, we will have left the house.

**Use 2: Duration in the Future.** Example: By the next year, I will have studied at this university for eight years.

**Use 3: Certainty about the Near Past. Example:** The chief minister will have arrived at the college by now. (I am sure the chief minister has arrived at the college)

➢ FUTURE PERFECT CONTINUOUS TENSE

It is used to refer to an ongoing action before some point in the future.

**STRUCTURE**

**Positive-**

Subject + Will + Have Been + V1 + ing + Time. (I will have been playing for an hour when it is 5 pm)

**Negative-**

Subject + Will + Not + Have Been + V1 + ing + Time. (I will not have been playing for two hours.) **Interrogative**

Will + Subject + Not + Have Been + V1 + ing + Time + ? (Will I not have been playing for two hours?)

**USES**

**USE 1: Duration.** This tense is used to describe circumstances that will persist for a set amount of time at a certain point in the future. For instance, we will have spent 5 hours cleaning the house before they arrive.

**USE 2: Cause.** This tense is used by English speakers to show certainty about the cause of a future scenario. Example: By this time, he will have been sleeping for eight hours, so he will be relaxed.

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**Check Your Progress**

**Question 1: Fill in the Blanks with Suitable Verb Forms. Specify the Tense of Each Sentence.**

    i. The patient ___ (die) before the doctor came. ii. Gandhi ji has
    (Write) a famous book. iii. I (Read) the novel since morning. iv. He
    (Smoke). {Negative Habit in the Past} v. He did not ___ with me.
    (Play) _____

**Answer:** _____

    i.   The patient had died before the doctor came. (Past Perfect Tense)
    ii.  Gandhiji has written a famous book. (Present Perfect Tense)
    iii. I have been reading the novel since morning. (Present Perfect Continuous Tense) iv. He
        was always smoking. (Past Continuous Tense) v. He did not play with me. (Simple Past
        Tense)

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**Check Your Progress**

**Question 2: Fill in the Blanks with the Most Suitable Options. Specify the Tense of Each Sentence.**

    i.     I am_____(go, went, going) to attend the party tonight.

    ii.    She has_____(take, took, taken) the full responsibility of the child.

    iii.   We_____(miss, missing, missed) you so much yesterday.

    iv.   Mr. Mohanty _____ (will teach, has taught, have taught) us English next
    year.

_____

_____

_____
Will you_____

| | |
|---|---|
| v. | Where did you _____ (go, went, gone) last Sunday? |
| vi. | My brother does not_____(liked, liking, like) football. |
| vii. | He has _____ (win, won, winning) a lottery. |
| viii. | He _____ (play, played, plays) the guitar when he was young. |
| ix. | _____ (help, helped, helping) me? |

**Answer:**

i.      I am going to attend the party tonight. (Present Continuous Tense)

ii.     She has taken the full responsibility of the child. (Present Perfect Tense)

iii.    We missed you so much yesterday. (Simple Past Tense/ Past Indefinite Tense)

iv.     Mr. Mohanty will teach us English next year. (Simple Future Tense/ Future Indefinite Tense)

v.      Where did you go last Sunday? (Simple Past Tense/ Past Indefinite Tense)

vi.     My brother does not like football. (Simple Present Tense/ Present Indefinite Tense)

vii.    He has won a lottery. (Present Perfect Tense)

viii.   He played the guitar when he was young. (Simple Past Tense/ Past Indefinite Tense)

ix.     Will you help me? (Simple Future Tense/ Future Indefinite Tense)

**Check Your Progress**

**Question 3: Choose the Most Suitable Options.**

| Q1 | This house ———————- in 1985 by my uncle. | | |
|---|---|---|---|
| | (a.) Built | (b.) | Was built |
| | (c.) Was build | (d.) | Has built |

| Q2 | The police —————————him. | | |
|---|---|---|---|
| | (a.) Has arrested | (b.) | Will arrested |
| | (c.) Was arrested | (d.) | Did arrested |

| Q3 | We ——————— for the examination. | | |
|---|---|---|---|
| | (a.) Have preparing | (b.) | Are preparing |
| | (c.) Had preparing | (d.) | Have been prepared |

| Q4 | It ——————— since yesterday. | | |
|---|---|---|---|
| | (a.) Is raining | (b.) | Has been raining |
| | (c.) Have been raining | (d.) | Was raining |

| Q5 | I ——————— for five hours. | | |
|---|---|---|---|
| | (a.) Have been working | (b.) | Has been working |
| | (c.) Was working | (d.) | Am working |

| Q6 | The students ——————— submit their reports by the end of this week. | | |
|---|---|---|---|
| | (a.) Will | (b.) | Are |
| | (c.) Is | (d.) | Was |

| Q7 | She .................................for a while. | | |
|---|---|---|---|
| | (a.) Are Ailing | (b.) | Is Ailing |
| | (c.) Has Been Ailing | (d.) | Have Been Ailing |

| Q8 | The teacher ——————— the student for lying. | | |
|---|---|---|---|
| | (a.) Has punished | (b.) | Punished |
| | (c.) Is punished | (d.) | Was punished |

| Q9 | I ——————— to become a successful writer. | | |
|---|---|---|---|
| | (a.) Have always wanted | (b.) | Am always wanted |
| | (c.) Were always wanted | (d.) | Was always wanted |

| Q10 | The inmates of the juvenile home ——————— away yesterday. | | |
|---|---|---|---|
| | (a.) Ran | (b.) | Runs |
| | (c.) Run | (d.) | Will Run |

| Q11 | ―I have watched the movie in Japanese.‖ This sentence is written in the_____. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) Present Perfect Tense | (b.) | Simple Past Tense | (c.) | Past Perfect Tense | (d.) | Present Perfect Continuous Tense |

| Q13 | Raj always | | meetings on time. | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Arrive | (b.) | Arrives | (c.) | Is arriving | (d.) | Are arriving |

| Q14 | Ruchi usually | | dinner for her husband after work. | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Cook | (b.) | Cooks | (c.) | Are Cooking | (d.) | Is Cooking |

| Q15 | This week Ruchi is away on business so Manish__dinner for himse lf. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Cook | (b.) | Cooks | (c.) | Are cooking | (d.) | Is cooking |

| Q16 | Mr. and Mrs. Malhotra _____to work together every day. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Drive | (b.) | Drives | (c.) | Are Driving | (d.) | Is Driving |

| Q17 | Today Mr. and Mrs. Malhotra _____to work separately because Mr. Parsons has to go to a meeting at another branch | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Drive | (b.) | Drives | (c.) | Are Driving | (d.) | Is Driving |

| Q18 | My parents normally breakfast at 7:00 a.m. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Eat | (b.) | Eats | (c.) | Are Eating | (d.) | Is Eating |

| Q19 | At the moment my parents are on vacation, so they_ breakfast much later. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Eat | (b.) | Eat | (c.) | Are Eating | (d.) | Is Eating |

| Q20 | My husband and his colleague_____golf right no w. | | | | | | |
|---|---|---|---|---|---|---|---|
| | (a.) | Play | (b.) | Plays | (c.) | Are Playing | (d.) | Is Playing |

**Answer:**

**1-b**

**2-a**

**3-b**
**4-b**
**5-a**
**6-a**
**7-c**
**8- a, b**
**9- a**
**10- a**
**11- a**
**12- c**
**13- b**
**14- b**
**15- d**
**16- a**
**17- c**
**18- a**
**19- c**
**20-c**

## 10.7 DEVELOPING STORY OUTLINES INTO READABLE STORIES

In this part of the lesson, you will learn how to develop story outlines into readable stories. This is a piece of guided composition. You will be required to develop a story from a given outline of 3-4 lines. The outline shall consist of brief hints regarding the beginning, middle and end of the story. The length of the story shall be 150-200 words. Let us start with a story you read during your school days. The following may be regarded as a sample outline:

―A group of mice live happily_the farm's cat is too old and lazy _____ a new cat arrives young and a keen hunter_mice start disappearing.

The mice have a meeting_proposes a plan to tie a bell around the cat's neck. All the mice agree _____great plan_none of them wants to take on the task.‖

<p align="center">(Based on Aesop's ―Belling the Cat‖)</p>

Can you develop a story based on the outline? To make the narrative more interesting, use your imagination. Remember that a story should be organized in such a manner so as to sustain the

curiosity of the reader to know what happens next. You should write it in a simple and lucid manner. A good story leaves a lasting impression.

Let us study some more story outlines and their respective expanded stories from Aesop's *Fables* (translated by George Fyler Townsend). **Study the following examples carefully:**

(i)

*Outline*

A LION-------------Mouse running over his face---------------caught him and was about to kill----------------Mouse requested for kindness and promised to pay back -------------- Lion showed mercy----------------- Lion caught by some hunters------------------ Mouse gnawed the rope with his teeth, and set him free. *Expanded Story*

**The Lion and the Mouse**

A LION was awakened from sleep by a Mouse running over his face. Rising up angrily, he caught him and was about to kill him, when the Mouse piteously entreated, saying: ―If you would only spare my life, I would be sure to repay your kindness.‖ The Lion laughed and let him go. It happened shortly after this that the Lion was caught by some hunters, who bound him by strong ropes to the ground. The Mouse, recognizing his roar, came and gnawed the rope with his teeth, and set him free, exclaiming: ―You ridiculed the idea of my ever being able to help you, not expecting to receive from me any repayment of your favor; now you know that it is possible for even a Mouse to confer benefits on a Lion.‖

(ii)

*Outline*

Sons perpetually quarreled among themselves ------------ Father wanted to teach a practical lesson- -------------asked them to bring him a bundle of sticks------------------------he placed the faggot into the hands of each of them in succession, and ordered them to break it in pieces------------------ Sons were not able to do it--------------- and then Father asked them to break each stick separately -------------- teaches the lesson that unity is strength.

*Expanded Story*

**The Father and His Sons**

A FATHER had a family of sons who were perpetually quarreling among themselves. When he failed to heal their disputes by his exhortations, he determined to give them a practical illustration of the evils of disunion; and for this purpose he one day told them to bring him a bundle of sticks. When they had done so, he placed the faggot into the hands of each of them in succession, and ordered them to break it in pieces. They tried with all their strength, and were not able to do it. He next opened the faggot, took the sticks separately, one by one, and again put them into his sons' hands, upon which they broke them easily. He then addressed them in these words: ―My sons, if you are of one mind, and unite to assist each other, you will be as this faggot, uninjured by all the attempts of your enemies; but if you are divided among yourselves, you will be broken as easily as these sticks.‖

(iii)

*Outline*

A HARE ridiculed the Tortoise------------ the Tortoise challenged to defeat the hare in a race----------------the Hare assented to the proposal --------------- the Fox should choose the course and fix the goal----------------the race started together-----------the Tortoise never for a moment stopped-------------------the Hare, lying down by the wayside, fell fast asleep ------------ the Tortoise reached the goal ------------- Slow but steady wins the race.

*Expanded Story*

**The Hare and the Tortoise**

A HARE one day ridiculed the short feet and slow pace of the Tortoise, who replied, laughing: ―Though you be swift as the wind, I will beat you in a race.‖ The Hare, believing her assertion to be simply impossible, assented to the proposal; and they agreed that the Fox should choose the course and fix the goal. On the day appointed for the race the two started together. The Tortoise never for a moment stopped, but went on with a slow but steady pace straight to the end of the course. The Hare, lying down by the wayside, fell fast asleep. At last waking up, and moving as fast as he could, he saw the Tortoise had reached the goal, and was comfortably dozing after her fatigue.

Slow but steady wins the race.

(iv)

*Outline*

A FOX fell into a deep well ----------------------- A Goat, overcome with thirst, came to the same well, and seeing the Fox, inquired if the water was good ----------------- the Fox praised the water--------------The Goat jumped down-------------- the Fox leaped upon his back --------------- safely reached the mouth of the well--------------------turned around and cried out, ―You foolish old fellow!‖ -------------------- Look before you leap.

*Expanded Story* **The**

**Fox and the Goat**

A FOX one day fell into a deep well and could find no means of escape. A Goat, overcome with thirst, came to the same well, and seeing the Fox, inquired if the water was good. Concealing his sad plight under a merry guise, the Fox indulged in a lavish praise of the water, saying it was excellent beyond measure, and encouraging him to descend. The Goat, mindful only of his thirst, thoughtlessly jumped down, but just as he drank, the Fox informed him of the difficulty they were both in and suggested a scheme for their common escape. ―If,‖ said he, ―you will place your forefeet upon the wall and bend your head, I will run up your back and escape, and will help you out afterwards.‖ The Goat readily assented and the Fox leaped upon his back. Steadying himself with the Goat's horns, he safely reached the mouth of the well and made off as fast as he could. When the Goat upbraided him for breaking his promise, he turned around and cried out, ―You foolish old fellow! If you had as many brains in your head as you have hairs in your beard, you would never have gone down before you had inspected the way up, nor have exposed yourself to dangers from which you had no means of escape.‖ Look before you leap.

(v)

*Outline*

TWO MEN were traveling together-------------- a Bear suddenly met them on their path-----------
One of them climbed up quickly---------------the other fell flat on the ground ---------------- when
the Bear felt him with his snout ------------------ he feigned the appearance of death as much as he
could-------------the Bear soon left him ----------------------- the other Traveler descended from the
tree and jocularly inquired of his friend what it was the Bear had whispered in his ear-----------
―Never travel with a friend who deserts you at the approach of danger.‖

*Expanded Stor*

**The Bear and the Two Travelers**

TWO MEN were traveling together, when a Bear suddenly met them on their path. One of them
climbed up quickly into a tree and concealed himself in the branches. The other, seeing that he
must be attacked, fell flat on the ground, and when the Bear came up and felt him with his snout,
and smelt him all over, he held his breath, and feigned the appearance of death as much as he
could. The Bear soon left him, for it is said he will not touch a dead body. When he was quite
gone, the other Traveler descended from the tree, and jocularly inquired of his friend what it was
the Bear had whispered in his ear. ―He gave me this advice,‖ his companion replied.
―Never travel with a friend who deserts you at the approach of danger.‖ Misfortune tests the
sincerity of friends.

(vi)

*Outline*

A SHEPHERD-BOY brought out the villagers three or four times by crying out, ―Wolf! Wolf!‖-
- -----------------when his neighbors came to help him------------------laughed at them for their
pains------------the Wolf  truly come at last---------------nobody believed the boy this time---------
---- the Wolf lacerated or destroyed the whole flock------------There is no believing a liar, even
when he speaks the truth.

*Expanded Story*

**The Shepherd‴s Boy and the Wolf**

A SHEPHERD-BOY, who watched a flock of sheep near a village, brought out the villagers
three or four times by crying out, ―Wolf! Wolf!‖ and when his neighbors came to help
him, laughed at them for their pains. The Wolf, however, did truly come at last. The Shepherd-
boy, now  really alarmed,  shouted  in  an  agony  of  terror:  ―Pray,  do  come  and  help  me;
the  Wolf  is killing the sheep;‖ but no one paid any heed to his cries, nor rendered any assistance.
The Wolf, having no cause of fear, at his leisure lacerated or destroyed the whole flock.

There is no believing a liar, even when he speaks the truth.

(vii)

*Outline*

A dying FATHER wants his sons to give the same attention to his farm as he himself had given
it------------------He said, ―My sons, there is a great treasure hid in one of my vineyards.‖--------
The sons carefully dug over every portion of their land-----------------no treasure ---------- but the
vines repaid their labor by an extraordinary and superabundant crop.

*Expanded Story*

**The Farmer and His Sons**

A FATHER, being on the point of death, wished to be sure that his sons would give the same attention to his farm as he himself had given it. He called them to his bedside and said, ―My sons, there is a great treasure hid in one of my vineyards.‖ The sons, after his death, took their spades and mattocks and carefully dug over every portion of their land. They found no treasure, but the vines repaid their labor by an extraordinary and superabundant crop.

(viii)

*Outline*

A CROW having stolen a bit of meat --------------- in her beak. A Fox longed to possess the meat himself---------------He praised her beauty and urged her to sing-------------exclaimed Oh, if her voice were only equal to her beauty ---------------------- the Crow set up a loud caw and dropped the flesh------------------the Fox quickly picked it up--------------- ―My good Crow, your voice is right enough, but your wit is wanting.‖

*Expanded Story*

**The Fox and the Crow**

A CROW having stolen a bit of meat, perched in a tree and held it in her beak. A Fox, seeing this, longed to possess the meat himself, and by a wily stratagem succeeded. ―How handsome is the Crow,‖ he exclaimed, ―in the beauty of her shape and in the fairness of her complexion! Oh, if her voice were only equal to her beauty, she would deservedly be considered the Queen of Birds!‖ This he said deceitfully; but the Crow, anxious to refute the reflection cast upon her voice, set up a loud caw and dropped the flesh. The Fox quickly picked it up, and thus addressed the Crow: ―My good Crow, your voice is right enough, but your wit is wanting.‖

(ix)

*Outline*

A thirsty CROW-------------water level low in the pitcher ------------- collected stones and dropped them into the pitcher-------------------water-level high-------------the Crow drinks water----------- --------------------Necessity is the mother of invention.

*Expanded Story*

**The Crow and the Pitcher**

A CROW perishing with thirst saw a pitcher, and hoping to find water, flew to it with delight. When he reached it, he discovered to his grief that it contained so little water that he could not possibly get at it. He tried everything he could think of to reach the water, but all his efforts were in vain. At last he collected as many stones as he could carry and dropped them one by one with his beak into the pitcher, until he brought the water within his reach and thus saved his life. Necessity is the mother of invention.

## 10.8 PRACTICE EXERCISES

**Develop the following outlines into readable stories:**

**1.**

a monkey who resided on a jamoon (berry) tree----------------------the kindhearted monkey offered the crocodile some fruits------------became good friends ----------- the monkey sent some fruits for the crocodile's wife-----------She desired to eat the monkey's heart -------------- He invited the monkey to his house for dinner-------------------- the crocodile took him on his back---------------------while talking, he blurted out the real reason for taking the monkey home----------------------The clever monkey said that he had left his heart on the tree------------The crocodile believed him and took him back to the tree ---------------- the clever monkey saved his life.

**2.**

An abandoned village after an earthquake---------------- the mice make it their home ----------- the elephants trampled the mice while walking there ------------ the king of mice clinched a deal with them: ―we will return the favour when you are in need.‖ The elephant king honoured the request and changed their route-----------After a few days, the elephants got trapped-------------the king sent a fellow elephant who was not trapped, to the mice------------ all the mice started nibbling the nets, and freed the elephants -------------- *A friend in need is a friend indeed.*

**3.**

A tortoise and two geese great friends------------the lake was drying-------------the geese to migrate-------the tortoise pleaded the geese to take him with them--------------They held a stick with their beaks and asked the tortoise to hold the stick with his mouth--------------warned him not to speak------------flew ----------------------some onlookers commented ------------------ the tortoise opened his mouth to say something back------------------------he fell to the ground and died ------------- *Think before you speak.*

## 10.9 LET US SUM UP

A short story is a fictional work of prose; it is shorter in length than a novel. A short story can be written in less than fifty words. In this unit, you have learnt how to develop stories between 150 and 200 words. Try to write your stories as simply and naturally as possible. Tenses form the backbone of the English language. Having a good understanding of tenses and sentence structures can help you produce grammatically acceptable sentences. Through many examples, you have learnt how to develop stories out of story outlines.

## 10.10 REFERENCES AND SUGGESTED READINGS

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The Motto of Our University
(SEWA)
**S**KILL ENHANCEMENT
**E**MPLOYABILITY
**W**ISDOM
**A**CCESSIBILITY

JAGAT GURU NANAK DEV
PUNJAB STATE OPEN UNIVERSITY, PATIALA
(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)

# Bachelor of Commerce (Hons.)

# (Accounting and Taxation)

# Semester - II

## BCB31205T

## Fundamentals of Digital Marketing

Head Quarter: C/28, The Lower Mall, Patiala-147001
WEBSITE: www.psou.ac.in

**COURSE COORDINATOR:**
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# Bachelor in Commerce (Hons.)
## (Accounting and Taxation)
## (BCB31205T): Fundamentals of Digital Marketing

Max. Marks: 100
External: 70
Internal: 30
Pass: 40%
Credits: 4

**Objective:**
To help learners explore several aspects of the new digital marketing. To make them understand frameworks and approaches in order to measure digital actions of the consumers

**INSTRUCTIONS FOR THE CANDIDATES:**

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

# Section A
**Block-1 Introduction to Digital Marketing**
Introduction to Digital Marketing: Concepts, Traditional Marketing vs. Digital Marketing, Digital Market Evolution, Career in Digital Marketing,

**Block-2 Digital Consumer:**
Digital Consumer: Consumer Characteristics and profiles, Information Search Behavior, Factors Influencing Consumption Behavior, Purchase Decision Process, Post Purchase Behavior and Management.

# Section B
**Block-3 Digital Marketing Strategy Formulation and Execution**
Digital Marketing Strategy Formulation and Execution.
Digital Marketing Mechanisms: Websites- Company and Retail Service Providers
**Block-4 Search Engines**
Search Engines- Google, Bing, Ask, Yahoo Video Hosting and Entertainment-Youtube, Amazon Prime, Netflix, Hotstar.

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

**COURSE COORDINATOR: DR. BALPREET SINGH**

**SECTION A**

| UNIT NO. | UNIT NAME |
|---|---|
| **UNIT 1** | INTRODUCTION TO DIGITAL MARKETING |
| **UNIT 2** | DIGITAL MARKET EVOLUTION, CAREER IN DIGITAL MARKETING |
| **UNIT 3** | DIGITAL CONSUMER: CONSUMER CHARACTERISTICS AND PROFILE |
| **UNIT 4** | INFORMATION SEARCH BEHAVIOUR |
| **UNIT 5** | FACTORS INFLUENCING CONSUMPTION BEHAVIOR |
| **UNIT 6** | PURCHASE DECISION PROCESS, POST PURCHASE BEHAVIOR AND MANAGEMENT |

**SECTION B**

| UNIT NO. | UNIT NAME |
|---|---|
| **UNIT 7** | DIGITAL MARKETING STRATEGY:  DIGITAL VS NON- DIGITAL MARKETING STRATEGY |
| **UNIT 8** | DIGITAL MARKETING DECISIONS- PRODUCT, PRICE, DISTRIBUTION AND PROMOTION |
| **UNIT 9** | DIGITAL MARKETING STRATEGY FORMULATION AND EXECUTION |
| **UNIT 10** | DIGITAL MARKETING MECHANISMS: WEBSITES- COMPANY AND RETAIL SERVICE PROVIDERS |
| **UNIT 11** | SEARCH ENGINES- GOOGLE, BING, YAHOO, VIDEO HOSTING AND ENTERTAINMENT- YOUTUBE, AMAZON PRIME, NETFLIX, HOTSTAR |

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

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**UNIT 1- INTRODUCTION TO DIGITAL MARKETING**

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**STRUCTURE**

**1.0 OBJECTIVES**

**1.1 INTRODUCTION**

**1.2 DIGITAL MARKETING**

**1.3 DIGITAL MARKETING AND ONLINE MARKETING**

**1.4 PRINCIPLES OF DIGITAL MARKETING**

**1.5 ORIGIN OF DIGITAL MARKETING**

**1.6 ROLE OF INTERNET**

**1.7 TYPES OF E-MARKETS**

**1.8 BARRIERS FOR DIGITAL MARKETING**

**1.9 ADVANTAGES OF DIGITAL MARKETING**

**1.10 DISADVANTAGES OF DIGITAL MARKETING**

**1.11 REASONS FOR THE GROWTH OF DIGITAL MARKETING**

**1.12 LET US SUM UP**

**1.13 KEY WORDS**

**1.14 ANSWERS TO CHECK THE PROGRESS**

**1.15 TERMINAL QUESTIONS**

**1.0 OBJECTIVES**

**After studying the Unit, you would be able to**

- Understand the Digital Marketing Concept and how it's different from online marketing
- Explore principles required for effective Digital Marketing
- Find out the origin of digital marketing and its different types
- Identify and manage the problems faced by marketers in Digital market
- Explain the Pros and Cons of Digital marketing
- Highlight the reasons for the growth of digital marketing

## 1.1 INTRODUCTION

World is changing at a remarkable pace and so does the world of marketing. Marketing is a simple process of creating awareness of products or services through various channels towards identified market. Marketing makes it easier to target certain group wherever and whenever. Earlier it was very difficult for the consumers and producers to buy and sell goods and services but now with the advancement of technology, it has become much easier than before in terms of time, money and efforts involved. Now consumers can purchase any product at any time while sitting at any place or any corner of the world. Consumers can get all details of the product. Digital Marketing has made the efforts of producers easier as they can upload all the details of their product and easily market their product. There is no worry about cost incurred on marketing a product.

Today, businesses operate in a dynamic environment, in which various kinds of competitions determine the rule of the game. Managing a competitive edge in today's business world demands an effective electronic strategy, concentrating on the convenience of electronic buying. Internet has converted traditional marketing into online and digital marketing. These days the world is fully competitive so every business wants to go on for long time. Many new techniques are used by different organizations to advance their brands all over the world. In order to promote, companies advertise their products on various websites. People usually do online shopping from these sites. Say if any consumer wants to buy any product, they can visit the websites of E-Marketers and after making comparison, place the orders.

Digital marketing was first used in 1990s as that was the phase when first search engine got emerged by a company called Hotwired. Then in 1998 another engine company got popped up that is "Google" as it gets more popular search engine in the world. After that the history of Digital marketing had been changed when WEB 2.0 came in the market.

## 1.2 DIGITAL MARKETING

The rapid adoption of the Internet as a commercial medium has caused marketers to experiment with the innovative ways of marketing thus changing the pattern of marketing strategies. "Marketing consists of individual and organizational activities that facilitate and expedite satisfying exchange relationships in a dynamic environment through the creation, distribution, promotion and pricing of goods, services and ideas". It is said that Digital Marketing first began in the beginning of 1990 with just text-based sites which provided

product information. In the beginning, the Internet was cool but with the explosion of internet growth, online marketing has started becoming popular. Digital Marketing creates additional customer value by transforming marketing strategies during effective segmentation, targeting, differentiation and positioning strategies.

The basic purpose of marketing is to satisfy the customers profitable by offering the right product to right customer at right time, the only that has changed is the methods, as Smith and Chaffey (2001) have remarked that "Digital Marketing is *Achieving marketing objectives through applying digital technologies".*

Digital Marketing is promotion of goods and services through the use of online mediums like the use of internet, use of mobile phones or any the use of any other technology which can be used to advertise a product or services, for example; Email Marketing, Web Marketing, Internet Marketing, Social media marketing, etc. Digital Marketing has made work much easier, earlier physical presence of buyer and seller was utmost importance in buying or selling, but, in online marketing such kind of drawback has been overcome.

Digital Marketing is the result of information technology applied to traditional marketing. The rapid growth of the internet and the popularity of the computers and electronic devices all over the world have been making the marketers scramble to determine how best they can use the technology for the business profitability. Marketers need to understand the technology, and how they can use the technology in the best possible way for the promotion and profitability of business. Digital Marketing is the application of a broad range of information technologies in the marketing functions to achieve the followings:

✓ Development of the products which has value for the customers and is possible to be marketed through online channels.

✓ Transformation of marketing strategies and policies to create more customer value through effective segmentation, targeting, differentiation and positioning strategies.

✓ Planning and execution of marketing conception, distribution, promotion, and pricing of goods and services, and ideas.

✓ Creating customers and satisfying the individuals and business customer's needs and wants.

Digital marketing increases the efficiency in all traditional marketing functions. Digital marketing uses the technology for transforming the marketing strategies in new business models that add customer value and increase company profitability.



For example, Swiggy and Zomato created an App as it helps the shopkeepers to reach to their customers so that they can order easily anything at any place as they want according to their needs. They also have their rating page to enhance their market share with online Marketing Apps.

## 1.3 DIGITAL MARKETING AND ONLINE MARKETING

In reality there is not much difference, both embrace the same methodologies. Primarily Digital Marketing takes the principles of traditional marketing and translates this to the online world. One key benefit being that the nature of 'online' removes the geographic boundaries that limit traditional media marketing. Digital Marketing or Online Marketing can take many forms, and continues to develop with new innovations all the time, the most common methodologies include;

| SEO | SEM | APP DEVELOPMENT | WEB MARKETING |
| --- | --- | --- | --- |
| VIDEO MARKETING | EMAIL MARKETING | CONTENT MARKETING | SOCIAL MEDIA MARKETING |
| BRANDING | GAME ADVERTISING | PAY PER CLICK | |

In today's business, Digital Marketing (or online advertising as it is often referred) has become an essential part of most companies' online marketing mix. Year on year companies is allocating increasingly high resources to advertising and marketing online and this is hardly surprising as the shift from offline to online continue to grow. Schemes such as 'laptops for everyone' and increasing end user awareness of the benefits of shopping online have contributed substantially to the rise business online. This in turn has created a shift from traditional marketing to Digital Marketing.

## 1.4 PRINCIPLES OF DIGITAL MARKETING

Digital Marketing is spreading awareness of products and services with the help of digitalized technologies, specifically online. Growth of digital marketing since 1990's and 2000's has revolutionized the way the companies and brands use technology for advertising. As we know the social media platforms or other digital platforms are increasingly used in the market on daily basis. Now, humans use these technologies inspite of going to physical shops, so these campaigns are more productive, effective and easy. The Basic principles of Digital Marketing are:

- **Build and actively manage a customer database:** In this era of scarce customers, companies need to capture the names of customers and useful information that is possible to collect about potentially valuable prospects and customers. A rich customer database can provide the company with a strong competitive advantage. The company can search and rate different groups and individuals for their probability of responding to a given offer or highly tailored offers. A database permits a company's targeting to be super-efficient.

- **Develop a clear concept on how the company should take advantage of the Internet:** A company can develop presence on the Internet in at least seven ways. The company can use the Internet to do research, provide information, run discussion forums, provide training, carry on-line buying and selling (i.e., e-commerce), provide on-line auctioning or exchanging, and even deliver "bits" to customers.

  The company's Web page must be appealing, relevant, and current if it is to attract repeat visits. Companies should consider using state-of-the-art graphics, sound, and video, they should also need to add weekly news or features. The site can be

developed to provide valuable help, such as links to a map showing the location of the hotel or restaurant.

- **Be easily accessible and quick in responding to customer calls:** Customers mostly have high and rising expectations about how quickly and adequately they should receive answers to questions and complaints sent in by phone or e-mail. Make sure the Internet user can communicate directly with the company. One advantage of the Internet is that we can communicate automatically. The computer can be programmed to book reservations, select and confirm seat assignments on airlines, and send confirmations of reservations, changes in flight plans and other information to the customer. However, when the user has a question that the computer cannot answer or they have a problem they would like to discuss, they should be given a phone number to call and an automatic e-mail option. Majority of companies' websites have the goal of having 100 per cent electronic communication, and they do not include telephone contact information.

## CHECK YOUR PROGRESS

I. Earlier it was very difficult for the consumers and producers to buy and sell goods and services but now with the advancement of technology. (True/False)

II. Today, businesses operate in a dynamic environment, in which various kinds of competitions do not determine the rule of the game. (True/False)

III. Digital Marketing is the result of information technology applied to …………… marketing.

IV. Digital marketing was first used in .................. as that was the phase when first search engine got emerged by a company called Hotwired.

|   |   |
|---|---|
| a. 1991 | c. 1981 |
| b. 1990 | d. 1980 |

V. In this era of scarce customers, companies need to capture the names of customers and useful information that is possible to collect about potentially valuable of …………..

|   |   |
|---|---|
| a. Advertising Agency | c. Prospects and customers |
| b. Marketing researcher | d. Sales men |

## 1.5 ORIGIN OF DIGITAL MARKETING

In this modern era, over 175 million patrons make use of digital media on daily basis, everyone is supposed to be known about digital marketing tools. Soon traditional media platforms will be absorbed and get dominated by digital media. Even more digital media is more cost effective than traditional methods as; large customer base can be reached within a short span of time.

The Digital Marketing came into existence in 1990's. It came over with the introduction of internet and with growth of the web 1.0, whereas web 1.0 is the phrase is known to as beginning of digital media marketing on World Wide Web, that did term as "Websites".

In the year, 1993 clickable banner or web banner came into existence. Clickable banner is basically a type of advertising done with the help of ad server on www. Entrenching an advertisement into a web page is known as web banner so that web traffic could be attracted to the web page by connecting to the web site of the marketer. In the year 1994, new digital tools incorporated in digital marketplace such as Yahoo, it was launched by Jerry Yang. In the very first year, Yahoo, was able to get 1 million thumbs. In year, 1996 various tools such as Alexa, look smart and in year 1998, the most used search engine "Google" came into existence. In year, 2006 customer base was developed up to 6.7 billion in a solitary month.

After then various social sites emerged, Myspace was firstly commenced social networking site, after that Facebook arrived in market followed by Instagram, Snapchat, Twitter etc. which took new opportunities in the market for the businesses, companies and consumers.

## 1.6 ROLE OF INTERNET

The internet is a global network of interconnected networks. This includes millions of governments, corporate, organizational and private networks forming the World Wide Web (www). The computers in these networks hold files such as web pages that can be accessed by all other networked computers. Computer, mobile phone, and other networked devices like laptops etc., can send and receive data in the form of e-mail or files, over the internet. The data move over phone lines, cables and satellites from sender to receiver. The internet therefore consists of computers with data, users who send and receive the data files and a technology infrastructure to move, create and view or listen to the content. Three important types of networks form part of the internet.

- Intranet: A network that runs internally in a company but uses the internet standards such as HTML and browsers. An intranet is like a mini-internet but only for the internal company use.

- Extranet: An intranet to which value chain partners have admissions for strategic reasons. The access is partial or restricted only.

- Web: The part of internet that supports a graphic user interface for hypertext navigation with a browser such as Netscape or Internet Explorer. The web is what most people think about when they think of the internet.

## 1.7 TYPES OF E-MARKETS

Digital Marketing is normally carried out in the following types:

- **B2B**: This involves business-to-business marketing. The business organisations make online transactions with other business. They sell the products and services using internet. Also other functions like purchasing, supply chain, services, support and payment systems are managed online.

- **B2C**: This involves business-to-consumer marketing. The goods and services are marketed directly to the consumers by the business organisations. This includes activities like sales, customer service and payment systems.

- **C2C**: This involves consumer-to-consumer marketing, where consumers directly sell products or services to other consumers, using the Internet. Firms like OLX, eBay, Quicker provide such facilities.

- **C2B:** This involves consumer-to-business marketing, where the consumers (individuals) create value and businesses consume that value. For example, when a consumer writes reviews or when a consumer gives a useful idea for new product development then that consumer is creating value for the business if the business adopts the input. Excepted concepts are crowd sourcing and co-creation.

## 1.8 BARRIERS FOR DIGITAL MARKETING

The problems which were faced earlier were overcome by Digital Marketing but there are some issues which are being there in Online Marketing, which are being faced by both consumers as well as producers.

- Lack of privacy

- More competition

- Online frauds

- Lack of proper knowledge

- Variety of customers

- Internet problems

- Security problems

- Gap between customers and sellers

- Lack of awareness

- Technical problems

- Difficult to engage customers


## 1.9 ADVANTAGES OF DIGITAL MARKETING

Digital Marketing embraces many of the basic principles of traditional marketing with a few differentiating factors. One key advantage to Digital Marketing is that results can be quantified, allowing the marketers to work more effectively, generate higher ROI and in turn increasing profitability. A well implemented Digital Marketing strategy can achieve a more cost-effective customer acquisition than traditional marketing. The 'reach' of Digital Marketing campaigns means that substantial incremental sales can be achieved online without affecting any other marketing efforts. The Digital Marketing has following advantages over the traditional marketing channels:

- **Digital Marketing can Reach Targeted Customers More Effectively:** Digital Marketing makes it possible to cover the global markets by eliminating the geographical and territorial boundaries. Thus, the location often becomes irrelevant through Digital Marketing. The nature of the internet means a potential customer from anywhere across the globe can make a business transaction and interact with the marketer. Unlike traditional marketing methodologies the power of the web means that prospects and clients can become a part of companies marketing mix 24*7 and 365 days from anywhere in the world.

- **Can Reach Wider or Even International Audience:** Digital Marketing helps in reaching out the customers who can be approached through only online means. Marketing embraces routes to market that simply do not exist with traditional marketing. It's no longer a case of just advertising through search engines and broadcast email shots. The use of new

media such as social networking, viral marketing and other methodologies exclusive to the online world provide access to the groups of customers that would otherwise have not been possible.

- **Cost Effective Marketing:** Utilising online technologies can make a substantial contribution to marketing budgets. By accurately targeting the potential core audience, Digital Marketing often provide the most cost-effective way to increase customer base, raise the brand awareness, increase the demand for product and stay in touch with customers by building long term relations.

- **Full Accountability:** Digital Marketing provides full accountability for its results to the organisations. Online activities are fully tractable and can accurately show ROI (return on investment); this means that marketers can see the value of every Rupee that has been spent on the Digital Marketing activities.

- **Consumer Control:** The internet has already affected a radical shift in the way the media and consumers interact. Traditional media have a one-to-many approach: the media outlet beams its message down to a host of passive consumers. The web, however, relies on many-to-many interaction or one-to-one interaction means: anybody can post content or comment on what they see, and media outlets no longer have complete power over their broadcast message. In the world where everything is social and shared, the consumer has a lot of power and it is likely to further grow in the coming years. Marketing agencies foresee that they will need to hand over even more control to customers, who want to engage on deeper and more significant levels with content. The trend may go so far as letting customers create and mediate Digital Marketing content, with agencies keeping oversight and steering from the side-lines.

- **Marketing can be Personalised as per Customers Need:** Technological devices are shrinking in size, lending themselves more and more to portability. Already, powerful computers can fit inside the wrist watches and cell phones, hide in car dash-boards and meld seamlessly with work and home tabletop surfaces. Consumers will expect to have round-the-clock access to whole of their data, regardless of where they are and what device they are using. Marketing messages will have to be flexible as per the customer requirements. There are many opportunities available here for even more specific and user-relevant content. A device with GPS will know exactly where it is and where the nearest restaurants, cinemas, shops, utilities and user's friends are; it will store user preferences and recommend nearby locations. Large billboards can gather user data from the people in the area, average out the

demographic statistics and display adverts that are most relevant to the largest number of customers who are passing by.

- **The Rise of Web 3.0:** Nobody is quite sure what web 3.0 will entail, or even whether it has not already started. General consensus is that it will involve the advent of the truly semantic web. The semantic web is a concept that means the exponentially growing amount of data will be categorised in personal and human-usable ways, enabling even better, more meaningful and more accessible content than has been ever possible. In other words, raw data will become real information. Web 3.0 also involved the concepts described above, especially portability, control over marketing and customisation of everything. In the far future, experts even predict the invention of web-based artificial intelligence that will think ahead and source information before a user even knows it is needed. Since web 3.0 is all about "me", marketing must take personalisation and engagement to a new level.

- **Delivers Immediate Results:** One of the most important advantages is the fast availability of the information. The clients/users can easily get information, by navigating the internet, about the products that they wish to purchase, and besides that, they can check the information at any time of the day.

- **Low Investment required:** Digital Marketing allows the companies to save money, an aspect that is really taken into account by the companies since the online marketing campaigns do not require a large amount of investment. The traditional marketing gives less importance to the differences between large and small companies. The Digital Marketing techniques helps in cost savings and thus significant for the companies which cannot incur high expenditure on promotion and marketing of the products and services. The benefits are further passed to the customers.

- **Global Markets:** Presence on the Internet can help the expansion of the company from a local market to national and international markets at the same time, offering almost infinite expanding possibilities.


## 1.10 DISADVANTAGES OF DIGITAL MARKETING

Digital Marketing may not be useful for all varieties of products and services. Many of the companies offer only a few selected items online, which are suitable to be sold using the online channels. Other products may not have the features to be promoted and sold online. Also, there are many costs associated with the Digital Marketing; these include costs for setting up the websites, maintaining and updating the websites and managing the online

channels. Many of the e-marketers are still struggling to make their business visible, viable and profitable using the Digital Marketing techniques.

- **Security:** Providing a secure website for web visitors should be the number one priority for online business owners, but not every business owner feels it necessary to provide maximum security for their web visitors. There are thousands of internet scammers and hackers consistently searching for gaps within the website of an internet business. Online business owners should respect their customers by providing security and making sure to add a badge or statement to ward off potential threats. This security concern further results into misuse of the personal information of the customers and thus they hesitate while making online transactions with the company.

- **Updates:** The Internet is a constant provider of fresh, up-to-the-second information. Yesterday's news is of no use and importance to the web surfer, so it is imperative to always keep the website updated with the latest information. It is one of the common mistakes of budding entrepreneurs, they get the website up and running and then simply leave it that way because they did not include the time needed to maintain the website into their marketing plan, and now the website is neglected and customers can easily notice these things.

- **Costs:** Businesses of all kinds should have a marketing strategy to map out how much money is needed for marketing and where the money will go. Many business owners who are just starting business are not aware of these hidden costs associated with online marketing. Sending a quick email to someone may not cost much more than internet access, but the costs of hardware resources, launching a website and running online marketing campaign make the online marketing an expensive affair.

- **Engagement:** Digital Marketing requires constant tweaking to keep the subscribers engaged. A person will often sign up to receive information as a part of the promotion. For example, if a user provides his email address, he may receive a discount on a product. A user might also unintentionally sign up, such as if subscribing was the default choice on a web page. In such cases, marketing may be perceived as a nuisance. Even in the case that someone deliberately signed up to receive marketing emails and promotion material, like an industry newsletter, marketers must still work to maintain a level of engagement to keep the reader from unsubscribing.

- **Appearance:** Marketers may be working for making the digital promotions to look exactly the way they have envisioned it. Unfortunately, due to the varying servers and computer settings, the design may not come through the way marketers hoped, which can diminish the impact of promotion message. Text may be moved from one line to the next on a person's screen. The email setting on another person's computer may only allow text, blocking images from coming through. If the main focus of online marketing was a logo, it could be lost during the process its open on the screen of the users.

- **Spam:** "Spam" is unsolicited email, if marketers want to email their customer base, they need to receive permission from them. Even after receiving permission, some people still consider any commercial email spam. This adds to difficulty for the online marketing and puts a question mark on Digital Marketing techniques.

- **Deliverability Issues:** The communication and promotion material may not reach its intended audience. For one thing, certain terms, such as "free" or "money" could trigger the spam filter, where the recipient may never see it. Other times, the headline may not be enticing enough for the customer to open the web page and check the site.

- **Undelivered E-mail:** These days many ISPs use complex junk-mail filters. So, there is no guarantee that E-mails are getting into audience inbox. Also, it is possible that individuals delete an E-mail from someone who is not in their contact list. This is increasingly becoming a disadvantage of e-mail marketing.

- **E-mail response decay:** It's not easy to keep subscribers actively engaged with company in the long-term through the online media.

- **Renderability:** Difficulty of displaying the creative as intended within the inbox of different E-mail reading systems. The subscribers may want a message with "unsecured" items such as color, graphics and links that not all browsers will support them. Finally, the recipient will instantly close the window or marketers will have to just settle for the drab all-text E-mail.

- **Privacy Issues:** When an E-mail gets through to the consumer, there is so much e-mail that needs to be looked at sometimes it is difficult for the individual to distinguish between solicited and unsolicited e-mail, as well as have time to read through the E-mail. Another disadvantage of E-mail marketing is to transmit many software viruses and it makes customers to become suspicious even to the trusted sources.

- **Dependability on technology:** Slow internet connections can cause difficulties. If the companies build too complex or too large websites, it will take too long for users to check them or download them and they will get bored eventually.

- **No Physical Contacts:** The Digital Marketing doesn't allow the user "to touch" the product before purchasing it. Because of this, the customers may not be able to become sure about the real look of the products. They have to just rely on what the companies and websites talk about the products. This may result into customer complaints and poor marketer-customer relationship.

- **Lack of Trust:** One of the major disadvantages may be the lack of trust of the users because of the constant virtual promotions that appear to be frauds. This is an aspect that deteriorates the image and reputation of honest companies.

- **Payment Terms:** The cash on delivery payment option may be another disadvantage of the online marketing systems. COD does not guarantee the 100% purchase of the product. This is also the case of thousands of users who dedicate themselves to daily mock big companies by ordering on the internet using fake identities.

- **Worldwide competition through globalisation:** Due to internet and global networks there has been great transparency about the pricing of all competitors resulting into cut throat competition among the players who are present in the online marketing and promotions. This also results into worldwide and global competitions.

**CHECK YOUR PROGRESS**

VI. In the year,................clickable banner or web banner came into existence.

    a. 1991             c. 1989

    b. 1990             d. 1993

VII. The part of internet that supports a graphic user interface for hypertext navigation with a browser such as Netscape or Internet Explorer.

    a. Web             c. Extranet

    b. Intranet          d. None of these

VIII. An intranet is like a mini-internet but only for the internal company use. (True/False)

IX. The business organizations make online transactions with other business, in ………..market.

    a. B2C             c. C2C

    b. B2B             d. C2B

X. This involves ………………. marketing, where consumers directly sell products or services to other consumers, using the Internet.

XI. The …………… of Digital Marketing campaigns means that substantial incremental sales can be achieved online without affecting any other marketing efforts.

XII. Digital Marketing does not make it possible to cover the global markets by eliminating the geographical and territorial boundaries. (True/False)

XIII. The ………………… is a concept that means the exponentially growing amount of data will be categorised in personal and human-usable ways, enabling even better, more meaningful and more accessible content than has been ever possible.

## 1.11 REASONS FOR THE GROWTH OF DIGITAL MARKETING

Earlier days, when human first started trading whatever it is, they traded and marketing that time was all about the stories that used to convince the customer to make trade. The method of trades are changed or improved. They are more efficient to convey the message and faster to communicate, spared the message to mass or niche, but the old principles are always applied. Now business organisations have started using Digital Marketing for the same due to:

- **Low Investment:** When Digital Marketing is implemented properly, the investments required are less and the return on investment is faster than traditional marketing.

- **Reach:** We are living in the era of global product and global brands. Through the WWW (World Wide Web), product would be in the reach of billions of customers in the world. Every day or every month there is increase in the customers by millions.

- **Scope:** In Digital Marketing scope of business is not limited or restricted. The marketers can provide other services also like information management, public relations, customer service and sales.

- **Interactivity:** The internet has made it possible to interact with the customers easily at any time and also responding to the customers instantly. The marketers now can interact better than traditional marketing.

- **Immediacy:** Digital Marketing makes the immediate impact on customer's mind, for example if we publish an advertisement in a newspaper of an apple's I-phone. Reader or customer is very eager to purchase the product but he is not interested to go to the show room and buy it because it is away. So customer might change his idea of

purchasing the product. But through Digital Marketing, customer can purchase the product immediately.

The following facts simplifies the reasons for the growth of Digital Marketing.

**Top three marketing priorities for the business are:**

- ✓ Driving increased conversion rates (47%)
- ✓ Increasing and improving brand awareness (46%)
- ✓ Collecting, measuring, and using behavior (29%)

**Top three metrics used to track the success of Digital Marketing:**

- ✓ Conversion Rates (67%)
- ✓ Engagement Rates (opens, clicks) (64%)
- ✓ Return on Investment (61%)

**Four key areas where marketers plan to increase spending by 2023:**

- ✓ Data & analytics (61% plan to increase)
- ✓ Marketing automation (60% plan to increase)
- ✓ Email marketing (58% plan to increase)
- ✓ Social media marketing (57% plan to increase

According to 2019 State of Marketing report, 98% of marketers plan to increase or maintain their future marketing spend so if your brand's marketing budget expanded considerably compared with last year, you are not alone. Data and analytics, marketing automation, email, social media, and content management ranked as the top five areas for increased spending and marketing budget, so expect to see more businesses tailor their content one-to-one as data investments grow alongside speedy, automated lifecycles.

**CHECK YOUR PROGRESS**

XIV. When Digital Marketing is implemented properly, the investments required are less and the return on investment is faster than traditional marketing. (True/False)

XV. Through the WWW (World Wide Web), product would not be in the reach of billions of customers in the world. (True/False)

XVI.   Through Digital Marketing, customer can purchase the product immediately.
(True/False)

## 1.12 LET US SOME UP

Today, businesses operate in a dynamic environment, in which various kinds of competitions determine the rule of the game. Managing a competitive edge in today's business world demands an effective electronic strategy, concentrating on the convenience of electronic buying. Internet Marketing has converted traditional marketing into digital marketing. These days the world is fully competitive so every business wants to go on for long time. The rapid adoption of the Internet as a commercial medium has caused firms/marketers to experiment with the innovative ways of marketing thus changing the pattern of marketing strategies. Marketers need to understand the technology, and how they can use the technology in the best possible way for the promotion and profitability of business. Digital Marketing is spreading awareness of products and services with the help of digitalized technologies, specifically online. Growth of digital marketing since 1990's and 2000's has revolutionized the way the companies and brands use technology for advertising. Digital Marketing embraces many of the basic principles of traditional marketing with a few differentiating factors. One key advantage to Digital Marketing is that results can be quantified, allowing the marketers to work more effectively, generate higher ROI's and in turn increasing profitability. A well implemented Digital Marketing strategy can achieve a more cost-effective customer acquisition than traditional marketing. Digital Marketing may not be useful for all varieties of products and services. Many of the e-marketers are still struggling to make their business visible, viable and profitable using the Digital Marketing techniques.

### KEYWORDS

| | |
|---|---|
| **MARKETING** | Marketing is a simple process of creating awareness of products or services through various channels towards desired market. |
| **DIGITAL MARKETING** | Digital Marketing is Achieving marketing objectives through applying digital technologies |
| **CLICKABLE BANNER** | A type of advertising done with the help of ad server on www |
| **INTRANET** | A network that runs internally in a company but uses the |

internet standards such as HTML and browsers

| | |
|---|---|
| **EXTRANET** | An intranet to which value chain partners have admissions for strategic reasons. |
| **SECURITY** | The security of consumer information on the internet. |
| **SPAM** | The unsolicited email sends by marketers with customers' consent. |
| **CONVERSION RATES** | To convert the potential customers in to actual customers. |

## ANSWER FOR CHECK YOUR PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | VI. | 1993 | XI. | Reach |
| II. | False | VII. | Web | XII. | False |
| III. | Traditional | VIII. | True | XIII. | Semantic web |
| IV. | 1990 | IX. | B2B | XIV. | True |
| V. | Prospects and customers | X. | Consumer-to-Consumer | XV. | False |
| | | | | XVI. | True |

## TERMINAL QUESTIONS

- What is Digital Marketing? How it will contribute to the growth of company and nation?

- Describe the concept of digital marketing and how it is different from online marketing?

- "Business organisations cannot have an effective digital marketing without following the principles of digital marketing" comments on this statement.

- Discuss the origin of digital marketing. What is the influence of internet for digital marketing?

- Explain the different types of digital marketing and highlight what are the barriers for the digital marketing?

- How would you define the digital marketing? What are the advantages and disadvantages of digital marketing?

- Highlight the factors contributing for the growth of digital marketing.

# BACHELOR IN COMMERCE (HONS.)

# (Accounting and Taxation)

## (BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING

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## UNIT-2 DIGITAL MARKET EVOLUTION, CAREER IN DIGITAL MARKETING

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**STRUCTURE**

**2.0 OBJECTIVES**

**2.1 INTRODUCTION**

**2.2 THE MARKETING REVOLUTION**

**2.3 DIGITAL MARKETING ISSUES, CHALLENGES AND OPPORTUNITIES**

**2.4 FUTURE TRENDS AND PREDICTIONS OF DIGITAL MARKETING**

**2.5 PREDICTIONS REGARDING MARKETING**

**2.6 TRADITIONAL MARKETING V/S DIGITAL MARKETING**

**2.7 THE SCOPE OF CAREERS IN DIGITAL MARKETING**

**2.8 LET US SUM UP**

**2.9 KEY WORDS**

**2.10 ANSWERS TO CHECK THE PROGRESS**

**2.11 TERMINAL QUESTIONS**

## 2.0 OBJECTIVES

**After studying the Unit, you would be able to**

- Have through knowledge how digital marketing came into existence
- Evaluate the SWOT analysis of digital marketing
- Explore the future trend of the digital marketing
- Make prediction for the digital marketing
- Understand how traditional marketing is different from digital marketing
- Explore the Careers scope in Digital marketing

## 2.1 INTRODUCTION

Even before the Internet there were many different ways to advertise, in different media such as radio, TV, newspapers, magazines, as well as via telemarketing or pamphlets. Usually, the goal was to get a company or product name and to communicate as many people as possible for the smallest price possible. When the Internet arose, a number of search options became available. Companies had the option to advertise themselves on a larger scale. Due to the advertising perception at the time, many businesses were assumed to have great value, and thus traded on the stock exchange at extraordinary high rates. This collapsed in 2001 at what is commonly known as the dot-com bubble.

While the timeline of Digital Marketing has been short, the cumulative events leading up to where we are now having impacted the entire globe faster than any marketing revolution in history. In 1994, spending for Digital Marketing totaled nearly nothing, but increased to over Rs.300 million in 1995. According to Forrester Research now, little more than a decade later, marketing spending and Digital Marketing business has exploded to nearly Rs.200 billion. Today, it's hard to believe in having an organization which doesn't have some kind of online presence.

## 2.2 THE MARKETING REVOLUTION

When the internet was first introduced in the early 1990s, it was not considered to be an advertising medium at all. Instead, the internet was treated as a tool for exchanging emails and digital information, but was not yet considered valuable for reaching customers. However, it was not long before marketing pioneers began to see the potential for Digital Marketing business as millions of web surfers logging on each day to find valuable and relevant information. Within just a few years, informative and educational marketing, as well as graphically enticing banner ads began to be shown up. It was not long before the results began to flood in, which proved the value of the internet marketplace to even the most skeptical advertisers.

Most importantly, companies which had been spending huge chunks of their marketing budget on offline list building, begin to realize that they could accomplish the same thing via email and for much less. It was not long before everyone from industry giants such as Microsoft Corp. to small businesses began to build company sites and spend marketing

dollars to attract qualified traffic. Next, search engine companies like Yahoo, began to create significant profits from advertising alone.

Then came the great Digital Marketing business bust around the year of 2000, which marked the beginning of the end for interruptive marketing such as flashing banner ads. What was happening? As interactive features were added to web pages, consumers were given the option of turning off marketing messages at will and they did. Then entered the age of education based invitational marketing, which crystallized with the creation of web 2.0 technologies. Suddenly, billions of "voices" began to rise all over the world, as the internet marketplace became as much a global community as it was an advertising medium. This led to a relational based marketing approach which has led to one of the most lucrative opportunities for solo entrepreneurs and small startups alike to make a small fortune working from their spare bedroom.

## 2.3 DIGITAL MARKETING ISSUES, CHALLENGES AND OPPORTUNITIES

There are number of challenges as well as opportunities before the Digital Marketing which are discussed as follows: -

- **Internet Usage:** If computer usage itself is insignificant, Internet usage is almost non-existent. Digital Marketing happens over the Internet and with low Internet usage. The government's role also seems limited in the promotion of Digital Marketing infrastructure. But maybe the country internet usage will speed up due to the fact that industries, services i.e. banking, investment, electronics, entertainment etc are being net based. Also, the introduction of wireless application protocol and generalized radio services internet and other forms of electronic exchange will come onto the scene.

- **Bandwidth:** The lack of bandwidth is a major cause for concern. India has very low bandwidth speed as compared to other countries i.e., USA, UK and China etc. But there have been have several applications with the DoT by the large and small ISPs to set up their own gateways, which would definitely result the introduction of newer and faster technology.

- **Cyber Laws:** Poor cyber laws may be considered a big issue in the way of Digital Marketing promotion in the country. Sometimes the consumers face problems with their electronic purchases due to of non-delivery of orders placed online. And it takes

only one scam to shake the confidence from the system. Legal shelter is extremely imperative for confidence to build up. Then there is the issue of insurance against fraud. The lack of a secure online payment mechanism and the continued debate on passing the Digital Signature Act are all major stumbling blocks.

Business-to-business sites are comparatively better off, as they normally have negotiated-contracts, with governing laws and jurisdiction set out clearly. Also, the transactions are normally between known entities that have, or are actively looking for long business relationships.

- **Digital Identity:** How can customers trust the site they are doing business with? Similarly, how does the site ensure that they are not using a stolen credit-card number? The answer to this is digital certificates. But, to issue a digital certificate, we need an extremely trustworthy agency issuing the certificate of identity.

- **Inter-State Goods Movement Regulations:** Anyone involved in selling and shipping goods across the state borders will testify what a nightmare this can be. No two states have the same sales tax and excise-duty rules. The rates differ, the forms to be filled in differ and then there's octroi.

- **Setup and Infrastructure Costs:** In spite of what many vendors would want us to believe, Digital Marketing is not a one-man operation that can run from a couple of servers stashed away in a corner in a basement. Equally big is the cost of software, Web-hosting services, bandwidth, and proper security. All these could add up to quite a big amount, both in initial investments and in running costs.

- **Advertising Costs:** The Internet is often likened to a high-speed digital highway with millions passing by every minute. No way, It's more like a mess of alleyways that no one has ever mapped out. Having a cool Website will not bring in people. People come to a Website either by typing the URL directly in their browser, or by clicking on an interesting link seen on some other site. Either of these costs a lot of money.

## 2.4 FUTURE TRENDS OF DIGITAL MARKETING

The Internet has actually modified the method in which details are shared, and has actually had an extensive influence on marketing. Over the previous couple of years, there has actually been even more of a change towards incoming strategies, while lots of outgoing

methods have actually become old. More companies are discovering success publishing original content instead of embedding ads within external content, because of the extra perks these strategies provide, such as branding and audience growth. Today, over 75% of website traffic comes through organic search results and 85% of people trust search engines for fulfilling their primary business needs. Let us find out what will be the future Digital Marketing trends.

- **Search engine optimization**: It is an essential strategy in digital marketing. It is the process in which the website's visibility is affected or making a web page visible in a search engine's unpaid results, it is often referred to as "natural results". This process is done by increasing the volume of keywords that a site ranks for.

  Search engine optimization targets the various kinds of search such as video search, image search etc. it also covers the factors like how the search engine works, about what the people search for and the kind of keywords typed into search engines. The kind of search engines are preferred by the company's targeted customers also finds out by the search engine optimization.

- **Pinterest:** Now Pinterest being the major platform to advertise the products in socially and publicly. Pinterest is a web and mobile application. It operates a software systems designed to discover information on the World wide web, mainly using images and on the smaller scale, GIFs and videos. It is improving day by day and providing better result to subscribers.

- **Adware:** It is software that once installed it automatically displays advertisements on the user's machine. All the ads may appear in the software itself, and integrated into the web pages visited by the user, or in pop-ups.

- **Social Conversion:** Social networking have already play an important role in Digital Marketing, expect their importance to increase. Social conversions are important for e-commerce and lead generation sites.

- **Automation:** With the passage of time marketing automation has been improve. Now most of the technical products have innovated like washing machines, fridges, coolers etc. by getting innovative ideas technical products become automatically.

- **Search engine marketing**: It is a type of internet marketing uses the search engines for advertising the company's website or business to customers using internet. The more traffic to company's website is generated via advertising or paid links. It

includes all the paid listings, search engine optimization and other related services that will increase traffic to the company's web site.

- **Exploring New Paying Methods:** Generally speaking that individual is looking for secure, simple and easy way for payment. Now many online payment methods are available in the market. By improving the payment methods international marketing will improve and become successful.

- **Email marketing:** It is one of the earliest ways of digital marketing. Email marketing is composed of sending the commercial message regarding the company's product to a group of targeted customers using email and delivering the personalized emails and the targeted messages at the right time. With the help of email marketing software the company can maintain separate email lists on the bases of customer's likes and dislikes.

- **Social media marketing**: It is a form of marketing that utilizes the networking sites as a tool of marketing. The main goal of social media marketing is to produce that kind of content that the customers share with their social network groups. Many customers try to finds their favourite brands on social media so proper social media strategy is now become necessary for every organization to reach to their targeted audience. With the increased popularity of Google, face book, twitter and YouTube social media marketing became more popular. Posting the right kind of content is necessary so that the people will share company's content, it helps to reach to the new customers. These kinds of sites also are used as an effective form of communication to engage with customers.

- **Mobile advertising:** It is also one of the biggest growth areas in the digital marketing. The advertising is done via mobile phones. The mobile phones which are used for advertising are: smart phones, wireless phones or tablet computers.

- **Online advertising:** It is also known as internet advertising or web advertising, is a form of marketing and advertising that uses the internet services to deliver the promotional marketing messages to the consumers. Despite of many benefits of online marketing there are some reasons the consumers finds this mode disruptive and blocking the ads. Online advertising includes: Social media marketing, search engine marketing and Mobile marketing.

- **Affiliate marketing:** Affiliate marketing occurs when the business firm organize third parties for bring in customers for them. The payment is given to the third parties

on the bases of sales generated through their advertising. Affiliate generates the traffic to the company through their affiliate networks; once the purchase is made by the visitors they receive the payment. The desired actions can be: Email submission, Phone call, Filling out an online registration form.

- **Display advertising:** It is done through advertising on websites. The main purpose behind display advertising is to deliver brand messages to site visitors and deliver general advertisements. Display advertising includes different formats and contains many items such as: Flash, Images, Text, Video, Audio.

**CHECK YOUR PROGRESS**

I. In 1994, spending for Digital Marketing totalled nearly nothing, but increased to over Rs.300 million in 1995. (True/False)

II. When the internet was first introduced in the early ………s, it was not considered to be an advertising medium at all.

a) 1995            c) 1985

b) 1990            d) 1981

III. ………… has very low bandwidth speed as compared to other countries i.e., USA, UK and China etc.

IV. Poor cyber laws is not considered a big issue in the way of Digital Marketing promotion in the country. (True/False)

V. ............................. of website traffic comes through organic search results.

a) 50%            c) 75%

b) 90%            d) 80%

VI. The motive behind paid search advertising is to get instant traffic to the ………...

VII. Google buzz which is an addition to social features in Gmail is creating buzz everywhere. (True/False)

VIII. Social conversions are not important for e-commerce and lead generation sites. (True/False)

## 2.5 PREDICTIONS REGARDING MARKETING

Digital Marketing has changed time to time with the passage of time. Digital Marketing start in 1993 with the simplest form of online marketing. Today, 25 years later, online marketing has changed in many significant ways, involve search engines, social media platforms, Gmail

cover all other electronic post platforms, You-tube etc. Some predictions are measured by specialists, they are given below.

- **Reality optimization will become a thing:** The concept of search optimization is all about getting found, but there can be a new, physical application of this inbound discovery efforts once augmented reality device become popular. In future the reality optimization will become only a thing.

- **Unbound ads will die:** Now internet is almost is everywhere, with no concept of connection, traditional advertising is going to finally die. In future we predict that only digital ads will available like television ads.

- **Competition will be reduced:** By increasing the technology and machines there will be less work available for the humans. With less work, there will be fewer businesses. All this results in a complicated evolution of economy system. We will have more distance to resources we have every time desire, but there will be some brands and businesses providing them. So the competition will reduce.

- **Strange new social interactions will be introduced:** Today are column collections of content; each person and company has an indifferent profile that submits and advertise content. In future digital profiles may be more closely bind to a public and individual can be able to produce content and exchange with others more immediate.

- **More Integrated Global:** Now inbound and outbound marketing are combined. We all know that after the innovation of digital or Digital Marketing the internet services is increase immediately and with this innovation the global marketing will also increase. In future more new technology will innovate and the global relation and businesses are there.

## 2.6 TRADITIONAL MARKETING V/S DIGITAL MARKETING

Traditional marketing is a broad concept that encompasses several different categories of advertising and marketing. Traditional marketing, rather than the rise of digital technology in online marketing, is critical for the growth of any company. Digital marketing refers to the promotion of goods or services through the use of digital media, mostly the internet, but mobile phones, display advertisements, and other digital terminology is also included.

The key distinction between traditional and digital marketing is how the marketing message is communicated to an audience.

| Area | Traditional Marketing | Digital Marketing |
|---|---|---|
| **Target Audience** | Traditional marketing strategies make it simple to connect with local audiences. | You can meet your target audience from all over the world using digital marketing. |
| **Marketing Approach** | Traditional marketing takes a more intimate approach so it is very straightforward for marketers to have a one-on-one interaction with the public while educating them or advertising their brand's name. | The marketers' tangible presence is not needed in digital marketing; it is a bonus, but it is not required, because digital marketing enables the marketer to reach a limited number of customers quickly. |
| **Documentation** | Traditional marketing strategies include a physical copy of the products/services definition that can be read several times. | Digital channels offer descriptions in softcopy via the website, or via images, you tube, and other media, which can be accessed at any time and from any location to fulfil the wants of the user, and they eliminate the need for paper documentation. |
| **Consumer Interaction** | Traditional marketing involves very little interaction because the medium of publicity are not versatile enough to incorporate consumer interaction. | Digital marketing provides consumers with a variety of digital ways like- social networking sites, e-commerce websites, and various apps for gathering reviews where they can express their opinions about the products/services. |
| **Marketing Cost** | Traditional marketing is costly because it involves printing and radio/TV commercials, all of which add to the company's costs. | Since everything is online and social media platforms is free, marketing is less costlier than traditional marketing. If a company's marketing needs necessitate it, they may choose to use paid advertisements. |
| **Marketing Analysis** | Traditional marketing makes result analysis more difficult because companies must rely on surveys and market findings. | In digital marketing, data and facts are collected and stored digitally, making it easier for marketers to evaluate marketing results. |
| **Real-Time Results** | Traditional marketing strategies require the organisation to wait weeks or months for a response. | Digital marketing produces instant results, making it simple to obtain real-time marketing results. |
| **Interruptions** | Advertisements and other items that causes interruptions are not something that consumers may opt to skip. | Consumers can miss the interruptive element of digital marketing strategies and continue to engage with the products/services. |

| | | Outcomes of the real-time results provided by digital marketing, strategy refining becomes much easier, and the marketing team may choose to modify or adjust their business strategy in response to market results. |
|---|---|---|
| **Strategy Refinement** | Since traditional marketing strategies do not produce real-time results, developing a marketing strategy that is based on marketing results takes time. | |
| **Communication** | Traditional marketing relies on one-way contact due to the rigidity of marketing mediums. | Online marketing encourages two-way contact, which helps to satisfy customers and give them the feeling that they are being heard and served. |

The secret to a successful marketing strategy is understanding the relationship between digital and traditional marketing methods. Will they be able to collaborate? Yes, absolutely. Digital marketing will be a valuable addition to traditional marketing. Both are essential parts of a marketing campaign. However, combining the two will yield better results for business.


## 2.7 THE SCOPE OF CAREERS IN DIGITAL MARKETING

As we know that huge growth has taken place in the area of online business and it has been growing day and night. We people have huge number of career opportunities in the Digital marketing.

- We can start our career as Professional Blogger
- We can start the Affiliate Marketing & AdSense
- There are opportunities for Freelancing Services
- Group of persons have expertise can start their own organisation
- A person can become a Youtuber
- A Person can start Drop transport business
- Person can start training and coaching classes for untrained persons in online business


Having expertise in the digital business person can occupy the following role in Digital Marketing:

- Digital Marketing Manager or Digital Director
- Web Developer & Web Designer
- Analytics Manager
- CRM Manager

- Email Marketing Manager

- E-Commerce Manager

- Digital Agency Account Director

- Social Media Executive and Social Media Manager

- Search engine optimization Executive/Expert

- PPC/SEM Expert

- Content Developer


**CHECK YOUR PROGRESS**

IX.  In future we predict that only digital ads will available like television ads. (True/False)

X.  In future digital profiles may be more closely bind to a public and individual can be able to produce content and exchange with others more immediate. (True/False)

XI.  …………. is a broad concept that encompasses several different categories of advertising and marketing.

a) Traditional marketing   c) Social Media Marketing

b) Niche Marketing   d) E-Mail Marketing

XII.  Digital marketing refers to the promotion of goods or services through the use of digital media, mostly the………………...

XIII.  Traditional marketing involves very huge interaction because the medium of publicity is not versatile enough to incorporate consumer interaction. (True/False)

XIV.  Digital marketing, produces instant results, making it simple to obtain ……… marketing results.

XV.  Traditional marketing relies on .......................contact due to the rigidity of marketing mediums.

a) one-way   c) Both

b) Two-way   d) None of these


**2.8 LET US SUM UP**

Digital Marketing business bust around the year of 2000, which marked the beginning of the end for interruptive marketing such as flashing banner ads. When the internet was first introduced in the early 1990s, it was not considered to be an advertising medium at all.

Instead, the internet was treated as a tool for exchanging emails and digital information, but wasn't yet considered valuable for reaching customers. However, it was not long before marketing pioneers began to see the potential for Digital Marketing business as millions of web surfers logging on each day to find valuable and relevant information. The Internet has actually modified the method in which details are shared, and has actually had an extensive influence on marketing. Over the previous couple of years, there has actually been even more of a change towards incoming strategies, while lots of outgoing methods have actually become old. There are number of challenges as well as opportunities before the Digital Marketing like Internet usage is almost non-existent, lack of bandwidth is a major cause for concern and many more. Even after problems, online marketing has changed in many significant ways, involve search engines, social media platforms, Gmail cover all other electronic post platforms, You-tube etc. Traditional marketing is a broad concept that encompasses several different categories of advertising and marketing. Traditional marketing, rather than the rise of digital technology in online marketing, is critical for the growth of any company.

## 2.9 KEY WORDS

| | |
|---|---|
| INTERRUPTIVE MARKETING | Innovative marketing such as flashing banner ads. |
| CYBER LAW | Law to protect the interest of online users |
| DIGITAL IDENTITY | Identification of company and user in the online market. |
| SEARCH ENGINE OPTIMIZATION | Technique to get high ranking for the company web site. |
| MOBILE MARKETING | Set of practices that enables organizations to communicate an interactive manner through any mobile device |
| BLOGGING | Blogging is a way to update website periodically with fresh and unique content. |

## 2.10 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | V. | 75% | IX. | True |
| II. | 1990 | VI. | Website | X. | True |
| III. | India | VII. | True | XI. | Traditional Marketing |
| IV. | False | VIII. | False | | |

| XII. | Internet | XIV. | Real-time |
| XIII. | False | XV. | One-Way |

## 2.11 TERMINAL QUESTIONS

- Describe in details how the digital marketing came into existence. What were the stages through which it has crossed to become a promotional tool?

- How digital marketing is useful for business organisations? What are the challenges which marketing managers facing in Indian Environment?

- What are digital marketing issues faced by the marketing managers and how would you predict the future trend for digital marketing under same scenario?

- Digital marketing has grown in India through difficult stages, how would you see the future of digital marketing in India?

- Digital marketing has grown from the traditional marketing but id has been doing great for the promotion of business organisation, how would you see which one is better?

- Explore the prediction for the digital marketing. How traditional marketing is different from the digital marketing?

- What is digital marketing evolution? What are the career opportunities in the digital marketing?

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

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**UNIT-3   DIGITAL CONSUMER: CONSUMER CHARACTERISTICS AND PROFILE**

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**STRUCTURE**

**3.0 OBJECTIVES**
**3.1 INTRODUCTION**
**3.2 CUSTOMER CENTRIC ONLINE MARKETING**
**3.3 THE ADOPTION PROCESS**
**3.4 WHY CUSTOMERS BUY**
**3.5 CHARACTERISTICS OF THE CONSUMERS**
**3.6 MARKET SEGMENTATION, TARGETING AND POSITIONING**
**3.7 E-MARKET SEGME NTATION**
**3.8 TARGETING**
**3.9 MARKET POSITIONING**
**3.10 REPOSITIONING**
**3.11 E-MARKETING SITUATION ANALYSIS**
**3.12 PUBLIC RELATIONS PROCESS**
**3.13 LET US SUM UP**
**3.14 KEY WORDS**
**3.15 ANSWERS TO CHECK THE PROGRESS**
**3.16 TERMINAL QUESTIONS**

**3.0 OBJECTIVES**

**After studying the Unit, you would be able to**

- Basics understanding for the consumer in online market
- Understand the customer centric online marketing
- Explore the adoption process
- Evaluate the features of consumers in online market
- Develop the strategies for segmentation, targeting and positioning
- Analysis the SWOT of E-Marketing
- Describe the Public relationship process

**3.1 INTRODCTION**

Digital Marketing is a revolution in today's business world. Business organizations have been forced to adopt technological change over the last decade. Digital Marketing utilizes electronic channels to carry through their marketing activities to attain marketing objectives of the organization.  In a broad sense, Digital Marketing is the utility of computer and internet technology, or electronic based activities, to improve marketing activities and performance. It

improves the online execution of delivering customer benefits and satisfaction. Digital

Marketing draws heavily on Internet communications to co-ordinate many marketing activities, such as market research, New product development, market segmentation, positioning, product distribution, customer services, promotion, customer feedback, etc. These internet or electronic based activities should, in turn, be integrated with the overall marketing strategy to support the corporate objectives of the E-commerce.

Digital Marketing is one of the ways through which marketers can develop the link and have good relation with the customer. As business is becoming more and more difficult or rigid, so there is need to make a good relation with the customer because a customer is the backbone of every business. Therefore, with the help of a customer centric online marketing marketer can make a customer happy, as survival of business depends on the happiness and satisfaction of the consumers.

## 3.2 CUSTOMER CENTRIC ONLINE MARKETING

Digital Marketing has become a vital component of the overall marketing efforts. In a competitive business environment, losing customers is very easy as the competitor is just a click away. Therefore, Implementing Digital Marketing strategy, requires an adequate understanding of changes in the way customers think and act on the World Wide Web. In other words, in a dynamic business environment, Digital Marketing is capable of cutting through the clutter to provide a precious opportunity for businesses to improve accessibility to the world and thrive.

Hence in case marketers want to acquire and to retain more customers, then they have to give more importance to the consumers than their competitors. With the help of a customer centre in online marketing strategy, marketers would be able to attract and satisfy more customers in the E-market; otherwise, E-marketers would not be able to survive in the market. Marketers need to deliver product and services as per the requirement of customers. Companies that are customer centric are 60% more profitable than companies that are not customer centric.

There are Customer-centric best practices marketers need to consider while developing marketing strategies.

- **Believe that customers come first:** In every business they have to believe that the customer will come first. No business can survive in the market without the customers. Customers are the heart and the backbone of the business.

- **Customer Satisfaction:** Customer satisfaction is one of the important factors, customer must be satisfied as far as the product or the services are being rendered by the business.
- **Handling time:** in case customers have any problem regarding product, they need to be solved as soon as possible, as this would create trust among customers.
- **Customer Needs:** There should be a proper market research in order to find the utility and value, customer seeking from the product. In case E-marketer is able to match with the expectations of customer, there would be more market share for the product.
- **Customer Relationship:** Marketers need to have good relationship with customers through online marketing channels. When they have a good relationship with customers, they would never sift to another brand. According to Sethgodin, "it is easier to love a brand , when the brands love you back".

3.3 THE ADOPTION PROCESS

The Adoption Process (also known as the Diffusion of Innovation) is more than forty years old. It was first described by Bourne (1959), so it has stood the test of time and remained an important marketing tool ever since. It describes the behavior of consumers as they purchase new products and services. The individual categories of innovator, early adopter, early majority, late majority and laggards are described below:

- **Innovators** are the first one to adopt and display behavior that demonstrates that they likely want to be ahead, and to be the first to own new products, well before the average consumer. They are often not taken seriously by their peers. They often buy products that do not make it through the early stages of the Product Life Cycle (PLC).
- **Early adopters** are also quick-to-buy new products and services, and so are key opinion leaders with their neighbors and friends as they tend to be amongst the first to get hold of items or services.
- **The early majority** looks to the innovators and early majority to see if a new product or idea works and begins to stand the test of time. They stand back and watch the experiences of others. Then there is a surge of mass purchases.

- **The late majority** tends to purchase the product later than the average person. They are slower to catch on to the popularity of new products, services, ideas, or solutions. There is still mass consumption, but it begins to end.
- **Laggards** tend to be very late to take on board new products and include those that never actually adopt at all. Here there is little to be made from these consumers.

There are a number of examples of products that have gone through the adoption process. They include I-pods or DVD players (or even video players and smart watches). Initially only a small group of younger or informed, well off people bought into these products. Opinion leaders or the early adopters then buy the product and tend to be a target for marketing companies wishing to gain an early foot hold. The early majority is slightly ahead of the average, and follow. Then the late majority buys into the product, followed by any laggards. New adoption process or curves begin all the time. Who knows what will happen with solid state technology or Internet purchases of media?

## 3.4 WHY CUSTOMERS BUY

Marketers spend millions of rupees trying to understand why customer buy products and services. Sometimes it seems that there is no reason for a purchase, but in reality, there is always a reason. Many factors are involved in a customers' buying decision, any one of which can become the deciding factor, such as:

- Practical-consumers purchase products because they need them to survive, such as food, clothes and medicine.
- Impractical-consumers are the opposite of practical, purchasing products that may be necessary.
- Rational-Purchases are made with logical.
- Irrational-products are purchased for foolish or absurd reasons.
- Factual-Purchasing products based on researched reports.
- Emotional-purchasing is based on feelings.

### 3.4.1 Consumers Also Buy:

- **To Increase:** Sales, Profit, Satisfaction, Confidence, Convenience, Pleasure, and Production.
- **To Protect:** Investment, Self, Employees, Property, Money, and Family
- **To Make:** Money, Satisfied customers, and Good impressions.
- **To Improve:** Customer relations, Employee relations, Brand image, Status, Earnings, and Performance.
- **To Reduce:** Risk, Investment, Expenses, Competition, Worry, and Trouble
- **To Save:** Time, Money, Energy, and Space.

## CHECK YOUR PROGRESS

I. Digital Marketing is the utility of computer and internet technology, or electronic based activities, to improve marketing activities and performance. (True/False)

II. In a competitive business environment, losing customers is very difficult as the competitor is just a click away. (True/False)

III. Companies that are customer centric are ……. more profitable than companies that are not customer centric.

|  |  |
|---|---|
| a) 70% | c) 60% |
| b) 50% | d) 80% |

IV. The Adoption Process is also known as the …………………..

V. ........................tend to be very late to take on board new products and include those that never actually adopt at all.

|  |  |
|---|---|
| a) Laggards | c) Early adopters |
| b) Innovators | d) The early majority |

VI. Marketers spend millions of rupees trying to understand why ……… buy products and services.

## 3.5 CHARACTERISTICS OF THE CONSUMERS

- **Intelligence:** Unless companies are specifically marketing a product to extremely intelligent individuals, it is best to word marketing messages on a level most people can understand, and do not ever talk to customers in a way that would make them feel inferior.
- **Involvement:** A customer with higher levels of involvement with the product, service and marketing information will have more recall than a consumer with less

involvement. Creating more interest in the product and making a website more interactive will help to increase sales. More involvement results in more sales.

- **Familiarity:** Generally, the more familiar a customer is with a product, the more likely they are to purchase it; however, having too much familiarity can lead to adaptation, when customers become tired of their "familiar" purchases and seek out novelty items.

- **Expectations:** If the customer does not know what to expect from the product or service, then they are not going to purchase it. This explains why familiar brands like Coca-Cola, Dabur, Godrej etc. do not change their logos; customers are familiar with them, have positive thoughts about them and know what to expect.

- **Physical limits:** Marketers need to remember that some consumers have limitations such as hearing impairment or colour blindness and these needs to be taken into consideration when creating marketing messages.

## 3.6 MARKET SEGMENTATION, TARGETING AND POSITIONING

It is very important to learn what market segmentation, why it is important is and the different dimensions used by marketers to segment the population. How marketers evaluate and select potential market segments is explained as is the development of a targeting strategy. We understand how a firm develops and implements a positioning strategy and creates a customer relationship management strategy to increase long-term success and profits. After careful study, we will learn that it is not at all right to treat people differently but is a requirement in successful marketing. As small children, we are often taught to treat everyone alike. But after reading market segmentation, we will learn that this strategy does not work in marketing. The goal of marketing is to create value and satisfy needs. However, everyone's needs are not the same and understanding needs is a complex task.

## 3.7 E-MARKET SEGMENTATION

Market segmentation is an important process in conventional marketing. Segmentation is an important step in ensuring successful implementation of marketing strategies. Market segmentation means dividing a market into different groups or categories according to certain criteria such as household income, level of income, level of education, age, gender, hobbies and more. Such data can be collected through questionnaire survey or from statistical department. Once we have those groups ready, we can then use differentiated marketing strategies to target those groups based on their needs and wants. For example, ask yourself

what you can sell to the senior citizens? Your answers could be nutritional products, tour packages, medicines, indoor exercising machines and more.

Now, how do we do market segmentation in the Internet marketplace, or rather marketspace? The concept is basically the same, the only difference is companies have a much larger marketplace, and the main concern is language and cultural differences. For example, if marketers wish to promote inbound tour packages, they can target adult travelers from different countries, using website that offers different major languages in the world, such as English, French, Spanish, German, Chinese and Japanese. If companies cannot do it themselves, they can always outsource to companies that provide translation services. Besides, organizations might want to customize the website according to different cultures, particularly those relating to food and things they like to see.

One of the most popular Internet outsourcing companies is **Odesk.com.** In this website, one can outsource jobs to suitable contractors who are mostly individual freelancers. One can bargain with them the price as well as other terms and conditions for handling their jobs. Jobs that can be outsourced are webpage design, contents writing and editing, graphic design, translation, copywriting, customer support and more.

### 3.7.1 The Need for Market Segmentation

Segmentation is the process of dividing potential markets or consumers into specific groups. Market research analysis using segmentation is a basic component of any marketing effort. It provides a basis upon which business decision makers maximize profitability by focusing their company's efforts and resources on those market segments most favorable to their goals. If all consumers were alike and had the same background, education and experience, mass marketing or undifferentiated marketing would be a logical strategy. The essence of market segmentation was summed up by Henry Ford.

### 3.7.2 Requirements of Market Segments

In addition to having different needs, for segments to be practical it should be evaluated against the following criteria:

- Identifiable
- Accessible

- Substantial
- Unique needs
- Durable

### 3.7.3 Bases for Segmentation

The next step in developing a market segmentation strategy is to select the most appropriate bases on which to segment the market. The marketer will have to try different segmentation bases or segmentation variables, alone or in combination, to find the best way to view the market structures. The major bases to segment consumer markets are the following:

- Geographic segmentation
- Demographic segmentation
- Psychographic segmentation
- Behavioural segmentation

### 3.8 TARGETING

In targeting, the marketers evaluate the attractiveness of each potential segment and decide which of these groups they will invest resources against to try to turn them into customers. The customer group or groups selected are the firm's target market. A target market consists of a set of buyers who share common needs or characteristics that the company decides to serve. Target marketing can be carried out at different levels:

- **Undifferentiated Marketing:** An undifferentiated targeting strategy is one that appeals to a wide-spectrum of people. If successful, this type of operation can be very efficient, especially because production, research, and promotion costs benefit from economies of scale, it's cheaper to develop one product or one advertising campaign than to choose several targets and create separate products or messages for each. The company must be willing to bet that people have similar needs or differences among them that are trivial.

- **Differentiated Marketing:** A company that chooses a differentiated targeting strategy develops one or more products for each of several customer groups with different product needs. A differentiated strategy is called for when consumers are choosing among brands that are well known in which each has a distinctive image in the marketplace and in which it's possible to identify one or more segments that have

distinct needs for different types of products. E.g.: Tata Motors- a car for every 'purse', purpose and personality, Nike shoes- for running, golf, aerobics, cycling and other sports, Procter and Gamble- different brands for laundry detergent.

- **Concentrated Marketing or Niche Marketing:** When a firm focuses its efforts on offering one or more products to a single segment, it is using a concentrated targeting strategy. A concentrated strategy is often useful for smaller firms that do not have the resources or the desire to be all things to all people. Marketers generally identify niches by dividing a segment into sub-segments. E.g.: sports channels like ESPN, Star Sports, and Religious TV Channels.

### Characteristics of niche marketing

- The customers in the niche have a distinctive set of needs.
- The customers are ready to pay a premium price to the company that best satisfies their needs.
- The niche is not likely to attract other competitors.
- The niche marketer gains some economies of scale through specialisation.
- The niche has adequate size, profitability and growth potential.

- **Customized Marketing or Micro Marketing:** Ideally, marketers should be able to define segments so precisely that they can offer products and services that exactly meet the unique needs of each individual or firm. A custom marketing strategy is common in industrial contexts in which a manufacturer often works with one or a few large clients and develops products and services that only these clients will use.

In most cases this level of segmentation is neither practical nor possible when mass-produced products are sold. However, advances in computer technology, coupled with the new emphasis on building solid relationships with customers, have focused managers' attention on devising a new way to tailor specific products and the messages about them to individual customers.

## 3.9 MARKET POSITIONING

The concept of positioning was propounded by two advertising executives, Al Ries and Jack Trout. They considered positioning as a creative exercise done by marketing people with both existing as well as new products. According to them positioning starts with a product, a piece

of merchandise, a service, a company, an institution or even a person. But positioning is not what is done to a product. Positioning is what marketers do to the mind of the prospect. That is, marketers position the product in the mind of the prospect.

Positioning is developing a product and brand image in the minds of consumers. It can also include improving a customer's perception about the experience they will have if they choose to purchase product or service. The business can positively influence the perceptions of its chosen customer base through strategic promotional activities and by carefully defining the business' marketing mix. Effective positioning involves a good understanding of competing products and the benefits that are sought by the target market. It also requires companies to identify a differential advantage with which it will deliver the required benefits to the market effectively against the competition. Business should aim to define themselves in the eyes of their customers in regards to their competition.

### 3.9.1 Developing a Positioning Strategy

Positioning means developing a marketing strategy aimed at influencing how a particular market segment perceives a product or service in comparison to the competition. Developing a positioning strategy entails gaining a clear understanding of the criteria that the target consumers use to evaluate competing products and then convincing them that your product will meet those needs. Positioning can be done in many ways. Marketers must devise a marketing mix that will effectively target the segment's members by positioning their products to appeal to that segment. A first step is to analyze the competitors' positions in the marketplace. Who are the direct competitors and what products or services are they providing? Indirect competition can also be important. The following is a list of some established product positioning strategies.

- **Against a Competitor:** Positioning product directly against a competitor's typically requires a specific product superiority claim. A memorable example is Dominos 30 minutes delivery guarantee.
- **Product Categories:** Comparing product to a product in a different category can be an effective way to differentiate. In a soap-compares-itself-to-lotion example, Palmolive dishwashing liquid claims that it softens your hands while you do the dishes.

- **Away from a Competitor:** Positioning as the opposite of competitor can help marketer to get attention in a market dominated by some other product. A famous example is 7-UP calling itself the Uncola.

- **Benefits:** This strategy focuses on a benefit; product provides to target audience. Examples include Volvo's emphasis on safety and Colgate toothpaste's focus on reducing cavities.

- **Product Attributes:** Highlighting a specific attribute of product can also be compelling. For example, Taj hotels focus on luxury; Ginger hotels focus on economy.

- **Usage Occasions:** This kind of positioning stresses when or how product is used by target audience. Jeep's focus on off-road driving is an excellent example.

- **Users:** Focusing on the unique characteristics of specific users can also be effective. For example, Dummies series of instruction books are attractive to people who want to learn about a topic from a source that doesn't assume any prior knowledge on the reader's part.

### 3.9.2 Product Positioning and Differentiation

Marketers must also develop a positioning strategy that includes offering a product or service with a competitive advantage, providing a reason why consumers will perceive the product as better than the competition. Once a positioning strategy is set, marketers must finalize the marketing mix by putting all the pieces into place. The elements of the marketing mix must match the selected segment. This means that the goods or services must deliver benefits that the segment values, such as convenience or status. Furthermore, marketers must price this offering at a level these consumers will pay, make the offering available at places consumers are likely to go, and correctly communicate the offering's benefits in locations where consumers are likely to take notice. Finally, marketers must evaluate the target market's responses so they can modify strategies as needed. Over time, the firm may find that it needs to change which segments it targets or even redo a product's position to respond to marketplace changes. An example of such a makeover is called repositioning.

### 3.10  REPOSITIONING

In volatile markets, it can be necessary, even urgent, to reposition an entire company, rather than just a product line or brand. When Goldman Sachs and Morgan Stanley suddenly shifted

from investment to commercial banks, for example, the expectations of investors, employees, clients and regulators all needed to shift, and each company needed to influence how these perceptions changed. Doing so involves repositioning the entire firm. This is especially true of small and medium-sized firms, many of which often lack strong brands for individual product lines. In a prolonged recession, business approaches that were effective during healthy economies often become ineffective and it becomes necessary to change a firm's positioning. Repositioning a company involves more than a marketing challenge. It involves making hard decisions about how a market is shifting and how a firm's competitors will react. Often these decisions must be made without the benefit of sufficient information, simply because the definition of "volatility" is that change becomes difficult or impossible to predict.

### 3.10.1 Product positioning process

Generally, the product positioning process involves:

- Defining the market in which the product or brand will compete (who the relevant and prospect buyers are)
- Identifying the attributes (also called dimensions) that define the product 'space'
- Collecting information from a sample of customers about their perceptions of each product on the relevant attributes
- Determine each product's share of mind
- Determine each product's current location in the product space
- Determine the target market's preferred combination of attributes (referred to as an ideal vector)
- Examine the fit between the product and the market.

### 3.10.2 Why is positioning important?

Product positioning is a crucial ingredient in the buying process and should never be left to chance. It is company's opportunity to influence the market's perception of their products and services. Failure to proactively address product positioning is unlikely to end well. With or without marketer input, customers will position the product, probably based on information from the competitors, which will not flatter the organisations. Clear, concise, meaningful product positioning also helps companies cut through the relentless advertising and marketing

noise of the marketplace. In customer's mind, product positioning gives the messages some context so they can be better heard and accepted.

**CHECK YOUR PROGRESS**

VII. More involvement of customer in purchase, results in more ………...

    a) Promotion              c) Production

    b) Sales                  d) Market share

VIII. If all consumers were alike and had the same background, education and experience, mass marketing or undifferentiated marketing would be a logical strategy. (True/False)

IX. ………….. is an important step in ensuring successful implementation of marketing strategies.

X. A……………… consists of a set of buyers who share common needs or characteristics.

XI. An..................... targeting strategy is one that appeals to a wide-spectrum of people.

    a) Differentiated           c) Undifferentiated

    b) Niche               d) All above

XII. It can also include improving a customer's perception about the experience they will have if they choose to purchase product or service. (True/False)

XIII. Positioning means developing a marketing strategy aimed at influencing how a particular market segment perceives a product or service in comparison to the competition. (True/False)

XIV. The......................of the marketing mix must match the selected segment.

## 3.11 E-MARKETING SITUATION ANALYSIS

The *situation analysis for E-marketing* bridges the internal audit and competitor research. It answers the question where are we now in terms of our electronic marketing (internal v/s external perspective)? The analysis literally considers **electronic marketing** situation by considering the fit between internal and external factors. There are similarities with traditional concepts and techniques, but marketers need to focus upon digital marketing.

Some of the problems that marketer may encounter with SWOT are as a result of one of its key benefits i.e., its flexibility. Since SWOT analysis can be used in a variety of scenarios, it has to be flexible. To overcome these issues, one should employ a Power SWOT. Smith and

Chaffey (2006) distil the situation of a business using Internet as part of its business under the following 5S's:

- **Sell**: Grow sales and attract business using digital technologies.
- **Serve:** Add value through the benefits of the Internet such as speed.
- **Speak:** Get closer to customers by making business available to them at home, work or on the go with mobile technologies.
- **Save:** Reduce costs by using information technologies to make business more efficient.
- **Sizzle:** Extend the online brand (or create a new one) remember sell the sizzle not the sausage i.e. the benefits, aesthetics or value of a product or service rather than its features.

## 3.12 PUBLIC RELATIONS PROCESS

The definition of Public Relations as relations with the general public through publicity, those functions of a corporation, organisation, branch of military service, etc., concerned with informing the public of its activities, policies, etc., attempting to create favourable public opinions. Public Relations are the planned effort to influence opinion through good character and responsible performance, based upon mutually satisfactory two-way communications.

- **Research-listening:** This involves probing the opinions, attitudes and reactions of those concerned with the acts and policies of an organisation, then evaluating the inflow. This task also requires determining facts regarding the organisation: "what's our problem?"
- **Planning-decision making:** This involves bringing these attitudes, opinions, ideas and reactions to bear on the policies and programmes of the organisation. It will enable the organisation to chart a course in the interests of all concerned: "Here's what we can do."
- **Communication-action:** This involves explaining and dramatizing the chosen course to all those who may be affected and whose support is essential: "Here's what we did and why."
- **Evaluation:** This involves evaluating the results of the programme and the effectiveness of techniques used: "How did we do?"

**CHECK YOUR PROGRESS**

XV. The *situation analysis for E-marketing* does not bridges the internal audit and competitor research. (True/False)

XVI. Public Relations are the planned effort to influence opinion through good character and responsible performance, based upon mutually satisfactory two-way communications. (True/False)

XVII. There are similarities with traditional concepts and techniques, but marketers need to focus upon digital marketing.

## 3.13 LET US SUM UP

Digital Marketing is one of the ways through which marketers can develop the link and have good relation with the customer. As business is becoming more and more difficult or rigid, so there is need to make a good relation with the customer because a customer is the backbone of every business. Therefore, with the help of a customer centric online marketing marketer can make a customer happy, as survival of business depends on the happiness and satisfaction of the consumers. The Adoption Process was first described by Bourne (1959), so it has stood the test of time and remained an important marketing tool ever since. It describes the behaviour of consumers as they purchase new products and services. Marketers spend millions of rupees trying to understand why people buy products and services. Sometimes it seems that there is no reason for a purchase, but in reality, there is always a reason. The goal of marketing is to create value and satisfy needs. However, everyone's needs are not the same and understanding needs is a complex task. Market segmentation is an important process in conventional marketing. Segmentation is an important step in ensuring successful implementation of marketing strategies. Market segmentation means dividing a market into different groups or categories according to certain criteria such as household income, level of income, level of education, age, gender, hobbies and more. In targeting, the marketers evaluate the attractiveness of each potential segment and decide which of these groups they will invest resources against to try to turn them into customers. Positioning is developing a product and brand image in the minds of consumers. It can also include improving a customer's perception about the experience they will have if they choose to purchase product

or service. The *situation analysis for E-marketing* bridges the internal audit and competitor research. It answers the question where are we now in terms of our electronic marketing.

## 3.14 KEY WORDS

| | |
|---|---|
| DIGITAL MARKETING | Electronic marketing strategy to carry through their marketing activities to attain marketing objectives. |
| CUSTOMER CENTRIC | Marketing strategy focused towards satisfying the customers. |
| ADOPTION PROCESS | It describes the behaviour of consumers as they purchase new products and services. |
| RATIONAL BUYING | Purchases are made with logical justifying. |
| SEGMENTATION | Dividing the Mass market into different groups. |
| TARGETING | Selecting the appropriate group out of all segmentations. |
| UNDIFFERENTIATED MARKETING | Where only one product satisfies all the customer in mass market. |
| NICHE MARKET | Small market, more narrowly defined market. |
| POSITIONING | Positioning is developing a product and brand image in the minds of consumers. |
| PUBLIC RELATIONSHIP | Public Relations are the planned effort to influence opinion through good character and responsible performance, based upon mutually satisfactory two-way communications. |

## 3.15 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | VI. | Customer | XII. | True |
| II. | False | VII. | Sales | XIII. | True |
| III. | 60% | VIII. | True | XIV. | 4Ps |
| IV. | Diffusion of Innovation | IX. | Segmentation | XV. | False |
| | | X. | Target market | XVI. | True |
| V. | Laggards | XI. | Undifferentiated | XVII. | Digital marketing |

## 3.16 TERMINAL QUESTIONS

- Why understanding the consumer perception is important for marketers? How the work is done under customer centric marketing strategy?

- What are the different stages for product adoption process? How the marketing strategies will differ for each stage?

- How the identification of characterises of consumers are important for the marketing manager?

- Highlight the stages of public relationship, how each stage contributes for long term relationship with the customer?

- What is market segmentation, and why is it an important strategy in today's marketplace?

- Explain the major variables used to segment the consumer markets. Give example of each.

- How do we segment the business markets?

- What is target marketing? What are the different levels of target marketing?

- What is market positioning? How the companies do positioning of their products? Discuss with examples.

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

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**UNIT-4     INFORMATION SEARCH BEHAVIOUR**

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**STRUCTURE**

> **4.0 OBJECTIVES**
> **4.1 INTRODUCTION**
> **4.2 CONSUMER BEHAVIOUR AND INFORMATION SEARCH**
> **4.3 BUYING MOTIVES DECIDE THE INFORMATION SEARCH**
> **4.4 DIFFERENT INFORMATIONS REQUIRED FOR DIFFERENT BUYING ROLES**
> **4.5 CUSTOMER VALUE**
> **4.6 CUSTOMER SATISFACTION**
> **4.7 MONITORING AND MEASURING CUSTOMER SATISFACTION**
> **4.8 DELIVERING CUSTOMER VALUE**
> **4.9 ROLES OF INTERNET MARKETERS**
> **4.10 LET US SUM UP**
> **4.11 KEY WORDS**
> **4.12 ANSWERS TO CHECK THE PROGRESS**
> **4.13 TERMINAL QUESTIONS**

**4.0 OBJECTIVES**

**After studying the Unit, you would be able to**

- Know how marketers sharing the information with customers
- Understanding the behaviour of customer while searching the information
- Understanding how motive will decide the information search
- Have experience how information requirement change with changing consumer role
- Importance of customer value for developing marketing strategies
- Explore how satisfaction will lead to change in consumer behaviour
- Monitor and measure the customer satisfaction
- Find out the role of internet marketers

**4.1 INTRODUCTION**

In Today's World "The customer is the King of the Market", So every company is making efforts to win the customer. All the process of every company is done by considering the

demands, nature, expectations of the customer related to products and services.

One of the many critical tasks of marketer is not only to create the new customers but also to sustain its existing customer base. Customer is the most important factor in the internal business environment because customer is the reason why the business exists. The customer market can be broadly categorized into consumer market and industrial/business market.

Consumer market comprises of the individuals and households who purchase the product and services for the final consumption. The consumer market is dominated by the products and services that are specifically designed and manufactured for the general consumers. For example, FMCG products and other retail products are a part of consumer market. Business/Industrial market includes the businesses (both private and public institutions) which buy products and services for their own operations or to use them in their own product and services. For example, when Apple purchases Intel processing chips from Intel for using them in its devices it becomes a part of business market for Intel.

Digital marketing is the method of developing a brand, service, or product on the internet. Digital marketing differs from traditional marketing in that it requires the use of online platforms and strategies that enable companies and organisations to monitor the effectiveness of their marketing campaigns, while in traditional marketing, each marketing campaign is evaluated individually.

Most businesses have established a web presence in the twenty-first century. E-mail was widely used, and technology made it possible for people to do it reasonably easily. For a long time, organisations have used customer relationship management systems to handle their databases. Some businesses used banner ads on their websites in a similar manner to how they advertise in the news. Forward-thinking businesses were developing their search engine strategies and collaborating with affiliates. All of this was online marketing, and online marketing teams and experts will appear in a very short time.

Marketers use digital platforms to direct prospects through their buying process and keep in touch with their current clients, in addition to traditional marketing channels such as television, newspapers, advertisements, and so on.

Marketing teams create content, videos and other assets to answer questions or provide context to consumers throughout the three stages of the buyer's journey:

- **The stage of awareness:** the buyer recognises that they have a need.
- **The evaluation stage:** Buyer chooses a course of action to satisfy their needs.

- **The decision stage:** The buyer selects a product or service to satisfy the requirement.

For example, a customer can discover that they need new gym shoes. An activewear company's marketing department could write a piece about what features you need in a running shoe versus what you need for strength training. The buyer decides that they require pairs of running shoes that meet the requirements based on material. Another piece of content could include a list of the most common running shoes, as well as their price ranges. They determine after they have been informed on these factors. Content marketing is often less costly than other types of marketing, and it generates almost three times the number of leads.

## 4.2 CONSUMER BEHAVIOUR AND INFORMATION SEARCH

It Refer to the habits or attitudes of a consumer that influences the buying process of a product or service. There are different types of studies are involved to read out the consumer behaviour. Every business concern has a different policies or methods to study the consumer behaviour. Consumer behaviour is dynamic in nature so they adopt the particular strategy to find these changes. Consumer behaviour impacts virtually every stage of the buying process specifically in relation to digital environments and devices.

In our daily life customer need different types of information to understand the things and make decisions. Consumer before finalize his buying decision use various kinds of information in order to get the answers of what to buy, from whom to buy, how to buy and many more related questions. In the past customers having limited sources of information and difficult for them to find out, but at present with the advancement of technology customer can get any information as per requirement from the ample sources of information. It is not only the consumers, have been searching the information, marketers too need information regarding the consumer to develop the marketing strategies and other business decisions. So, marketers and business organization have been relying on the different online sources to get the related information.

## 4.3 BUYING MOTIVES DECIDE THE INFORMATION SEARCH

Consumers are going to behave differently to satisfy their needs, consumer behavior basically starts with the needs. The consumer's needs may differ at various points of times. The hierarchy of need theory has been given by the Abraham Maslow, he has classified the needs in five stages i.e., Basic need, Safety need, Social need, Esteem needs and Self Actualization

need. The persons satisfy their needs in sequences; initially they satisfy their basic needs then move to next. In a same way to satisfy his self-actualization need, he has to satisfy rest of the need first. It is all because of these different need's consumers behave differently. D. J. Durian has defined the Buying Motives as "those influences or factors which provide the impulse to buy, induce action or determine choice in the purchase of goods and services." Buying motives are those motives which induce the consumers to select or buy particular product to satisfy needs. In another way buying motives are reasons which are satisfied by purchase of the commodities.

As we are clear that buying motive is the motive or urge to satisfy the needs that make customers to buy goods. There are buying motives behind every purchase. Buying motives are the thoughts, feelings and instincts which create a desire in the customers to buy an article. A person is not buying because the sales men have influence them to buy, they are buying due to desire that have taken place in them.

Identifying buying motives of the consumer is a difficult task for the marketers, as there are number of factors to induce consumers to buy particular product. The different experts have given different classification of buying motives. We have done the classification on the bases of:

1. Product Motives
2. Patronage Motives.

1. **Product motives:** Product motives are those motives which are related to the product that induce or prompt the consumers to choose and buy the product. Product motives are related with the attributes of the product. They include physical attraction of product (design, colour, shape, package, price etc.) and psychological attraction of the product (life style and status associated with the product).

   **Product buying motives may be further subdivided in to four groups:**
   - Emotional Product motives
   - Rational product motives
   - Operational product motives
   - Socio-psychological motives

   - **Emotional Product Motives:** Emotional product motives are those which induce the persons emotionally to buy a product either they need or not or

even buy the product without evaluating its attributes. When buyers choose or buy a product without thinking over the matter logically, they are said to be influence by emotional product buying motives. The emotional product motives include:

- ✓ Pride is the strongest emotional motive used by the sellers to induce the buyer to buy product. Many consumers are proud of possessing some products, for example diamond merchants sell their products by using pride or prestige motives.

- ✓ Emulation is another emotional buying motive used by the sellers to sell the products to customer. For example, a girl may like to have same product for a simple reason that all her friends have the same.

- ✓ Affection for other is one of the important emotional buying motives inducing the customers to choose or buy the product. For example, a father buys a watch for his son out of his affection.

- ✓ Desire for comfort is another emotional motive used by the sellers. Many customers buy the product only because of comfort.

- ✓ Sex appeal is another emotional motive used by the marketers to sell the product. Consumers use the product, as they want to be attractive to the members of the opposite sex.

- ✓ Ambition is also used as emotional motive by the sellers to induce the consumers to buy the product. Out of ambition some consumers buy the products.

- ✓ Sometime customers buy the product, because they want to have the product which is not possessed by others.

- ✓ Many consumers buy a particular product because of habit.

For example, Jealousy is an emotional motive of persons, the larger percent being the ladies. It is feeling of hatred, envy or inferiority complex in matters of beauty, wealth, achievement and possession. That someone else is lucky, successful, deserving impress upon the neighbour, friends, colleagues and relatives, people may be induced to buy sarees, ornaments, refrigerators, cars, buildings, paintings, furniture etc. It will not be out of the place here to mention the advertisement by Onida T.V. Company which says, 'Neighbour's Envy, Owner's Pride'.

- **Rational Product motives:** As compare to the emotional motives there are a rational motive which induces the customers to buy the products. Here the consumers make the purchase decisions with logical analysis of product's attributes. When customers buy the product after careful consideration, they are said to be influence by rational product motives. A rational Product motive includes:
  - ✓ Desire for safety is an important rational buying motive to induce the consumers. For example, we go for safety locker in bank; it is all because of this motive. In a same way we buy Vitamin tablets or medicines due to this reason.
  - ✓ Saving money while buying the product is the rational motive to influence the customers. Mostly consumers buy Honda bikes due to high mileage.
  - ✓ Relatively low price is one of the rational buying motives; customers buy the products which are relatively cheaper.
  - ✓ Suitability of the product for the needs another rational motive as we know the intelligent persons buy the product based on their suitability.
  - ✓ How much the product is durable another rational motive which induces the customers.
  - ✓ The convenience of the product is another strongest rational product motive to influence the person to buy the product.

- **Operational Product Motives:** Operational product motive is concerned with the satisfaction derived from the functions of products and the utility of the product. The products having more utility for the customers or products having more satisfaction power will be more preferred by the customers. Hence the satisfactions from product or product's utility induce the persons to buy the product.

- **Socio-Psychological Motives:** Socio-psychological motives are different from the above three motives. In this customer attracted toward the products because of prestige attached with product. Thus, the produced are evaluated by

the consumers on the bases of social status. Customer would prefer to buy product which is socially acceptable.

2. **Patronage buying motives:** These motives refer to those reasons which influence the customers to buy wanted product from a particular seller or shop. Many times, we see most of the times customers are going to buy the product from particular shop, there are number of motives or reasons behind this kind of behaviour. Patronage buying motives are further classifies into two groups:
   - **Emotional Patronage motives**
   - **Rational Patronage motives**

- **Emotional Patronage Motives**: In this motive customer buy the wanted product from a particular shop without evaluating the reason; why that particular shop to buy product. Here the reason for buying from that particular shop is purely a subjective. The emotional patronage motive includes:
   ✓ Appearance of the shop one of the strongest motives to induce the customer to buy from particular shop. Customers buy goods and services from particular shop because of attractive appearance of the shop.
   ✓ Seller display the products in the shop in such a way, the customers get attracted toward that shop for buying the goods and services.
   ✓ Recommendations of the others like friends or family members also induce the customer to go for shopping in that particular shop.
   ✓ Sometime customers go to a particular shop for shopping because other customers are also going to that particular shop for shopping.
   ✓ Prestige is one of the strongest patronages buying motives of the buyers. For example, customers prefer to go five-star hotels for coffee all because of prestige.
   ✓ Sometime customers always go to particular shop for buying product, because they are habitual to buy from that particular shop.

- **Rational Patronage buying Motives:** On the other hand, the customers have the logic for buying from a particular shop in case of rational patronage motives. In this motive the customers are aware what are the advantages attached with a particular

shop in the form of wide selection, quality material, after sales services etc. we can include in the rational patronage motives:

- ✓ Convenient location of the shop which induce the buyer to buy product from particular shop.
- ✓ If the seller offers discounts or charge less price for the product, customer will prefer to go there for shopping.
- ✓ The credit services provided by the shop also induce the customers.
- ✓ The before and after sales services provided by the shop also influence the customers to go for a particular shop.
- ✓ The efficiency of the seller's staff to help the customer in buying process also induce the customer to go that shop for buying.
- ✓ The variety of quality products in the shop is one of the motives making the buyer patronise a particular shop.
- ✓ The reputation of the shop in society is also one of the rational motives to induce the customer.

**CHECK YOUR PROGRESS**

I. In Today's World "The customer is the.................. of the Market", So every company is making efforts to win the customer.
   a) Promoter                           c) Producer
   b) User                               d) King

II. …………………. comprises of the individuals and households who purchase the product and services the service for the final consumption.
   a) International market               d) Non-profit organisation
   b) Consumer market                       market
   c) Business Market

III. Digital marketing is the method of developing a brand, service, or product on the newspaper. (True /False)

IV. Most businesses have established a web presence in the .................. century.

V. Consumer behaviour impacts virtually every stage of the buying process specifically in relation to digital environments and devices. (True /False)

VI. The consumer's needs may differ at various points of times. (True /False)

VII. Identifying buying motives of the consumer is a easy task for the marketers, as there are number of factors to induce consumers to buy particular product. (True /False)

VIII. ……………….. are those motives which are related to the product that induce or prompt the consumers to choose and buy the product.

IX. ……………… motives are those which induce the persons emotionally to buy a product either they need or not or even buy the product without evaluating its attributes.

X. …………………. motive is concerned with the satisfaction derived from the functions of products and the utility of the product

    a) Emotional product          c) Both

    b) Operational product        d) None of these

## 4.4 DIFFERENT INFORMATIONS REQUIRED FOR DIFFERENT BUYING ROLES

Most of the time the purchases are made by the individuals, but some time it may be done one a group like household. The number of individuals may interact to affect or influence the purchase decision. Depending upon the products, the persons involved in the process of purchase have to play different role or some time one person has to play all the roles required in buying process.

The five different roles which are required in buying process are discussed as:

- **Initiator:** The persons who start the process of considering a purchase is the initiator, as they are the persons who wants product to satisfy their needs. For example, a student may act as initiator for a laptop that he needs for education motive, a girl may feel the need of beauty products.

- **Influencer:** The influencers are going to influence the initiator's decision that needs products to satisfy their needs. A marketer needs to focus the influencer because they are going to alter the behavior of person who need product. For example, a student taken the initiative to buy the motorcycle, the elder brother or father in the family may influence him to buy the scoter not the bike.

- **Decider:** Decider is the person who is going to decide whether to buy the product or not, actually he is the person who is going to pay for the product. For example, in a family father is the payer, thus he is having a great influence in the buying process.

- **Buyer:** The person who actually goes to the market and buys the product. Usually, the buyer is the person to whom marketer can see in the market. But evaluating the

behavior of buyer cannot fulfill the purpose of marketers because the decisions regarding product, brand, shop etc. have already been taken at the end of decider.

- **User:** the person who is actually going to use or consume the purchased product. Most of the time it is the initiator who use the product. The product may be consumed by the individual or it can be consumed in a group.

Here it is important to note that who is going to play what role all depends upon the Product's type, its price, buying capacity and many more variables. For example, a student has to buy the note book for study and he has enough pocket money. In this case a student may play all the roles required in buying process. In another example a student need motorcycle, the different persons involved in buying may play different roles, like student himself act as initiator, his friends or bother may play the role of influencer to influence him what kind of bike he should buy, Parents may play the role of decider who are actually going to pay for the bike and at the end student who is going to ride the bike may act as user. In the same way if the student's elder brother has taken the initiative regarding bike for commuting college to home, elder bother will be considered as initiator or student for whom the bike has been purchased would be considered as user. It is not necessary the role of initiator and user played by one person. So, who is going to play what role all depends on the product type, how much expenditure will be done for the product, by whom the product would be used and many more factors.

Few more examples of Different role in buying process:

1. A kindergarten student needs to buy colour crayons to use in class.
   - ✓ Initiator: The student
   - ✓ Influencer: His teacher or his classmates
   - ✓ Decider: Either of the parents
   - ✓ Buyer: Either of the parents or a sibling.
   - ✓ User: The student himself.

2. A boy enters college and needs a laptop for doing assignments.
   - ✓ Initiator: The boy himself
   - ✓ Influencer: His friends and classmates
   - ✓ Decider: The boy himself
   - ✓ Buyer: The boy himself

✓ User: The boy himself

## 4.5 CUSTOMER VALUE

Customer Value relates to any organization's Customer, and what they feel while buying and using their products. It could be defined as "the difference between the value the customer's gain from owning it and using the product and the cost of obtaining it. Woodruff defines customer value as a "customer perceived preference for and evaluation of those products, attributes, attribute performances and consequences arising from use that facilitate (or block) achieving customers goals and purposes in use situations. Customer value is of two types, desired value and perceived value. Desired value means what the customer wants or desires in a product while the perceived value represents the benefits a customer receives after buying the product.

Delivering customer value is a continuous effort as the Value of a product keeps on changing according to the needs and wants of the product. According to *Steve Jobs "You can't just ask customer's what they want and then try to give that to them. By the time you get it built, they'll want something new."*

**Classification of customer value:** Customer value can be classified into four types:

- **Functional value:** it relates to what solution a product provides to the customer.

- **Monetary value:** it refers to whether the function of the product relates to the price of the product or the product is worth the price paid for it.

- **Social value:** It refers to how the product helps the customer to connect with other people in the society.

- **Psychological value:** the extent to which the product allows consumers to express themselves or feel better in their life.

**Customer Perceived Value**

The consumers of any product are usually unaware of the production costs of that product. They simply have an internal feeling about the worth of that product, which is based on total customer benefits and total customer cost associated with it. This worth of a product or service in the mind of the customer is known as customer perceived value. This perceived

value often affects the price that a customer is willing to pay for a product. In order to pay a higher price for their products various companies apply marketing strategies to create a higher perceived value for their product. For example, perfumes are often associated with big celebrities to create a higher brand value in the minds of the customers.

Customer Perceived Value = Total customer benefit + Total customer cost

> **Total customer benefit**= Product benefit + Service benefit + Personnel benefit + Image benefit.

> **Total customer cos**t = Monetary cost + Time cost + Energy cost + psychological cost.

**RFM Analysis**

It is a marketing analysis tool often used to identify any organizations loyal customers. This analysis is based on three quantitative factors.

- **Recency:** It means "how recently "or the time elapsed since the last purchase was made by a customer or an advertisement was last published or broadcasted.

- **Frequency:** It refers to how often a customer purchases a particular product.

- **Monetary value:** it refers to the amount of money a customer spends on purchasing a product. RFM analysis often supports the marketing adage that "80% of business comes from 20% of the customers."

**Customer lifetime Value**

In marketing, customer lifetime value (CLV) is a metric that represents the total net profit a company makes from any given customer. CLV is a projection to estimate a customer's monetary worth to a business after factoring in the value of the relationship with a customer over time. CLV is an important metric for determining how much money a company wants to spend on acquiring new customers and how much repeat business a company can expect from certain consumers.

**4.6 CUSTOMER SATISFACTION**

Custom satisfaction is a measure of how the products and services supplied by a company meet the customer's expectations. It is measured and seen as a key performance indicator for

measuring the success or failure of any business enterprise. If we want to retain our customer's then they should be satisfied with our products.

*Loyal customers, they don't just come back, they don't simply recommend you, they insist that their friends do business with you.*

It is seen as a key performance indicator within business and is often part of a Balanced Scorecard. In a competitive marketplace where businesses compete for customers, customer satisfaction is seen as a key differentiator and increasingly has become a key element of business strategy

**Importance of customer satisfaction:**

- Key performance indicator
- Key element of business strategy
- Indicator for consumer purchase intentions.
- Level of satisfaction varies from person to person and from time to time.
- Indicator for good quality product and services.
- Higher customer satisfaction can lead to higher economic growth.
- Higher satisfaction is directly proportional to greater customer loyalty.

Know what customers want most and what company does best, so, focus on where these two meets.

Customer satisfaction measures how well the expectations of a customer concerning a product or service provided by company have been met. Customer satisfaction is an abstract concept and involves such factors as the quality of the product, the quality of the service provided, the atmosphere of the location where the product or service is purchased, and the price of the product or service. Businesses often use customer satisfaction surveys to gauge customer satisfaction. These surveys are used to gather information about customer satisfaction. Typical areas addressed in the surveys include:

- Quality of product
- Value of product relative to price - a function of quality and price
- Time issues, such as product availability, availability of sales assistance, time waiting at checkout, and delivery time
- Atmosphere of store, such as cleanliness, organization, and enjoyable shopping environment

Studies carried out by companies like Argos and Cadburys have found very high levels of customer satisfaction. It is not surprising because these companies emphasize market research and marketing as the tools to find out what customers want. Knowing what customer wants then makes it possible to tailor everything do to pleasing the customers e.g., providing the goods that customers want, in the packaging that they want, in retail outlets which are convenient to use and well placed.

There are many factors which lead to high levels of customer satisfaction including:

- Products and services which are customer focused and thence provide high levels of value for money.

- Customer service giving personal attention to the needs of individual customers.

- After sales service, following up the original purchase with after sales support such as maintenance and updating services given with the core product (for example in the updating of computer packages).

What is clear about customer satisfaction is that customers are most likely to appreciate the goods and services that they buy if they are made to feel special. This occurs when they feel that the goods and services that they buy have been specially produced for them or for people like them. This relates to a wide range of products such as razors that are designed for ease of use and good quality finish, petrol products that are environmentally friendly and customized to meet the needs of particular types of engines, etc.

**CHECK YOUR PROGRESS**

XI. The persons who start the process of considering a purchase is the ………….

    a) Influencers          c) Initiator

    b) Deciders          d) Buyer

XII. The …………………. are going to influence the initiator's decision that needs products to satisfy their needs.

XIII. ……….. is the person who is going to decide whether to buy the product or not, actually he is the person who is going to pay for the product.

    a) Influencers          c) Initiator

    b) Deciders          d) Buyer

XIV. Customer value is of two types, desired value and ………………..

XV. Delivering customer value is a continuous effort as the Value of a product keeps on changing according to the needs and wants of the product. (True /False)

XVI. ..............................relates to what solution a product provides to the customer.

a) Monetary value                         c) Psychological value

b) Functional value                       d) Social value

XVII. ……………. means "how recently "or the time elapsed since the last purchase was made by a customer or an advertisement was last published

XVIII. ………………is a marketing analysis tool often used to identify any organizations loyal customers.

XIX. Customer lifetime value (CLV) is a metric that represents the total net profit a company makes from any given customer. (True /False)

XX. Custom satisfaction is a measure of how the products and services supplied by a company meet the customer's expectations. (True /False)

## 4.7 MONITORING AND MEASURING CUSTOMER SATISFACTION

The increasing market competition and growing customer focus has resulted in measuring the level of customer satisfaction related to a product or service. Higher degree of customer satisfaction is said to be an indicator for customer's future profits. It can be measured in case of both goods and services. Satisfied and delighted customers are believed to be profitable for any business enterprise, it helps to determine companies focus areas for improving service quality and identifying the gaps. It helps us to understand whether the organization is meeting customer expectation and delivering the required standard of quality services.

Customer behaviour is one of the best ways for measuring customer satisfaction. There can be two ways of measuring customer satisfaction.

- **Direct Ways:** It is done by directly approaching the customers for their valuable feedback (personal calls, face to face interviews, questionnaires etc.)

- **Indirect ways:** This can be obtained by a) complaint reports of customers regarding any specific product or service. If the complaint reports under a particular segment are high, it is an indication of low performance by the company. If the complaints are low that means the organization is performing well during that period of time. b) Customer loyalty: if the customer is coming back and buying the same product that means it loyal to the product and gives an indication of positive customer satisfaction.

**Direct ways of obtaining customer feedback**

- **Event based survey:** This type of survey is done during or after the customer service period on a regular and a continuous basis with short 3-5 questions.

- **One time/One off Survey:** This type of survey is performed for specific reasons example, a change in service provider, etc. It is usually done after a major change has been done in the organization.
- **Focus Groups:** It is a special group od people who meet and discuss on predetermined issues. One person reports all the points and sums up all the important findings.
- **Periodic/Annual survey:** It is a planned and a scheduled procedure on a periodic basis, mostly done quarterly or annually. In each periodic survey the elements to be measured remain the same. This type of survey helps the organization in comparing its own services over a period of time.

**The Process of measuring customer satisfaction**:
- To ensure the reliability and validity of measures choose a team of researchers.
- Select an appropriate method for obtaining feedback e.g. telephone, interviews, face to face interviews, questionnaires etc.
- Select the sample of customers for obtaining feedback.
- Select the attributes to be measured and a measurement scale.
- Carry out the research.
- Analyse the results.
- Adopt corrective measures.

## 4.8 DELIVERING CUSTOMER VALUE

One of the most common reasons for the failure of a business venture, is its inability to deliver value to customers. The concept of value is one of those things that is both simple and complex. Simple because it only has three components; complex because it can only be defined by the customer, and can include tangible and intangible concepts such as perceptions and opinions.

Consumer having wants and resources (financial ability), they demand products and services with benefits that add up to the most value and satisfaction.

The four types of value include: *functional value*, *monetary value*, *social value*, and *psychological value*. The sources of value are not equally important to all consumers.

How important a value is, depends on the consumer and the purchase. Values should always be defined through the "eyes" of the consumer.

- **Functional Value:** This type of value is what an offer does, it is the solution an offer provides to the customer.

- **Monetary Value:** This is where the function of the price paid is relative to an offering perceived worth. This value invites a trade-off between other values and monetary costs.

- **Social Value:** The extent to which owning a product or engaging in a service allows the consumer to connect with others.

- **Psychological Value:** The extent to which a product allows consumers to express themselves or feel better.

For a firm to deliver value to its customers, they must consider what is known as the "total market offering". This includes the reputation of the organization, staff representation, product benefits, and technological characteristics as compared to competitor's market offerings and prices. Value can thus be defined as the relationship of a firm's market offerings to those of its competitors.

The term value may mean, low price, receiving what is desired, receiving quality for what is paid, or receiving something in return for what is given (Zeithaml). Evaluation of customer value can be done at different levels.

At a lower level, customer value can be viewed as the attributes of a product that a customer perceives to receive value from. At a higher level, customer value can be viewed as the emotional payoff and achievement of a goal or desire. When customers derive value from a product, they derive value from the attributes of the product as well as from the attribute performance and the consequence of achieving desired goals from the use of the product. Thus, delivering value to the customers includes all the steps a customer will go through while obtaining the product and while using the product.

**Points to be remembered while delivering customer value:**
- Understand the value of a product for the customer.

- The value should be provided at both the stages during the buying procedure and after purchasing the product.
- The value should be delivered at all the steps.
- The value for a particular product may vary from time to time.

## 4.9 ROLES OF INTERNET MARKETERS

Internet marketers, the essentiality of taking online businesses to greater heights. The generating of marketing leads, developing/expanding customer base, tracking sales conversions and evaluating overall web marketing and promotional campaigns are the many roles that an Internet marketer plays. Being in a team of players, the website developer, the programmer and the website administrator, the Internet marketer is often involved in the creation of web content which showcases the overall aesthetics of the website and the business.

Search Engine Optimization (SEO) and Search Engine Marketing (SEM) are terms that Internet marketers are familiar and close with. The difference is that SEO is used to generate organic traffic while SEM involves paying or sponsoring the traffic (such as a Google AdWords & PPC campaign). In order to fulfill the roles of the above, the Internet marketer has to be adept in keyword research, being able to bring out the accuracy and niche keyword and phrases. Analyzing them comes as the next step, to strategies which keywords would help anchor an online web marketing campaign success.

Internet marketers have to grasp the concept of link building, on top of SEO and SEM. The main goal is to constantly compete in page ranking in search engines like Google. Indeed, it is an arduous process of generating link juices which usually involve search engine and directory submission, bookmarking and campaigning for reciprocal link building.

Measuring marketing performance and tracking conversions is another important tool that Internet marketers have to be equipped with. The combination of Google analytics and Google AdWords will be able to achieve that, including the tracking of behavioral patterns of website visitors such as bounce rate, browser capabilities and mobile device accessibility.

Without forgetting the entrance of social media, the Internet marketer has to expand its roles in managing corporate accounts of different social media networks. Social networking sites

like Facebook, Twitter, YouTube are fertile grounds available for the expansion of brand awareness, generation of marketing leads and web traffic. In addition, the recent trend to go local, Geo-location-based marketing, has further broadened the scope of web marketers.

What is described above is a complex and highly technical job scope, which does not involve skills and trainings alone. But, with the passion and love for the journey, the Internet marketer is able to excel to his/her best abilities.

## CHECK YOUR PROGRESS

XXI.    Customer behaviour is one of the best ways for measuring customer satisfaction. (True /False)

XXII.    …………… is a special group of people who meet and discuss on predetermined issues.

XXIII............................is a planned and a scheduled procedure on a periodic basis, mostly done quarterly or annually.

XXIV.    One of the most common reasons for the failure of a business venture, is its inability to…………………...

## 4.10 LET US SUM UP

Consumer market comprises of the individuals and households who purchase the product and services the service for the final consumption. The consumer market is dominated by the products and services that are specifically designed and manufactured for the general consumers. Marketers use these digital platforms to direct prospects through their buying process and keep in touch with their current clients, in addition to traditional marketing channels such as television, newspapers, advertisements, and so on. In our daily life customer need different types of information to understand the things and make decisions. Consumer before finalize his buying decision use various kinds of information in order to get the answers of what to buy, from whom to buy, how to buy and many more related questions. In the past customers having limited sources of information and difficult for them to find out, but at present with the advancement of technology customer can get any information as per requirement from the ample sources of information. Consumers are going to behave differently to satisfy their needs, consumer behavior basically starts with the needs.

Identifying buying motives of the consumer is a difficult task for the marketers, as there are number of factors to induce consumers to buy particular product. The different experts have given different classification of buying motives. Most of the time the purchases are made by the individuals, but some time it may be done one a group like household. The number of individuals may interact to affect or influence the purchase decision. Depending upon the products, the persons involved in the process of purchase have to play different role or some time one person has to play all the roles required in buying process. Customer Value relates to any organization's Customer's and what they feel while buying and using their products. As far as Custom satisfaction is a measure of how the products and services supplied by a company meet the customer's expectations.

## 4.11 KEY WORDS

| | |
|---|---|
| CONSUMER BEHAVIOUR | It Refer to the habits or attitudes of a consumer that influences the buying process of a product or service. |
| BUYING MOTIVES | Factors which provide the impulse to buy |
| PRODUCT MOTIVES | Motives which are related to the product that induce or prompt the consumers to choose and buy the product. |
| PATRONAGE BUYING MOTIVES | Those reasons which influence the customers to buy wanted product from a particular seller or shop. |
| INITIATOR | The persons who start the process of considering a purchase. |
| CUSTOMER VALUE | Customers' feel while buying and using their products. |
| FUNCTIONAL VALUE | It relates to what solution a product provides to the customer. |
| CUSTOMER SATISFACTION | It's a measure of how the products and services supplied by a company meet the customer's expectations. |

## 4.12 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | King | VIII. | Product motives | XIV. | Perceived value |
| II. | Consumer market | IX. | Emotional product | XV. | True |
| III. | False | X. | Operational product | XVI. | Functional value |
| IV. | Twenty-first | | | XVII. | Recency |
| V. | True | XI. | Initiator | XVIII. | RFM Analysis |
| VI. | True | XII. | Influencer | XIX. | True |
| VII. | False | XIII. | Deciders | XX. | True |

| XXI. True | XXIII. Periodic/Annual | XXIV. Deliver value to |
|-----------|------------------------|------------------------|
| XXII. Focus Groups | survey | customers |

## 4.13 TERMINAL QUESTIONS

- Discuss in detail how digital marketing has contributed to make consumer as king of the market?

- What is consumer behaviour? Highlight the behaviour of the consumer while searching for the information.

- What kind of information required by the consumer for finalising product to buy? What is the role of buying motives to decide the information required?

- Do consumers use the same kind of information irrespective of their buying role?

- What is customer value and why it is important for the marketers? Do customer value and customer satisfaction are the same?

- What is RFM analysis and why it is used?

- What is customer satisfaction and how we can measure the satisfaction level of consumer?

- How we can insure the delivery of customer value? What is the role of internet marketers for the same?

BACHELOR IN COMMERCE (HONS.)

(Accounting and Taxation)

(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING

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UNIT-5    FACTORS INFLUENCING CONSUMPTION BEHAVIOR

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STRUCTURE

5.0 OBJECTIVES
5.1 INTRODUCTION
5.2 CONSUMER BEHAVIOUR
5.3 INTERNAL INFLUENCERS TO IMPACT THE CONSUMER'S BEHAVIOUR
5.4 ROLE OF ONLINE PUBLIC RELATIONSHIP IN CONSUMER BEHAVIOUR
5.5 DISTINCTION BETWEEN MARKETING AND PUBLIC RELATION
5.6 BENEFITS OF ONLINE PR
5.7 COMPONENTS AND TOOLS OF PUBLIC RELATIONS
5.8 FUNCTIONS OF PUBLIC RELATIONS
5.9 CHARACTERISTICS OF THE ENVIRONMENT
5.10 CUSTOMER RELATIONSHIP MANAGEMENT
5.11 REASONS FOR ORGANISATIONS LOSING CUSTOMERS
5.12 LET US SUM UP
5.13 KEY WORDS
5.14 ANSWERS TO CHECK THE PROGRESS
5.15 TERMINAL QUESTIONS

5.0 OBJECTIVES

After studying the Unit, you would be able to

- Describe the Consumer Behavior
- Find out how the internal influencers impact the consumer behavior
- Explore the role of public relationship in consumer behavior
- Utilizes the public relationship for marketing
- Highlight the dimensions of public relationship
- Evaluate, how environment influence the consumer behavior
- Elaborate the CRM and its best use in marketing
- Identify the reasons for losing customers

5.1 INTRODUCTION

Digital marketing is normally associated with Internet marketing. Internet marketing captures data which feeds into the firm's database; the database is used to generate profiles and lists,

which enable the firm to have effective direct marketing campaigns. Underlying electronic business has two phenomena: digitalization and connectivity. Digitalization consists of converting text, data, sounds, and image into a stream of bits that can be dispatched at incredible speeds from one location to another. Connectivity involves building networks and expresses the fact that much of the World's business is carried over networks connecting people and companies. These networks are called intranets when they connect people within a company; extranets when they connect a company with its suppliers and customers; and the Internet when they connect users to an amazingly large information superhighway."

## 5.2 CONSUMER BEHAVIOUR

Consumer behaviour is described as the action and reaction of the consumer while searching, evaluating, buying and consuming the product to satisfy their needs. Consumer behaviour focuses on how individuals make decisions to spend their resources (time, money and effort) on products and services for consumption and satisfaction purpose. As individuals we all differ in many ways, in likes, dislikes, attitudes, cultural background, income level, education, occupation, family background etc. Despite such differences we are all consumers.

If a marketer can identify online consumer's buying behaviour, he or she will be in a better position to target products and services at them. Online Buyer behaviour is focused upon the needs of individuals, groups and organisations.

It is important to understand the relevance of human needs to buyer behaviour (remember, marketing is about *satisfying needs*). Let us look at human motivations as introduced by Abraham Maslow in his hierarchy of needs: The hierarchy is triangular. This is because as you move up it, fewer and fewer people satisfy higher level needs. We begin at the bottom level.

Physiological needs such as food, air, water, heat, and the basic necessities of survival need to be satisfied. At the level of safety, man has a place to live that protects him from the elements and predators. At the third level we meet our social and belongingness needs i.e., we marry, or join groups of friends, etc.

The final two levels are esteem and self-actualisation. Fewer people satisfy the higher-level needs. Esteem means that you achieve something that makes you recognised and gives personal satisfaction, for example writing a book. Self-actualisation is achieved by few. Here a person is one of a small number who actually do something. For example, Neil Armstrong

self-actualised as the first person to reach the Moon. The model is a little simplistic but introduces the concept a differing consumer need quite well.

To understand consumer buyer behaviour is to understand how the person interacts with the marketing mix. As described by Cohen (1991), the marketing mix inputs (or the four Ps of price, place, promotion, and product) are adapted and focused upon the consumer.

The psychology of each individual considers the product or service on offer in relation to their own culture, attitude, previous learning, and personal perception. The consumer then decides whether or not to purchase, where to purchase, the brand that he or she prefers, and other choices.

## 5.3 INTERNAL INFLUENCERS TO IMPACT THE CONSUMER'S BEHAVIOUR

- **Personality:** Some marketers believe customers choose products that express their personalities. Personality is defined as the thoughts, emotions, intentions and behaviour that people express as they move through their environment. Personality is unique to individuals, but may be applied to groups, is a combination of characteristics and traits and influences purchasing behaviours. Marketers use interviews and focus groups to understand personality and how it relates to the purchase of certain products in online market.
  - ✓ **Frugality:** consumers restrain themselves and think heavily about purchases
  - ✓ **Impulsiveness:** purchases are made without much thought beforehand
  - ✓ **Anxiety:** a person with lots of anxiety may have more post-purchase dissonance and feel upset about purchases after they get them home
  - ✓ **Bargaining:** some consumers prefer to bargain for purchases, it gives them a sense of control over their spending
  - ✓ **Vanity:** taking excessive pride in one's appearance and accomplishments
  - ✓ **Competence:** being responsible and dependable
  - ✓ **Ruggedness:** craving products that are tough and strong
  - ✓ **Sincerity:** honest and genuine
  - ✓ **Excitement:** craving daring and spirited purchases
  - ✓ **Sophistication:** desiring products that are glamorous and prestigious
- **Motivation:** Motivation is an internal state that drives consumers to satisfy needs. Motivation is the energizing force that could be used by marketers to activate online

consumer's behaviour. Once we recognize that we have a need, a state of tension exists that drives the consumer to the goal of reducing this tension and eliminating the need. Consequently, only unmet needs motivate.

- **Memory:** Marketing messages can be effective only if the consumer correctly understands the online messages, and remembers them when needed. Memory refers to a consumer's ability to understand the online marketing messages and assign them value and meaning. Value and meaning has to come together to make memory an effective influencer.

  - ✓ **Colour:** Colours have an enormous impact on marketing messages, and it affects consumers in a subjective manner, so that most of the time consumers do not even know they are being affected.

  - ✓ **Font:** The presentation of words and how they are shaped online, will also enhance the marketing message and contribute to the value and meaning.

  - ✓ **Simplicity of the message:** A simple message is generally easier to understand. Using short phrases and easy to read terminology, such as "heart healthy" will quickly and easily convey the message that the product is good for your heart.

  - ✓ **Consistency of the message:** The message needs to fit with the surrounding information; style, colour, text, photographs, music and all have to work together.

  - ✓ **Source of the message:** Consumers will be more likely to remember and purchase products endorsed by credible sources, animated characters or celebrities. They have to be likeable, have some expertise or at least pretend that they have expertise, be trustworthy, and attractive.

## 5.4 ROLE OF ONLINE PUBLIC RELATIONSHIP IN CONSUMER BEHAVIOUR

In the mid-twentieth century, mass production techniques and mass marketing changed the competitive landscape by increasing product availability for consumers. However, the purchasing process that allowed the shopkeeper and customer to spend quality time getting to know each other was also fundamentally changed. Customers lost their uniqueness, as they became an "account number" and shopkeepers lost track of their customers' individual needs as the market became full of product and service options. Many companies today are racing to re-establish their connections to new as well as existing customers to boost long-term

customer loyalty. Some companies are competing effectively and winning this race through the implementation of relationship marketing principles using strategic and technology-based public relationship (PR) applications.

Public Relations in its true sense are about human connections and the art of mastering human connections at a deep level. In the early days of PR, it was about relationships with not just the press but communities in various forms; the only difference was that these audiences were not online.

Online PR is very similar to traditional PR in the sense that it's about influencing people rather than buying placement for brand content. The influence could result in a story in a magazine, newspaper or blog. It could also result in other online pick-up, including social media. Typically, when people talk about traditional PR, they are referring to traditional media: newspapers, TV, radio and magazines. With online PR, traditional media brands may still be a target, but often online PR targets online properties, along with an array of other platforms and networks, from search to social.

## CHECK YOUR PROGRESS

I. Digital marketing is normally associated with Internet marketing. (True/False)

II. Consumer behaviour does not focus on how individuals make decisions to spend their available resources on products and services for consumption and satisfaction purpose. (True/False)

III. If a marketer can identify online consumer's buying behaviour, he or she will be in a better position to target products and services at them. (True/False)

IV. ....................... desiring products that are glamorous and prestigious.

V. In ....................... consumers restrain themselves and think heavily about purchases.

    a) Anxiety             c) Frugality

    b) Impulsive           d) Compulsive

VI. In ……………… a person with lots of anxiety may have more post-purchase dissonance and feel upset about purchases after they get them home.

    a) Impulsive           c) Frugality

    b) Compulsive         d) Anxiety

VII. ……………… is the energizing force that could be used by marketers to activate online consumer's behaviour.

VIII. In the mid-twentieth century, mass production techniques and mass marketing changed the competitive landscape by increasing product availability for consumers. (True/False)

IX. ……………. in its true sense are about human connections and the art of mastering human connections at a deep level.

## 5.5 DISTINCTION BETWEEN MARKETING AND PUBLIC RELATION

- Marketing promotes the transfer of goods and services from the producer and provider to the consumer. Public relations help an organization and its publics adapt mutually to each other.

- Marketing's immediate goal is sales. Public relations' immediate goal is mutual understanding or positioning of the organization with its publics.

- Marketing's implicit goal is profit. Public relations' implicit goal is positive perceptions and predispositions.

- Marketing's measure of success is the number of sales and/or the revenue it generates. Public relations' measure of success is expressed public opinion or other evidence of public support.

## 5.6 BENEFITS OF ONLINE PR

A successfully executed online public relations strategy offers endless benefits to a business. By listening and researching online conversations and key influencers, creating compelling content and interacting with others online within online communities, a company can effectively use Digital PR to enhance the business and achieve growth. Some of the benefits of Digital PR include the following:

- Increased traffic to a website, thus increased web conversion rates
- Contribution to search engine optimisation by generating links back to a website as well as enhancing website authority
- Enhanced brand awareness
- Position a company as an authoritative voice in their industry
- Provide an avenue for improved customer relations by allowing a company to directly engage with Individuals interested in their brand or product

- Provide a platform to communicate information and/or company insights to target audience

## 5.7 COMPONENTS AND TOOLS OF PUBLIC RELATIONS

- **Public:** A group of similar individuals; an assortment of persons having the same interests, problems, circumstances, goals; it is from such persons that opinion emanates. Public is a varied creature; it comes in many forms and sizes. Public has a multitude of wants and desires; it has its likes and dislikes, sometimes, strong likes and strong dislikes. Employers make for a public and employees another public; the government is a public and citizens constitute another public, and so on, each of these groups is a public of the sort, tries to attract a different audience with its own tools and techniques.

- **Relations:** Human wants to create the need to establish relations with one another. The representative wants of the individuals will profoundly affect their relationship. To understand any relationship, therefore, one must understand the wants of those involved. 'Relationships are of all possible types. We have relationship by ran-superior to inferior, inferior to superior, and equal to equal. We have relationship by sentiment-benevolent, Friendly, suspicious, jealous, hostile. A relationship may be active, or it may be passive it may be good or it may be bad, or it may be neutral. At any rate, the relationship is there to be accepted, ignored or altered, as desired.

- **Propaganda:** Propaganda is the manipulation of symbols to transmit accepted attitudes and skills. It describes political application of publicity and advertising, also on a large scale, to the end of selling an idea cause or candidate or all three.

- **Campaigns**: These consist of concerted, single-purpose publicity programme, usually on a more or less elaborate scale, employing coordinated publicity through a variety of media, aimed, at a number of targets, but focused on specific objectives. A campaign objective may be the election of a candidate, the promotion of political cause or issue, the reaching of a sales goal, or the raising of a quota of funds.

- **Lobbying**: It entails the exertion of influence, smooth and measured pressure on other, exercise of persuasion cum-pressure. In essence, it means a group putting its points of view forward in an attempt to win the other groups support.

## 5.8 FUNCTIONS OF PUBLIC RELATIONS

- Public Relations is establishing the relationship among the two groups (organisation and public).
- Art or Science of developing reciprocal understanding and goodwill.
- It analyses the public perception & attitude, identifies the organisation policy with public interest and then executes the programmes for communication with the public.

**CHECK YOUR PROGRESS**

X.....................is the manipulation of symbols to transmit accepted attitudes and skills.

    a) Campaigns      c) Propaganda

    b) Lobbying      d) All three

XI. Public relations' measure of success is expressed public opinion or other evidence of public support. (True/False)

XII. Public relations' immediate goal is ........................ of the organization with its publics.

XIII. A successfully executed online public relations strategy does not offers endless benefits to a business. (True/False)

XIV. ……………. means a group putting its points of view forward in an attempt to win the other groups support.

    a) Campaigns      c) Lobbying

    b) Propaganda      d) All three

## 5.9 CHARACTERISTICS OF THE ENVIRONMENT

- **Intensity of information:** If a consumer is overloaded with stimuli in an environment, they are much more likely to avoid the ad, or not comprehend it at all. We live in a world cluttered with advertisements; it can be difficult for companies to break through all of it and get to target market customers. Marketers have to be more creative since customers can now skip commercials; marketers use product placement in the actual movie or television show, the characters in the show use the brand name products and may even talk about how they like the brand name. This is all part of the advertising. Marketers are also making use of new social marketing movements such as Twitter and Facebook that can be programmed to reach customers that want to see your marketing messages.

- **Framing:** Messages can be framed to seem positive or negative and this will affect how customers assign value. "If you don't use sunscreen, you could get skin cancer" or "Use sunscreen to moisturize and protect your delicate skin".
- **Timing:** Many factors will influence how a message is interpreted and assigned value including: amount of time customer has to view a message, time of day, and type of medium used. A customer driving in the morning 70mph past a billboard for coffee may only have a few seconds to interpret the message, but since it is a time of day when that product is most consumed, they may be more likely to act on the message.

The value and meaning assigned is largely determined by internal factors, (thoughts, feelings, emotion, attitude, perception, motivation, personality, and lifestyle) which are different for each consumer. For example, a consumer who drinks lots of milk, sees an advertisement that says "Got Milk?" and since they already have positive feelings for the product they will purchase more milk, whereas a consumer who does not enjoy drinking milk and sees the same ad, may dismiss the ad or may try drinking more milk for a short period of time and then decrease consumption again.

## 5.10 CUSTOMER RELATIONSHIP MANAGEMENT

To be market-leader, companies must be customer-driven. Marketers are focusing on customers because to increase the market share. As Philip Kotler defines, "Marketing is managing profitable customer relationships. The two-fold goal of marketing is to attract new customers by promising superior value and to keep and grow current customers by delivering satisfaction".

Customer relationship management (CRM) focuses totally on customers and the organisation's entire gamut of functions related to value creation and value delivery. It is concerned with developing customer loyalty and brand loyalty to the highest possible level, to maintain long-term customer relationship.

Customer relationship management (CRM) is defined as a process of acquiring customers by understanding their needs, retaining customers by fulfilling the needs, and attracting new customers through customer specific strategic marketing approaches.

CRM is beneficial both to the marketers and the customers. The marketers benefit from reduction in customer acquisition cost, more loyal customers, expansion of customer base, savings in advertisement and promotion budget, increase in the number of profitable

customers, the future possibility of introducing new products easily in the market and possibility to expand the business. CRM is beneficial to the customers in the form of improvement in service quality by the marketers, more attention, personalized service, less risk, more commitment and increased value for money.

- **Customer Value:** Customer value is the benefit that a customer will get from a product or service in comparison with its cost. This benefit might be measured in monetary terms, such as when a product saves the customer money that would have been spent on something else. A benefit also can be difficult to quantify, such as the enjoyment that a customer receives from a product or service. The term "customer value" should not be confused with the value of customers to businesses. It refers to the value that the customers receive, and does not explain the value of customers for the company.

- **Customer Satisfaction:** Customer satisfaction is a term frequently used in marketing. It is a measure of how products and services supplied by the marketers meet or surpass customer expectation. Customer satisfaction is defined as "the number of customers, or percentage of total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals".

  In researching satisfaction, firms generally ask customers whether their product or service has met their expectations. Thus, expectations are a key factor behind satisfaction. When customers have high expectations and the reality falls short, they will be disappointed and will likely rate their experience as less than satisfying. For this reason, a luxury resort, for example, might receive a lower satisfaction rating than a budget motel, even though its facilities and service would be deemed superior in 'absolute' terms."

  The importance of customer satisfaction diminishes when a firm has increased bargaining power. For example, cell phone plan providers, such as Airtel, Idea, Vodafone and BSNL participate in an industry that is an oligopoly, where only a few suppliers of a certain product or service exist. As such, customers have very low satisfaction level for many cellphone service providers and they would never prefer them if there were, say, 100 cell phone plan providers, because customer satisfaction would be far too low, and customers would easily have the option of leaving for a better contract offer.

- **Customer Delight:** Customer delight is surprising a customer by exceeding his/her expectations and thus creating a positive emotional reaction. This emotional reaction leads to the word of mouth. Customer Delight directly affects sales and profitability of a company as it helps to distinguish the company and its products and services from the competition. In the past customer satisfaction has been seen as a key performance indicator. Customer satisfaction measures the extent to which the expectations of a customer are met (compared to expectations being exceeded). However, it has been discovered that mere customer satisfaction does not create brand loyalty nor does it encourage positive word of mouth.

  Customer Delight can be created by the product itself, by accompanied standard services and by interaction with people at the front line. The interaction is the greatest source of opportunities to create delight as it can be personalized and tailored to the specific needs and wishes of the customer. During contacts with touch points in the company, more than just customer service can be delivered. The person at the front line can surprise by showing a sincere personal interest in the customer, offer small attentions that might please or find a solution specific to particular needs. Those front-line employees are able to develop a relationship between the customer and the brand.

- **Customer Loyalty:** Customer loyalty is the key objective of customer relationship management and describes the loyalty which is established between a customer and companies, persons, products or brands. The individual market segments should be targeted in terms of developing customer loyalty. Customer loyalty is both an attitudinal and behavioural tendency to favour one brand over all others, whether due to satisfaction with the product or service, its convenience or performance, or simply familiarity and comfort with the brand. Customer loyalty encourages consumers to shop more consistently, spend a greater share of wallet, and feel positive about a shopping experience, helping attract consumers to familiar brands in the face of a competitive environment. There are many definitions of customer loyalty. Yet each of them fails to realize that loyalty runs hand-in-hand with emotions. Customer loyalty is the result of consistently positive emotional experience, physical attribute-based satisfaction and perceived value of an experience, which includes the product or services. Consider whom you yourself are loyal to. Surely you will answer family and friends. Why? Because of the emotional bond you have with them. Your family and

friends can do things you may not like, but you stay loyal because of that bond. The same applies with customer loyalty. To prompt customer loyalty you must build an emotional bond with your customers.

To build customer loyalty, customer experience management blends the physical, emotional and value elements of an experience into one cohesive experience. Retaining customers is less expensive than acquiring new ones, and customer experience management is the most cost-effective way to drive customer satisfaction, customer retention and customer loyalty. Not only do loyal customers ensure sales, but they are also more likely to purchase ancillary, high-margin supplemental products and services. Loyal customers reduce costs associated with consumer education and marketing, especially when they become Net Promoters for your organization.

## 5.11 REASONS FOR ORGANISATIONS LOSING CUSTOMERS

✓ If the price of a brand appears very high, and the customer perceives a mismatch between the price and the customer value, he would switch to a competitor's brand.

✓ If a new product, which is advanced in technology, offering better features and performance enters the market, customers may opt for that.

✓ If the customers are dissatisfied with the service- pre sales, during sales, and after sales- they would switch over to a substitute.

✓ Customers can also move away towards the competitors' products attracted by augmented benefits offered by them.

✓ Personal reasons can also make a customer to switch from one brand to another. Like shift of residence, change in preferences, family and friends influence, anger, emotions and sentimental reasons.

### CHECK YOUR PROGRESS

XV.    We live in a world cluttered with advertisements; it can be difficult for companies to break through all of it and get to target market customers. (True/False)

XVI.    …………. can be framed to seem positive or negative and this will affect how customers assign value.

XVII. ..............................focuses totally on customers and the organisation's entire gamut of functions related to value creation and value delivery.

   a) BRP
   b) ERP
   c) CRM
   d) MIS

XVIII. CRM is beneficial to the customers in the form of improvement in service quality by the marketers, more attention, personalized service, less risk, more commitment and increased value for money. (True/False)

XIX. …………….. is surprising a customer by exceeding his/her expectations and thus creating a positive emotional reaction.

   a) Customer delight
   b) Customer Value
   c) Customer Satisfaction
   d) All three

XX. The individual market segments should be targeted in terms of developing ……...

   a) Customer Value
   b) Customer Satisfaction
   c) Customer Delight
   d) Customer loyalty

## 5.12 LET US SUM UP

Electronic marketing is normally associated with Internet marketing. Internet marketing captures data which feeds into the firm's database; the database is used to generate profiles and lists, which enable the firm to have effective direct marketing campaigns; and two of the media for direct marketing are the Internet using e-mails and CD-ROMs with hyperlinks to the Internet. Underlying electronic business has two phenomena: digitalization and connectivity. Consumer behaviour is described as the action and reaction of the consumer while searching, evaluating, buying and consuming the product to satisfy their needs. Consumer behaviour focuses on how individuals make decisions to spend their available resources (time, money and effort) on products and services for consumption and satisfaction purpose. As individuals we all differ in many ways, in likes, dislikes, attitudes, cultural background, income level, education, occupation, family background etc. Despite such differences we are all consumers. If a marketer can identify online consumer's buying behaviour, he or she will be in a better position to target products and services at them. Online Buyer behaviour is focused upon the needs of individuals, groups and organisations. In the mid-twentieth century, mass production techniques and mass marketing changed the competitive landscape by increasing product availability for consumers. However, the

purchasing process that allowed the shopkeeper and customer to spend quality time getting to know each other was also fundamentally changed. Customers lost their uniqueness, as they became an "account number" and shopkeepers lost track of their customers' individual needs as the market became full of product and service options. Public Relations in its true sense are about human connections and the art of mastering human connections at a deep level. In the early days of PR, it was about relationships with not just the press but communities in various forms; the only difference was that these audiences were not online. Customer relationship management (CRM) focuses totally on customers and the organisation's entire gamut of functions related to value creation and value delivery. It is concerned with developing customer loyalty and brand loyalty to the highest possible level, to maintain long-term customer relationship.

## 5.13 KEY WORDS

| | |
|---|---|
| DIGITALIZATION | It means converting text, data, sounds, and image into a stream of bits that can be dispatched at incredible speeds from one location to another. |
| CONSUMER BEHAVIOUR | It is described as the action and reaction of the consumer while searching, evaluating, buying and consuming the product to satisfy their needs. |
| PERSONALITY | It is defined as the thoughts, emotions, intentions and behaviour that people express as they move through their environment. |
| IMPULSIVENESS | Purchases are made without much thought beforehand. |
| SOPHISTICATION | Desiring products that are glamorous and prestigious. |
| MOTIVATION | It is an internal state that drives consumers to satisfy needs. |
| PROPAGANDA | It is the manipulation of symbols to transmit accepted attitudes and skills. |
| CUSTOMER RELATIONSHIP MANAGEMENT | It is defined as a process of acquiring customers by understanding their needs, retaining customers by fulfilling the needs, and attracting new customers through customer specific strategic marketing approaches. |
| CUSTOMER VALUE | It is the benefit that a customer will get from a product or service in comparison with its cost. |
| CUSTOMER | It is a measure of how products and services supplied by the |

| SATISFACTION | marketers meet or surpass customer expectation. |
|---|---|
| CUSTOMER | It is surprising a customer by exceeding his/her expectations and |
| DELIGHT | thus creating a positive emotional reaction. |

## 5.14 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | VIII. | True | XIV. | Lobbying |
| II. | False | IX. | Public Relations | XV. | True |
| III. | True | X. | Propaganda | XVI. | Messages |
| IV. | Sophistication | XI. | True | XVII. | CRM |
| V. | Frugality | XII. | Mutual | XVIII. | True |
| VI. | Anxiety | | understanding | XIX. | Customer delight |
| VII. | Motivation | XIII. | False | XX. | Customer loyalty |

## 5.15 TERMINAL QUESTIONS

- What is consumer behaviour and how the technology has influenced the consumer behaviour?

- How the consumer behaviour is under the great influence of internal factors. How these factors influence the consumer behaviour?

- What is role of Public relationship for consumer behaviour?

- How public relation is different from Marketing? What are the benefits of Online PR?

- Highlight the important dimensions of Public relations and why they are important for the marketing managers?

- What are the characteristics of the environment and how they influence the consumer behaviour?

- What is CRM and how they are beneficial for the marketers and customers?

- Discuss the essence of E-CRM and why the business organisations are losing customers these days?

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## UNIT-6    PURCHASE DECISION PROCESS, POST PURCHASE BEHAVIOR AND MANAGEMENT
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**STRUCTURE**

6.0 OBJECTIVES
6.1 INTRODUCTION
6.2 BUYER DECISION PROCESS
6.3 CLASSIFICATION OF BUYING BEHAVIOR
6.4 POST PURCHASE BEHVIOUR CONSUMER BUYING PROCESS
6.5 POST-PURCHASE DISSONANCE
6.6 INTERNET MARKETING
6.7 INBOUND VERSUS OUTBOUND MARKETING
6.8 THE INBOUND MARKETING METHODOLOGY
6.9 LET US SUM UP
6.10 KEY WORDS
6.911ANSWERS TO CHECK THE PROGRESS
6.12 TERMINAL QUESTIONS

## 6.0  OBJECTIVES

**After studying the Unit, you would be able to**

- Identify the nature of consumer during buying process

- Understand the Behaviour of consumer while making purchase

- Talk about the different stages of buying process

- Elaborate the classification of consumer Behaviour

- Indicate the behavior of consumer after purchase

- Understand the post purchase dissonance

## 6.1  INTRODUCTION

Marketers frame their marketing strategies on the bases of assumptions how customers are going to behave in a given set of circumstances. It is assumed that customer will buy more if prices are charged low and sales automatically come down if the marketers increase the price of the product.

Consumer behaviour is a branch which deals with the whole process through which consumers have to go while purchasing and using the products to satisfy their needs. In the

market, we can see the consumer are behaving differently to select and buy the product among various product to satisfy their needs.

Marketers assume that by understanding what are the factors that cause the consumers to buy particular brand of product, they will be able to identify, what product is needed in the market, which one is obsolete and how to present the products to consumers. For example, if a customer is selecting pain reliever, they may like the idea is one pain reliever is cheaper than another, but what they really want is fast pain relief, and will probably pay more if they think the more expensive brand can do that more effectively. Marketers need to understand the principal motivation behind each type of product to correctly target potential customers.

**Nature of Consumer Behaviour:**

- The consumer behaviour is influenced from number of factors which prevail in the surrounding environment.

- All the consumers do not behave in a same manner. Consumers behave differently due to different elements i.e., age of consumer, income level, education etc.

- Consumer behaviour is not static; it undergoes a change over a period of time depending upon the need s and wants of the consumers.

- The consumer behaviour varies across state and countries. The needs of urban's consumers different from the rural consumers.

- Consumers behave differently for the different products. They do not have same behaviour for the different products.

- Consumer behaviour is not influenced from the status of consumers infect it reflect it.


## 6.2 BUYER DECISION PROCESS

The consumer has to go through number of different stages in order to buy any product and services. Nobody is planning to buy anything until they don't recognise the need, once need recognised information is required to take the decision and at last decision would be taken. Let's have a look at each stage and offer a quick explanation of what it is all about:

- **Recognition of Problem/ Need:** Stage one is the recognition of the particular problem or need and here the buyer has a need to satisfy or a problem that needs solving. Problem recognition is in fact the beginning of the buying process. It is a matter of perception, we realize what we should have and what we have at present. A perfume bottle of Charlie may be purchased when one sees it in the window of a shop. Problem recognition is generally a slow process but can occur fast when purchases are made online impulsively.

  Digital Marketing efforts facilitate the problem recognition stage. Ads provoke us to buy many things. Similarly, an online product display also acts as an incentive to buy. Online promotional strategies make us realize what our unfulfilled needs and wants are. Psychological factors do influence Problem recognition stage.


- **Search for the Information:** Stage two is where we begin to online search for information about the product or service. Buyers here begin to look around to find out what's out there in terms of choice and they start to work out what might be the best product or service for solving the problem or satisfying any need. More often than not, there is little knowledge available about alternatives available. The search is mostly directed towards the products that are consistent with our needs. For example, a house wife buying a washing machine might start visiting the online market websites selling it and might start online discussing the need with her friends. She is interested in knowing which brands are on offer and their features.

  The amount and type of information collected is related to the product in question and the consumer's personality. To buy consumer durables like fridges and AC's we need a great deal of information from different sources. To buy fast moving consumer goods, we need limited information. The beauty of brand marketing is that it makes the consumer loyal to the brands. These consumers then continue to buy the same brands and sometime do not seek any information at all.

  Information seeking starts with cognitive internal search; recalling information stored in memory. This may lead to further stages of buying decision process. Alternatively, the consumer may start external search, seeking information from sources other than memory. The major external sources are peers, friends, colleagues, relatives whom

we trust. In addition, we get information from different marketing communications, media, distribution channels and consumer's own experience.

- **Evaluation of Available Alternatives:** Stage three sees the evaluation of the available alternatives whereby the buyer decides upon a set of criteria by which to assess each alternative. In online market its easier for the consumers to make comparisons among different products and brands. When the consumer seeks information, he realizes the alternative choices available to him and gets the background against which these choices can be judged. The brands which a consumer consider while making a purchase decision forms an evoked set, which is a small proportion of the total brands available. Each brand in the evoked set is evaluated against some chosen criteria. A consumer may want to look into the following criteria before buying a product online. These may be the Brand name, the price, the functions performed, the appearance and looks, reputation of the company, warranty specifications, technical specifications and also the after sales service available. Each of the criteria is assigned some weightage, which may differ from consumer to consumer. After this it is all a matter of perception. Promotion, especially advertising, provides information to the consumers, enabling him to evaluate the different alternatives.

- **Make Choice:** We buy or select a product/service/supplier at stage four. Individuals or teams of buyers make the final choice of what to buy and from whom to buy it. After the alternative choices are evaluated, the brands are ranked, and the top- ranking brand may be purchased. The ultimate buying decision may undergo a change, if the preferred brand is not available. In such a situation, the second, ranked brand may be bought. The ultimate buying occurs only when the consumer finds a suitable outlet where the brand is available, and price negotiations are complete.

- **Post Purchase Evaluation:** Interestingly the process does not stop at the point of purchase because there is a stage five called the post-purchase evaluation. A satisfied consumer stores the product information in his memory and uses it next time at the time of problem recognition stage. A dissatisfied consumer may go for another brand next time he is out to buy. He will seek additional information and will consider

another set of brands. Thus, consumer decision making is an extensive process. Promotions play a vital role helping customers decide during the process. But the companies should keep in mind that they do not rub in the offers for it may work adversely for them.

Let's look at an example based upon buying a new smart cellphone. The first stage is likely to be that you have a need for communication or access to the internet, or problem because you cannot interact with friends using social media without it. The value added by products such as Android, iPhone or Windows phone and others should satisfy your need or solve your problem.

So, the second stage is where you speak to your friends and surf the internet looking at alternatives, which represent stage two or your information search. As a buyer you might visit a local cellphone store and speak to the sales staff to help you complete stage three, i.e. your evaluation of alternatives. Stage four is the selection of product and you go and make your final decision and buy your Smartphone from a local store or using an e-commerce website. Stage five involves your post-purchase evaluation whereby you use the phone and have a positive, negative or mediocre experience of the product. If it doesn't satisfy your needs you take action and more importantly you will tell others of your problems. If you are pleased with the product, you will tell your friends and this will influence stage two (their information search) when they decide to buy a cell phone. Remember that organisations and businesses also go through this process and that teams of individuals contribute to the decision-making process. This is called a Decision-Making Unit (DMU).

**CHECK YOUR PROGRESS**

I.     The consumer behaviour is influenced from number of factors which prevail in the surrounding environment. (True/False)

II.    Stage two in ………………… is where we begin to online search for information about the product or service.

   a) Product life cycle

   b) Buying decision process

   c) New product development

   d) None of these

III. Consumers do not behave differently for the different products. (True/False)

IV. Information seeking does not starts with cognitive internal search; recalling information stored in memory. (True/False)

V. Consumer behaviour is not influenced from the status of consumers infect it reflect it. (True/False)

VI. For FMCG the purchase decision process tends to be ………….., and for habitual purchase behaviour or repeat purchases the decision process is short-circuited.

VII. Digital Marketing efforts facilitate the problem recognition stage. (True/False)

VIII. A satisfied consumer stores the product information in his memory and uses it next time at the time of ...................... stage.


## 6.3 CLASSIFICATION OF BUYING BEHAVIOR

In the human being wants are unlimited but the resources to satisfy them are limited. Hence consumers think rationally before taking the purchase decision. Consumer's decision varies with the type of product purchased to satisfy needs. There are differences in the buying behavior of consumers when he is going to buy toothpaste, cricket bat, a laptop and new car. Complex and purchases involved high expenditure demands more participation and deliberation of buyer. Consumers need more information about the products which are expensive for them. There are four types of buying behavior of the consumers on the basis of buyer involvement while buying the products.

| | *High involvement* | *Low involvement* |
|---|---|---|
| *Significant differences between brands* | Complex buying behavior | Variety seeking behavior |
| *Few differences between brands* | Dissonance buying behavior | Habitual buying behavior |

High involvement means the consumers is highly involved while purchasing the product. The consumers involved high when they are buying the expensive or luxuries products. For example, while buying the diamond a consumer is highly involved. On another side low involvement means, when consumers are not highly involved in buying the product. Low involvement is shown by the consumers for low priced products like buying the toothpaste. Significant differences between brands mean when there are significant differences between brands.

- **Complex Buying Behavior:** Consumers go through the complex buying behavior, when they are highly involved in the buying the products and they can easily identify the difference between the different brands. Consumers would be highly involved when the product is expensive and bought infrequently. Consumers do not know much about the products and need information to learn about product more. In this case the buyers go through a cognitive learning process. So, in this case consumers need to get proper information about the product's attributes and marketers must assist the consumers by providing the detailed information regarding product features. For example, consumer would be highly involved in the purchase and has the information or awareness about significant difference between brands.

- **Variety seeking buying behavior:** Some time buying situations demand low involvements of the consumers but significant difference is there in brands. Consumers are brand switcher in this kind of buying behavior. Brand switching occurs because of seeking variety not due to dissatisfaction from the consumption of last product. For examples ladies most of the time use different brand of washing detergent just for variety. Therefore, it would be better for the marketers to retain the consumers to offer them incentives along with the core product i.e., discounts, free sample, gift coupons etc.

- **Buying behavior reducing Dissonance:** in some case while buying the product consumers are highly involved but it is difficult for them to distinguish the brands. Consumers are highly involved because the product is expensive and infrequently purchased. The buyers will visit around to get information what is available but will buy quickly because difference among the different brand is not easy. For example, consumers while buying the floor tiles buy them quickly as in brands of tiles, there are few differences.

- **Habitual buying behavior:** Most of the products are purchases by the consumers which demand low involvement and significant difference between brands are absent. In this case there is low involvement of the consumers and there are few differences between the brands as consumers do not need extensive information about the products. The consumers buy product on routine bases for example toothpaste, soaps,

etc. Consumers do not have any kind of attitude toward ant brand but they prefer to buy familiar brand. Hence marketers should use the promotional techniques to get the consumers familiar with the brand or product.

## 6.4 POST PURCHASE BEHVIOUR CONSUMER BUYING PROCESS

Post-purchase conduct is the response of the customer and the individual, it gives a thought regarding the products' preferences, inclinations and perspectives and satisfaction about the product. The stage is concerned with the behavior of the consumer after consumption of product; the behavior may be positive or negative. A satisfied consumer will go for repeat purchase or recommend the product to other. On other side dissatisfied consumer will feel restless or start search for another product to satisfy unsatisfied need. He will do the negative marketing of unsatisfied product in the society.

The customer while settling on a choice goes through three stages:

1.     Pre purchase behavior activity which comprises us

Problem ⟶ Information research ⟶ Evaluate alternative

2. Purchase process

Intention to buy ⟷ Situational influence

3. Post purchase behavior

Usage cost       repair

Post purchase behavior

96
maintenance

4. Feedback to marketer

Improves the product

Change marketing mix
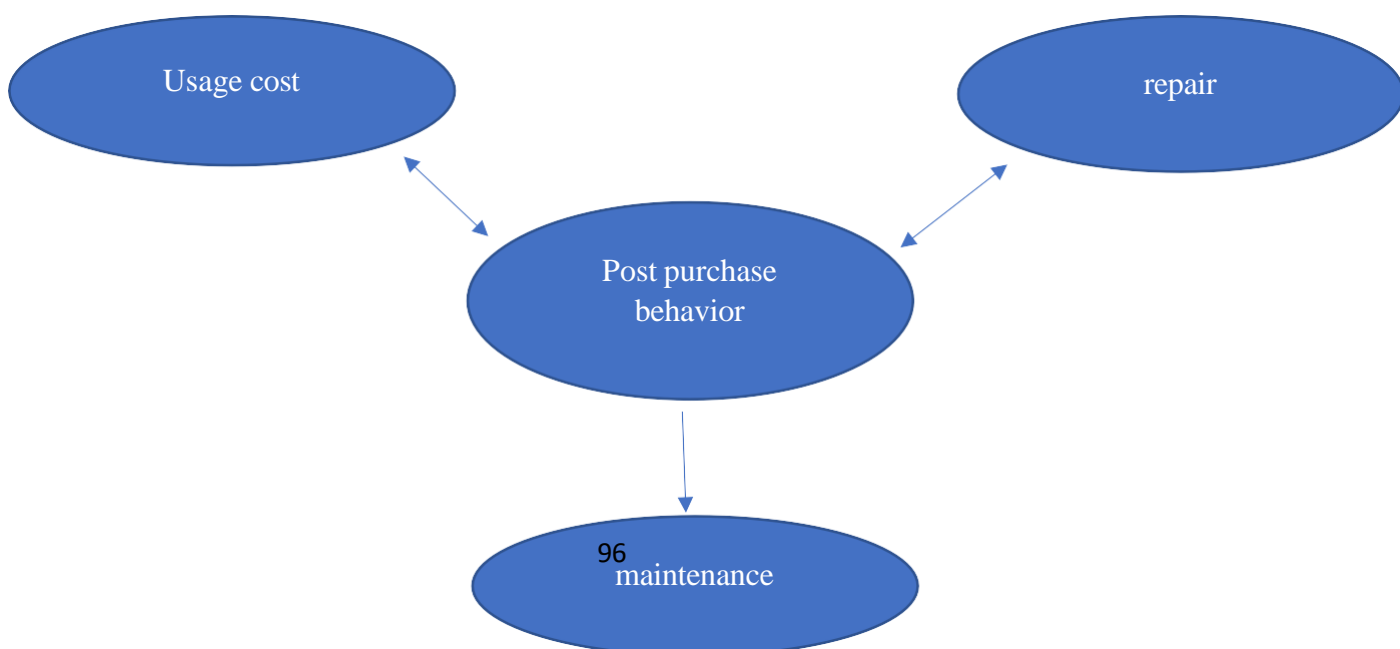
Give more facility to customer

## 6.5 POST-PURCHASE DISSONANCE

A customer's reaction after he was involved in the process of purchasing some high involvement product, usually a very expensive one, like furniture or a house or a car maybe. This purchase creates doubt and anxiety in the mind of the consumer, especially when the degree of commitment is high. This dissonance often leads to consumption guilt, which is a negative emotion or feeling aroused by the usage of that expensive product.

- **Consumers can reduce dissonance by**
  - ➢ By focusing on more supportive that outweigh the dissonant belief
  - ➢ Reduce the importance of conflicting belief
- **Marketers can reduce dissonance by**
  - ➢ By increasing the desirability of the brand
  - ➢ By decreasing the desirability of the opposing brand
  - ➢ By reversing the purchase decision

**CHECK YOUR PROGRESS**

IX.    …………… is shown by the consumers for low priced products like buying the toothpaste.

X.    Consumers are brand switcher in ....................... kind of buying behavior.

a) Variety seeking buying behavior

b) Buying behavior reducing Dissonance

c) Habitual buying behavior

d) Complex Buying Behavior

XI. Consumers would be …………….. when the product is expensive and bought infrequently.

XII. Purchase creates doubt and anxiety in the mind of the consumer, especially when the degree of commitment is high. (True/False)

XIII. Consumers would be highly involved when the product is expensive and bought infrequently under ……………..

a) Variety seeking buying behavior

b) Buying behavior reducing Dissonance

c) Habitual buying behavior

d) Complex Buying Behavior

## 6.6 INTERNET MARKETING

*The Internet* is **not** synonymous with world wide web. The Internet is a massive network of networks, a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. The World Wide Web, or simply the Web, is a way of accessing information over the medium of the Internet. It is an information-sharing model that is built on top of the Internet.

## 6.7 INBOUND VERSUS OUTBOUND MARKETING

Outbound marketing was typically the traditional approach to market business and this was known as an interruption-based marketing. This is where we broadcast our message through advertising and other mediums and try to grab the attention of the user. When consumers are bombarded with on average 3,000 messages a day, we can understand why this form of marketing is becoming increasingly difficult. It certainly still works in some cases, but there are now other ways that can be more effective.

Inbound marketing is where marketers provide something of value that attracts a customer to come to shop. When marketers attract that customer, they try to build a relationship. After

they build the relationship, they develop trust and this then allows them to sell their product or service to customers. This form of marketing, although difficult to grasp is becoming increasingly effective.

A permission-based approach such as this can also produce much better results because:

- When marketers build a relationship within any client online or offline their chances of a sales increase significantly. When they go into a sales meeting and fail to build rapport with the potential customer it is difficult to get the sale. Online is now becoming very similar.
- It's generally more cost effective. It does involve more of the time, but there is less expense.
- The performance / return is relatively easy to track so marketer can adjust to get better results

## 6.8 THE INBOUND MARKETING METHODOLOGY

- **Attract:** In inbound marketing we want attract the right customer to your website and to your brand with a quality, answers that questions they have. We well use blogging, social media, keyword and SEO strategy and even outbound advertising to do this.
- **Convert:** After attracting the strangers on websites, a company will ready to convert them into prospect collect their contact info. Emails give important information for an inbound marketer. This includes eBooks, whitepapers, case studies and tips sheets.
- **Close:** With the help of tools like lead scoring closed-looks reporting, lead nurturing and vast lead intelligence, paired with lead follow up best practices and sales tactics, marketers will then work to transform those leads into now business.
- **Delight:** Delight refers to deliver the right information to the right person at the right person at the right time. Delight tools are such as Smart content, Email marketing, conversations inbox, attribution reporting and marketing automation.

## 6.9 LET US SUM UP

Marketers frame their marketing strategies on the bases of assumptions how customers are going to behave in a given set of circumstances. Consumer behaviour is a branch which deals with the whole process through which consumers have to go while purchasing and using the products to satisfy their needs. Marketers assume that by understanding what are the factors that cause the consumers to buy particular brand of product, they will be able to identify,

what product is needed in the market, which one is obsolete and how to present the products to consumers. The buyer decision process represents a number of stages that the online purchaser will go through before actually making the final online purchase decision. The consumer buying decision making process and the business/organisational buyer decision process are similar to each other. In the human being wants are unlimited but the resources to satisfy them are limited. Hence consumers think rationally before taking the purchase decision. Consumer's decision varies with the type of product purchased to satisfy needs. There are differences in the buying behavior of consumers when he is going to buy toothpaste, cricket bat, a laptop and new car. Post-purchase conduct is the response of the customer and the individual, it gives a thought regarding the products' preferences, inclinations and perspectives and satisfaction about the product. The stage is concerned with the behavior of the consumer after consumption of product; the behavior may be positive or negative. A satisfied consumer will go for repeat purchase or recommend the product to other. On other side dissatisfied consumer will feel restless or start search for another product to satisfy unsatisfied need.

## 6.10 KEY WORDS

| | |
|---|---|
| CONSUMER BUYING BEHAVIOUR | It is a branch which deals with the whole process through which consumers have to go while purchasing. |
| BUYER DECISION PROCESS | It represents a number of stages that the online purchaser will go through before actually making the final online purchase decision. |
| PROBLEM RECOGNITION | It is the beginning of the buying process. |
| HIGH INVOLVEMENT | Means the consumers is highly involved while purchasing the product. |
| COMPLEX BUYING BEHAVIOR | When consumers are highly involved in the buying the products and they can easily identify the difference between the different brands. |
| HABITUAL BUYING BEHAVIOR | Purchases made by the consumers which demand low involvement and significant difference between brands are absent. |
| DISSONANCE | It often leads to consumption guilt, which is a negative emotion or feeling aroused by the usage of expensive product. |

## 6.11 ANSWERS TO CHECK THE PROGRESS

I.     True
II.    Buying    decision
       process
III.   False
IV.    False
V.     True

VI.    Shorter/quicker
VII.   True
VIII.  Problem
       recognition
IX.    Low involvement
X.     Variety    seeking
       buying behavior

XI.    Highly involved
XII.   True
XIII.  Complex    Buying
       Behavior

## 6.12 TERMINAL QUESTIONS

- What is Consumer behaviour? Discuss the nature of consumer behaviour.

- Describe in detail the buying decision process by taking any product category.

- How the different stages of buying decision process are important for the marketers in strategy formulation?

- What is buying behaviour? What are the classifications for the buying behaviour, explain them with examples?

- What is post purchase buying behaviour and why such behaviour is important for the marketing managers?

- Explain in detail the post purchase dissonance.

- What is Internet Marketing and what are the strategies under internet marketing for consumer satisfaction?

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

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UNIT-7    DIGITAL MARKETING STRATEGY:  DIGITAL VS NON- DIGITAL
MARKETING STRATEGY

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**STRUCTURE**

**7.0 OBJECTIVES**
**7.1 INTRODCTION**
**7.2 MARKETING STRATEGIES**
**7.3 NON-DIGITAL MARKETING STRATEGIES**
**7.4 DIGITAL MARKETING STRATEGIES**
**7.5 DIFFERENCE BETWEEN TRADITIONAL MARKETING AND DIGITAL
MARKETING**
**7.6 DIGITAL MARKETING ENVIRONMENT**
**7.7 FACTORS AFFECTING DIGITAL MARKETING**
**7.8 MICRO (INTERNAL) ENVIRONMENTAL FACTORS**
**7.9 MACRO (EXRERNAL) ENVIRONMEMTAL FACTORS**
**7.10 MARKET OPPORTUNITY ANALYSIS**
**7.11 LET US SUM UP**
**7.12 KEY WORDS**
**7.13 ANSWERS TO CHECK THE PROGRESS**
**7.14 TERMINAL QUESTIONS**

**7.0 OBJECTIVES**

**After studying the Unit, you would be able to**

- Frame the marketing strategies
- Understand the important dimensions for marketing strategies
- Compare the digital and non-digital marketing
- Describe the tools for digital marketing
- Elaborate the digital marketing environment
- Find out the different factors affecting the marketing strategies
- Evaluate the how micro and macro environment influence the marketing
  strategies

**7.1 INTRODCTION**

Marketing is a method of advertisement that is used by the companies to attract customers
and making them aware about the products and services those are provided by the companies.
Main goal of marketing is to reach the desired segment of customers that matches with the

company's products/services or we can say to reach the customers that needs or wants our

company's products/services. Reaching the desired segment of customers ensures the profitability to the business firm.

Marketing is a tool that is used by the companies to sell their products/services to the customers. Marketing includes the sales, pricing, public relations, packaging and distribution. It is a kind of process that ensures the needs and wants of customers and delivering the products efficiently and ensures the profitability to the firm. It is all about addressing the needs of customers; through advertising, selling and delivering products to customers. The whole process includes following steps:

1. Coordination of identification
2. Selection and development of a product
3. Determination of its price
4. Selection of a distribution channel to reach the customer's place
5. Development and implementation of a promotional strategy.

Through traditional marketing organizations straightforwardly target and discover clients, while through digital marketing their goal is to have individuals discover them. Accomplishment of a digital marketing exceptionally relies upon the clients approaching the Internet and being comfortable with the channels used to target them, be those informal communities or sites.

## 7.2 MARKETING STRATEGIES

It is a long-term, forward looking approach of any business firm having a goal of achieving the competitive advantage by understanding the wants and needs of their customers. A marketing strategy covers the company's key brand messaging, value proposition; it contains the target customer's data demographics and other elements.

**Marketing strategy covers "four Ps" of marketing:**

| PRODUCT | PRICE | PLACE | PROMOTION |

- **NON-DIGITAL MARKETING:** It is termed as a type of marketing that is not conducted online. It includes print, broadcast, direct mail, phone and other outdoor advertisements like billboards. Newspapers and radio help the company to reach targeted audiences.

It is not only one of the oldest methods of marketing but it is also one of the most researched. Many marketers adopt this method because it is tried and true. Traditional marketing is playing an important part in reaching the local audiences. Physical Ads those can be kept for longer period of time.

- It includes greater cost because it has various platforms.
- The scope of traditional marketing is limited, as the target audience is very specific.
- The campaigns tend to be rigid cause of no room for adjustments.
- It allows Uni-dimensional communication with having very little customer interaction.
- In non-digital marketing the employees can be available to the customers only during the working hours.
- A Non-digitalised advertisement takes time to spread among the audience.
- There is no any specific tool available to measure the performance of a campaign.
- Only general audience is targeted through non-digital marketing.
- Door to marketing is possible in case of traditional marketing the campaign can directly interact with the customers.
- This method requires huge investment as compared to the digital marketing.
- The reach to customers is very limited in traditional marketing.
- Non-digital marketing cannot target the audience groups effectively.
- Proper availability of budget is required to execute the campaign.
- Personalized advertisements are not possible.
- The conversion rates are low.
- Auditing is difficult.

- **DIGITAL MARKETING**: It refers to a marketing that is conducted online by the company. It includes email marketing, social media ads. It is becoming popular because the world is now becoming digitalised. It is more cost-efficient than the traditional marketing.

More audience can be targeted at once through digital marketing. Many customers prefer to purchase the products online that's why it becomes the most preferred platform for buying the products.

- It allows the multidimensional communication and also facilitates the active communication from consumers.
- The strategies of digital marketing have much room for facilitating the adjustments.
- Cost of promoting the campaign is very low, as predominant platform is internet.
- It has a large scope, all the information is made available to the customers as a whole.
- In digital marketing the company can target millions of people at once because all the people are connected with technology.
- The company/organization can provide 24/7 availability to the customers.
- The advertisement takes only few seconds to reach to your target audience.
- There are many tools available online to monitor the performance of marketing campaign.
- In digital marketing scheduling is possible making it possible for the employee to post even at non-working hours.
- Niche audience can be target with digital media.
- Two way communications is possible with the customers.
- It is more cost efficient the investment is not much.
- It can customize the advertisements according to the user's interests.
- This method is very cost effective and in some scenarios it is totally free.
- The conversion rates are high.
- Audit is possible at any time.

## 7.3 NON-DIGITAL MARKETING STRATEGIES

It relies on offline strategies such as direct mail, direct sales, word-of-mouth communication, and print advertisements in magazines, newspapers, billboards, radio and television. The main aim of the company behind the non-digital marketing is to create brand awareness. In the recent survey, only 4% of the respondents rated the leads generated from radio, print and TV ads as of high quality.

- **Signage**: It comprises of digital photos those are framed and lighted in the dark. Now the companies started putting signage on mobile taxis irrespective on the boring walls. This method helps to reach the wider segment of audience than ever before.

- **Billboards**: Using printed or the hand painted canvas images are used by many organizations. Billboards have come a long way from the highways to hallways. Non-digital marketing uses more images and less text. A picture express thousand words, so it is best way for creating brand awareness. Most of the business firms are more familiar with this system of marketing. Billboards give wide reach across the social classes and the geographical boundaries.

- **Direct mail**: Business firms and many other organizations use the direct mail system for conveying the people about their services. Mailing is a personalizing, creative method for targeting a particular segment of audience. Direct mail has a great power to influence the readers; it is also easier to understand. Faster feedback is received in case of the direct mails, more purchases are made and it is an greater ease for retrieval making of the good old fashioned direct mail the real deal in new age of marketing.

- **Flyers and brochures**: Flyers and brochures are come in handy in places such as: streets, malls, brick and mortal establishments. Flyers and brochures are used for special discounts and offers. Business cards introduce a business to the client without having any personal interaction. Non-digital marketing is more connective and interactive way of dealing with the customers in face-to-face interactions.

- **Face to face interaction**: This method has been used for around ages. Face to face interaction is more attractive way to deal with the customers and conveying the details regarding their business products. It helps the customers also for understanding all the details regarding the products they want to buy in their preferred language. Customers also provide the feedback to the company regarding the product experience and the kinds of modifications they want in the products.

- **Direct sales:** It involves the marketing and sales of products/services directly to the customers, but the location may be differing. These kinds of sales are done at customer's homes or at their jobs. Direct sales are also done over the phone.

- **Tradeshows**: Tradeshows are continued to be a popular mode of marketing channel for many organizations and the business firms. In business to business space the attendees are 34% more willing/likely to purchase the product than the persons who hear about the products through other channels of marketing.

- **Print marketing**: It creates awareness of the product and the service through advertisements in a magazines, pages, billboards and newspapers, etc. it is a targeted or broad way of marketing. But this mode of marketing is expensive as compared to the digital marketing.

- **Referral**: It is also known as word-of-mouth marketing. It leverages the company's existing customer's to advocate for company's business. Many business organizations provide referral payments to the customers who bring in other customers in the company.

- **Broadcast:** Many of the small business firms rely on the television and the radio advertisements to reach the target audience.

- **On-site activities**: Most of the organizations still invest in on-site marketing activities and events. It is a great way to make a lasting relationship/connection with the target market. On-site activities provide the opportunity to capture great content like photographs and videos.

- **Handwritten cards**: Sending the handwritten cards to the clients on some special occasions like birthdays, graduations and other special life events makes the clients feel special and this kind of special treatment adds a personal touch.

- **Speaking engagements**: Speaking engagements can be the great way for getting directly in front of the target audience and it helps to create brand awareness. It can be an effective way of marketing tool because speaking engagements helps to build face-to-face connection brands with the consumers.

**CHECK YOUR PROGRESS**

I. Reaching the desired segment of customers ensures the ……………. to the business firm.

II. A marketing strategy covers the company's key brand messaging, value proposition; it contains the target customer's data demographics and other elements. (True/False)

III. ........................is termed as a type of marketing that is not conducted online.

IV. ..............................is more cost-efficient than the traditional marketing.

V. ……………….. interaction is more attractive way to deal with the customers and conveying the details regarding their business products.

    a) Direct Mail                     c) Face to face marketing

    b) Display advertising             d) Flyer and poster

VI. Flyers and brochures are not used for special discounts and offers. (True/False)

VII. The technique, business firms rely on the television and the radio advertisements to reach the target audience is known as ………………

    a) Broadcast                 c) Display advertising

    b) Direct Mail               d) Face to face marketing

VIII. Speaking engagements can be the great way for getting directly in front of the target audience and it helps to create brand awareness. (True/False)

## 7.4 DIGITAL MARKETING STRATEGIES

There are numerous digital marketing strategies those are used by the business firms for advertising their products and services. These are explained further:

- **Email marketing:** It is one of the earliest ways of digital marketing. Email marketing is composed of sending the commercial message regarding the company's product to a group of targeted customers using email and delivering the personalized emails and the targeted messages at the right time. With the help of email marketing software the company can maintain separate email lists on the bases of customer's likes and dislikes.

- **Social media marketing**: It is a form of marketing that utilizes the networking sites as a tool of marketing. The main goal of social media marketing is to produce that kind of content that the customers share with their social network groups. Many customers try to finds their favourite brands on social media so proper social media strategy is now become necessary for every organization to reach to their targeted audience. With the increased popularity of Google, face book, twitter and YouTube social media marketing became more popular. Posting the right kind of content is necessary so that the people will share your company's content, it helps to reach to the new customers. These kinds of sites also are used as an effective form of communication to engage with your customers.

- **Search engine optimization**: It is an essential strategy in digital marketing. It is the process in which the website's visibility is affected or making a web page visible in a search engine's unpaid results, it is often referred to as "natural results". This process is done by increasing the volume of keywords that a site ranks for.

  Search engine optimization targets the various kinds of search such as video search, image search etc. it also covers the factors like how the search engine works, about

what the people search for and the kind of keywords typed into search engines. The kind of search engines are preferred by the company's targeted customers also finds out by the search engine optimization.

- **Mobile advertising:** It is also one of the biggest growth areas in the digital marketing. The advertising is done via mobile phones. The mobile phones which are used for advertising are: smart phones, wireless phones or tablet computers.

- **Search engine marketing**: It is a type of internet marketing uses the search engines for advertising the company's website or business to customers using internet. The more traffic to company's website is generated via advertising or paid links. It includes all the paid listings, search engine optimization and other related services that will increase traffic to the company's web site.

- **Online advertising:** It is also known as internet advertising or web advertising, is a form of marketing and advertising that uses the internet services to deliver the promotional marketing messages to the consumers. Despite of many benefits of online marketing there are some reasons the consumers finds this mode disruptive and blocking the ads. Online advertising includes: Social media marketing, search engine marketing and Mobile marketing.

- **Affiliate marketing:** Affiliate marketing occurs when the business firm organize third parties for bring in customers for them. The payment is given to the third parties on the basis of sales generated through their advertising. Affiliate generates he traffic to the company through their affiliate networks; once the purchase is made by the visitors they receive the payment. The desired actions can be:

  ➢ Email submission
  ➢ Phone call
  ➢ Filling out an online registration form.

- **Display advertising:** It is done through advertising on websites. The main purpose behind display advertising is to deliver brand messages to site visitors and deliver general advertisements. Display advertising includes different formats and contains many items such as:

  ➢ Flash
  ➢ Images
  ➢ Text
  ➢ Video

> ➤ Audio.

- **Adware:** It is software that once installed it automatically displays advertisements on the user's machine. All the ads may appear in the software itself, and integrated into the web pages visited by the user, or in pop-ups.

## 7.5 DIFFERENCE BETWEEN TRADITIONAL MARKETING AND DIGITAL MARKETING

The key distinction between traditional and digital marketing is how the marketing message is communicated to an audience. Here are some quick comparisons of digital and traditional marketing.

- **Cost:** Traditional Marketing has recurring costs that can add up quickly and result in a poor return on investment. An advertisement in the local newspaper or on the radio or television would only be worthwhile if it hits the target audience on the day it is transmitted or written. What are the odds of that happening?
  Any more publicity will require a re-run of the print or broadcast campaign, which will necessitate additional funding. Compare this to content marketing, which build once on website and can use for months or even years without costing anything extra. Digital marketing has the potential to be less costly.

- **Marketing Approach:** Since the marketer must build a personal relationship with the audience, traditional marketing requires a more personal approach. There is no need for a face-to-face partnership in digital marketing since all meetings take place online. However, in order to boost its image in the minds of the audience or customers, the marketer must maintain a considerable amount of online presence.

- **Target Audience:** Every marketing campaign has a specific target audience in mind. It is easy to reach out to the local audience or customers in the traditional market. Marketers need to figure out who target market is and then position marketing messages (via a channel) where they can easily see, hear, or communicate. It caters to a wide range of consumers and audiences. For example, Using newspaper advertisements, banners, and radio or television advertisements.
  Digital marketing has a broader scope. To enter a global audience, digital marketing is made possible across the internet. It employs organic and paid search engine and

social media material, as well as email marketing, video marketing, and influencer marketing. Single piece of content in digital marketing has a particular target market.

- **Customer interaction and participation:** Since traditional marketing mediums are not versatile enough to enable consumer engagement, traditional marketing provides very little interaction with the viewer. The viewer is left to see, hear, or interpret the marketing message without being able to quickly provide feedback.

  Engagement and interaction are made easier with digital marketing. Customers can easily provide feedback in the form of product reviews, buyer experiences, testimonies, and other similar products. This enables the company to quickly gather consumer reviews and implement it into their analytics.

- **Ease of measuring results:** Traditional marketing makes it difficult to track outcomes. Marketer never know how far ads can go when send fliers, give away brochures, or advertise in newspapers or magazines. Marketers can easily monitor results with digital marketing. Instead of going blind-eyed, they get a clear-sighted marketing strategy. To grasp where they are going, they have access to a lot of details about their clients and prospects. For example, they shall know how many people visit website and how many people watched video.

**Below is a table of distinguish between Non-Digital Marketing and Digital Marketing**

| NON-DIGITAL MARKETING | DIGITAL MARKETING |
|---|---|
| In this marketer cannot target audience group effectively. | In digital marketing can target audience very effectively. |
| Personalized advertisement is impossible. | Can customize the advertisement as per the interest of audience. |
| It can take long duration to implement campaign. | In this campaign can implement very fast and easily. |
| Huge budget is required to implement a campaign. | It is cost effective, in some scenario it is free of cost. |
| Can generate positive ROI based on the product. | Very high ROI compared to advertising cost. |
| Static ads mostly non-engaging or non-interactive. | Easily create engaging and interactive advertisements. |

| Measuring campaign results are difficult. | Can easily measure the campaign metrics and data. |
|---|---|

**CHECK YOUR PROGRESS**

IX. The main goal of ..........................is to produce that kind of content that the customers share with their social network groups.

    a) Display advertising

    b) Email marketing

    c) Social Media Marketing

    d) Search Engine marketing

X. …………… is the process in which the website's visibility is affected or making a web page visible in a search engine's unpaid results.

XI. Affiliate marketing occurs when the business firm organize third parties for bring in customers for them. (True/False)

XII. The main purpose behind display advertising is to deliver brand messages to site visitors and deliver general advertisements. (True/False)

XIII. ……………….. is software that once installed it automatically displays advertisements on the user's machine.

## 7.6 DIGITAL MARKETING ENVIRONMENT

It refers that all the surrounding of the business which affects the Digital Marketing internally and externally. Study of these factors is called Digital Marketing environment analysis, as the study of these factors or surroundings is very beneficial for developing marketing strategies. Environment which surrounds the Digital Marketing is flexible, unpredictable in nature and complex. Due to flexible in nature and cannot stands still, it gives number of new opportunities to the business, therefore it is very important to frame new strategies according to the changes in the environment.

## 7.7 FACTORS AFFECTING DIGITAL MARKETING

**INTERNAL FACTORS:** Digital markets exist in the environment where there are lot of changes are going to take place and all such changes directly affect to the Digital Marketing environment. The internal factors include:

- **Target Market:** The first factor in the online market Environment is target market. It is foremost factor in business. Before deciding for a digital marketing, marketer should firstly analyse or determine how the customers through use of digital marketing get the information about services and products. Marketers always post or update content which is suitable and interesting for the target market.

- **Budget:** In every organisation cost is a big factor in every environment. In case there is shortage of funds then business should avoid the major channels for Digital market. Businesses where there have huge budgets, they would have more options like pay per click (PPC), setting new websites, and short message (SMS) services. Digital marketing is cheaper than traditional method of marketing but it involves much cost.

- **Talent:** Talent is the most appropriate factor in the Digital Marketing environment. Without this Digital Marketing cannot establish as talent come from experiences and the knowledge. If there is no skilled talent in the environment than everything is out of the place. It includes to know the; Alternatives or options, Implementing ideas and Measure that ideas.

- **Time factor:** Online marketing takes time as lot of time required for planning, implementing and monitoring etc. Monitoring on the strategies of digital marketing is done all the time or constant monitoring is required. In small businesses this factors hardly influence the strategies.

- **Channels:** In Digital Marketing marketers need to use the various channels to approach the target markets**.** Manager should evaluate the all these channel for their cost effectiveness.

## 7.8 MICRO (INTERNAL) ENVIRONMENTAL FACTORS

It also called operating environment as micro environment factors also directly influence the electronic market environment. The Factors are:

- **Customer:** Every business wants to have more sale of products, so they try to increase more and more customers. Customer is a major part of marketing model and It is very important for the company to know about their customers. There are lot of customer in the market therefore company should have knowledge about the customer that what type of media customer used for buying process.

- **Competitor:** Next factor in micro environment is competitors. Marketing Manager should aware about the strategies; plan of competitors in the market and with techniques of benchmarking overtakes the competitor activities and strategies.

- **Suppliers/distributors:** They also affect the online marketing environment. This factor includes all digital channels start from seller place to buyer place. With rapidly growth of the internet the digital connection between the business and consumer has grown as there is a less need of intermediator like wholesaler and retailer etc.

- **Organisation structure:** Digital market is all depends on the organisation, which includes behaviour of the employee, skills, technique, adoption of new methods in the organisation. In some organisations peoples (employees, managers) do not want to change in the organisation and uses old methods for marketing. To overcome this types of situation manager have to setup or modify all organisational structure in such way that it is beneficial for Digital Marketing.

## 7.9 MACRO (EXRERNAL) ENVIRONMEMTAL FACTORS

Macro environment mean general environment of business. Macro forces are Uncontrollable in comparison to the micro forces of environment. The growth and survival of business depend upon its adaptability to Macro environmental factors which include Political, Economic, Social, Technological, Legal and Environmental forces.

- **Political:** The political environment has many factors influencing the trading environment; they are shaped by the interplay of government agencies, public opinions and consumer pressure groups. Some examples of these factors include taxation, investment and management of business and public affairs. So marketers need to frame marketing strategies as per the rule of government.

- **Economic:** The United Kingdom has an open economy and ranks among the sixth largest in the world and it has best market place in the world. Issues such as Inflation, GDP, employment levels, and interest rates need to be considered to ensure sustainability of a competitive and strong position in the online market.

- **Social:** The key factors that make up social forces and the implications for online marketing include; social communities based on demographic profile, social exclusion and cultural factors. The highest important shift in demographic trends is that over 50% of the population of the world lives in an urban setting. As well

as emerging markets in Russia, India, Brazil and China represent the market growth.

- **Technological:** Technology is vital for competitive advantage and it is the major driver of globalization. Marketers need to understand digital and internet technology as making mistakes can lead to significant consequences.

- **Legal:** Laws are in place to provide a framework of control and regulations to enable individuals and businesses to go about their business in a legal manner. There are many legal and ethical considerations in the online trading environments and marketers have to understand and work with them. PLT will follow the Data protection and privacy law so their customers are protected online.

## 7.10 MARKET OPPORTUNITY ANALYSIS

Market opportunities analysis focus on the discovery of new opportunities and to evaluate the current position of company's current technological, competitive and financial willingness to make use of that. It includes identifying the demands of customer which could not be met in past and identifying the target Markets and resources capacity to fulfil the requirements of the market's needs.

**There are several ways to find out the market opportunities:**

- **Consumer segmentation:** for understanding the demand of market first thing is to do market segmentation and identification of consumer segment. There are basically two types of segmentations:

  Soft variables: lifestyles, purchasing motivations, attitude of customers towards products.

  Hard variables: age of consumer, geographical area of consumer, education level, income level and gender of the consumer.

- **Purchase situation analysis:** This type of analysis can be used for the expansion of the business like uncover expansion opportunities. There are several question arises in this analysis.

  When the people buy the product?

  Is it be there when people's need it?

Where people makeup purchase?

How they would pay for them?

- **Direct competition analysis:** After analysing purchasing situation and demands in the market next step is to find or analyse the supply. Its first aspect is to study about the players exist in the market where marketer going to compete. Several questions are arises in this analysis

  What are the growing brands and product of our Industry and why?

  What is the competitive advantage we have over them?

- **Indirect Competition analysis:** Market opportunities are also found with the help of analysing substitute industries. This type of analysis is helpful to provide additional opportunities in the growth.

- **Analysis of other industries:** In this type of analysis company have not only objective is to continue operating business within the same industry but also to expand the business in other industry or expand the business model.

- **Complementary products and services analysis:** In this type of analysis marketers have to monitor performance of the other companies which are complementary to the first one.

## CHECK YOUR PROGRESS

XIV.    Online marketing takes time as lot of time required for planning, implementing and monitoring etc. (True/False)

XV.    Marketing Manager should not aware about the strategies; plan of competitors in the market and with techniques of benchmarking overtakes the competitor activities and strategies. (True/False)

XVI.    Digital market is all depends on the organisation, which includes behaviour of the employee, skills, technique, adoption of new methods in the organisation. (True/False)

XVII.    The growth and survival of business depend upon its adaptability to …………….. factors.

## 7.11 LET US SUM UP

Digital Marketing draws heavily on Internet communications to co-ordinate many marketing activities, such as market research, New product development, market segmentation, positioning, product distribution, customer services, promotion, customer feedback, etc. These internet or electronic based activities should, in turn, be integrated with the overall marketing strategy to support the corporate objectives of the E-commerce. Implementing Digital Marketing strategy, requires an adequate understanding of changes in the way customers think and act on the World Wide Web. In other words, in a dynamic business environment, Digital Marketing is capable of cutting through the clutter to provide a precious opportunity for businesses to improve accessibility to the world and thrive. Marketers need to deliver product and services as per the requirement of customers. Digital Marketing Environment refers that all the surrounding of the business which affects the Digital Marketing internally and externally. Study of these factors is called Digital Marketing environment analysis, as the study of these factors or surroundings is very beneficial for developing marketing strategies.

## 7.12 KEY WORDS

| | |
|---|---|
| MARKETING | It is a tool that is used by the companies to sell their products/services to the customers. |
| NON-DIGITAL MARKETING | It is termed as a type of marketing that is not conducted online |
| DIGITAL MARKETING | It refers to a marketing that is conducted online by the company. |
| SIGNAGE | It comprises of digital photos those are framed and lighted in the dark. |
| REFERRAL | It is known as word-of-mouth marketing. |
| EMAIL MARKETING | It is composed of sending the commercial message regarding the company's product to a group of targeted customers |
| SOCIAL MEDIA MARKETING | It is a form of marketing that utilizes the networking sites as a tool of marketing |
| DISPLAY ADVERTISING | It is the advertising done on websites. |
| MACRO ENVIRONMENT | Macro forces are Uncontrollable in comparison to the micro forces of environment. |

| PURCHASE SITUATION ANALYSIS | The analysis can be used for the expansion of the business like uncover expansion opportunities. |
|---|---|

## 7.13 ANSWERS TO CHECK THE PROGRESS

I. Profitability
II. True
III. Non-digital marketing
IV. Digital Marketing
V. Face to face marketing
VI. False
VII. Broadcast
VIII. True
IX. Social Media Marketing
X. SEO
XI. True
XII. True
XIII. Adware
XIV. True
XV. False
XVI. True
XVII. Macro environmental

## 7.14 TERMINAL QUESTIONS

- What is the requirement of Digital Marketing Environment analysis? Discuss the Customer Centric Online Marketing.

- What is Off line marketing strategies? Discuss in detail the various activities taking place in this.

- What is on-line marketing strategy? Discuss in detail the various activities taking place in digital marketing.

- Describe in details the non-digital marketing strategies.

- What are the different digital marketing strategies and how they are useful for the marketers?

- What is traditional marketing and how it is different from the digital marketing?

- What is digital marketing environment? Discuss in details the different factors of macro environment and how they are affecting the marketing?

- What is market opportunity analysis? how the different factors of environment are important for analysis?

- Discuss in detail the Factors that marketers need to evaluate. What are the various variables affecting the Digital Marketing Environment?

- Describe the Market opportunity analysis. How marketers can find out the marketing opportunities prevailing the market?

# BACHELOR IN COMMERCE (HONS.)

## (Accounting and Taxation)

### (BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING

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## UNIT-8 DIGITAL MARKETING DECISIONS- PRODUCT, PRICE, DISTRIBUTION AND PROMOTION
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**STRUCTURE**

8.0 OBJECTIVES
8.1 INTRODUCTION
8.2 MARKETING MIX WITH INTERNET
8.3 COMPONENTS OF DIGITAL MARKETING
8.4 DIGITAL MARKETING DECSIONS (DIGITAL MARKETING MIX)
8.5 EFFECTIVE DIGITAL MARKETING MIX DECSION IS EQUAL TO PROFITS
8.6 INTERNET HAS CHANGED THE MARKET
8.7 DISTRIBUTION
8.8 PROMOTION
8.9 PROMOTION TOOLS
8.10 LET US SUM UP
8.11 KEY WORDS
8.12 ANSWERS TO CHECK THE PROGRESS
8.13 TERMINAL QUESTIONS

## 8.0 OBJECTIVES

**After studying the Unit, you would be able to**

- Take the digital marketing decisions
- Understand the Internet and marketing mix relationship
- Find out the important components of digital marketing
- Describe the digital marketing mix
- Frame the digital marketing strategies
- Understand how effective marketing leads to profit
- Elaborate how internet has changed the market
- Fin out the role of distribution and promotion for marketing effectiveness

## 8.1 INTRODUCTION

Digital marketing targets a specific segment of the customer base and is interactive. Digital marketing is booming and includes search results ads, email ads, and promotional tweets, anything that involves marketing with customer feedback or a two-way interaction between company and customer.

Digital marketing is a combination of two words namely digital and marketing. In simple terms, Digital means anything can see or hear from an electronic device such as a TV, cell phone, radio. Marketing means understanding the needs of the consumer and providing the products or services accordingly. Digital Marketing is designed to reach the target audience to analyse their needs, promote product and services and market awareness through various digital platforms available online. It is done mainly on the Internet.

The Internet provides an endless array of both useful and useless type of information. Marketers can discover how many cans of Coke are left in a Coke machine on the one side of the world; watch live coffee being brewed in a coffee pot; or make contact with old friends and new friends, tour a museum, explore libraries and encyclopaedias all online. There is no doubt about it; the Internet has its good and bad aspects in ethical, moral and social perspective. Equally in marketing, the Internet has its positive and negative features. Internet can help marketers in more ways than one.

Both the organization's own web site and other organization's web sites and associated technologies can help marketers in many ways, from conducting research, to database building, relationship management customer service, new product development, internal communications, cost reduction and last but not the least promotion, selling and distribution.

## 8.2 MARKETING MIX WITH INTERNET

| | |
|---|---|
| **Marketing Research** | ➢ Market information<br>➢ Competitor information<br>➢ Customer information<br>➢ Miscellaneous information<br>➢ Collect cost saving ideas |
| **Database Building** | ➢ World-wide club<br>    ➢ Dynamic relationship marketing |
| **Customer Service** | ➢ Self-servicing customers<br>➢ Self-service customer abuse<br>    ➢ Self-service cost saving |
| **New Product Development** | ➢ Collecting new ideas<br>    ➢ Tailor-made, products |

| Internal Communications | ➢ Intranets |
| |     ➢ Extraneous |
| Cost Reduction | ➢ Print and distribution |
| | ➢ Phone calls |
| | ➢ Customer service |
| | ➢ Collecting cost saving tips |
| | ➢ Revenue generation |
| Distribution | ➢ Products |
| | ➢ Services |
| | ➢ Purchases |
| Selling | ➢ Few fairies' tale sales stories |
| | ➢ New markets |
| | ➢ Small value, big turnover |
| | ➢ Sales management tool |
| Promotion | ➢ Have a presence |
| | ➢ Interactive advertising |
| | ➢ Creative sponsorship |
| | ➢ Sales promotions |
| | ➢ Public relations |
| | ➢ Database marketing |

## 8.3 COMPONENTS OF DIGITAL MARKETING

- **Website streamlining (SEO)**: Search Engine Optimization is a cycle to change and adjust the site's information to improve the site's positioning in Search Engine.
- **Pay Per Click (PPC:** It's a training to pull in online rush hour gridlock towards their site by paying some measure of cash to ad distributer.
- **Email Marketing**: It's a straightforward and direct method of advanced advertising to arrive at end clients by sending them an email containing some significant data.
- **Partner Marketing**: In this sort of advanced advertising, the advertiser pays commission to member advertisers to advance their brands on various stages.
- **Content Marketing**: Contents like text, recordings, designs, pictures, and so on are utilized to associate with the focused on crowds to speak with them.

## 8.4 DIGITAL MARKETING DECSIONS (DIGITAL MARKETING MIX)

The marketing mix is a key foundation on which most modern marketing strategies and business activities work. As in the case of traditional marketing, Digital Marketing also uses combination of components of the marketing mix. E-marketers attempt to deliver value to ultimate customers, whether individuals, business, household, to satisfy their needs and wants in the best possible manner. Digital Marketing attempts to do the costs and benefit analysis. Benefits are based on consumer perceptions of the product by evaluating the features, attributes, brands and after-sale services. The costs associated with a product or services include the price plus other factors such as time invested in the purchase process and psychological factors.

In Digital Marketing, the internet provides facility to increase benefits while reducing the costs. The benefits include mass customization, digital delivery of products, and one-stop shopping. Lower costs are the result of direct selling, segmented pricing, and expanded delivery services through the web. The increased benefits and decreased costs can be explored by looking at the product, price, place and promotion components of the Digital Marketing mix.

- **Product:** With the introduction of Digital Marketing, the possibilities have increased for the development of several new and innovative products. Companies are working consistently to explore the customer needs and match those needs with the technological developments to create new products that can deliver value to users. The product life cycles (PLC) of the products have shortened because there has been advancement in the product development at a very high pace. With Digital Marketing the competition has also increased in the market and things are moving at a very fast face. So competition, speed of innovations and research and developments in product has become the phenomena for survival and growth thus building the potential for greater profits.

  The web is giving opportunity to both small and big business to grow. Even the small businesses can compete with the large giants globally using the web. Distance and time are not a constraint now. Transport, courier and logistic service firms like FedEx, DHL, and TNT facilitate the global exports, imports and speedy delivery of the products to the customers.

- **Price:** The standard pricing methods and strategies are not useful in Digital Marketing. Traditional pricing theory is based on the economic assumptions of laws of returns to scale which tells declining fixed costs as the volume expands. But this theory of cost advantage may not hold true in case of Digital Marketing. The constant product innovations makes the life cycles short thus require innovative pricing policies.

  The marketers have created efficiencies by lowering the costs associated with the final exchange of products marketed on the web. Self-service websites offer potential for costs and thus lower pricing on the web. Also the automation of order processing and payment adds to the potential savings.

- **Place:** The Digital Marketing uses internet and thus have expanded the ways marketers sell their products. Digital Marketing has resulted into disintermediation of many traditional channels of distribution and re-intermediation of many new and innovative channels of distributions. Many new channels of distribution have evolved from the use of internet to market goods. E-tailers represent a new distribution channel for traditional firms as well as for companies that exist only on the internet such as Amazon.com, eBay, Flipkart. In delivery process also e-marketers have developed new ways to deliver products and services including digital products, more efficient customer service, and new ways to sell directly to the customers. Innovative new intermediaries have emerged because of special needs associated with Digital Marketing

- **Promotion:** In traditional marketing, the consumer is passive in the communication process as they cannot interact with the company or marketer. They can only see and read advertisements, listen to radio ads, and view the TV commercials. Digital Marketing offers the interactive and active media where the consumers must choose, i.e., click, to see something and can view it for as long or as short as they like. They can have direct interactions with the company or marketers online. Also even in the personal selling process where the consumer is more involved, different techniques of promotion can be used by the marketers.

  Digital Marketing also changes the other promotional activities of a company. Nowadays, all advertisements contain the web address for the company offering the products and services. This is done with the intention that customers can further interact online to get more information.

**CHECK YOUR PROGRESS**

  **I.**  Digital Marketing is designed to reach the target audience to analyse their needs, promote product and services and market awareness through various digital platforms available online. (True/False)

  **II.**  ...................... is a cycle to change and adjust the site's substance/information to improve the site's positioning in Search Engine.

      a) PPC                   c) Partner marketing

      b) SEO                   d) All three

  III. ..............................is straightforward and direct method of advanced advertising to arrive at end clients by sending them an email containing some significant data.

  **IV.**  The........................... is a key foundation on which most modern marketing strategies and business activities work.

## 8.5 EFFECTIVE DIGITAL MARKETING MIX DECSION IS EQUAL TO PROFITS

What's an effective "marketing mix" and why should marketer care? An online "marketing mix" is what brings all of the different components of successful selling on the internet into a congruent and cohesive system to achieve its business goals. It effectively targets the right group of people, with the right products and services, at the right time and place, which all lends itself to the end goal of substantial and increased profits. It's also been called the 7 Ps of marketing.

The 7 Ps of the online marketing mix include **People, Product, Price, Promotion, Place, Process, and Physical Evidence.**

- **People:** This is where it all begins, people. First it's very important that marketer must find out through research if there are enough people in demand of a certain types of products and services. Typically marketer can get a good idea of the demand for certain products and services by research. In certain markets there may be several different types of products which can cater to a particular segment of people. If there is a high demand of certain types of products, then this can be great news for business. This will help marketers when it comes to creating their sales funnel and for future product development for repeat sales to that segment of people down the road. The competitors may offer something similar, but if the marketers treat customers and

satisfy their needs than it will result into them dealing with the same marketer again in the future!

- **Product:** Do the marketers have right products for the market they are trying to target? As mentioned earlier, marketers absolutely need to have the right types of products that are in demand for market. But, how do they know?

  If there is already products and services available than marketers should think, what can they do to offer a better product to this group of people than the competitors. What can give them the edge to stand out? Marketers can look for the consumer needs from online forums where people are asking where they can find a certain script that does "this or that", or who provides the best solution to a service they need. Skype groups, Facebook groups can be great for this type of research as well.

- **Price:** Price is the next thing that's important within the "Marketing Mix". This is actually an area where marketers have to be somewhat careful, plus, be mindful of what their target market might actually be willing to pay. Price is a touchy area. Pricing has a lot to do with how a product is perceived by the customers as well. If price of the product is too low, then it might be considered as somewhat inferior to the competitions. If marketers try and increase the price too high, it could result into creating a difference for people who may not think the benefits of the product or service are worth the asked price.

  The marketers should consider the competitor's products and services, their positioning, and pricing also how fit it is in the market. If company already have current customers, they can take their feedback about their perception.

- **Promotion:** The fourth "P" in the "Marketing Mix" is Promotion. This part of process in the marketing plan can include several components such as how the marketers may be communicating about the product to the customers, including:

  - ✓ PPC
  - ✓ Article marketing
  - ✓ Social media marketing such as YouTube, Facebook, Twitter etc.
  - ✓ JV partners
  - ✓ Media buys

The selection of promotion media and how the marketers will promote will depend on the budget, the message to communicate, and the group of target customers. Things to consider:

- ✓ What is the promotion budget?
- ✓ Access to partners willing to promote
- ✓ The types of incentives that can be offered

- **Place:** At first glance, marketers might think place is obvious. The place here means selling the products or services using web site. Some places to consider listing product: Clickbank, https://seller.flipkart.com/*, ebay.in* , PayDotCom, *sellers.snapdeal.com/*

- **Process:** The next thing to consider within the marketing mix is the process of how products are delivered. This is generally the technical part of the equation. For this the companies are going to need an effective "sales system".
  It's how marketers are going to get paid, and deliver the products. For most digital products this is all done online. However, if the products or services happen to be physical, marketers might require the use of a distribution channels to support the physical distribution of the products. There are several effective sales systems available in the market today which is capable of handling the main offer and any possible up-sell or down-sell offers.

- **Physical Evidence:** When it comes to online marketing "physical evidence" pertains to how organisations, products, or marketers are presented in the market place.
  Here there is need to give importance to branding, which is extremely important. This can include the professionalism in how products, logo, and the entire message that "brand" is trying to get across to the public is perceived. It's important that company and its products and services come across in a congruent manner, where each part can complement one another, to create the overall "brand". When customer see the Nike swoosh, or a McDonalds sign, they know immediately what their logos stand for.

## 8.6 INTERNET HAS CHANGED THE MARKET

The internet has changed the way to sell products and services. That's a fact, consumers now use the internet to research and purchase products/services online, so firms need online

strategies to attract and retain customers. The Digital Marketing mix considers the elements of traditional marketing, presenting the marketing mix online. Let us discuss this further:

- **E-Product Strategies:** We walk into a shop and see a product we like, we can assess it, touch it. Online, this immediate tangibility disappears. But, is that a disadvantage? Within the Indian e-commerce sales are increasing at extremely high rates. Why? What does buy products online offer over one to one sale? Firstly, there are clear online facts about the product, customers are purchasing. The buyer knows immediately about product features, the facts, not sales persons assumptions.

  The buying process is also customised for returning visitors, making repeat purchases easier. Organisations can also offer immediately ancillary products along with the main purchase. Example, offer to buy extra printer cartridges along printer purchases online. The product can also be customised to consumers' needs. www.nike.com offer customised trainers to users online. Users can design and see their trainers online before they order.

- **E-Price Strategies:** As mentioned in Marketing Mix section, pricing is always difficult to do and must take into account many considerations. Traditionally pricing was about finding about costs, discovering how much consumers are willing to pay, taking account competition pricing then setting your price. The internet has made pricing very competitive. Many costs i.e., store costs, staff cost have disappeared for complete online stores, placing price pressures on traditional retailers.

  The internet gives consumers the power to shop around for the best deal at a click of a button. Website such www.mysmartprice.com compares mobile prices from different websites informing consumers of where the best deal is. Such easy access to information helps to maintain prices within the online world. The growth of online auctions also helps consumers to dictate price. The online auction company www.ebay.com has grown in popularity with thousands of buyers and seller bidding daily.

  E-pricing can also easily reward loyal customers. Technology allows repeat visitors to be tracked, easily allowing loyalty incentives to be targeted towards them. Payment is

also easy, Paypal, or credit cards allows for easy online payments. However, the downside to this is internet fraud, which is growing rapidly around the world.

- **E-Place Strategies:** One of the biggest changes to the marketing mix is online purchasing. Consumers can purchase directly from the manufacturers eliminating the role of various intermediaries such as retailers and wholesalers totally from the transactions. The challenge for online retailers is to ensure that the product is delivered to the consumer within a reasonable time. Location is important within place strategy. Online location can refer to where links are placed on other websites. Placing a link on www.google.com home page would generate high consumer traffic. Knowing customer and knowing where they visit should help to understand where to place online links and advertisements.

- **E-Promotion strategies:** Promoting products and service online is concerned with a number of issues. Having a recognisable domain name is first stage towards e-promotion. Organisation such as www.apple.com, www.samsung.com, has successfully positioned the brand on the online world as an online bank.

  Most of the organisations today have websites and they use them for online promotions and Digital Marketing. Placing banner advertisements on other web pages is a common form of e-promotion. Banner ads must be placed where potential customers browse. Web public relations are another approach to promoting online. News worthy stories based on product or service launches can be placed on the company's web page, or WPR articles sent to review sites for consumers to read. Online promotion helps in attracting the attention of consumers and influencing their purchase behaviour. Direct email is a popular and common form of e-promotions, although slowly becoming the most disliked form of online promotion by many consumers. Organisations can send e-leaflets to hundreds and thousands of respondents, hoping a small percentage will reply. The problem is that for every 100 emails sent the response rate is not more than 1 to 2 per cent. Direct emailing is also known as SPAM which stands for Sending Persistent Annoying email.

**CHECK YOUR PROGRESS**

V.  The product life cycles of the products have shortened because there has been advancement in the product development at a very high pace. (True/False)

**VI.** Traditional pricing theory is not based on the economic assumptions of laws of returns to scale which tells declining fixed costs as the volume expands. (True/False)

**VII.** In traditional marketing, the consumer is....................... in the communication process as they cannot interact with the company or marketer.

**VIII.** Marketer can not get a good idea of the demand for certain products and services by research. (True/False)

**IX.** ...........................is important within place marketing strategy.

a) Value          c) Location

b) Price          d) Advertising

## 8.7 DISTRIBUTION

Place or distribution channel means how and where the product will be provided to the customer. In Digital marketing, there are numerous alternatives for the organization to sell on a wide scope of platforms. There are number of channels to use but not every channel is used to distribute every product. The product could be distributed via single channel or set of channels, depending upon the type of product they are selling, budget, audience to be reached etc.

some of the channels are:

- Social media stages (Facebook Shop)
- Dedicated online store (WooCommerce, Shopify,).
- Online commercial centres (Amazon, eBay)

Selecting the right channel for the product is crucial. The channel should be easily accessible, and the decision on the right kind of channel highly depends upon the targeted audience.

Whenever choosing place open doors in organization's web based showcasing blend, the requirement for sorting out how much market inclusion it is ready to reach inside that place. An online store can possibly have more extensive inclusion if there's a spending plan accessible for contacting the crowd/ people.

## 8.8 PROMOTION

Under digital marketing promotion means utilization of web based showcasing specialized apparatuses to arrive at objective people. Direct communication, sales promotion, public

relations, and advertising helps to reach to the people digitally. The organization and its online items require various methodologies when arriving at its clients.

Organizations can't put resources into each channel available in the market, the need to comprehend the crowd initially is critical for delivering and implementing a compelling promoting system digitally. Despite the fact that being limited by spending plan, time, areas, innovation, each organization can discover and use viable strategies for web-based advertising to achieve pre decided goals. The introductory showcasing procedure should incorporate limitations to keep away from plans that we can't execute as expected. For instance, putting resources into site. With the help of web analytics, the progress of the selected tool and strategy can be tracked in digital marketing. Digital marketing is quick and provides huge data for future policy making. Online promotion blend incorporates:

- **Advertising** - utilizing relational interchanges media.
- **Sales advancement** - helps present moment to animate fast deal.
- **Public Relations** - making a good picture for the intended interest group proceed.
- **Direct advertising** - utilizing client information bases for conditional and social advertising via reactions and estimations.

## 8.9 PROMOTION TOOLS

- Twitter can bring organizations image mindfulness up in a very brief timeframe; the chance of utilizing hashtags will keep the brand to stay apparent active on the web. Moreover, this stage offers a ton of helpful publicizing choices .twitter handles helps in one on one conversations and helps in creating a campaign starting with a # (hashtag) and can reach to larger crowd and become trending on twitter .

- Google+ is fit for advancing the product both among private clients and different organizations. So in case the organization is keen on Business to business activities, Google+ may be a decent wagered, even it can improve the SEO over the long-time.

- Pinterest is a visual stage. Pinterest permits organization to flaunt the item contributions, comparative pictures, and curated pin-sheets. Pinterest is a desert spring for specialists, ladies and grooms. Travel schedules, proposed pressing records, arranging thoughts, make activities, and wedding motivation are easily done on this platform .

- Instagram has huge amount of dynamic clients and has similar publicizing alternatives as Facebook. It's a visual stage, hHere people can follow the products official account and the people will get the information about the product, offers etc. in the form of Instagram stories and posts. Even the number of followers tells about the liking of the product by the people around the globe.

- LinkedIn This stage is known as the essential long range informal communication stage for experts. Business can utilize LinkedIn to refresh clients in the list, associate with industry accomplices, and enrol new colleagues. Being an expert platform, it is preferred decision for business-to-business web-based media advertising.

- YouTube is a video real time stage which can be of extraordinary assistance to any organization as it can empower them to discover a gathering of individuals whom the organization wants to focus on and change over them into clients by instructing, engaging and giving answer for clients issues.

- Facebook permits the organization to target clients by their area, Age, Gender, pay, etc., which assists the business with directing people to the online business shops. Facebook help the business in accomplishing staggered advertising Like and offer are astounding highlight. If somebody likes the organizations page the person will get information about new items and advancements .

- Email advertising is one of the conventional computerized showcasing channels that is both viable and economical. The leads produced by the marketers, can be utilized to send messages and contact the likely clients. The business can send clients pamphlets, digests, lists, direct ads, update messages, messages illuminating customers about extraordinary arrangements and limits, and the email promoting effort can be either centred around raising the image mindfulness or transformation rates

- In Display Advertising business advertisements put on the outsider sites or applications. This advertisements is normally connected to a greeting page of the advanced website. Display promoting can be a solid match in the event that business realize that some particular sites or applications are especially valuable for the business intended interest group, and with their assistance, we can raise the image mindfulness and pull in new people. The costs of these advertisements are generally determined on the CPM premise.

- Affiliate showcasing is affiliating with different organizations and influencers in business specialty, organization can spread its image to a more extensive crowd and

increment its deals. it helps in setting advertisements or connections on partner sites and visitor presenting on sharing leads and trading complementary whoops.

**CHECK YOUR PROGRESS**

   **X.**  In Digital marketing, there are numerous alternatives for the organization to sell on a wide scope of platforms. (True/False)

  **XI.**  Under …………….. promotion means utilization of web based showcasing specialized apparatuses to arrive at objective people.

 **XII.** ..........................can bring organizations image mindfulness up in a very brief timeframe.

     a) Twitter           c) Facebook

     b) Google Plus       d) Pinterest

**XIII.**  ………………. has huge amount of dynamic clients and has similar publicizing alternatives as Facebook.

**XIV**..........................permits the organization to target clients by their area, Age, Gender, pay, etc.

     a) Twitter           c) Facebook

     b) Google Plus       **d)** Pinterest

 **XV.**  Email advertising is one of the conventional computerized showcasing channels that is both viable and economical. (True/False)

**8.10 LET US SUM UP**

Digital marketing targets a specific segment of the customer base and is interactive. Digital marketing is booming and includes search results ads, email ads, and promotional tweets - anything that involves marketing with customer feedback or a two-way interaction between company and customer. The marketing mix is a key foundation on which most modern marketing strategies and business activities work. As in the case of traditional marketing, Digital Marketing also uses combination of components of the marketing mix. E-marketers attempt to deliver value to ultimate customers, whether individuals, business, household, to satisfy their needs and wants in the best possible manner. In Digital Marketing, the internet provides facility to increase benefits while reducing the costs. The benefits include mass customization, digital delivery of products, and one-stop shopping. What's an effective "marketing mix" and why should marketer care? An online "marketing mix" is what brings all of the different components of successful selling on the internet into a congruent and

cohesive system to achieve its business goals. It effectively targets the right group of people, with the right products and services, at the right time and place, which all lends itself to the end goal of substantial and increased profits. In Digital marketing, there are numerous alternatives for the organization to sell on a wide scope of platforms. There are number of channels to use but not every channel is used to distribute every product. The product could be distributed via single channel or set of channels, depending upon the type of product they are selling, budget, audience to be reached etc. Under digital marketing promotion means utilization of web based showcasing specialized apparatuses to arrive at objective people. direct communication, sales promotion, public relations, and advertising helps to reach to the people digitally.

## 8.11 KEY WORDS

| | |
|---|---|
| **MARKETING** | Marketing means understanding the needs of the consumer and providing the products or services accordingly. |
| **SEARCH ENGINE OPTIMIZATION** | It is a cycle to change and adjust the site's substance/information to improve the site's positioning in Search Engine. |
| **EMAIL MARKETING** | It's a straightforward and direct method of advanced advertising to arrive at end clients. |
| **PARTNER MARKETING** | In this sort of advanced advertising, the advertiser pays commission to member advertisers to advance their brands on various stages. |
| **MARKETING MIX** | It brings all of the different components of successful selling on the internet into a congruent and cohesive system. |
| **DISTRIBUTION** | It means how and where the product will be provided to the customer. |
| **PROMOTION** | It means utilization of web based showcasing specialized apparatuses to arrive at objective people. |

## 8.12 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | V. | True | IX. | Location |
| II. | SEO | VI. | False | X. | True |
| III. | Email Marketing | VII. | Passive | XI. | Digital marketing |
| IV. | Marketing Mix | VIII. | False | XII. | Twitter |

## 8.13 TERMINAL QUESTIONS

- Define the term marketing mix. Explain structure of marketing mix and its elements.

- What are the issues and challenges in the way of Digital Marketing? What do you think are the possible opportunities for Digital Marketing?

- What is marketing mix and what would be the role of internet in marketing mix?

- What are the critical components of digital marketing and how they influence the digital marketing mix?

- How the marketing manager ensure the effectiveness of marketing strategies with the help of marketing mix?

- Why marketing mix effectiveness is important and how it will contribute towards profitability of organization?

- What kind of changes have taken place in the marketing mix as a result of internet?

- What do you mean by marketing mix? Discuss various elements of marketing mix with suitable examples.

- Write short notes on the followings: -
    a. Digital Marketing Mix Strategies
    b. E-Product Mix
    c. E-Price Mix
    d. E-Place Mix
    e. E-Promotion Mix

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UNIT 9- DIGITAL MARKETING STRATEGY FORMULATION AND EXECUTION
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## STRUCTURE

**9.0 OBJECTIVES**
**9.1 INTRODUCTION**
**9.2 DIGITAL MARKETING STRATEGY IMPORTANT**
**9.3 COMPONENTS OF DIGITAL MARKETING STRATEGY**
**9.4 WAYS TO MAKE DIGITAL MARKETING STRATEGIES MORE EFFECTIVE**
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**9.18 LET US SUM UP**
**9.19 KEY WORDS**
**9.20 ANSWERS TO CHECK THE PROGRESS**
**9.21 TERMINAL QUESTIONS**

## 9.0 OBJECTIVES

**After studying the Unit, you would be able to**

- Have basic understanding for the digital marketing strategies
- Understand why digital marketing strategies are important and its components
- Find out how we can lake digital marketing strategies more effective
- Compare hoe inbound marketing is different from outbound marketing
- Effective use of inbound marketing methodology
- Know the process for creating digital marketing strategy
- Elaborate the segmentation, targeting and positioning
- Develop the positioning marketing strategy
- Know the importance of positioning and its importance

## 9.1 INTRODUCTION

*The Internet* is **not** synonymous with *World Wide Web*, it is a massive network of networks or a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. The World Wide Web, or simply the Web, is a way of accessing information over the medium of the Internet. It is an information-sharing model that is built on top of the Internet.

Digital Marketing is the fastest growing and most exciting branch of marketing today. As the world becomes ever more connected, keeping up with developments and trends is vital for marketers trying to reach new audiences, who are more discerning, fragmented and cynical than ever. Technology and software are changing at such a high rate that it seems almost impossible to keep up with trends. Products and services are evolving and adapting to the online sphere. The web is constantly shifting, growing and changing everything is fleeting.

Digital marketing refers to the promotion of goods or services through the use of digital technologies such as the internet, social media, cell phones, and other digital platforms. It comprises not only advertising that is shown on websites, but also other kinds of online activities like email and social networking. Every aspect of Digital Marketing is digital, meaning that it is electronic information that is transmitted on a computer or similar device, though naturally it can tie in with traditional offline advertising and sales too.

## 9.2 DIGITAL MARKETING STRATEGY IMPORTANT

To achieve any aim, having a strategy is almost as important as having a plan. It optimises process execution, allowing for high efficacy while keeping an eye on different areas to evaluate data analytics and take appropriate action.

This allows for continuous improvement in various digital marketing techniques such as search marketing, conversion rate optimization (website user experience), email marketing, and social media marketing to help achieve business goal of attracting new customers and strengthening existing relationships.

Company also needs a competitive and long-term content marketing plan to reach and convert more consumers by leveraging the power of online content and combining digital and conventional marketing platforms.

As companies embrace digital transformation in their core operations and new avenues for

reaching consumers, having a solid digital marketing plan is critical to their success.

## 9.3 COMPONENTS OF DIGITAL MARKETING STRATEGY

A digital marketing strategy should include the following elements:

- **Creating a brand:** To identify brand, use brand guidelines. Consider the company's USPs (Unique Selling Propositions).

- **Demographics:** Understanding demographic details such as age, gender, and place, as well as the reasons that motivate customers to select products and services, is key to developing consumer personas. Use Google Analytics to help build buyer personas and segment them based on organic traffic keywords.

- **Identifying target markets:** Perform market research and find possible target markets using market research tools including Google Keyword Planner, Google Trends, and Facebook Audience Insights.

- **Doing competitive analysis:** Evaluate the rivals and perform a SWOT analysis using web and social analytics tools including similarweb, Semrush, and SocialBakers.

- **Appropriate resource management and allocation to achieve objectives:** Manpower (in-house or outsourced, external marketing agencies) and budget are two resources.

- **Reviewing and improving campaign results:** Use digital marketing analytics tools like Google Analytics to monitor, assess, and report on the performance of digital marketing campaigns.

## 9.4 WAYS TO MAKE DIGITAL MARKETING STRATEGIES MORE EFFECTIVE

- **Involve Customer:** Customer needs to be motivated online to post their views regarding various kinds of products and there queries and questions should also be cleared promptly.

- **Consider all the customers:** All the customers should be kept in mind before marketing a product. The taste as well as preferences of all the customers should be considered and segmental.

- **Social welfare focused advertising:** Nowadays there is a trend of working for social welfare, so some social work should also be included so that customers feel attracted.

- **Advertising Frequency:** Specific occasions need to be consider while deciding the frequency of online advertising.

- **Advertising through effective ways**: The advertising of the products and services should be done in such a way so that customers feel attracted to see that particular product.

- **Target Customers:** The customers which are beneficial as well as profitable for the organization should be targeted so that they stood beneficial for the company and therefore benefit the company in long run afterwards.

- **Optimum use of resources:** Online Marketing is economical in terms of time, money as well as efforts involved. So all the resources which are used should be used in wise as well as efficient way.

- **Adequate Investment:** Investment in Online Marketing should be Adequate; there should be neither more nor less investment for Digital Marketing, it must be as per the requirement of the company and the competition in the market.

- **Market's Competition:** One should work by seeing others, that is the other competitors workings can't be ignored whenever there is an advantage than should be grabbed immediately.

- **Content of the advertisement:** The content that seems to be interesting should be taken into account so that customers feel attracted to see that particular advertisement.

- **Target market planning:** Proper planning should be done before targeting customer. All information about the customers should be collected before targeting any customer's segment.

- **Content Updating:** The content should be uploaded regularly so that the customers do not feel uninterested in the products.

- **Competitor's Strategy:** The strategy of competitors should be known so that counter strategy can be made by the companies. This is important because customer these days switch companies or products very easily.

- **Innovativeness:** Time to time updating of the technology should be there in the organization so that nothing outdated should be there in the company.

- **Contact with Customers:** The customers should be contacted time to time and proper reviews of the customers and their preferences about the various products should also be known.

## 9.5 INBOUND VERSUS OUTBOUND MARKETING

Outbound marketing was typically the traditional approach to market business and this was known as an interruption-based marketing.



Image Source: http://www.seomoz.org/blog/inbound-marketing-is-taking-off)

Inbound marketing is where marketers provide something of value that attracts a customer to come to shop. When marketers attract that customer, they try to build a relationship.

## 9.6 INBOUND MARKETING METHODOLOGY

1. **Attract:** In inbound marketing marketers want attract the right customer to website and to brand with a quality, answers that questions they have. We have to use blogging, social media, keyword and SEO strategy.
2. **Convert:** After attracting the strangers on websites, a company will ready to convert them into prospect, collect their contact information. Emails give important information for an inbound marketer. This includes eBooks, whitepapers, case studies and tips sheets.
3. **Close:** With the help of tools like lead scoring closed-looks reporting, lead nurturing and vast lead intelligence, paired with lead follow up best practices and sales tactics, marketers will then work to transform those leads into now business.

4. **Delight:** Delight refers to deliver the right information to the right person at the right person at the right time. Delight tools are such as Smart content, Email marketing, conversations inbox, attribution reporting and marketing automation can be used by the marketers.

## 9.7 BREAKDOWN OF THE KEY FORMS OF DIGITAL MARKETING

| Types | Explanation |
|---|---|
| Search Engine Optimization (SEO) | This is a process used to optimize a website so that it appears more in Google searches. |
| E-mail marketing | E-mail marketing is marketing through delivery of e-mails to current and potential clients. |
| Affiliate marketing | Affiliate marketing is where marketers get third party companies to promote company with a commission paid for a lead or sale. |
| Online PR | PR can be a very effective tool for promoting business and there are many ways of doing this online. |
| Online Advertising | There are many forms of online advertising. Although advertising through the likes of newspapers is not that effective as targeted advertising online can be very effective. For example, if we are searching to buy a Canon camera and the ad is directly relevant to this then we don't view this as a bad thing. |
| Social media | Social media marketing is marketing through conversation and engagement with potential customers. |
| Website | The website is a key Digital Marketing tool used to promote business online. |

**CHECK YOUR PROGRESS**

I.   Digital Marketing is the fastest growing and most exciting branch of marketing today. (True/False)

II. ......................refers to the promotion of goods or services through the use of digital technologies such as the internet, social media, cell phones, and other digital platforms.

III. Customer needs not to be motivated online to post their views regarding various kinds of products to involve the customer in strategy formulation. (True/False)

IV. ............................need to be considered while deciding the frequency of online advertising.

V. The customers which are beneficial as well as profitable for the organization should be ………………..

a) Targeted
c) Both

b) Segmented
D) None of both

VI. The strategy of competitors should be known so that counter strategy can be made by the companies. (True/False)

VII. Outbound marketing known as an …………………..

a) Interruption-based marketing
c) Content based Marketing

d) All three

b) Psychological based marketing

VIII. .................................is where we get third party companies to promote our company with a commission paid for a lead or sale.

a) Email Marketing
c) Affiliate Marketing

b) Direct Marketing
d) Online PR

## 9.8 PROCESS TO CREATE AN DIGITAL MARKETING STRATEGY

Online and brick-and-mortar businesses require Digital Marketing strategies. A comprehensive Digital Marketing strategy can launch or increase sales substantially for a business. Digital Marketing requires knowledge of social media, search engine optimization (SEO), blogs, email lists, affiliate marketing and more.

- **Create a Customer Persona:** Previously, digital marketers accrued qualitative and quantitative data approximately the target audience that blanketed age, gender, profession, hobbies, and location. The definition of the capability consumer has been taken to another level currently, with buyer personas taking over. Now, the most effective advertising strategies are incomplete without them. Buyer personas are a

term used to explain the proper customer that can be defined through surveying and contacting the pre-defined target organization. To define personal consumer persona, marketers could make use of on-line equipment like MakeMyPersona and Persona Creator.

- **Identify Goals and Tools:** Every expert marketer knows how vital this level is, without dreams, the strategy certainly will not work, so defining them is primary challenge. Make certain that the goals are suitable and lead them to measurable. Example of a vulnerable advertising intention: Increase the conversions at the internet site next year and create two promotional gives.

- **Focus on Blogging:** Creating notable content material is essential for any digital marketing strategy. Blogging is one way to create content for a website and enlarge content material advertising method. This key component of the method plays a few vital functions, including bringing extra visitors to website, reinforcing social media presence, positioning towards different organizations, and ranking all the ones lengthy-tail seek queries and key phrases.

- **Evaluate Existing Digital Marketing Channels:** Analyze the virtual property and channels that are already the usage of, inclusive of website, weblog content, social media account, word-of-mouth, local advertising, Google AdWords, paid advertising, and so on. Ask, how powerful had been they and how can they be used next year?

- **Automate Marketing:** Marketing automation is huge, and it's best getting higher with new generation and software. Today's main marketing automation platforms can do wonders for virtual advertising method, making it easy for automate activities such as content advertising, e-mail advertising and marketing, lead generation, and greater. It is easy to find advertising automation platforms which are integrated together with CRM, which improves the whole sales procedure.

- **Nail Mobile Optimization:** It's a cellular-first era, and there's no excuse for now not enhancing web page for a brilliant mobile revel in. Mobile optimization includes web page velocity, website online layout, and diverse different SEO practices to make sure that folks that come for web page the usage of a mobile device have a very good revel in. Review cellular responsive layout and e-mail templates to make sure that the use of the latest methods and offer handiest applicable.

- **Easy for Customers to Reach:** Online business is all approximately connecting with ability customers, so traffic to internet site ought to be excessive to ensure nice outcomes. Digital marketing strategy therefore should make certain that visitors are not exerting unnecessary attempt to hook up. Engaging together with customers is priceless in business. To remove the pointless effort, marketers ought to make sure that touchdown pages do now not ask for inappropriate facts. Make call-to-actions honestly seen at the landing page and other pages at the website.

- **Use the Right Technology:** Online marketing attempt is wasted if an ineffective or irrelevant technology is used. For a proper digital advertising approach, marketers shall need equipment along with advertising and marketing automation software in addition to enterprise equipment. There are equipment that allow marketer to during each level of the virtual advertising method, inclusive of equipment that assist identify goals to gear that assist song in which traffic are coming from.

- **Confirm Differentiators:** If corporation is not unique from competition, marketer should now not count on excessive profits. Make sure you convert your difference from the others via talking in your clients and asking them why they decided on your enterprise. Every business enterprise has a unique promoting proposition, an attribute that units you apart from the opposition. Do the research and work to discover what this is? Then, restore your existing differentiators if wanted. Incorporate this message into your content material marketing campaigns.

- **Track Process:** Constant tracking ought to be provided to make sure that the method is running successfully. This is executed by assigning teams that would supply this task. Remember to examine from the errors and continually find development opportunities.

## 9.9 MARKET SEGMENTATION, TARGETING AND POSITIONING

It is very important to learn what market segmentation, why it important is and the different dimensions used by marketers to segment the population. How marketers evaluate and select potential market segments is explained as is the development of a targeting strategy. We understand how a firm develops and implements a positioning strategy and creates a customer relationship management strategy to increase long-term success and profits.

## 9.10 E-MARKET SEGMENTATION

Market segmentation is an important process in conventional marketing. Segmentation is an important step in ensuring successful implementation of marketing strategies. Market segmentation means dividing a market into different groups or categories according to certain criteria such as household income, level of income, level of education, age, gender, hobbies and more. Such data can be collected through questionnaire survey or from statistical department. Once we have those groups ready, we can then use differentiated marketing strategies to target those groups based on their needs and wants. For example, ask yourself what you can sell to the senior citizens? Your answers could be nutritional products, tour packages, medicines, indoor exercising machines and more.

Now, how do we do market segmentation in the Internet marketplace, or rather marketspace? The concept is basically the same, the only difference is companies have a much larger marketplace, and the main concern is language and cultural differences. For example, if marketers wish to promote inbound tour packages, they can target adult travelers from different countries, using website that offers different major languages in the world, such as English, French, Spanish, German, Chinese and Japanese. If companies cannot do it themselves, they can always outsource to companies that provide translation services. Besides, organizations might want to customize the website according to different cultures, particularly those relating to food and things they like to see.

One of the most popular Internet outsourcing companies is **Odesk.com.** In this website, one can outsource jobs to suitable contractors who are mostly individual freelancers. One can bargain with them the price as well as other terms and conditions for handling their jobs. Jobs that can be outsourced are webpage design, contents writing and editing, graphic design, translation, copywriting, customer support and more.

## 9.11 BASES FOR SEGMENTATION

The next step in developing a market segmentation strategy is to select the most appropriate bases on which to segment the market. The major bases to segment consumer markets are the following:

1. Geographic segmentation
2. Demographic segmentation

3. Psychographic segmentation

## 9.12 TARGETING

In targeting, the marketers evaluate the attractiveness of each potential segment and decide which of these groups they will invest resources against to try to turn them into customers. The customer group or groups selected are the firm's target market. Target marketing can be carried out at different levels:

- Undifferentiated Marketing
- Differentiated Marketing
- Concentrated Marketing or Niche Marketing
- Customized Marketing or Micro Marketing

## CHECK YOUR PROGRESS

IX.    Digital Marketing requires knowledge of social media, search engine optimization (SEO), blogs, email lists, affiliate marketing and more. (True/False)

X........................is one way to create nice content for a website and enlarge content material advertising method.

a)  Email Marketing                    c)  Advertising
b)  Blogging                           d)  Branding

XI.    Online marketing attempt is wasted if an ineffective or irrelevant ..................... is used.

XII.   Constant tracking ought to be provided to make sure that the method is running successfully. (True/False)

XIII.  Market …………… means dividing a market into different groups or categories according to certain criteria.

a)  Positioning                        c)  Segmentation
b)  Targeting                          d)  None of these

XIV.   A ……………. market consists of a set of buyers who share common needs or characteristics that the company decides to serve.

a)  Positioned                         c)  Segmented
b)  Target                             d)  None of these

XV. An.................................... strategy is one that appeals to a wide-spectrum of people.

XVI. A........................... is often useful for smaller firms that do not have the resources or the desire to be all things to all people.

## 9.13 MARKET POSITIONING

The concept of positioning was propounded by two advertising executives, Al Ries and Jack Trout. They considered positioning as a creative exercise done by marketing people with both existing as well as new products. According to them positioning starts with a product, a piece of merchandise, a service, a company, an institution or even a person. But positioning is not what is done to a product. Positioning is what marketers do to the mind of the prospect. That is, marketers position the product in the mind of the prospect.

## 9.14 DEVELOPING A POSITIONING STRATEGY

Positioning means developing a marketing strategy aimed at influencing how a particular market segment perceives a product or service in comparison to the competition. Developing a positioning strategy entails gaining a clear understanding of the criteria that the target consumers use to evaluate competing products and then convincing them that your product will meet those needs. Positioning can be done in many ways. Marketers must devise a marketing mix that will effectively target the segment's members by positioning their products to appeal to that segment. A first step is to analyse the competitors' positions in the marketplace. Who are the direct competitors and what products or services are they providing? Indirect competition can also be important. The following is a list of some established product positioning strategies. (Already discussed in Unit 3)

- Against a competitor
- Product Categories
- Away from a Competitor
- Benefits
- Product Attributes
- Usage Occasions
- Users

## 9.15 PRODUCT POSITIONING AND DIFFERENTIATION

Marketers must also develop a positioning strategy that includes offering a product or service with a competitive advantage, providing a reason why consumers will perceive the product as better than the competition. Once a positioning strategy is set, marketers must finalize the marketing mix by putting all the pieces into place. The elements of the marketing mix must match the selected segment. This means that the goods or services must deliver benefits that the segment values, such as convenience or status. Furthermore, marketers must price this offering at a level these consumers will pay, make the offering available at places consumers are likely to go, and correctly communicate the offering's benefits in locations where consumers are likely to take notice. Finally, marketers must evaluate the target market's responses so they can modify strategies as needed. Over time, the firm may find that it needs to change which segments it targets or even redo a product's position to respond to marketplace changes.

In volatile markets, it can be necessary even urgent to reposition an entire company, rather than just a product line or brand. When Goldman Sachs and Morgan Stanley suddenly shifted from investment to commercial banks, for example, the expectations of investors, employees, clients and regulators all needed to shift, and each company needed to influence how these perceptions changed. Doing so involves repositioning the entire firm. This is especially true of small and medium-sized firms, many of which often lack strong brands for individual product lines. In a prolonged recession, business approaches that were effective during healthy economies often become ineffective and it becomes necessary to change a firm's positioning. Repositioning a company involves more than a marketing challenge. It involves making hard decisions about how a market is shifting and how a firm's competitors will react. Often these decisions must be made without the benefit of sufficient information, simply because the definition of "volatility" is that change becomes difficult or impossible to predict.

## 9.16 PRODUCT POSITIONING PROCESS

The product positioning process involves the following stages:

i.    Defining the market in which the product or brand will compete (who the relevant and prospect buyers are)

ii.   Identifying the attributes (also called dimensions) that define the product 'space'

iii. Collecting information from a sample of customers about their perceptions of each product on the relevant attributes

iv. Determine each product's share of mind

v. Determine each product's current location in the product space

vi. Determine the target market's preferred combination of attributes (referred to as an ideal vector)

vii. Examine the fit between the product and the market.

## 9.17 IMPORTANCE OF POSITIONING

Product positioning is a crucial ingredient in the buying process and should never be left to chance. It is company's opportunity to influence the market's perception of their products and services. Failure to proactively address product positioning is unlikely to end well. With or without marketer input, customers will position the product, probably based on information from the competitors, which will not flatter the organizations. Clear, concise, meaningful product positioning also helps companies cut through the relentless advertising and marketing noise of the marketplace. In customer's mind, product positioning gives the messages some context so they can be better heard and accepted.

**CHECK YOUR PROGRESS**

XVII. .......................... is developing a product and brand image in the minds of consumers.

    a) Positioning              c) Segmentation

    b) Targeting                d) None of these

XVIII. Effective positioning involves a good understanding of competing products and the benefits that are sought by the target market. (True/False)

XIX. …………… means developing a marketing strategy aimed at influencing how a particular market segment perceives a product or service in comparison to the competition.

XX. Once a positioning strategy is set, marketers must finalize the marketing mix by putting all the pieces into place. (True/False)

XXI. Product positioning is a crucial ingredient in the buying process and should never be left to chance. (True/False)

## 9.18 LET US SUM UP

The goal of marketing is to create value and satisfy needs. However, everyone's needs are not the same. Understanding needs is a complex task. Market segmentation is an important process in conventional marketing. Segmentation is an important step in ensuring successful implementation of marketing strategies. Now, how do we do market segmentation in the Internet marketplace, or rather marketspace? The concept is basically the same, the only difference is companies have a much larger marketplace. Market research analysis using segmentation is a basic component of any marketing effort. The marketer will have to try different segmentation bases or segmentation variables, alone or in combination, to find the best way to view the market structures. In contrast to consumers, industrial customers tend to be fewer in number and purchase larger quantities. In targeting, the marketers evaluate the attractiveness of each potential segment and decide which of these groups they will invest resources against to try to turn them into customers. The customer group or groups selected are the firm's target market. A target market consists of a set of buyers who share common needs or characteristics that the company decides to serve. The business can positively influence the perceptions of its chosen customer base through strategic promotional activities and by carefully defining the business' marketing mix. Effective positioning involves a good understanding of competing products and the benefits that are sought by the target market. In volatile markets, it can be necessary even urgent to reposition an entire company, rather than just a product line or brand. Product positioning is a crucial ingredient in the buying process and should never be left to chance. It is company's opportunity to influence the market's perception of their products and services.

## 9.19 KEY WORDS

| | |
|---|---|
| DIGITAL MARKETING | It refers to the promotion of goods or services through the use of digital technologies such as the internet, |
| TARGET CUSTOMERS | The customers which are beneficial as well as profitable for the organization. |
| OUTBOUND MARKETING | Typically, the traditional approach to market business. |
| INBOUND MARKETING | Inbound marketing is where marketers provide something of value that attracts a customer to come to shop. |

| | |
|---|---|
| DELIGHT | It refers to deliver the right information to the right person at the right person at the right time. |
| AFFILIATE MARKETING | In this, we get third party companies to promote our company with a commission paid for a lead or sale. |
| MARKET SEGMENTATION | It means dividing a market into different groups or categories according to certain criteria. |
| TARGETING | In this, marketers evaluate the attractiveness of each potential segment and decide which of these groups they will invest resources against to try to turn them into customers. The |
| UNDIFFERENTIATED MARKETING | An undifferentiated targeting strategy is one that appeals to a wide-spectrum of people. |
| POSITIONING | It is developing a product and brand image in the minds of consumers. |

## 9.20 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | True | VIII. | Affiliate Marketing | XV. | Undifferentiated targeting |
| II. | Digital marketing | | | XVI. | Concentrated strategy |
| III. | False | IX. | True | | |
| IV. | Specific occasions | X. | Blogging | XVII. | Positioning |
| V. | Targeted | XI. | Technology | XVIII. | True |
| VI. | True | XII. | True | XIX. | Positioning |
| VII. | Interruption-based marketing | XIII. | Segmentation | XX. | True |
| | | XIV. | Target | XXI. | True |

## 9.21 TERMINAL QUESTIONS

- What is digital marketing strategy and why it is important?
- What is the importance of digital marketing strategies? What are the critical components of digital marketing?
- Highlight the important dimensions that must be considered by the marketers to make the digital marketing strategy more effective.
- What is Inbound marketing and how it is different from outbound marketing?

- Discuss the process for developing the effective digital marketing strategy.
- What is market segmentation, and why is it an important strategy in today's marketplace?
- Explain the major variables used to segment the consumer markets. Give example of each.
- How do we segment the business markets?
- What is target marketing? What are the different levels of target marketing?
- What is market positioning? How the companies do position of their products? Discuss with examples.

**BACHELOR IN COMMERCE (HONS.)**

**(Accounting and Taxation)**

**(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING**

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**UNIT-10    DIGITAL MARKETING MECHANISMS: WEBSITES- COMPANY AND RETAIL SERVICE PROVIDERS**
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**STRUCTURE**

**10.0 OBJECTIVES**
**10.1 INTRODUCTION**
**10.2 OFFLINE MARKETING CHANNELS**
**10.3 DIGITAL MARKETING MECHANISMS**
**10.4 DIFFERENCE BETWEEN CHARACTERISTICS OF GOODS AND SERVICES**
**10.5 DIGITAL MARKETING STRATEGIES FOR RETAIL SECTOR**
**10.6 FACTORS FOR DECIDING THE RIGHT MARKETING MECHANISM**
**10.7 ELECTRONIC CHANNELS**
**10.8 BENEFITS OF ELECTRONIC CHANNELS**
**10.9 THE DESIGN OF A SERVICE DISTRIBUTION SYSTEM**
**10.10 LET US SUM UP**
**10.11 KEY WORDS**
**10.12 ANSWERS TO CHECK THE PROGRESS**
**10.13 TERMINAL QUESTIONS**

**10.0 OBJECTIVES**

**After studying the Unit, you would be able to**

- Understand the marketing and offline marketing channels
- Basic understanding of digital marketing mechanism
- Comparison among goods and services
- Know the digital marketing strategies for retailing
- Elaborate the critical factors influencing the digital marketing mechanism
- Understand the electronic channels and its benefits

**10.1 INTRODUCTION**

A business enterprise is a system that is created and managed by the people. The single main purpose of business is to create a satisfied customer. The business should always aim at creating and delivering values, to satisfy the customers. In order to understand clearly the business system, knowledge about marketing processes, systems and sub-systems are required. This will also help in knowing how the business and customers can be in

advantageous position. From a general point of view, marketing is a practice of identifying and satisfying customer needs. With the explosion of digital technology, including the full

use and spread of computers and smartphones, businesses are beginning to try new ways of marketing. Marketing is a process through which value is communicated to the consumer.

## 10.2 OFFLINE MARKETING CHANNELS

- **TV and Radio Advertising:** It is one of the heavily used channels for marketing due to its wider reach to the local and rural people. But doing this there are certain things which should be kept in mind so that our marketing campaign should reach to max target audiences;

    ➢ Deciding the right media vehicle or TV channel for Ad.

    ➢ Deciding the placement of ad in chosen vehicle i.e., time of Ad.

    ➢ Deciding the frequency of Ad.

- **Print Media Advertising:** Print media advertising includes advertisements through magazines, newspapers and pamphlets. To get max of desired responses along with the factors which we should keep in mind like Tv or radio advertising we have to keep certain additional factors too in print media.

    ➢ Along with keeping in mind the selection of right media vehicle the section of the newspaper or magazine where we have to place the ad should also be checked. And ad should be placed in the relevant section of product only

    ➢ Days of week should also be considered while this for ad. There should be more ads of discounts or sale on sun days than any other days.

- **Outdoor Advertising:** Outdoor advertising is used to advertise about broad messages, branding and support various campaigns. Some of ways of outdoor Advertising are
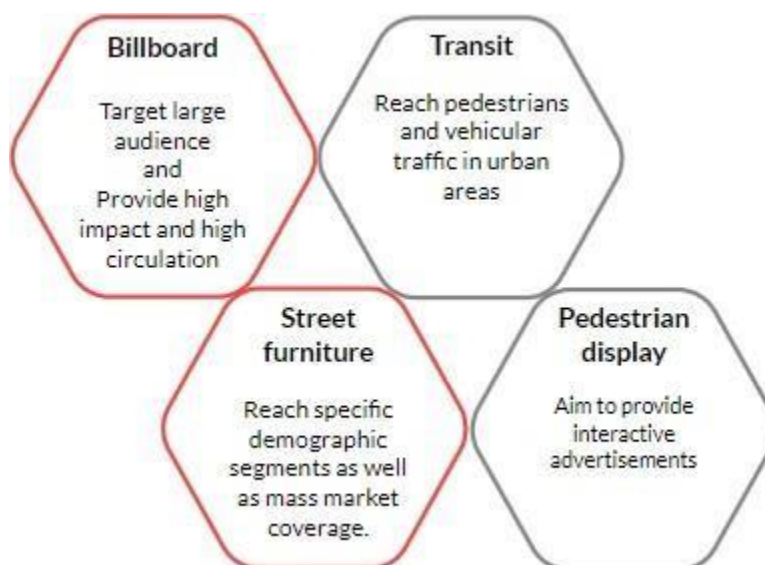
- **Event Advertising:** Event marketing helps to create more meaningful and long-lasting relationship with the customers. It involves presenting and advertising product via human commercials in a social gathering.

    Some of the areas where event advertising can be done:

    ➢ Trade shows or social gatherings

    ➢ Conferences which are majorly company specific marketing events.

    ➢ On field events like of road shows, Converts etc.

## 10.3 DIGITAL MARKETING MECHANISMS

- **Search engine Optimization:** Search marketing strategies are used to increase any firm's presence online so that whenever a potential customer searches for their brand or a related service, their owned media assets are displayed at the top of search results. This can be done by improving the three factors-

| Content | Technology | Authority |
|---|---|---|
| • Keywords people most likely use on search engines to find your product<br>• Commonly used words or phrases in your content<br>• The user problems your product or service solves | • Responsive Design<br>• Accelerated mobile pages<br>• Quick Loading on mobiles<br>• Lazy Loading<br>• International languages inclusion | • Brand awareness<br>• Product marketing<br>• Lead generation and Lead nurturing<br>• Content promotion<br>• Building relationships |

- **E-Mail Marketing:** Emails are often used as a method by the companies to contact with their groups. E-mails are having a great role in brand awareness, Product marketing, Content promotion and lead generation. A normal person checks his email multiple times in a day. To build up retail presence, we can send him significant data about the thing is moving in the business. On the off chance that we send important data about their advantage individual would begin looking us as an asset and we can utilize this position to pitch items.

Effectiveness of an email campaign is calculated on the following parameters:

➢ Deliverability: Rate at which email reach to intended subscriber`s inbox

➢ Open Rate: Percentage of people that open email once it reaches to their inbox.

➢ CTR: Percentage of people that click on CTA's.

➢ Unsubscribes: No. of people who opt out of email list.

- **Search Engine Marketing:** The major difference between SEO and SEM is this that SEM is a paid marketing strategy whereas SEO is an organic one. SEM is able to bring more visitor in a shorter period of time. SEM is also referred as Pay Per Click marketing. Main purpose of SEM is to:

  ➢ Build Brands

  ➢ Generate leads

  ➢ Sell product

Three major components of SEM are:

➢ **Keywords:** These are the relevant words that shows on the web page in the first search result. Many of brands conduct keyword research and create campaigns that target best keywords.

➢ **Ad text**: There should be customized text in the ad. Headline is the first thing that a person sees when he made a search. So, it should be attractive as it made customer click on the Ad.

➢ **Landing Page**: It is the page where whole of traffic come from the campaign. So, this should be specific to the product and should use some of same keywords that are used in the Ad.

➢ **Display Ads:** These are used to give general advertisements and brand messages to site visitors. Generally, are of three types:

  ✓ Banner Ads: Appears on the side frame of the website.

  ✓ Text only ads: Mostly seen in you tube videos they don't have any graphics or link included in them.

  ✓ Rich media ads: Combination of heavy graphics and images which provide interactive experience to the viewer.

- **Social Media Marketing:** It is one of the major forms of marketing which is going more and more popular these days due to presence of large number of youngsters on the platforms like of Facebook, Instagram and so on.

  Throughout the consumer decision-making process, social media marketing serves the following purpose:

  - ➢ Awareness stage: Increase brand awareness, increase reach and impressions, Build an online community.
  - ➢ Consideration stage: Engage users, get traffic to website, get users to fill the forms.
  - ➢ Purchase stage: Convert users into customers, increase revenue, reduce cost of acquiring new customer.
  - ➢ Delight stage: Manage and build online reputation, Provide customer service.

The above-mentioned techniques are the major ones for marketing digitally to any of website of a company. But along with them there are some of other techniques are there:

- **Content marketing**: Content Marketing is making significant and appropriate content dependably on stages. A brand can use content marketing as a gadget to achieve better brand care by displaying itself as an association that is in contact with and important to the world. For example, this is the way Nike is persistently running ad campaigns for athletes that are on the climb. The channels that can have an influence in substance advertising technique include:

  - ➢ Blog posting
  - ➢ E-book and white papers
  - ➢ Infographic

- **Affiliate Marketing** - This is a kind of Marketing based on publicizing where affiliate company will get commission for advancing another person's product or services on their site.

These are the marketing mechanisms with which we can digitally market website of any company and so on.

But along with all these when we came to retail service providers there can be some of other ways or mechanism with which they can market their product. These ways no doubt are digitals but are not online.

- **By Mobile or cell phone:** Suppose a retail store owner message his customers about the new price slash or new arrivals at his store. This is a digital way to market product but this involves no use of internet. So, it can be referred as digital but not online method.

**CHECK YOUR PROGRESS**

I. The business should not always aim at creating and delivering values, to satisfy the customers. (True/False)

II. ......................media advertising includes advertisements through magazines, newspapers and pamphlets.

III. ………… involves presenting and advertising product via human commercials in a social gathering.

a) Event Advertising           c) Email Advertising

b) Print Advertising           d) Social media Advertising

IV. ....................................strategies are used to increase any firm's presence online.

a) Search engine optimization      c) Social Media Marketing

b) Email Marketing           d) All three

V. ………….. are having a great role in brand awareness, Product marketing, Content promotion and lead generation.

VI. ............................ is the rate at which email reach to intended subscriber`s inbox

VII. .................................is the page where whole of traffic come from the campaign.

## 10.4 CHARACTERISTICS OF GOODS AND SERVICES

There are three basic attributes on the basis of which the differentiation of evaluation of goods and services take place. They are Search, Experience and Credence (SEC), explained below:

- **Search qualities:** This is a characteristic that can estimate before the purchase or consumption of a product. This is the quality on the basis of which some

goods/services can be searched. Goods have a higher degree of these search qualities as compared to services. (a) For goods it can be all physical attributes like, price, color, design, looks, style, shape, size, etc. So, they are easy to search. (b) For services this can be price, convenience, presentation, promptness of service, courtesy, mannerism, ambiance, etc. Here these are not easy to search, so other factors like tangibility are used for help in searching.

- **Experience qualities:** The quality of goods and services are those which can only be assessed after purchase, utilization, use or consumption, i.e., after the experience. Services have higher experience attributes than goods.

- **Credence qualities:** There are certain attribute of any goods or services that can't be assessed even after use/utilization/consumption. Because the customers lack certain ability to analyse or estimate them, like the effect of some nutritious food or vitamin. Some health service provider may claim that the food contains organically produced fertilizers, but there is no way to ascertain it. But, however, when services are offered by experts, professionals, specialists, it creates credence for services

## 10.5 DIGITAL MARKETING STRATEGIES FOR RETAIL SECTOR

Digital market has made his space in every field, due to its vast advantages. Every sector of industry is adopting digital methods of marketing. Following are the few online marketing strategies for retail service provider:

- **Using Facebook Ads to get more revenue:** In the retail industry it is one of the major strategies to generate more revenues. There are three stages of running a successful Facebook ad which will add up in resume:
  - ➢ To have a start, start with engagement campaigns.
  - ➢ Create a sense of urgency to the customers, by putting some of discounts on visits on particular time or a particular day.
  - ➢ This will dive more traffic to store.

- **Google shopping campaigns:** Google owns 92% of search engine market. Google Shopping ads are the main thing clients see, and they are additionally more unique than customary Google advertisements. Google Shopping highlights item pictures, valuing, dispatching data, and star evaluations. The genuine stunt is to utilize Google

Shopping efforts not withstanding other Google advertising systems.

- **Re-target customers:** It was proven that only 2% of the customer which visit website will purchase. There are such countless reasons why a client didn't choose to purchase on their first visit. They may have had more inquiries they required addressed first. Possibly they are holding for a very decent arrangement. Perhaps they outrageously need your item, yet it is not at the first spot on their list at this moment, and they were taking a gander at your site like window customers do in a shopping center.

   Retargeting ads should work to solve those potential points. For example, if it's the price, then an extra discount will sway them.

   Two main types of retargeting are:

   ➢ Using email lists

   ➢ Using a Facebook pixel on selected pages.


- **Use Influencer marketing for unique and value driven content:** Influencer showcasing is intended to be explicit, relatable, and individual. As clients need more pertinent substance, it's not difficult to perceive any reason why 65% of impact promoting spending plans are required to increment in 2022.

   Discovering credible influencers to advance the image, permits to acquire trust and enlist new clients. Instagram has been the home for most influencers. Instagram's expansiveness of client created content permits to discover influencers who are normal fits for vertical.

- **Buy online and pick up in store:** It is one of the most common method used by every big retailer as of the name suggests that a user or customer can buy online from the website of the retailer and can collect his or her item from the store. This allows store owner to advertise his products at two different platforms and by this he can pitch more product to the customer as customer has to visit store too for collecting the items. Store owner can track the activity of consumer on the web page and can give more discount on the product which customer has viewed but not purchased.

## 10.6 FACTORS FOR DECIDING THE RIGHT MARKETING MECHANISM

- **Goals:** Your choice of digital marketing channels depends on the goals you want to achieve. The goals can be: Brand awareness, creating new leads, improving online search ranking, increasing website traffic, improving conversation rate.

- **Budget:** Marketing costs contrast from one channel to another. Some offer apparatuses that you could use free of charge, while others must be utilized for an expense. All things considered, some others like paid hunt fall some place in the middle with execution showcasing benefits, where you possibly pay when somebody clicks your promotion.

- **Target Audience:** One approach to target explicit personas is to know on which channels they are generally dynamic or locked in. With this data, it is likewise simpler to think of channel that will target your crowd.

- **Competitors:** On the off chance that your rival is offering to clients through a specific advertising channel, you can either go a similar course and exploit that channel's current market or look the alternate route where there is less rivalry, in spite of the fact that you shall have to consider as well if there's sufficient chance for you to sell in less mainstream channels.

- **Functionality:** Contingent upon the size or nature of your business, you could conceivably require each one of those pleasant to-have highlights that a specific advanced advertising channel offers. Consider beginning with essential highlights and afterward increasing things once you see they're worth putting resources into.

## CHECK YOUR PROGRESS

VIII.   ……………….. are certain attribute of any goods or services that can't be assessed even after use/utilization/consumption.

IX.   Google owns 92% of search engine market. (True/False)

X.   In the retail industry ……………… is one of the major strategies to generate more revenues.

XI.   It has proven that only 2% of the customer which visit website will purchase. (True/False)

XII.   Discovering credible influencers to advance the image, permits to acquire trust and enlist new clients. (True/False)

XIII. ...............................has been the home for most influencers.

|   |   |   |   |
|---|---|---|---|
| a) | Instagram | c) | LinkedIn |
| b) | Facebook | d) | Snapchat |

## 10.7 ELECTRONIC CHANNELS

Electronic channels are becoming more and more popular day by day as there is no direct man to man interaction. Internet, e-commerce, telephone, television, etc. are the examples of electronic channels. For retailers, the internet has become the main commercial medium. Many efficient distribution services are provided by the internet. Industries such as financial services, software, data processing and economy dominated by the electronic activities distance is not important. The service firms provide movies on demand, banking and financial services, multimedia libraries, database, video conferencing facilities, etc. through electronic channels. The businesses and consumers are able to exchange the not only information, but also different kinds of products and services through internet. The World Wide Web has provided many opportunities in speed, price and comparability to meet the expectations of the consumers. Due to the global market, service companies have to improve the quality constantly to be in competition. Technology has become important as well as it links the service providers, distributors and the consumers. As compared to the traditional methods, the electronic distribution will gain a big market share in the future. Multichannel retailers and the pure players share the online shopping market share. Pure players are the companies which sell the products online and do not have stores. Multichannel retailers are those which supplement the conventional stores with the online services.

## 10.8 BENEFITS OF ELECTRONIC CHANNELS

- **Quality Control:** Through the electronic channels the service organisations can reach the consumers without any change in the standard package of the services. The electronic channels do not interpret the services. Whatever is designed is transmitted to the consumers. The centralized design of the service package is facilitated by the electronic channel which leads to better quality control.

- **Cost:** As compared to the human being the cost of distribution through the electronic channel to reach each consumer is low.

- **Customer Convenience:** The most important benefit of the electronic channel is convenience to the consumers. Through the electronic media the consumers can access whatever and wherever consumers want the service.

- **Distribution:** Through the electronic channels cost effective market coverage is possible.

- **Customer choice:** A wide variety of the services can be offered to the consumers, according to the choice of the consumers. Movies, cables programmes, etc. are some of the electronic channels offered by the service organisations.

## 10.9 THE DESIGN OF A SERVICE DISTRIBUTION SYSTEM

While designing the electronic channel it should be kept in mind that the execution of the system should be effective and efficient. If the execution is poor, even the strong and sound system will lead to negative or poor results. Distribution can be used as a strong weapon if it is designed properly. Following are the points which should be kept in mind while designing the distribution system.

- **Align the system properly:** Service principles, intermediaries and customers are involved in the indirect distribution system. The service principles design the business system planning which has many dimensions. In the process which involves service production, delivery and consumption, the dimensions such as personal and business and the customers personal and social dimensions play a very important role. To make the distribution system work effectively there should be proper alignment of the dimensions, intermediaries and the customers. The goals of the distribution system and the organisation goals should match.

- **Remember each part of the sales cycle:** "Before sales", "during sales" and "after sales" form the sales cycle of the organisation. "Before the sale" there is initial contact between the service sales employee and the customer. Service organisations should see that the location of the services is convenient to the consumers. This stage of the sales is mainly affected by the design of the service process and promotion methods used by the service organisations. "During the sale", the service firms try to facilitate the customer participation. During this stage of the sales cycle, the service firms should focus on the quality performance and they should try to perform right at the first time. In the last stage, i.e., "after the sale" the service organisations try to retain the customers through the customer relationships, customer complaint handling, service recovery strategies. If all the three stages of the service sale cycle are performed effectively and efficiently, these will have a positive impact on the quality perception of the consumers.

- **Balance retail and wholesale intermediaries:** The functions of the retailers and the wholesalers are different. Retailers come in direct contact with the consumers whereas the wholesalers are intermediaries between the producer and the retailers. So, both the retailers and the wholesalers require different skills. There should be a balance between the activities of the wholesalers and the retailers. The activities of both of them should be clear. For the efficient and effective working of the service firms, there should be a balance and coordination between the wholesalers and the retailers.

## CHECK YOUR PROGRESS

XIV.    Electronic channels are becoming more and more popular day by day as there is no direct man to man interaction. (True/False)

XV.    The ……………… has provided many opportunities in speed, price and comparability to meet the expectations of the consumers.

XVI.    The centralized design of the service package is facilitated by the electronic channel which leads to better quality control. (True/False)

XVII. ..................................can be used as a strong weapon if it is designed properly.

## 10.10 LET US SUM UP

In the era of digital economy Internet marketing strategies are the one that promote effectiveness and success of companies on the market. It is a fact that companies which nowadays are not present online are literally invisible for the consumers. And here comes the digital marketing. Well, marketing has been a part of our system since ages. In the earlier times too, people use to market their products by announcements and with the invention of printing press marketing becomes cheaper and easy as now one has to just print poster. With the passage of time marketing techniques has also been evolved. With invention of Tv and Radio era of advertisements came in and when social media gain its advantage there has been a numerous no. of new ways of advertising., These days ads put a vast impact on every person`s purchasing decision. These are ads only who create awareness about the product and tell its features. After creating awareness, they try to give a sense of urgency to the customer pitch their product. With the use of digital media, it has become very easy to figure out that which method of advertising works for one and which is not working. As we can track each and every visitor coming to our site from where he is coming what he is looking for what he

is purchasing and what he is looking but not purchasing. Digital marketing has given a significant insight to the companies that what planes should be made to have maximum no of sales and how we can increase our sales and can left our competitor far behind. As traditional methods of advertising were way costlier and more inefficient than the digital ones. So, with the passage of time they are losing their importance.

## 10.11 KEY WORDS

| | |
|---|---|
| PRINT MEDIA ADVERTISING | It includes advertisements through magazines, newspapers and pamphlets. |
| EVENT ADVERTISING | It involves presenting and advertising product via human commercials in a social gathering. |
| SEARCH ENGINE OPTIMIZATION | Search marketing strategies are used to increase any firm's presence online. |
| SEARCH ENGINE MARKETING | SEM is able to bring more visitor in a shorter period of time. |
| LANDING PAGE | It is the page where whole of traffic come from the campaign. |
| AFFILIATE MARKETING | This is a kind of Marketing based on publicizing where affiliate company will get commission for advancing another person's product or services on their site |
| CREDENCE QUALITIES | Attribute of any goods or services that can't be assessed even after use/utilization/consumption. |

## 10.12 ANSWERS TO CHECK THE PROGRESS

| | | | | | |
|---|---|---|---|---|---|
| I. | False | VI. | Deliverability | XII. | True |
| II. | Print | VII. | Landing Page | XIII. | Instagram |
| III. | Event Advertising | VIII. | Credence qualities | XIV. | True |
| IV. | Search engine optimization | IX. | True | XV. | World Wide Web |
| | | X. | Facebook ad | XVI. | True |
| V. | E-mails | XI. | True | XVII. | Distribution |

## 10.13 TERMINAL QUESTIONS

- What is digital marketing mechanism? What are the off-line marketing channels?

- Describe the digital marketing mechanism and discuss its channels.

- What is the role of product in digital marketing mechanism? Describe the characteristic of good and services.

- What are the digital marketing strategies for the retailing?

- Define the digital marketing mechanism. What are the factors important for effective digital marketing mechanism?

- How would you define the electronic channels and how they are beneficial for the business organizations?

BACHELOR IN COMMERCE (HONS.)

(Accounting and Taxation)

(BCB31205T): FUNDAMENTALS OF DIGITAL MARKETING

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UNIT-11  SEARCH ENGINES- GOOGLE, BING, YAHOO, VIDEO HOSTING AND ENTERTAINMENT- YOUTUBE, AMAZON PRIME, NETFLIX, HOTSTAR

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**STRUCTURE**

11.0 OBJECTIVES
11.1 SEARCH ENGINE
11.2 GOOGLE- MEDIUM OF MARKETING
11.3 HOW TO ADVERTISE ON GOOGLE
11.4 GOOGLE TOOLS FOR MARKETING
11.5 GOOGLE +
11.6 BING
11.7 BING MARKETING
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11.29 TERMINAL QUESTIONS

## 11.0    OBJECTIVES

**After studying the Unit, you would be able to**

- Learn how Search Engine work

- Understand the Google as Marketing tool
- Have knowledge about Google+, Bing, and Yahoo as marketing tool
- Explore video marketing and its tools
- Highlight the different platforms and strategies for video marketing
- Learn about YouTube and why customers like it most
- Understand the Video Hosting and its platforms
- Importance of Entertainment for customers and how digital marketing involve in it
- Have basic understanding for Netflix, Amazon Prime and Hotstar

## 11.1 SEARCH ENGINE

Searching is one of the most used moves at the internet. Search engines like Google as a tool, are very famous and mostly used websites. Website online proprietors use main search engines like Google and yahoo for filing their sites on it, and for searching. Regular users use number one search engines like Google essentially for looking, and every now and then for filing their Webpages.

Search engine help the customers to find out the required information to the take the purchase decision. In the search engine either we talk about Google, Yahoo or any other search engine the show the results of website of companies. The sequencing of the website all would depends upon the algorithm, SEO and SEM. The customers can visit the companies' website as per the click they would have on the given links on the search engine results pages. The companies have lot of paid and unpaid strategies to bring their companies' website at the top on the search engine research page.

In order to become expertise in SEO and SEM, at beginner stage you ought to learn how to use engines like Google for looking the information. Individual should know that there are two methods of looking: by handle ding customer questionnaire or by using the resources of class. If individual have keyword to describe about their work art than it will be easily to understand or learn about it.

## 11.2 GOOGLE- MEDIUM OF MARKETING

Marketing on google is done through the digital marketing tools used for search engine marketing, such as adwards, google analytics. Google helps to market the products through the google adwards and google analytics by payperclick to the companies who are

advertisers. Google marketing strategy is developed on the product qyality and usability but there are also other espects effects the marketing strategy.

## 11.3 HOW TO ADVERTISE ON GOOGLE

- **Create a account on google**:  First of all have to create an account on google and log in.
- **Setting of budget**: After logging into google ads, have to set daily budget for ads. It may be increase or decrease.
- **Set a location:**  later have to set location where we want to taget the market/customers.
- **Choose a network :** After that the next step is to choose a network.
- **Select keywords:** Keywords are very important in google marketing. Before any advertisement, we have to choose the proper and attractive keywords that's related to business and product.
- **Create ads:**  The last step would be to create and cast it.

## 11.4 GOOGLE TOOLS FOR MARKETING

In every second, there are around 40,000 quires o the google. So google search is the backbone of google bussinesses and processors.  It is a powerfull and effective search engine , where a lot of people search information on the daily bases. They also provide  various types of tools to the developers and marketers to develop their business.

**There are the basic uses of  google marketing**:
1. Improves SEO Ranking.
2. Build Brand awareness
3. Attract and engaged many people with brand.
4. Maintain and create brand reputation.

## 11.5 GOOGLE +

Google+ is a powerfull marketing tool as compare to other social networks. We can share informations, images and videos. It is a tool where marketers promote their goods and services and connect with other individuals and make good relationships with them. If a

marketer creates an attractive profile and pages of their business it attracts the new peoples and companies.

Google+ is Google's own social network, enabling brands to build relationships with prospects, customers, and other businesses. Similar to other networks, you can share information and images, promote yourself as an individual and if, used correctly.

- Google+ is a powerful search engine marketing tool for companies, influencers, and your own personal branding.
- Google can be a powerful social media marketing tool.
- The importance of Google+ should be assessed on an individual basis, as it is based on your unique appeal. If is thought to be of benefit to your brand, it should be used as part of your overarching social media strategy.

So, Google+ is Google's flagship social network, allowing users to connect easily and often, through interests and friendship. It's not an independent service, instead, it is integrated and connected through all Google services as part of the ecosystem.

Interactions with individuals or companies are based on profiles or pages. Understanding google+ in many respects, Google+ is more of an `information network` than a social network.

## 11.6 BING

Under the leadership of the Ballmer company, Microsoft try to design new products or a new service and in this try they make a software Bing in 2009 they started this search engine Bing. Bing come with new features of software and also helps in marketing.

## 11.7 BING MARKETING

Bing has been used for advertising and promotion of goods and services by the business organisations. Markets have been taking the help from the Bing to promote their products and customers have been getting the information regarding the products and services.

**Benefits for advertisers**

- Bing face less competition
- Bing is economical than other

- Provide more and more options
- Help to tackle target consumers
- Provide control facilities
- Provide more transparency in the process
- Provide information about the demographic
- Handle many of consumers

**CHECK YOUR PROGRESS**

I.    ……………. help the customers to find out the required information to the take the purchase decision.

     a.  Emails                          c.  Search Engine

     b.  Blogs                            d.  All three

II.   Website online proprietors use main search engines like Google and yahoo for filing their sites on it, and for searching. (True/False)

III.  YouTube helps to market the products through the google adwards and google analytics by payperclick to the companies who are advertisers. (True/False)

IV............................is a powerfull and effective search engine , where a lot of people search information on the daily bases.

V.    Google+ is Google's own social network, enabling brands to build relationships with prospects, customers, and other businesses.

     a.  Blogging                       c.  Google +

     b.  YouTube                       d.  Search Engine

VI.   Bing has been used for advertising and promotion of goods and services by the business organisations. (True/False)

## 11.8 YAHOO

Yahoo is a brand with related to research, predicts, crate and associates in the motion brand shows the new achievements and the way of doing work and yahoo logo is made from wordmark. This is organized as the dictionary and the web index which help to search by most of people in march 1994 the web name as jerry and David 's Guide to the world wide web as the name Yahoo.

Later this is known as Yahoo dictionary and also the domain name is set for yahoo is the Yahoo.com

- In yahoo, advertisers can make the small chat group for the advertising.
- In yahoo can find best types of keyboard .
- Yahoo is automatically rolling the ads and advertisers can select the best platform for there advertisement.
- Yahoo search marketing is used by most of advertisers.
- Send the users to related pages and help to optimize website.

## 11.9 PRODUCT AND SERVICES OF YAHOO

- Yahoo! home page - This is the main page is main home page
- My Yahoo!
- Yahoo! Auctions
- Yahoo! Developer Network
- Yahoo! Entertainment
- Yahoo! Lifestyle
- Yahoo! Mail This is mail developed by the yahoo and there is for type of mail developed by yahoo
- Yahoo! Maktoob
- Yahoo Mobile
- Yahoo Movies
- Yahoo! News
- Yahoo! Research
- Yahoo! Smart TV
- Yahoo Sports
- Rivals.com
- Yahoo! Gemini,
- Yahoo! Search
- Yahoo! Shopping
- Yahoo! Small Business

- Yahoo search
- Yahoo video

## 11.10 VIDEO MARKETING

Video marketing is a part of marketing, by the means of which a company communicate the features of its product and services to its potential consumers. The basic objective of marketing by video is to convert the potential consumers to real time consumers.

A video is a representation of visual images with background music. Videos can consist of different pictures which changes with the frame per second. It is said that a picture says thousand words. Video is considered as the most effective Way to grab attention of the people. We humans, remember the thing visually more than remembering them by listening or talking. Companies promote their product or services by adding the information about their product in tits and bits of the video. A video could engage the consumer in a story and promote its product through it. Many companies try to hit the audience on the emotional part and try to connect to them.

### 11.11 EVOLUTION OF VIDEO MARKETING

Before the evolution of web, there were very limited options for the companies to introduce their product in the market. Companies used to beg the mainstream media that were television channels to play their advertisements on it and tell the story to the customers on the behalf of company. But now, with the evolution of internet, there are plenty of options to showcase the product promotional videos.

### 11.12 TOOLS OF VIDEO MARKETING

There are a lot of video marketing software which helps a manager to create a perfect marketing video for his product and services.

- **Flipagram:** Flipagram is a video editing software which combines the images to create short video stories. It is very easy to use and perfect for those videos which are going to be posted on Instagram and Facebook. This tool is available on the different operating software like play store and apple app store since 2014 for free. It is one of the popular editing apps.

- **Stop Motion:** Stop Motion is really instinctive and will help to make amazing videos with this technique. This application is available for iOS and has features of green screen, image import and sound effect. This application can be used on phone as well as on laptops. This is a paid application, which helps to edit the video frame by frame while watching. It contains the new feature of thumb menu to control all the editing options available for each frame.

- **YouTube Editor:** This interesting tool is integrated by YouTube, which is available for free. It contains the interesting editing capabilities. Transcripts and annotations can be added to the videos to make them look interesting and search engine optimization friendly. It makes the editing easy as well as promotes the YouTube as a platform for uploading videos.

- **Animoto:** It is one of easiest apps to use for video editing. One can create a sunning video in just three simple steps:
    - ➢ Add pictures and videos
    - ➢ Customize video by adding music, style, text and other features of choice
    - ➢ Upload it to website

In this video is ready in just few minutes and the application works for both editing and sharing videos.

- **WeVideo:** WeVideo is the web-based video editor which helps to create digital stories though still photographs. It also allows to voice over during the video plays. One can crop pictures, add text to the slides and edit audio files with the help of this app. Moreover, this application is available on mobile, so that you can get your videos edited on the go.

- **PowToons:** PowToon is free application for creating animated videos and presentations, which can be showcased on website and can be shared on social media handles. This app provides wide range of templates, characters, backgrounds and transition effects. It allows the user to create its own template from scratch.

- **Picovico:** Picovico is an amazing online tool that automatically creates the slideshow of the photos and videos, in the matter of few seconds. The main exciting features are voice-over, video clips, and pre-defined video templates. The videos created with the help of this app can be exported to any device and allows to upload directly to social media handles. It offers videos for professional and well personal use and API option for heavy size videos.

- **Wideo:** Wideo is easy and fun to use as it offers the selection of templates, which can be customize to deliver message or just create own template from scratch. Moreover, you can create your own logos and add them into videos to make it more interesting. This app is also available in a lite edition as well.

- **Stupeflix:** Stupeflix is a great video editor around for mixing photographs, videos and music. It features wide selection of beautiful themes, which can be used for making the video making process quicker. Photos, videos, as well as text, a soundtrack, and even maps could be inserted with the help of this app. There is feature where two people can voice-over the video at the same time. After completing the video, you can post your videos on YouTube or on website and can download it. Stupeflix is a website which also available in the form of an app.

- **Sellamations:** There are very few applications and software which offers the animation feature and sellamations is one of those. It would be the best to choose this out of others. Doodle animations which are very attractive and fun to watch, can engage the viewers, can be done in this software. One can create fully customize specially for your brand and add that to your video. This software beneficial for professional voice-overs and script writing.

## 11.13 PLATFORMS FOR VIDEO MARKETING

Now, in the era of digitalization there are billion option to post videos, all that can become the way for promotion and marketing of a product by the means of video.

- **YouTube**: It is one of the most used app now a days. This platform provides the opportunity to share videos for free. Brands create there channels and post the videos for advertising there product and services. YouTube creates a lot of public engagement for brands. For example, t-series which is a music company has account on YouTube, they continuously keep posting the new songs on YouTube and made its mark with having most subscribers all across the world. YouTube has created a lot value in similar way for many brands. There is an another way marketing is done on YouTube which is, the youtubers who post videos regularly and become famous, brands approach them to use their product and review them in there videos. This encourage the subscribers of that particular youtuber to buy your product and lend your services.

- **Instagram:** There may not anyone to not have an Instagram accounts. This is one of the most used app all over the world. The most common way to promote brand or product is to ask brand ambassador to make a video while using the product and post that on their official accounts. It helps the audience to get products and services and boost up sales. The other way is to make an account of brand and post videos there. It will increase the brand value and more people will get to know about product.

- **TickTok**: This is one of most popular apps among the people. Specially, teenagers really enjoy making videos on it. This application offers to make videos while using the background music. Brand have find their way to get the best use of this for marketing. They approach the creators who have a large number of followers and ask them to make the videos on the official sound tracks of the brand in an interesting way. They are asked to make a particular hashtag which is to be written in the caption of the video. When people make videos on the same track inspired from famous creators, the hashtag comes in the top used trending lists. This helps to gain lot of new customers to the brands and add on to the value and goodwill of the brand. For example, recently Coca-Cola made a new track for its video and it was in trending on TickTok also.

- **Television:** It has been the most traditional platforms for advertising the products. But, it have been working good even after the evolution of wide range of social media apps. Primarily, videos were made only to be played on television screens for promoting the products and services.

## 11.14 VIDEO MARKETING STRATEGY

There are some points which one need to take account of while making video for marketing purpose.

- **Allocation of resources:** For making the video, planning is going to be the first step. We need to plan and to set a budget for it. Things at least required are a decent equipment, a good editing software, a marketing agent for a good team and most important element, time to create it.

- **Storytelling:** Storytelling is the most important element for making the video. Brainstorm the ideas to decide what story you want to tell, the way it is going to be told and how you will show product in that story. Select the most suitable story that shows the best of your product.

- **Audience engagement:** Telling a great story is not the only that you need to do, you must engage audiences while you do so. There must be some elements in video which could hook the customer throughout the video and to make them watch it till the end.

- **Duration of the video:** There is not a fix duration for the marketing videos although there are recommendations for it. But generally, it is believed that shorter the video is, better it is. Be very carefully will editing, cut everything unnecessary out and keep the major content in such a way that whole attention of the customer goes towards the product. Attention spans are short, so make the best that can be made out of it.

- **Publishing the video:** Use the wide range of platforms to upload videos and to promote product and services. The different platforms for video marketing are YouTube, whatsapp, Instagram, Facebook etc. The most effective way that could be possible to make video reach the most number of people, when the brand ask its brand ambassador to upload the video on their official accounts.

- **Analysis:** Track the statistics of video and to determine that when the video perform at its best. Identify the reasons for its best performance, so that you can add those elements in the future promotional projects.

## CHECK YOUR PROGRESS

VII. ………………. is a part of marketing, by the means of which a company communicate the features of its product and services to its potential consumers.

VIII. ………………. is considered as the most effective Way to grab attention of the people.

    a. Email                   c. Video

    b. Blog                    d. All three

IX. …………….. is a video editing software which combines the images to create short video stories.

    a. WeVideo             c. Flipagram

    b. Animoto             d. All three

X...........................is available for iOS and has features of green screen, image import and sound effect.

XI. …………….. is the web-based video editor which helps to create digital stories though still photographs.

    a. WeVideo                   b. Animoto

c. Flipagram                      d. All three

XII. Under……………. the most common way to promote brand or product is to ask brand ambassador to make a video while using the product and post that on their official accounts.

## 11.15 YOUTUBE

As we all know YouTube is a video sharing service where we can access to various videos. People can watch, share, like and download videos from YouTube. We can access videos through smart phones, PCs, laptops etc.

For teenagers it is an entertaining and learning source as well. As a teen, we can discover things which we like. For young generation, it is a source for watching movies, comedy shows, life hacks as well as a good source of education. Users can also create their personal YouTube channel and subscribe the channel which they want. As it is a video sharing website, that makes it easy to watch online videos.

YouTube was started by three employees of PayPal online payment service. They are Jawed karim, Chad Hurley and Steve Chen. YouTube was first launched in the year 2005. It gained so much popularity very fast and has now become one of the most visited websites in the history of internet. According to one of the data, it is seen that visitors watch around 6 billion hours of data every month.

We can find all kinds of videos on YouTube. There is always something new to watch on YouTube. Google has purchased YouTube in 1.65 million dollars. Why you should use it, depends on how you check out the site and see what you can get out of it.

YouTube is a video platform that is driven by two types of users:

- **Video Creator:** Video Creators are those people who have their YouTube channels and upload videos for viewers.
- **Video Viewers:** Video Viewers are those people who watch videos, interact videos and subscribe to channels.

You can be both a creator and viewer. YouTube is for everyone, whether you are an individual who is looking for entertainment stuff/creative stuff or CEO of an organization with a large budget for a video ad campaign.

Although it's user base ranges from young to older generation. There are almost 50 different languages on YouTube and a wide variety of content. Since it is owned by Google, all you need is a Google account to access you tube.

## 11.16 A BRIEF HISTORY OF YOUTUBE

In 2005, a content and photo sharing sites were more, the founder of YouTube noticed a problem that there was an explosion in the number of expensive and inexpensive ways to capture videos but there wasn't a good way to share videos.

On 14<sup>th</sup> February 2005, Hurley registered the trade mark, logo and domain of you tube. Three months later, in May 2005, a small group of early employees launched a site www.youtube.com. In November 2005, Sequoia capital gave funding to you tube. In December, YouTube officially become a corporation.

The first office of YouTube was located above a pizzeria and Japanese restaurant in San Mateo, California. Over a tine, YouTube has become popular, its employees increased which led to formation of chain. In October 2006, Google came knocking at the door. At the time YouTube had 65 employees. On the day, the acquisition was announced YouTube moved into a former GAP Office in San Bruno, California. The much-discussed deal was settled one month later.

There wouldn't be a YouTube without PayPal. YouTube was created by three former PayPal employees, staffed by other employees of the company and bankrolled by the people who used to work at PayPal which was launched in 1998.

All knowledge which Karim got from PayPal was summed up in two words "STAY FLEXIBLE". This mantra has guide YouTube to gain success and popularity in the world.

Today, YouTube is the largest online video destination in the world and third most visited website overall. This site almost got 2 billion views a day. Nearly about the prime-time audience of all three majors US network combined. This platform comprises the largest video sharing community in the world and includes users, advertisers and over 10,000 partners.

## 11.17 WHY AUDIENCE SHOULD USE YOUTUBE

There is wide variety of videos on YouTube. You can either watch videos or create videos. It is a source of entertainment, learning for the people who want to start their own business. It is

the cheapest way for advertising. When it comes to marketing, we can easily give information about product and services to the users. YouTube is a great tool for getting your product in market in very low cost.

For singers and the person who creates music, this is the best way to reach the public. Earlier it was really very difficult to show talent to the public but YouTube made it easy in very little cost.

When a music creator creates a video with the help of public reviews and comments, he can easily know what public think about the video and can make changes as per public demand. Audience can also subscribe channels for regular update. So that whenever a person uploads any video, audiences get a notification of that. So, when you put a new video song on your channel, the people who are interested in your music can follow.

We can not only watch videos in fact it is also very easy to download video from YouTube. It is relatively easy and fast but depends on internet connection.

For watching videos all you need is to search for a particular video which we want to watch. We can easily access to the video. When it comes to the trending videos it is on the top of the you tube, so we can easily get updated about the trending videos on YouTube.

Video files are often very large and it takes time to send the whole video but with the help of YouTube we can easily share a video simply by sending other person a URL link, that is the address of the relevant internet page.

Nowadays, the term 'Viral Video' is common. Viral videos are the video clips that people have liked and shared too much by e-mails with millions of people around the world.

 Companies have realized that they can harness this ability and can easily reach potential customers. So, companies started creating their own YouTube accounts for posting advertisement and other marketing video.


## 11.18 HOW TO KEEP AUDIENCE AWAKE

For any video creator the most important task is to keep the audience awake. Probably many of the users who are watching videos are tired. So, it is very much important for a you-tuber to help them stay awake, to actually pay attention and consider what they are saying.

First of all, tell your audience what they will get from your talk, so that the users time can be saved. We can use various strategies for this purpose:

- SPEAK LESS THAN THE TIME ALLOTED: When a you-tuber present any video, it is necessary that he gives great information in very short period of time. To attract the audience you can say that "I know I have total time of 20 minutes but I will only talk for 10 minutes. This will surely attract the audience and make them happy not to have to listen as long as they expect.

- USE SILENCE EFFECTIVELY: When we make a statement we have to wait in silence to see how people receive it. It is necessary for the user to use silence effectively. Don't throw more words and statement without giving your audience the chance to understand each sentence.

- EMPHASIZE KEY WORDS: It is necessary that the speaker should not speak in the same tone throughout the entire presentation because due to this no one understands what is really important. Make it obvious to your audience that what they really need to pay attention to.

- USE NUMBERS AND EMPHASIZE THEM:  A person can pay much more attention when we use number strategies to solve this situation like "Number 1…., Number 2…." Every time when we say a number, it reengages audience's attention and helps their brain to listen.

- ADD SOME EMOTION OR HUMOR TO YOUR TALK: To engage audience and make topic interesting, we can use emotional words like "I am excited today to be here to tell some good news" etc.

- DO SOMETHING UNEXPECTED:  In every video, do something unexpected so that it make the interest of the users. Like you can ask from the audience to give their views on the topic. This will surely change the energy. People start talking and come to some understanding before he went on.

## 11.19 VIDEO HOSTING

Video hosting platform is also known as video sharing platform. It provides a platform for businesses and individuals to share video. The video hosting platform handles video streaming and playback, providing users with a seamless video experience. It also helps to increase the traffic to the website. In addition to these advantages, a good hosting platform

offers: Content security, Thumbnail management, adding subtitles, Basic analysis So far, everything looks good. Video hosting platforms allow to post videos online, increase engagement and provide excellent visibility to content. Therefore, we can customize video player (using a hosting platform), customize video, and understand audience.

## 11.20 VIDEO HOSTING PLATFORMS

- YouTube
- Vimeo
- Amazon Prime
- Netflix
- Hotstar
- Facebook
- Hippo Video
- Moj

## 11.21 ADVANTAGES OF VIDEO HOSTING

The biggest advantage of online video hosting is that videos can be shared in multiple locations and managed from one control panel at the same time. This means you can get the best experience with the least amount of effort and share it widely. This will help you create more videos and achieve better results. Here are some of the benefits of video hosting platforms: Great viewing experience. You can sharpen the video hosting image (adapted to your device) and control the video player. Time-saving tool. Hosting services can do a lot to automatically download videos. If necessary, you have the option to compress the video and automatically encode it for viewing on other devices. Otherwise, you have to remember that Windows Explorer requires H.264 codec and Google Chrome requires Webm codec. Video marketing is more effective. If you can manage all your videos

- **Save time with integration:** The hosting platform can be integrated with other apps, so you can target videos to different channels. You can also edit them after posting, or download them quickly if needed.
- **High availability:** The hosting platform plays videos in data centres around the world, so you can access them simultaneously in multiple countries. Hosting offers automatic backups. When a site goes down, the video doesn't go anywhere else.

## 11.22 ENTERTAINMENT

In today's fast-paced Internet world, entertainment is the most stressful part of everyday life. Entertainment falls into several categories such as television, films, music, animation, games, etc. The biggest challenge in the media and entertainment industry is attracting viewers and increasing fan base. Increased use of smartphones and lower costs of accessing digital data have led to increased competition. Today, billions of people have access to social channels like YouTube, Facebook, Twitter, Instagram, Pinterest and more. It makes it easy to promote movies, music albums and short films.

## 11.23 USEAGE OF DIGITAL MARKETING TO PROMOTE THE ENTERTAINMENT INDUSTRY

YouTube and social media are the largest platforms helping to advance the entertainment industry. Let's take a closer look.

- YouTube Marketing: YouTube is the second largest search engine reaching millions of people making huge profits from this platform. You are more likely to get into the 18-49 age group using mobile devices than television. It is the largest platform in the entertainment industry to instantly receive updates from people and connect with them via video.
  - ➢ Put your video in the best place when people are looking for video content.
  - ➢ Place multimedia and entertainment ads alongside other popular videos for your category. Improving YouTube video views and sharing.
  - ➢ Increase the likes and subscribers of your YouTube channel.
  - ➢ Build your YouTube channel brand.
- Social media marketing: through more forms of entertainment channels.


## 11.24 BENEFITS OF DIGITAL MARKETING TO THE ENTERTAINMENT INDUSTRY

Digital marketing is growing rapidly and many industries have benefited from it. Now, let's take a look at the biggest benefits of digital marketing in the entertainment industry.

- Reach a large audience.
- High-yeld investment program (HYIP) for upcoming entertainment and media updates.

- Find the best followers for your entertainment fans.
- Make a good impression of your project.
- Encourage the audience to participate in viewing the media.

## 11.25 AMAZON PRIME, NETFLIX AND HOTSTAR

Netflix and Amazon Prime's core business strategy is that users will have to browse both apps and continue to pay more for a membership. The competition is intensifying and it is up to someone to decide which application to choose and why. When people can make payment transactions online and they become available, they will hesitate when they read both reviews, which means that the two applications will vibrate and create strong competition with each other.

Amazon Prime Video and Netflix are two of the most popular streaming services in the United States. The more people are interested in streaming online, the more competitive the market will be. This confusion has led many consumers to wonder which of the two players in the code-shortening industry is better. Netflix v/s Amazon Prime Video: Which Streaming Service Is Better?

Of course, both services have different content, so having both is not a bad idea. However, if you only use one, it can be difficult to choose between the two. If you decide to use Netflix or Amazon Prime Video, the following part provides a detailed description of both services so you can decide which one is best for you.

**Netflix v/s Prime Video Functionality**

The Netflix Experience: Online Payment Service AlphrHOME, PAYPALNetflix vs. Amazon Prime Video: Which Streaming Service Is Better? Kassandra, December 24, 2020 Amazon Prime Video Email and Netflix are two of the most popular streaming services in the United States. The more people are interested in streaming online, the more competitive the market will be. This confusion has led many consumers to wonder which of the two players in the code-shortening industry is better. Netflix vs Amazon Prime Video: Which Streaming Service Is Better? Of course, the content of the two services is different, so it's not a bad idea for both. However, if you only use one, it can be difficult to choose between the two. If you decide to use Netflix or Amazon Prime Video, this article provides a detailed description of

both services so you can decide which one is best for you. Freestar Netflix vs. Prime Video Netflix Experience Netflix is mostly digital nowadays. Use

The Prime Video Experience: At the bottom of the list is the Show All option, which does not include Netflix. There is a lot of free content on this service, but some movies and shows charge additional fees for rentals, third-party subscriptions, or purchases. However, Prime members can see a long list of available Prime content.

**Netflix v/s Prime Video Price Comparison**

Netflix vs Prime Video Price Comparison Netflix and Amazon Prime Video offer at least a 7-day trial, but often you can use it for 30 days. If you want to give it a try before you buy, this is your chance to see what each product has to offer and how it works. If you're a student, Amazon also offers a 6-month free trial. So, if you are still learning, there is no reason not to use Amazon Prime Video.

As mentioned earlier, Netflix charges a monthly fee, while Prime Video offers several options. With Prime Video, you create an account and only buy the content you want to watch, or pay monthly or yearly for your Amazon Prime account. If you choose Amazon Prime, you get free 2-day shipping, Prime Music Service, and more.

**Hotstar**

Hotstar is an Indian video streaming service owned and operated by Star India, a subsidiary of Walt Disney Company India. This service mainly includes content from the Star India and Fox networks, including films, TV shows, sports content and original programming, as well as third-party content such as HBO, Showtime and Sony Pictures.

Hotstar operates international versions of the service in Canada, Singapore, the United Kingdom and the United States. The service is aimed at overseas Indians and is mainly focused on Star India home entertainment and sports content (Disney is a self-service in this market). Disney's Star has expanded the integrated version of the Disney service to other markets such as Indonesia and plans to launch the service in Malaysia, the Philippines and Thailand in 2021.

Hotstar, India's leading OTT platform, and Zapr Media Labs, a media technology company, today announced a strategic partnership to promote India's next generation mobile audience analytics. In a development process that will appeal to advertisers and agencies, the two

companies will work together to create a deeper understanding of mobile audiences that brands can use to create personalized communications and offerings.

Internet access in India has skyrocketed in recent years, especially on mobile screens, but mobile marketing is constrained by the lack of platforms for active user engagement and audience segmentation. While many brands have invested a lot of money in mobile in recent years, especially with banner and display ads, marketers have been frustrated by the lack of online brand building tools that can be used to conduct in-depth audience analysis. With an obvious leap towards digital marketing, this partnership could lead to more rigorous audience analysis and greater accountability for results in the mobile marketing world.

**CHECK YOUR PROGRESS**

XIII. .....................was started by three employees of PayPal online payment service.

    a. YouTube                c. Instagram

    b. Email                    d. FaceBook

XIV. Video Viewers are those people who watch videos, interact videos and subscribe to channels. (True/False)

XV. ...........................platform is also known as video sharing platform.

XVI. Amazon Prime Video and Netflix are two of the most popular streaming services in the United States. (True/False)

XVII. Hotstar is an Indian video streaming service owned and operated by Star India, a subsidiary of Walt Disney Company India. (True/False)

**11.26 LET US SUM UP**

Searching is one of the most used moves at the internet. Search engines like Google as a tool, are very famous and mostly used websites. Website online proprietors use main search engines like Google and yahoo for filing their sites on it, and for searching. Regular users use number one search engines like Google essentially for looking, and every now and then for filing their Webpages. Google helps to market the products through the google adwards and google analytics by payperclick to the companies who are advertisers. Google marketing strategy is developed on the product qyality and usability but there are also other espects effects the marketing strategy. Google+ is a powerfull marketing tool as compare to other social networks. We can share informations, images and videos. Under the leadership of the

Ballmer company, Microsoft try to design new products or a new service and in this try they make a software Bing in 2009 they started this search engine Bing. Bing come with new features of software and also helps in marketing. Yahoo is a brand with related to research, predicts, crate and associates in the motion brand shows the new achievements and the way of doing work and yahoo logo is made from wordmark. This is organized as the dictionary and the web index which help to search by most of people in march 1994 the web name as jerry and David 's Guide to the world wide web as the name Yahoo.

Video marketing is a part of marketing, by the means of which a company communicate the features of its product and services to its potential consumers. The basic objective of marketing by video is to convert the potential consumers to real time consumers. There are a lot of video marketing software which helps a manager to create a perfect marketing video for his product and services. As we all know YouTube is a video sharing service where we can access to various videos. People can watch, share, like and download videos from YouTube. We can access videos through smart phones, PCs, laptops etc. For any video creator the most important task is to keep the audience awake. Probably many of the users who are watching videos are tired. So, it is very much important for a you-tuber to help them stay awake, to actually pay attention and consider what they are saying. Video hosting platform is also known as video sharing platform. It provides a platform for businesses and individuals to share video. The video hosting platform handles video streaming and playback, providing users with a seamless video experience. It also helps to increase the traffic to the website. In addition to these advantages, a good hosting platform offers: Content security, Thumbnail management, adding subtitles, Basic analysis So far, everything looks good. In today's fast-paced Internet world, entertainment is the most stressful part of everyday life. Entertainment falls into several categories such as television, films, music, animation, games, etc. The biggest challenge in the media and entertainment industry is attracting viewers and increasing fan base. Increased use of smartphones and lower costs of accessing digital data have led to increased competition.

## 11.27 KEY WORDS

| | |
|---|---|
| **SEO** | Digital marketing tool to have high ranking for the company's website. |
| **GOOGLE+** | It is a tool where marketers promote their goods and services and |

| | |
|---|---|
| | connect with other individuals and make good relationships with them. |
| **VIDEO MARKETING** | It is a part of marketing tool to communicate the features of product and services to its potential consumers. |
| **FLIPAGRAM** | It is a video editing software which combines the images to create short video stories. |
| **WEVIDEO** | It is the web-based video editor which helps to create digital stories though still photographs. |
| **VIDEO CREATORS** | These are those people who have their YouTube channels and upload videos for viewers. |
| **VIDEO VIEWERS** | These are those people who watch videos, interact videos and subscribe to channels. |
| **VIDEO HOSTING** | It is a platform handles video streaming and playback, providing users with a seamless video experience. |

## 11.28 ANSWERS TO CHECK THE PROGRESS

I.     Search Engine

II.    True

III.   False

IV.    Google

V.     Google+

VI.    True

VII.   Video marketing

VIII.  Video

IX.    All three

X.     Stop Motion

XI.    WeVideo

XII.   Instagram

XIII.  YouTube

XIV.   True

XV.    Video hosting

XVI.   True

XVII.  True

## 11.29 TERMINAL QUESTIONS

- What is search engine and how it contributes for the promotion of products and services?
- How Google is useful marketing tools for marketers? How marketing is done under Google? What are the tools of Google?
- What is Google+ and Bing? How they are useful tool for the business organizations?
- What is Video Marketing? Highlight the platforms used for promotion of products and services.

- Discuss the various tool video marketing used by the markets for marketing and what are their features?

- How YouTube has been emerged as one of the best marketing tools in the online market?

- What is video hosting and what are its benefits? Discuss the different platform for video hosting.

- Why entertainment in important for the customer and how Netflix and Hotstar contribute for the same?

**The Motto of Our University (SEWA)**

**S**KILL ENHANCEMENT

**E**MPLOYABILITY

**W**ISDOM

**A**CCESSIBILITY

# JAGAT GURU NANAK DEV
# PUNJAB STATE OPEN UNIVERSITY, PATIALA

# BACHELOR OF COMMERCE (Hons.)
## (Accounting and Taxation)

# COMPULSORY NON-CREDIT COURSE

# SEMESTER-II

# HRB31206T
# HUMAN RIGHTS AND DUTIES

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**JAGAT GURU NANAK DEV PUNJAB STATE OPEN UNIVERSITY, PATIALA**
**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

## PREFACE

Jagat Guru Nanak Dev Punjab State Open University, Patiala was established in December 2019 by Act 19 of the Legislature of State of Punjab. It is the first and only Open University of the State, entrusted with the responsibility of making higher education accessible to all, especially to those sections of society who do not have the means, time or opportunity to pursue regular education.

In keeping with the nature of an Open University, this University provides a flexible education system to suit every need. The time given to complete a programme is double the duration of a regular mode programme. Well-designed study material has been prepared in consultation with experts in their respective fields.

The University offers programmes which have been designed to provide relevant, skill-based and employability-enhancing education. The study material provided in this booklet is self-instructional, with self-assessment exercises, and recommendations for further readings. The syllabus has been divided in sections, and provided as units for simplification.

The University has a network of 89 Learner Support Centres/Study Centres, to enable students to make use of reading facilities, and for curriculum-based counselling and practicals. We, at the University, welcome you to be a part of this institution of knowledge.

Dr. G S Batra,

Dean Academic Affairs

# BACHELOR OF COMMERCE (Hons.)
## (Accounting and Taxation)
## HUMAN RIGHTS AND DUTIES

## SEMESTER-II
## (HRB31206T) (COMPULSORY NON-CREDIT COURSE)

**MAXMARKS:100**
**EXTERNAL:70**
**INTERNAL:30**
**PASS:40%**

**Objective:**
The objective of the course is to impart Learners basic knowledge about human rights as well as duties, and to enable them to meet challenges of human rights violations.

**INSTRUCTIONS FOR THE CANDIDATES:**
Candidates are required to attempt any two questions each from the sections A, and B of the question paper, and any ten short answer questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

### Section A
(Introduction to Human Rights)

**Unit I- Foundational Aspects:** Meaning, Characteristics; Classification; Generations of Human Rights.

**Unit II-Constitutional-Legal Recognition in India:** Fundamental Rights; Directive Principles of State Policy.

### Section B
(Introduction to Human Duties)

**Unit I- Conceptual Perspective:** Meaning, Nature & Characteristics of Human Duties; Classification of Human Duties; Relevance of Human Duties.

**Unit II- Recognition to Human Duties in India:** Fundamental Duties in Indian Constitution Part IV A.

**Suggested Readings:**

1. United Nations. The United Nations and Human Rights 1945-1995. Geneva: United Nations Blue Books Series, Vol. VII, 1996.
2. Sastry, S. N. Introduction to Human Rights and Duties. Pune: University of Pune Press, 2011.
3. Mertus, Julie. The United Nations and Human Rights-A Guide for a New Era. London: Routledge, 2009.
4. Donnelly, Jack. Universal Human Rights in Theory and Practice. New York: Cornell University Press, 2013.

# BACHELOR OF COMMERCE (Hons.)

## (Accounting and Taxation)
## HUMAN RIGHTS AND DUTIES

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7.  Deol, Satnam Singh. Human Rights in India-Theory and Practice. New Delhi: Serials Publications, 2011.

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**(Established by Act No. 19 of 2019 of the Legislature of State of Punjab)**

# BACHELOR OF COMMERCE (Hons.)

# (Accounting and Taxation)

# SEMESTER-II

### HRB31206T: HUMAN RIGHTS AND DUTIES
### COURSE COORDINATOR AND EDITOR: DR. SUKHPAL KAUR

## SECTION A

| UNIT NO: | UNIT NAME |
|----------|-----------|
| UNIT 1 | FOUNDATIONAL ASPECTS |
| UNIT 2 | CONSTITUTIONAL-LEGAL RECOGNITION IN INDIA |

## SECTION B

| UNIT NO: | UNIT NAME |
|----------|-----------|
| UNIT 1 | CONCEPTUAL PERSPECTIVE |
| UNIT 2 | RECOGNITION TO HUMAN DUTIES IN INDIA |

# BACHELOR OF COMMERCE (Hons.)

## (Accounting and Taxation)

### SEMESTER-II

### COURSE: HUMAN RIGHTS AND DUTIES

### UNIT 1: MEANING; CHARACTERISTICS; CLASSIFICATION; GENERATIONS OF HUMAN RIGHTS

## STRUCTURE

## 1.0 OBJECTIVES:

The objective of this lesson is to demonstrate an understanding of the meaning and nature of human rights. It further provides details about various types of classification of human rights. It will also apprise the reader with the historical evolution of human rights as three generations of rights.

## 1.1 <u>INTRODUCTION:</u>

In last few decades human rights have come to the centre stage within the theory and practice of international law and politics. Human rights are an integral part of every human being and form an integral part of the social cultural fabric of mankind. These are essential rights which every human being requires to lead a dignified life. Rights are the touch stones of political legitimacy. Their possession by citizens of a state qualifies it as a democratic and non-democratic state. Rights as a Bosanquet stated "is a claim recognised by the society and enforced by the state". The society recognises the claims of individual but it is the coercive sanction of the state that gives the right the legal recognition. Leski stated that "Rights in fact are those conditions of social life without which no man can see in general to be himself at his best". He further added "every state is known by the rights it maintains". According to Article 1 of the Universal Declaration of Human Rights "All human beings are born free and equal in dignity and rights." This substantiate the fact that everyone is entitled to these rights irrespective of their caste, class, race, religion, gender, place of birth, or any other consideration. These are rights that allow us to develop fully and use our human qualities, our intelligence, our talents and our conscience to satisfy our spiritual and other needs. The purpose of this chapter is to give a brief outline of the meaning, nature and scope of human rights. It will also elaborate how various rights have been classified internationally.

## 1.2 <u>DEFINING HUMAN RIGHTS:</u>

The concept of human rights is based on the belief that every human being is entitled to enjoy her/his rights without discrimination. Various academicians and Jurists have defined Human Rights differently. **Milne** argues that "Human rights are simply what every human being owes to every other human being and as such represent universal moral obligations. These rights can be summarised as the right to life, to freedom from unprovoked violence and arbitrary coercion, to be dealt with honestly, to receive aid in distress, and to be respected as a human person". Some of the other definitions of human rights have been mentioned below.

**Susan Moller Okin** states that human rights is "*a claim to something (whether a freedom, a good, or a benefit) of crucial importance for human life*".

**According to the United Nations Centre for Human Rights:** *"Human Rights could be defined as those rights which are inherent in our nature and without which we cannot live as human beings".*

**According to DD Basu:** *"Human rights are those minimum rights which every individual must have against state or other public authorities by virtue of his being a member of human family, irrespective of any other consideration".*

**According to MH Beg (former Chief Justice of India):** *"Human Rights imply justice, equality and freedom from arbitrary and discriminatory treatment. These cannot be subordinated to the interest of the rulers. No one can be subjected to coercion for holding particular religious beliefs. The doctrine of national sovereignty cannot justify violation of human rights".*

A very comprehensive definition of human rights has been found in the **Protection of Human Rights Act, 1993**. According to this Act "*Human Rights mean the rights relating to life, liberty, equality and dignity of individual guaranteed by the Constitution or embodied in the international covenants and enforceable by courts in India*".

### 1.3 <u>NATURE OF HUMAN RIGHTS:</u>

The concept of Human Rights defines basic dignity and worth of human being and his or her most fundamental entitlement. The denial of human rights and fundamental freedoms not only is an individual and personal tragedy but also creates conditions of social and political unrest sowing the seeds of violence and conflict within and between society and Nations. The key characteristics of human rights are:

- **Universal:** These rights are called universal in nature as every human being is equally entitled to these human rights. The entry into force of the UN Charter on 24 October 1945 marked the formal recognition of human rights as a universal principle, and compliance with human rights was mentioned in the Preamble and in Articles 55 and 56 as a principle to be upheld by all states. In 1948, it was followed by the adoption of the Universal Declaration of Human Rights (UDHR), and in 1966 by the International Covenant on Economic Social and Cultural Rights (ICESCR) and the International Covenant on Civil and Political Rights (ICCPR). The UDHR emphasized on the universality of human rights. Its universality is underlined by the fact that in 1948 it was formulated and agreed upon not only by Western states, but also by representatives from countries such as China, the Soviet Union, Chile, and Lebanon. It was moreover adopted without any objection: no votes against and only eight abstentions. The preamble of UDHR proclaimed that Universal Declaration of Human Rights as a common standard of achievement for all peoples and all nations and has been reasserted in many international human rights conventions, declarations, and resolutions.
- **Inalienable:** Human rights are inalienable. It means that they cannot be taken away, except in specific situations and according to due process. The inalienability of human rights has a base in the principle of natural rights. The state is the protector of these rights. All human being are entitled to these rights just by virtue of being born as a human being.
- **Indivisible and Interdependent:** The various Declarations and Conventions on human rights have provided a comprehensive list of rights including civil and political rights as well as economic, social and cultural rights. However, it has to be understood that all these are indivisible and interdependent.  This means that one set of rights cannot be enjoyed fully without the other For example, right to effectively participate in the local self-government in India may seem to be a civil and political right of women; however, its effective enforcement lies in the ensuring economic, social and cultural rights to women. Similarly, violating economic, social and cultural rights can negatively affect many other rights. The interdependence of various human rights was also stressed upon in the Vienna Declaration and Programme of Action (1993). As stated in the 1993 Vienna Declaration and Programme of Action: 'All human rights are universal, indivisible and interdependent and interrelated. The international community must treat

human rights globally in a fair and equal manner, on the same footing, and with the same emphasis.'

- **Human Rights are not absolute:** Human beings are social animal and we live in civic society and there are certain restrictions in the enjoyment of various rights and freedoms. Human rights are not absolute in nature and there are certain restrictions imposed on the enjoyment of these rights for greater public good. However, all these restrictions must be based on the principle of natural justice.

- **Dynamic and Subjective:** Human rights are not static. As human rights deal with human beings, the understanding and scope of human rights keep on changing with the changing socio-cultural milieu. This makes the human rights dynamic as well as subjective.

## 1.4 CHECK YOUR PROGRESS I:

(a) **Do you agree that human rights are interrelated? Explain by giving an example from your day-to-day experiences.**

(b) **If human rights are universal, what leads to enjoyment of these rights only by few? Introspect.**

## 1.5 CLASSIFICATION OF RIGHTS:

Though all human rights are indivisible and interrelated, the human rights have been classified in a number of ways by various scholars. Some of the major classification of human rights has been discussed below.

**(a) Classification from Social Sciences Point of View:**

**(i) Civil and Political Rights:**

Civil rights are those rights which provide opportunity to each person to lead a civilized social life. Civil rights are attached to people simply because they are human beings. They're guarantees of equal social opportunities and protection under the law, regardless of race, religion, or other characteristics. These rights have been listed in the first eighteen articles of the UDHR. Later on these rights were made legally binding for the State Parties through International Covenant on Civil and Political Rights. Some of these rights are: right to freedom from torture; right to a fair trial; the right to freedom of assembly and association; the right to freedom of thought, conscience and religion; the right to freedom of expression; the right to effective remedy; the right to privacy; right to liberty and security; right to asylum; right to freedom from discrimination etc.

Political rights are those rights by virtue of which citizens get a chance in the political process. These enable citizens to take an active part in the political process. The degree of political freedom enjoyed by the citizens of a country has two prerequisites. The first one is whether the Constitution of the country extends these political rights to individuals and the second one is how effectively the people are able to enjoy these rights in reality. The second issue is equally relevant from human rights perspective as it ensures that the State is able to provide the rights mentioned in the Constitution to the citizens in actual sense. Articles 19 to 21 in UDHR enumerated various political rights. These rights were later codified in the ICCPR.

These rights include: right to vote; to get elected; a right to hold public office and right to criticize.

### (ii) Economic, Social and Cultural Rights

Economic and social rights are human rights that relate to the ability of a person to live with dignity and participate fully in the society. These rights provide the conditions necessary for prosperity and wellbeing. Social rights often deal with the allocation and distribution of resources. Social rights are primarily private rights requiring government intervention and sacrifice, rather than a negative right that implicates government inaction. The economic and social rights have been listed in Articles 22 to 26 of the UDHR, and were further developed and set out as binding treaty norms in the ICESCR. Economic rights refer, for example: right to property; the right to work; the right to a fair wage; a reasonable limitation of working hours; and trade union rights. Social rights are those rights necessary for an adequate standard of living, including rights to health; shelter, food, social care, and the right to education. These rights have been enumerated under Articles 6 to 14 in the ICESCR.

Cultural Rights are rights related to art and culture, both understood in a large sense. The objective of these rights is to guarantee that people and communities have an access to culture and can participate in the culture of their choice. Cultural rights are human rights that aim at assuring the enjoyment of culture and its components in conditions of equality, human dignity and non-discrimination. They are rights related to themes such as language; cultural and artistic production; participation in cultural life; cultural heritage; intellectual property rights; author's rights; minorities and access to culture, among others. The UDHR lists cultural rights in Articles 27 and 28: the right to participate freely in the cultural life of the community, the right to share in scientific advancement and the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which one is the author. These rights have also been mentioned in Article 15 of ICESCR and Article 27 of ICCPR.

### (b) Classification from Enforceability Point of View:

In general understanding, civil and political rights are called 'Negative' rights as enjoyment of these rights require the non-intervention of the state (negative obligation) while economic, social and cultural rights are called 'positive rights' as these rights can be enjoyed by the people through active intervention on the part of the state (positive obligations). In other words, negative rights entail an obligation for the state to refrain from certain actions, while positive rights oblige it to provide certain guarantees.

There has always been a dichotomy between civil and political rights, and economic, social and cultural rights. As civil and political rights can be expressed in very precise language, imposing merely negative obligations which do not require resources for their implementation, these rights are easily enforceable. On the other hand, economic, social and cultural rights are considered to be expressed in vague terms, imposing only positive obligations conditional on the existence of resources and therefore involving a progressive realisation. As a consequence of these alleged differences, it has been argued that civil and political rights are justiciable whereas economic, social and cultural rights are not. In other

words, this view holds that only violations of civil and political rights can be adjudicated by judicial or similar bodies, while economic, social and cultural rights are 'by their nature' non-justiciable. However, in the last one decade, economic, social and cultural rights have been re-examined. Various international documents have stressed upon the indivisibility and interdependency of human rights.

**(c)    Classification from Historical Point of View:**

Human rights, both conceptually and practically are hardly new. The rules for the protection of human rights may be traced as far back as in the Babylonian laws. Babylonian King Hammurabi issued a set of laws to his people which are called Hammurabi's codes. The codes though offered harsh punishments, it provided standards by which Babylonian could order their lives and treat one another. The historical evolution of human rights is also rooted in ancient art and in philosophical concepts of natural law and natural rights. The basic principles of human rights can be found in all religious traditions, ancient and modern, as well as in all philosophical traditions dating from the ancient text of the Upnishads and the early Buddhist and the later in the writings of Plato, Saint Thomas Aquinas and the enlightenment philosophers. The term civil and political rights however evolved lately specifically in 13th century in English common law with the introduction of Magna Carta in the year 1215. Although the Charter applied to privileged elite, gradually the concept was broadened to include all Englishman in the Bill of Rights in 1689 and eventually all citizens. The political and economic rights of people recognised under English laws laid the groundwork for the French Declaration of the Rights of Man and of the Citizens (1789) and the US Bill of Rights (1791).

The Second World War was a turning point in the history of human rights. The problem of the Holocaust accompanied by the perception that the world's nations needed to unite to prevent another catastrophe led to the foundation of United Nations in 1945. Shortly after this, a committee Chaired by former US first lady Eleanor Roosevelt set to work to draft the Universal Declaration of Human Rights. The task was completed in 1948 and was proclaimed by General Assembly on December 10, 1948 making that day International Human Rights Day. The declaration was later divided into two treaties known as International Covenant on Civil and Political Rights and International Covenant on Economic, Social and Cultural Rights. These two documents got ratified and came into force in 1976. Besides this international legal framework, various regional mechanisms have been established in various regions across the world to protect and promote human rights.

**(d) Classification on the Basis of Individual and collective rights**

Although the fundamental purpose of human rights is the protection and development of the individual (individual rights), some of these rights are exercised by people in groups (collective rights). Freedom of association and assembly, freedom of religion and, more especially, the freedom to form or join a trade union, fall into this category. The collective element is even more evident when human rights are linked specifically to membership of a certain group, such as the right of members of ethnic and cultural minorities to preserve their own language and culture. One must make a distinction between two types of rights, which are usually called collective rights: individual rights enjoyed in association with others, and the rights of a collective. The most notable example of a collective human right is the right to self-

determination, which is regarded as being vested in peoples rather than in individuals (Articles 1 ICCPR and ICESCR). The recognition of the right to self-determination as a human right is grounded in the fact that it is seen as a necessary precondition for the development of the individual. It is generally accepted that collective rights may not infringe on universally accepted individual rights, such as the right to life and freedom from torture.

**(e) Classification from Philosophical Perspective**

One way of classifying human rights is from philosophical point of you. It can come under two major heads that is in liberal sense and strict sense. Theological theory of human rights as well as theory of natural law can be broadly considered as theories from liberal perspective. The reason for the same is that theological theory is based on the perception that source of human rights is God or religious scriptures. Similarly, the natural rights theory is based on the perception that source of human rights is nature. Both these theories are highly un-codified and lead to subjectivity and different interpretation which can vary from person to person. On the other hand, the concept of positive law can be considered as a theory in strict sense. According to the legal positivism, the source of human rights is law. The positive law is the foundation of the present-day codified concept of human rights. In today's world all the human rights which have been provided through the constitution or under international law are considered to be the codification of human rights in true sense. Though there is no denying to the fact that human rights exist even if there is no codified law to enforce the same. As stated, earlier state is not the provider of these rights, in fact state is the protector of these rights. Another major theory in the strict sense can be the Marxian concept of human rights. The entire struggle of communism has been a struggle for human rights and to abolish economic exploitation of the proletariat by the bourgeois. The Marxian Communism propagated for the classless society. The state has been considered duty-bound to abolish the economic exploitation and human right should prevail in society for all without any discrimination.

**1.6 CHECK YOUR PROGRESS II:**
1. **Which right is more crucial for a person: right to vote or right to employment? Justify your answer.**
2. **What make Directive Principles of State Policy in India non enforceable in India?**

**1.7 THREE GENERATIONS OF RIGHTS:**

Framework of human rights is often described in terms of generations of rights. The division of human rights into three generations was first proposed by Karel Vasak at the International Institute of Human Rights in Strasbourg.

**(a) First Generation Rights:**

The formalisation of civil and political rights sometimes termed as first-generation rights began in England with the Magna Carta (1215) and the Bill of Rights (1689). Civil and Political Rights are often referred to as negative rights because they came to protect the individual against the state. These are related to liberty and refer fundamentally to civil and political rights. These rights represent the first generation of subjective rights, and more precisely those rights that refer to personal autonomy of the individual and the rights that enable citizen participation

in a society. The rights of this generation are mainly political and civil rights and freedoms. Rights such as freedom of speech, free choice of residence and freedom of religion are among the first-generation rights. The first generation of rights is generally about the person against political power and typically, maintains the originality of the human. This has been considered in article 2 to 21 of the Universal Declaration of Human Rights. Martin Golding called these rights as "selective" rights which mostly deal with the concepts of freedom and choice. They are the same traditional freedoms and citizenship privileges which have been formed as political and civil rights. The first-generation rights mainly match the Liberalism Tradition; because these are the inalienable rights of people which have immunity against aggression of common goods and state authority; the point emphasized by Liberalism. In the modern age, these rights have found their consecration in constitutions and in the laws of most countries, as well as in international documents.

**(b) Second Generation Rights:**

The second-generation rights are related to equality, including economic, social and cultural rights. The second generation of rights, against the first generation of rights requires institutional support from the state, the first-generation rights can be exercised independently and singular. The state must intervene through legislation to create an institutional system that allows the exercise of these second-generation rights. Rights such as education, dwelling, hygienic protection, employment and an appropriate level of living, are considered as the rights of second generation. The rights of second generation guarantee an active life along with health. These rights are also called "welfare" rights. On the contrary to the rights of first generation which generally emphasize non-intervention of the government and non-existence of obstacles (negative freedom), rights of second generation not only stress the nonexistence of obstacles, but also demand facilities and necessaries from government (positive freedom). The basic idea of such division is that, the rights of first generation are ascertained by avoiding any action and rights of second generation by doing some actions; but the most important commonality between these two generations, is the emphasis of both on humanity of everybody or in other words, the rightfulness of human.

**(c) Third Generation Rights:**

Third generation rights came to the fore in the second half of the 20th century as more Nations became independent and the western centric colonial perspective weakened. The establishment of the third generation is the result of new needs of human. The developing human, international, social procedure and moralizing the international rights and human rights and also weaknesses of the first and second generations led to appearance of the third generation of human rights. The rights of third generation or unity rights do not talk about human; but put emphasis on the universal citizen. In contrast with the first and second generations which are products of theories (liberalists and socialists), the third generation of rights is the result of human experience and human life realities that has caused them to form. For instance, environmental pollution became an issue of grave concern after the Second World War and due to unsustainable production and consumption patterns. Hence, right to clean environment emerged as a third generation right.

In this generation of rights, the beneficiaries are society and social groups. The most important features of the third generation of rights are: establishing a powerful feeling among members of the universal society, putting emphasis on subjects higher than the geographical

areas or special economic and political systems, and specifying the rights which are made as the results of human presence in the human society. Most instances of the third generation of human rights (collective/solidarity rights) are: development right, peace right, right of human in choosing his destiny, right to have a healthy environment, right to human common wealth, right to philanthropic aids and the right to communication.

The rights in this category cannot be exerted individually, but only by groups of people. The third-generation rights require not only the need to create an institutional support by the State, but, as in the case of second generation rights, they need to restrict the first generation of rights, through a so called "positive discrimination", in the sense that these rights, like the rights of any minority, require a limitation of rights of first generation. The environmental law allows social groups to live in a healthy environment, clean, without harmful agents to health but, at the same time, imposes a number of limitations on the rights of first or second generation, like owning a forest. The only third generation right which so far has been given an official human rights status - apart from the right to self-determination, which is of longer standing - is the right to development. The Declaration on the Right to Development, adopted by the UN General Assembly on 4 December 1986, and the 1993 Vienna Declaration and Programme of Action (Paragraph I, 10) recognizes right to development. The Vienna Declaration confirms the right to development as a collective as well as an individual right, individuals being regarded as the primary subjects of development.

While the classification of rights into 'generations' has the virtue of incorporating communal and collective rights, thereby overcoming the individualist moral theory in which human rights are grounded, it has been criticised for not being historically accurate and for establishing a sharp distinction between all human rights. Indeed, the concept of generations of rights is at odds with the Teheran Proclamation and the Vienna Declaration and Programme of Action, which establish that all rights are indivisible, interdependent and interrelated.

## 1.8 SUMMARY

Human rights are the vehicles for human solidarity because they are the claims that all people are entitled to make and the obligations and responsibilities that all people share. Moreover, human rights allow us to generalize across national borders and across social settings. Human rights encompass soft rights such as right to education for freedom from poverty and hard rights which fall under criminal law such as right not to be tortured. Humans have equal rights to enjoy political and civil freedom, to have economic and social security, to participate in community and family life, to have an education and to benefit from scientific research. In addition, humans have equal rights to dignity and to self-determination; to have their own distinctive identity and personality; to participate in culture; and to express themselves through their faith ideology and concessions. These two principles: the right to equality and the right to human uniqueness motivate our discussion and frame our purposes. The pursuit and achievement of human rights need to be considered as woven into social life at all levels including the local community and national laws and policies and international relations.

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## 1.11    MODEL QUESTIONS

1. What do you understand by the term human rights?
2. Do you agree that human rights are Universal rights?
3. Why human rights are not absolute?
4. Name any four historical events which are significant for the growth of human rights.
5. What is the difference between individual and collective rights?
6. Who gave the concept of three generations of rights?
7. Why third generation rights are called solidarity rights?

# BACHELOR OF COMMERCE (Hons.)

## (Accounting and Taxation)
### SEMESTER-II
### COURSE: HUMAN RIGHTS AND DUTIES

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### Unit 2: Fundamental Rights and Directive Principles of State Policy

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**STRUCTURE**

2.0     Objectives

2.1      Introduction

2.2     Fundamental Rights

    (a)  Right to Equality (Articles 14-18)

    (b)  Right to Freedom (Articles 19-22)

    (c)  Right Against Exploitation (Articles 23-24)

    (d)  Right to Freedom of Religion (Articles 25-28)

    (e)  Cultural and Educational Rights (Articles 29-30)

    (f)  Right to Constitutional Remedies (Articles 32)

2.3     Check your progress-I

2.4     Directive Principles of State Policy

    (a)  Welfare State Principles

    (b)  Gandhian Principles

    (c)  Liberal-Intellectual Principles

2.5     Check your Progress- II

2.6     Summary

2.7     References

2.8     Further Readings

2.9     Model Questions

**2.0 OBJECTIVES:**

The objective of this lesson is to get a better understanding of Indian Constitution. It further provides details about various rights provided under Fundamental Rights and Directive Principles of State Policy in Indian Constitution.

## 2.1 INTRODUCTION:

The Constitution of any country is the political document which is adopted by the people of that country or is given to them showing what system of the government they are having in that country. Our Constitution proclaims to have been adopted and enacted and given by its own people to themselves. It is in pursuance of a solemn resolution to constitute India into a sovereign, socialist, secular, democratic republic. The constituent assembly which drafted the Constitution of India was constituted under the cabinet mission plan in 1956. It consisted of several national leaders such as Dr Rajendra Prasad, Pt Jawahar Lal Nehru, Dr BR Ambedkar. Dr Rajendra Prasad was the Chairman of this constituent assembly. On November 26, 1949 the new Constitution was finally adopted by the constituent assembly. The Constitution of India is supreme. Belief in the secularism, socialism and in peace and progress are the commitments given by our Constitution. The Constitution of India is the largest constitution in the world (initially 395 articles and 8 schedules). The Indian Constitution as Granville Austin states is "first and foremost a social document". The core of its commitment to a fundamental change in the social order lies in the sections of Fundamental Rights and the Directive Principles of State Policy. In this lesson we will learn about two major parts of the Constitution that is Part III, which deals with Fundamental Rights and Part IV which deals with Directive Principles of State Policy

## 2.2 FUNDAMENTAL RIGHTS:

The Fundamental Rights reflect both India's assimilation to western liberal tradition and its desire for the political freedom it was denied under colonial rule. The Fundamental Rights, embodied in Part III of the Constitution, guarantee to each citizen basic, substantive and procedural protection against the state. These rights are fundamental in the sense that they have been incorporated in the Constitution of India. They are fundamental in the sense that they are justiciable rights and enforceable by the courts and are available to all citizens.

Provisions of Part III of the Indian Constitution which enumerates the Fundamental Rights are more elaborate than those of any other existing written constitution relating to Fundamental Rights. It covers a wide range of topics. The Constitution itself classifies the fundamental rights in six groups as follows:

(a) Right to Equality (Articles 14-18)
(b) Right to Freedom (Articles 19-22)
(c) Right Against Exploitation (Articles 23-24)
(d) Right to Freedom of Religion (Articles 25-28)
(e) Cultural and Educational Rights (Articles 29-30)
(f) Right to Constitutional Remedies (Articles 32)

The original Constitution had seven groups of rights. Of these, the right to property was eliminated by the 44th Constitutional Amendment Act 1978 so only six rights now remain as fundamental rights. These six rights have been discussed below.

(a) **Right to Equality:** Articles 14 to 18 of the Indian Constitution deal with the right to equality. Equality is one of the basic postulates of democracy and is therefore rightly made the foundation of Indian polity by the Constitution.

  (i) **Equality before law** (Article 14 of the Constitution) provides that "The State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India." Equality before the law is an expression of English common law, while equal protection of laws poses its origin to the American Constitution. Both the expression seems to be identical but in fact they mean different things. While equality before the law is somewhat negative concept implying the absence of any special privilege in favour of an individual and the equal subjection of all classes of the ordinary. Equal protection of the law is a more positive concept, implying equality of treatment in equal circumstances. **Equal protection of laws** would mean that among equals, the law should be equal and equally administered. That is like should be treated alike. In other words, it means the right to equal treatment in similar circumstances both in the privilege conferred and in the liabilities imposed by the law. It does not mean that every person should be taxed equally, but that person under the same character should be taxed by the same standard.

  (ii) **Prohibition of Discrimination:** Article 15 (1) prohibits discrimination based on the place of birth, religion, race, caste or sex. Certain provisions can be made for the women, children, and citizens from any socially or educationally backward class for their upliftment (such as reservation and access to free education). However, it has to be understood that it cannot be read as prohibiting discrimination based on residence. Residence as a qualification for certain purposes such as employment may not be classed as discrimination based on caste and place of birth. The significance of the Article is that it guarantees against every form of discrimination by the state on the basis of religion, race, caste or sex. It also strikes at the root of provincialism of prohibiting discrimination based upon one's place of birth. It also goes well with the ideal of the single citizenship which the Constitution establishes for the entire country.

  (iii) **Equality of opportunity in matters of public employment:** Article 16 guarantees equality of opportunity in matters of public employment. The state is prohibited from showing any discrimination against any citizen on ground of religion, caste, sex, and place of birth or residence. The only exceptions to the above rule of equality are:

  • Residence within the state may be laid down by the Parliament as a condition for particular classes of employment or appointment under any state or other local authority;

  • The state may reserve any post of appointment in favour of any backward class of citizens who, in the opinion of the state, are not adequately represented in the services under the state;

- The claim of the members of the Scheduled Castes and Scheduled Tribes shall be taken into consideration in the matter of appointment to services and force under the Union and the states, as far as may be consistent with the maintenance of efficiency of the administration (Article 335).

(iv) **Abolition of Untouchability**: Article 17 abolishes untouchability and its practice in any form is made an offence punishable under the law. Parliament is authorised to make a law describing the punishment for this offence under Article 35 and in exercise of this power, Parliament has enacted the Untouchability Offences Act, 1955, which has been amended and renamed in 1976 as the Protection of Civil Rights Act. The acts of offences include:

- Preaching untouchability directly or indirectly.
- Preventing any person from entering any shop, hotel, public place of worship and place of public entertainment.
- Refusing to admit persons in hospitals, educational institutions or hostels established for public benefit.
- Justifying untouchability on traditional, religious, philosophical or other grounds.
- Insulting a person belonging to Scheduled Caste on the ground of untouchability.

(v) **Abolition of titles**: In India, the practice of British government conferring the number of titles every year mostly on their political supporters and government officers, had already created a peculiar class of nobility among the people. It was difficult for independent India to recognise and accept these titles apart from consideration of the merit of those who had them. Article 18 abolishes all titles and the state is prohibited from conferring titles on any person. The only exception made to the strict rule of non-recognition of title is that provided in favour of academic or military distinctions and it has made four provisions in this regard:
- It prohibits the state from conferring any title on any citizen or a foreigner (except a military or academic distinction).
- It prohibits a citizen of India from accepting any title from any foreign state.
- A foreigner holding any office of profit or trust under the state cannot accept any title from any foreign state without the consent of the President of India.
- No citizen or foreigner holding any office of profit or trust within the territory of India can accept any present, emolument or office from or under any foreign State without the consent of the president.

**(b) Right to Freedom:** Personal liberty is one of the fundamental human rights in Indian Constitution. Article 19 to 22 deal with the different aspect of this fundamental right.

Taken together these four articles form a charter of personal liberty which provides the backbone of the chapter on fundamental rights.

(i) **Fundamental Freedoms:** There were seven freedoms under our original Constitution. Later on, one of them 'the right to acquire, hold and dispose of property' was omitted by the Constitutional 44th Amendment Act 1978 leaving only six freedoms in that Article. These are:

- **Freedom of speech and expression:** Expressing one's own views, opinions, belief and convictions freely by word of mouth, writing, printing, picturing or in any other manner.

- **Right to assemble peaceably and without arms: It i**ncludes the right to hold public meetings, demonstrations and take out processions which can be exercised only on public land. It does not protect violent, disorderly and riotous assemblies or strike.

- **Freedom of association**: It includes the right to form political parties, companies, partnership firms, societies, clubs, organisations or trade unions.

- **Freedom of movement:** The freedom of movement has two dimensions, viz, internal (right to move inside the country) (article 19) and external (right to move out of the country and right to come back to the country) (article 21).

- **Right to reside and settle in any part of the territory of India:** Though the citizens have right to reside and settle in any part of the territory of India, the right of outsiders to reside and settle in tribal areas is restricted to protect the distinctive culture and customs of scheduled tribes and to safeguard their traditional vocation and properties against exploitation.

- **Freedom of profession, occupation, trade or business**: It doesn't include the right to carry on a profession that is immoral (trafficking in women or children) or dangerous (harmful drugs or explosives, etc,).

(ii) **Protection in Respect of Conviction for Offences: Article 20** grants protection against arbitrary and excessive punishment to an accused person, whether citizen or foreigner or legal person like a company or a corporation. It provides that:

- No person shall be convicted of any offence except for violation of a law in force at the time of the commission of the act or subjected to a penalty greater than that prescribed by the law.

- No person shall be prosecuted and punished for the same offence more than once.

- No person accused of any offence shall be compelled to be a witness against himself.

(iii) **Protection of Life and Personal Liberty: Article 21** declares that no person shall be deprived of his **life or personal liberty** except according to the procedure established by law. This right is available to both citizens and non-citizens. The right to life is not merely confined to animal existence or survival but also includes the right to live with human dignity and all those aspects of life which go to make a man's life meaningful, complete and worth living.

(iv) **Right to Education: Article 21 (A)** declares that the State shall provide free and compulsory education to all children of the age of six to fourteen years. This provision makes only elementary education a Fundamental Right and not higher or professional education. This provision was added by the **86ᵗʰ Constitutional Amendment Act of 2002.** Before the 86ᵗʰ amendment, the Constitution contained a provision for free and compulsory education for children under **Article 45 in Part IV** of the Constitution.

(v) **Protection against Arrest and Detention:** Article 22 grants protection to persons who are arrested or detained. Detention is of two types, namely, **punitive** (punishment after trial and conviction) and **preventive** (punishment without trial and conviction). The first part of Article 22 deals with the ordinary law and includes: Right to be informed of the grounds of arrest; Right to consult and be defended by a legal practitioner; Right to be produced before a magistrate within 24 hours, excluding the journey time and Right to be released after 24 hours unless the magistrate authorises further detention.

  The second part of Article 22 deals with preventive detention law. Protection under this article is available to both citizens as well as aliens and includes: the detention of a person **cannot exceed three months** unless an advisory board (judges of high court) reports sufficient cause for extended detention; the grounds of detention should be communicated to the detained person and the detained should be afforded an opportunity to make a representation against the detention order.

**(c) Right Against Exploitation:**

Articles 23 and 24 deal with right against discrimination. This right seeks to ban trafficking in human beings, begar or any other form of forced labour. Employment of children below 14 years of age in any factory or mine or other risky occupation is also prohibited by law. Exploitation means misuse of services of others with the help of force. In India, prior to the promulgation of the Constitution, services of backward communities and weaker sections of the society were used without any payment. This was known as a practice of begar. For instance, in villages, landless labours were supposed to work for the most part of the year on the jagirs without any compensation in cash or kind. The Constitution has, therefore, abolished this practice. The Constitution also prohibits forced labour. A bold step towards the abolition of forced labour and the economic and physical exploitation of the weaker sections of the people has been taken by the enactment of the Bonded Labour System Abolition Act, 1976 by Indian parliament.

**(d) Right to Freedom of Religion:**

India is a secular state. A state which observes an attitude of neutrality and impartiality towards all religions. The attitude of impartiality is secured by the Constitution of India under Article 25 to 28. Article 25 states that all persons are equally entitled to freedom of conscience and the right to profess, practice and propagate religion. There are only three restrictions to the freedom of religion namely: public order, morality and health.

Article 26 is, in fact, a corollary to Article 25 and guarantees the freedom to manage religious affairs. According to this, every religious denomination is given the right:
- to establish and maintain Institutions for religious and charitable purposes;
- to manage its own affairs in matter of religion;
- to own and acquire movable and immovable property; and
- to administer such property in accordance with law.

Article 27 provides an additional protection to religious activity by exempting funds appropriated towards the promotion or maintenance of any particular religion from the payment of taxes. Article 28 prohibits religious instruction in any educational institution wholly maintained out of state funds whether such instruction is given by the state or by any other body. Even though religious instruction be imparted in educational institutions recognised by or receiving aid from the state, no person attending such institution shall be compelled to receive that religious instruction without the consent of himself/herself or of his/her Guardian (in the case of a minor). Thus while the secular character of the state is demonstrated by all state educational institutions, private or denominational institutions, even when they receive state aid, are given freedom to maintain their religious character.

**(e) Cultural and Educational rights**:

The Constitution provides that a minority shall have the right to conserve its own language, script, literature and culture. Admission to any state aided educational institution shall not be refused to anybody on grounds of religion, race, caste or language under Article 29. Article 30 provides that all minorities whether based on religion or language, shall have the right to establish and administer educational institutions of their choice. The state shall not in granting aid to educational institutions, discriminate against any educational institution on the ground that it is under the management of a minority, whether based on religion or language. With the guarantee of these rights, the Constitution ensures the protection of the rights of the minorities.

**(f) The right to Constitutional Remedies:**

The right to constitutional remedy is covered under article 32 of the Indian Constitution. This article guarantees the individual the right to move the Supreme Court by appropriate proceedings for the enforcement of his/ her fundamental rights. The Supreme Court is empowered to issue directions or orders or writs including writs in the nature of *Habeas Corpus, mandamus, prohibition, quo warranto and certiorari,* whichever it considers appropriate. Further, without prejudice to the powers of the Supreme Court, the Parliament may by law, empower any other Court to exercise within the local limits of its jurisdiction or any of its powers exercisable by the Supreme Court. The right to constitutional remedies may be suspended as provided by the Constitution under article 353 and 359.

The inclusion of a detailed scheme of fundamental rights in the Constitution marks the culmination of a long and sustained desire of the Indians to be bestowed with the basic liberties of free and happy life. These rights, therefore, have been given a very esteemed

position in the constitutional law of the country, for, all laws in force in the territory of India immediately before 26 January 1950, and all legislations enacted thereafter, have to conform to the provisions of Part III of the Constitution. Moreover, the scope of the fundamental rights are wide enough to encompass practically all those rights which human ingenuity has found to be essential for the development and growth of the personalities of the citizens of the country. Significantly, the focus of attention of the framers in this regard was on the citizens mainly, if not exclusively, as many of these rights are not guaranteed to the aliens.

## 2.3 : CHECK YOUR PROGRESS 1:
**(a) Which Fundamental right is most significant according to you?**
**(b) Exploitation is worst form of human rights exploitation? Try to understand it from the perspective of child labour in India.**

## 2.4 DIRECTIVE PRINCIPLES OF STATE POLICY

Part IV of the Constitution (Articles 36 to 51) provides the Directive Principles of State Policy. These principles may be classified under several groups. It shall be the duty of the state to follow these principles both in the manner of Administration as well as in the making of laws. They embody the object of the state under the republican constitution, namely, that it is to be a welfare state and not a mere police state. Most of these directives, aim at the establishment of the economic and social democracy which is pledged for in the Preamble of Indian Constitution. The framers of the Constitution were influenced most by the Constitution of the Irish Republic which embodies a chapter on Directive Principles of State Policy. A number of these principles are entirely Indian and Gandhian in nature like setting up of village panchayats and cottage industries, prohibition, protection against cow slaughter etc. Dr Ambedkar called Directive Principles of State Policy as a novel feature of the Constitution of India. These Directive principles are in the nature of general directions or instructions to the state. They embody the objectives and ideals which Union and State governments must bear in mind while formulating policy and making laws.

Indian Constitution has not originally classified DPSPs but on the basis of their content and direction, they are usually classified into three types-Welfare State Principles, Gandhian Principles and Liberal-Intellectual Principles. The DPSPs have been discussed below under these three principles

(a) **Welfare State Principles:** They are the principles that aim at providing social and economic justice and set the path towards the welfare state.
(i) **Article 38:** Promote the welfare of the people by securing a social order through justice—social, economic and political—and to minimise inequalities in income, status, facilities and opportunities.
(ii) **Article 39:** Secure citizens:

- Right to adequate means of livelihood for all citizens
- Equitable distribution of material resources of the community for the common good
- Prevention of concentration of wealth and means of production

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- Equal pay for equal work for men and women
- Preservation of the health and strength of workers and children against forcible abuse
- Opportunities for the healthy development of children

(iii) **Article 39A:** Promote equal justice and free legal aid to the poor

(iv) **Article 41:** In cases of unemployment, old age, sickness and disablement, secure citizens: Right to work, Right to education and Right to public assistance.

(v) **Article 42:** Make provision for just and humane conditions of work and maternity relief.

(vi) **Article 43:** Secure a living wage, a decent standard of living and social and cultural opportunities for all workers.

(vii) **Article 43A:** Take steps to secure the participation of workers in the management of industries.

(viii) **Article 47:** Raise the level of nutrition and the standard of living of people and to improve public health

(b) **Gandhian Principles:** These principles are based on Gandhian ideology used to represent the programme of reconstruction enunciated by Gandhi during the national movement.

(i)     **Article 40:** Organise village panchayats and endow them with necessary powers and authority to enable them to function as units of self-government.

(ii)     **Article 43:** Promote cottage industries on an individual or co-operation basis in rural areas.

(iii)     **Article 43B:** Promote voluntary formation, autonomous functioning, democratic control and professional management of co-operative societies.

(iv)     **Article 46:** Promote the educational and economic interests of SCs, STs, and other weaker sections of the society and to protect them from social injustice and exploitation.

(v)     **Article 47:** Prohibit the consumption of intoxicating drinks and drugs which are injurious to health.

(vi)     **Article 48:** Prohibit the slaughter of cows, calves and other milch and draught cattle and to improve their breeds.

(c) **Liberal-Intellectual Principles:** These principles reflect the ideology of liberalism.

(i)     **Article 44:** Secure for all citizens a uniform civil code throughout the country.

(ii)     **Article 45:** Provide early childhood care and education for all children until they complete the age of six years.

(iii)     **Article 48:** Organise agriculture and animal husbandry on modern and scientific lines.

(iv)     **Article 49:** Protect monuments, places and objects of artistic or historic interest which are declared to be of national importance

(v)     **Article 50:** Separate the judiciary from the executive in the public services of the State.

(vi)     **Article 51:** Promote international peace and security and maintain just and honourable relations between nations; Foster respect for international law and treaty obligations and Encourage settlement of international disputes by arbitration.

42nd Amendment Act, 1976 added four new Directive Principles in the list i.e.

- To secure opportunities for the healthy development of children (**Article 39);**
- To promote equal justice and to provide free legal aid to the poor (**Article 39A);**
- To take steps to secure the participation of workers in the management of industries (**Article 43A) and**
- To protect and improve the environment and to safeguard forests and wildlife (**Article 48A).**

A perusal of various principles reveals interesting features regarding the scope and diversity of the directive principles. As pointed out earlier, provision of directive principles afforded various shades of perspectives an opportunity to provide their ideals a place in the Constitution. First, the substantive numbers of directive principles are aimed at the establishment of a welfare state by bringing about a subtle socio-economic transformation in the country. Second, a large number of directive principles aspire to implement the Gandhian principles of social life. Last, certain directive principles deal with the streamlining of governance in the country and promotion of international peace.

## 2.5 CHECK YOUR PROGRESS-II
- **How Gandhian Ideology played a significant role while framing DPSP?**
- **The DPSP are called less enforceable than Fundamental Rights in India? Do you agree with this belief?**

## 2.6 SUMMARY
The Directive Principles of State Policy and the Fundamental Rights constitute the most important features of Indian Constitution. The Directive Principles, the fundamental in the Governance of the country, are not enforceable by any court in terms of the express provision of article 37 of the Constitution while Fundamental Rights are enforceable by the Supreme Court and the high courts in terms of the express provision of Article 32 and 226 of the Indian Constitution. In the well-known case A. K. Gopalan vs the State of Madras (1950) Fundamental Rights were held as paramount. In case of conflict between Directive principles and Fundamental Rights the latter are enforceable by the courts. This shows the dichotomy between these two. However both constitute essential features of the constitution. Although these two may appear in the Constitution as distant entity, the leaders of freedom struggle had drawn no distinction between the positive and negative obligations of the state. Both types of rights had developed as a common demand products of the national and social revolutions of their almost inseparable inter twinning and of the character of Indian politics itself. In the words of Mr Justice Deshpande, "the Constitution is not only a legal but also a social and political document. Its legal aspect namely the Fundamental Rights is enforceable by the individual through writ

petitions and otherwise in the courts. Its social aspect can, however, be amended only by legislation to carry out the objectives of the Directive Principles of State Policy".

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## 2.9 MODEL QUESTIONS

Q 1: What is the significance of Fundamental Rights in protecting and promoting human rights in India?

Q 2: How right to freedom has been incorporated into Indian Constitution?

Q 3: Which Fundamental Right according to you is the most significant and why?

Q 4: Why Directive Principles of State Policy were incorporated in the Indian Constitution?

Q 5: Name the Gandhian Principles provided under DPSP.

Q 6: Do you feel that DPSP are less effective than Fundamental Rights? Justify your answer.

# BACHELOR OF COMMERCE (Hons.)

## (Accounting and Taxation)

### SEMESTER-II
### COURSE: HUMAN RIGHTS AND DUTIES

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## UNIT 3: MEANING, NATURE & CHARACTERISTICS OF HUMAN DUTIES; CLASSIFICATION OF HUMANDUTIES; RELATIONSHIP BETWEEN RIGHTS AND DUTIES

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**STRUCTURE**

**3.0 Objectives**

**3.1 Introduction**

**3.2 Meaning**

**3.3 Nature & Characteristics of Human Duties**

**3.4 Check your Progress- I**

**3.5 Historical Evolution of the Concept of Human Duty**

**3.6 Classification of Human Duties**

  (a) **Moral and Legal Duties**

  (b) **Positive and Negative Duties**

  (c) **Primary and Secondary Duties**

  (d) **Absolute and Relative Duties:**

  (e) **Classification in African Charter**

**3.7 Check your Progress-II**

**3.8 Relationship between Rights and Duties**

  (a) **Right is a Duty in Itself**

  (b) **Every Right has a Corresponding Duty**

  (c) **Rights carry Social Obligations**

**3.9 Summary**

**3.10 References**

**3.11 Further Readings**

**3.12 Model Questions**

**3.0 Objectives:**

The objective of this lesson is to understand the meaning, nature and characteristics of Human Duties. It further provides details about various types of Classification of Human Duties.

**3.1 Introduction:**

Everyone has rights, but the very desire to enjoy one's rights also puts an onus on each individual, institution and the state to recognise the responsibility of respecting the rights of others. Responsibility in relation to rights is becoming increasingly significant as the nature and scope of human rights expands and the search for a new global culture of human rights accelerates. In a global village, the Gandhian ideal of "all rights reserved and preserved come from duty well done" resumes renewed significance. Responsibility in the context of human rights has been a subject of debate for long. The notion that individuals, while having particular human rights, also have particular duties in relation to the social entity in which they live have been a constant feature of the United Nation's work and predates the UN Charter's entry into force in 1945.

**3.2 Meaning of Human Duties**

The concept of Duty arises from fulfillment of a requirement. It arises in several ways and means, such as moral duties, legal duties, parental duties, societal duties, and civil duties etc. However from the point of view of law, duties arise from legal norms or requirements. They have to be discharged, the way it was prescribed. Accordingly, the actions are constituted as right or wrong. The word duty is also said to be derived from the word 'debt' which means 'loan'. Thus duty is a kind of loan which a citizen pays in return for the rights. In this sense, it becomes an obligation. A person is said to have a duty to perform towards other in any matter by being under an obligation to do or not to do something.

- According to **Prof. Dicey**, "a duty is a species of obligation. People obey it due to indolence, deference, sympathy, fear and reason. And due to psychological, social and moral pressures. Most duties are supported by State. The breach of the duty leads to imprisonment or fine."

- **Keeton** defines duty as an act of forbearance which is enforced by the state in respect of a right vested in another and breach of which is a wrong.

- **Salmond** defines duty as roughly speaking an act which one ought to do, an act the opposite of which would be a wrong.

- According to **Frazier**, "To have a duty is, above all, to be subject to a binding, normative requirement. This means that unless there are exculpating reasons someone who has a duty is required to satisfy it, and can be justifiably criticized for not doing so. Having a duty to do something is like having been given a command by someone who has a right to be obeyed: it must be done".

**3.3 Nature and Characteristics of Human Duties**

The word obligation commonly referred to as a synonym of duty or vice versa. C. H. Whiteley, for instance, while he does not propose any explicit definitions, says that 'duty' and 'obligation' are approximate synonyms and that "a duty or obligation is a consequence of a contract or undertaking, either explicit or implicit. However strictly speaking there exists a difference

between the two. According to H.L.A. Hart, duty and obligation are distinct to each other. A right exists without any correspondence to an obligation incurred or created at times. What distinguishes obligations from duties is that "they may be voluntarily incurred or created" (whereas duties arise from position, status, and role), and that "they are owed to special persons (who have rights) ". This means every time a duty has a connection with the position of person, which is linked with right. Hence, an obligation may not correspond to a duty at all times. It is only usage or practice of referring to write as a synonym of duty. Cicero, an early Roman philosopher who discusses duty in his work "On Duty", suggests that duties can come from four different sources:

- as a result of being a human;
- as a result of one's place in life (one's family, one's country, one's job);
- as a result of one's character;
- as a result of one's own moral expectations for oneself.

Reciprocity plays a key role in Fuller's account of duty. According to him, the existence of duties depends partly on the behavior of others. In particular, it is fair to expect me to act in certain ways only if similar expectations hold with respect to those judging my behavior. In the legal context, citizens have a duty to follow legal rules provided those rules outline a standard that citizens are knowledgeable of, capable of following, and that is actually used to judge their conduct.

### 3.4 Check your Progress I:
(a) **What is more important according to you: 'Human Duty or Human right?**
(b) **How Prof Dicey denied duty?**

### 3.5 Historical Evolution of the Concept of Human Duty
Eastern jurisprudence encompasses all the aspects of human behavior within 'Dharma' for which it is said '*Dharmo Rakshti Rakshta'*( respect dharma; dharma will respect you ) Dharma in its core involves duties as its subject matter. Even the King is said to have duties falling under Raj dharma. Duties have prevalence and predominance in Eastern Jurisprudence while the right is subservient, collateral and relative in contrast to western jurisprudence. In Bhagwat Geeta, various verses emphasize on the significance of duty by stating that: 'Your right is to work only, but never to the fruit thereof. Let not the fruit of action be your object, nor let your attachment be to inaction'. Though the message apparently talks about the right but here the right itself is in the form of duty to work. In subsequent verse it unequivocally speaks about duty, where the message says: 'Arjuna, perform your duties: dwelling Yoga, relinquishing attachment, and indifferent to success and failure; equanimity is called Yoga'. The jurisprudence of west and Dharma of east is law and/or science of law. Once it is arrived at that jurisprudence is in relation to law, it is imperative to deliberate inter-alia upon the 'Right and Duties' as concept of law (Bhagwat Geeta , verse 47 &48). Mahatma Gandhi also laid great emphasis on performance of duty and has stated that – "The true source of right is duty and if we all discharge our duty, right will not be far to seek. If leaving duty unperformed, we run

after rights, they will escape us like Will-o-the-wisp. The more we pursue them, the farther they will fly".

### 3.6 CLASSIFICATION OF HUMAN DUTIES:

The duties can be classified in a number of ways. Some broad classifications of human duties have been discussed below.

**(a) Moral and Legal Duties:**

Moral duties are those obligations which we should observe but we are not legally bound to observe them. It is our moral duty that we should serve our parents, teachers, brothers and sisters and the relatives. It is the moral duty of every one that he should lend a helping hand to the poor and down-trodden. On the other hand, an individual is legally bound to perform legal duties. A legal duty is adversary of a legal wrong and it is recognized by the law for administration of justice. If he does not perform them, he will be punished by the state. It is an act, the opposite of which is a legal wrong. It is an act recognised as duty by law. Law ensures performance of legal duties and punishes disregard to this duty. For example, it is the legal duty of every citizen to show obedience to the constitution, commands of law and pay taxes regularly and honestly. It is our legal duty to remain loyal to our country. There is a marked difference between legal duties and moral duties. It depends entirely on the conscience of the individual to perform moral duties or not to perform them. A duty may be moral but not legal or legal but not moral, or both at once. For example, the act of not wasting paper is our moral duty but not legal.

**(b) Positive and Negative Duties**:

When a person is enforced to perform a duty, the duty is called positive duty. Whereas, when the law asks the person from refraining in involving or undertaking a particular act, such duty is called negative duty. For example – to pay debt is a positive duty whereas, not to trespass on third person's land is a negative duty. In positive duties performance extinguishes both duty and right. A negative duty can never be extinguished by fulfilment. In the words of Dr Zakir Hussain "Duty is not dumb obedience; it is an active desire to fulfil obligations and responsibilities". Negative duties require that we refrain from harming and injuring others, while positive duty requires that we render assistance to those in distress. The two most plausible positions on this issue can be labelled as 'conventionalism' and 'equivalence'. Conventionalists maintain that we have both negative and positive duties towards others and positive duties are restricted to rendering assistance when doing so involves a minimum expenditure of effort and resources; positive duty requiring a maximum sacrifices are considered supererogatory. Hence our requirement to aid the needy is a duty only if the sacrifices and expenditure of resources on our part is minimal - if it does not place a burden on our basic life interest. Conventionalists also recognise, of course, negative duty towards others. They maintained that violation of negative duties are morally worse acts, other things being equal, than violations of correlated positive duties.

**(c) Primary and Secondary Duties**

Primary duty is one which doesn't need to be stated, it exists on its own. A primary duty is that which exists per se and independent of another duty. According to W. D. Ross, people mostly discharge their duties to live up to their promises as goodwill. This means, many a times people perform their duties basing on the advantages and disadvantages. This being the primary

concept of duty, Ross calls individuals to be rational in discharging their duties in a proper manner without harming the interests of others. The duty not to cause personal injury to another is a primary duty. A secondary duty is one which exists only for giving the way to other duties and has no independent existence. The duty to pay damages for the injury already done is a secondary duty.

**(d) Absolute and Relative Duties:**

Absolute duties are the one which are not followed by a right which means a right is mot corollary of a duty in the case of absolute duties, whereas relative duties are the duties which come with a bond and are followed by right. Thus, a relative duty cannot exist without a right. Austin distinguished between absolute and relative duties. According to him, while every right is relative and has a correlative duty, every duty need not necessarily have a correlative right. In Austin's opinion some duties are absolute duties to which no corresponding rights are attached. Austin stated four kinds of absolute duties:

    (i)       Duties not regarding persons (those owed to God and the lower animals),

    (ii)      Duties owed to persons indefinitely (duties towards the community e.g. Duty not to commit nuisance),

    (iii)    Self-regarding duties (duty owed to one self e. g. Duty not to commit suicide or duty not to become intoxicated),

    (iv)    Duty towards State.

As indicated above absolute duties are those which have no corresponding or correlative rights. Relative duties are those to which there is a corresponding right in some person or definite body of persons e.g. duty to pay one's debt to the creditor. All these four kinds of absolute duties as mentioned by Austin are really reducible to one head – Duties towards the State. Man's relation to God is a matter of religion and not of law. If the legal system protects certain religious duties with a sanction, then that duty is part of the law and amenable to same analysis as other legal duties. So far as duties towards animals are concerned, if the law prohibits cruelty, one may owe a duty to the State. In case of duties towards the community or the public, duty is merely the correlative of the right inhering in each member of the community. As for self-regarding duties, there cannot be a legal duty owed to oneself. The duty not to commit suicide is not a duty I owe to myself but is part of the criminal law and subject to the same analysis as any other duty imposed by the criminal law. In Austin's view, the duties of the subjects towards the State are absolute. This argument leads to the rejection of the notion that there can be a right-duty relationship between the subject and the state. Austin maintained that when the state imposes a duty on a subject, it is a misuse of language to say that the State has a corresponding legal right. The state has physical power. The exercise of a legal right is regulated, whereas the power of the sovereign is not. Austin's thesis of 'absolute duties' is generally rejected in modern times.

    Salmond did not support this concept of absolute and relative duties. According to Salmond, all duties are relative and there can be no absolute duties, for there must be a right in another when one is under a duty. He believed there is no duty without a right. Salmond also believed that no right can exist without a corresponding duty. Every right or duty involves a bond of a legal obligation by which two or more persons are bound together. Thus, there can be no duty unless there is someone to whom it is due; there can be no right unless is someone from whom

it is claimed, and there can be no wrong unless there is someone who is wronged, that is to say, someone whose right has been violated.

However, Prof. C.K.Allen supported Austin's view. He was of the view that where the State imposes duties in virtue of its sovereign character, the duties are absolute without correlative rights in the State. For example, a State compels children to go to school, or to be vaccinated, prohibits the sale of liquor. In these cases there are no corresponding rights. According to Allen, the duties imposed by the criminal law are absolute duties. Duty is the correlative of a right which can be understood as an obligation to do something. It is an act whose opposite would be wrong. Whenever law ascribes duty to a person, a corresponding right also exists with the person on whom the duty is imposed. Hibbert also refers to absolute and relative duties. The former duties are owed only to the state, breach of which is generally called a crime, and the remedy, therefore, is punishment. The latter kind of duties is owed to any person other than the one who is imposing them, the breach of which is called a civil injury which is redressable by compensation to the injured party.

**(e) Classification in African Charter**:
The African Charter under Chapter II deals with the duties of the individuals of the Contracting Parties in detailed manner. These duties are as follows:
- Duty towards his family and society, the State other legally recognized communities and international communities (Article 27, Para 1).
- Duty to respect and consider his fellow beings without discrimination and to maintain relations aimed at promoting, safeguarding and reinforcing mutual respect and tolerance (Article 28).
- Duty to preserve the harmonious development of the family and to work for the cohesion and respect of the family, to respect his parents at all times, to maintain them in case of need (Article 29).
- Duty to serve his national community (Article 29).
- Duty not to compromise the security of the State whose national of resident he is (Article 29).
- Duty to preserve and strengthen social and nation security (Article 29).
- Duty to preserve and strengthen the national independence and the territorial integrity of his country (Article 29).
- Duty to work to the best of his abilities and competence, and to pay taxes imposed by law in interest of the society.
- Duty to preserve and strengthen positive African cultural values in his relations with other members of the society (Article 29).
- Duty to contribute at all times to the promotion and achievement of African unity (Article 29)

**3.7 CHECK YOUR PROGRESS-II**
**(a) Give one example of moral and legal duty each.**
**(b) What was Austin's view o duties.**

## 3.8 RELATIONSHIP BETWEEN RIGHTS AND DUTIES:

It is commonly held that rights "correlate" with duties. By this is usually meant at least that rights imply duties (even if not all duties imply rights) and also that claims of individual rights need not be recognized unless backed by proof that corresponding obligations obtain. Such a doctrine of correlativity also forms part of the view that rights must be understood or analysed in terms of duty or obligation. The relationship between rights and duties has been elaborated below.

### (a) Right is a Duty in Itself:

Rights and duties are closely related and cannot be separated from one another. Both go side by side. These are the two sides of the same coin. One's right is one's duty also. If a citizen wants to exercise and enjoy a right, he must also know, realize and concede that others also have a similar right, and as such he must not temper with a similar rights of others. It becomes the duty of every citizen to exercise his rights in a manner which must not be prejudicial to the free exercise of the same rights by others. For example if I have the right to move freely in any part of the country or express my views freely, than others have also the same rights. Therefore, I must also let others exercise their rights properly. At the same time, I must not misuse my rights to the detriment of others. If the state gives the right to life to a citizen, it also imposes an obligation on him to not to expose his life to dangers, as well as to respect the life of others. If I have a right to work and earn, it is also my duty to recognize the same right of others. Rights are not the monopoly of a single individual. Everybody gets these equally. This means that "others also have the same rights which I have, and it is my duty to see that others also enjoy their rights." Laski has rightly said that one man's right is also his duty. It is my duty to respect the rights of others as well as the duty to use my rights in the interest of society.

### (b) Every right has a Corresponding Duty

Rights can be enjoyed only in the world of duties. For every right there is corresponding duty. When the people fail to discharge their duties properly, the rights become meaningless. A right, belonging to one person, imposes a corresponding duty on others to give due respect to his right. If I have the right to property, then correspondingly it becomes the duty of others not to steal, take away or interfere with my property. And if anybody tries to curtail or abridge my right then I can seek the protection of the laws of the state and get the culprit suitably punished. Rights are to be enjoyed by all citizens living in a social setup. If disregard is shown to the rights of some by others, then confusion or chaos will follow in which nobody would be able to exercise his rights. If I have a right to live then it is the duty of others to let me enjoy this right properly. In fact, in the observance of such a duty lies the right of others to live. Besides this non-interference in and acceptance or recognition of others' rights bestow upon you the similar rights. In this way, we find that one's right is another's duty. I can enjoy my rights only if the others allow me to do the same. I have the right to life and it is the duty of others to respect my life and not to cause any harm to me.

### (c) Rights carry Social Obligations:

Since it is the state which grants, maintains and protects the rights of individuals, individuals too has a duty towards the state. He has to be loyal to the state. We must obey the laws of the state and be always prepared to sacrifice everything for the sovereignty and integrity of the state. It is also expected that citizens would use their rights in a befitting manner. There improper exercise may prove harmful and dangerous to the society and to the political system.

If the right to speech is exercised to the extent of provoking or instigating others to revolt against the political system, then anarchy would prevail which would ultimately endanger the rights of all the citizens. Rights are, therefore, to be enjoyed in a democratic spirit and at no point of time the public good should be ignored. It is only in the society that people get their rights. Therefore, they have a duty towards society which protects their rights. An individual must not keep on furthering his own interest at the cost of the general interest of the society. He must try to contribute his best to the common good because he cannot enjoy rights independent of society.

### 3.9 SUMMARY:

Then the question is how the duties have to be performed? The answer lies in our culture and that is, 'the duty is to be performed not only for the sake of the duty but with a feeling that it is a sacred entrustment by almighty and for breach of the same, the individual is answerable to his own conscience'. When such concept of duty is engrained in the minds of people, the country is bound to progress. There are number of factors which retard the progress of duties. These are lack of values, education, poverty and corruption and require to be tackled on war footing. For this, social attitudes of the people have to be changed. The parents, teachers, civil servants, professional and those who are engaged in administration of justice have to act as role models so that the people may learn and imbibe the concept of duty from them. Rights and duties are the very important elements of law. Their administration of justice, in most part, consists of the enforcement of rights and the fulfilment of duties. Rights and duties are correlated to each other in such a way that one cannot be conceived of without other. In other words, the existence of the one depends on the existence of the other. When we speak about the right, it correlates to a duty upon another individual, employer, government, authority. In other words, the right of one is an obligation of another. Thus right is always against someone upon whom the correlative duty is imposed. In the same way, duty is always towards someone in whom the core relative right vests. There are some jurists who do not agree to this view. They say that there can be duties without a corresponding right. They call such duties as absolute duties. The duties which are always correlated with the right are called the relative duties. Thus we find that the rights and duties are closely related to and dependent on each other. One cannot exist without the other. They are the two aspects of the same thing. If there are rights, they are there because certain duties are performed. Rights imply duties and one cannot be even conceived of without the other.

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## 3.12 MODEL QUESTIONS

**Q 1:** Define the term Human Duty.

Q 2: What is the nature of human duties?

Q 3: What is the difference between moral and legal duty?

Q 4: Do you agree with Austin that there is a difference between absolute and relative duty? Justify your answer.

Q 5: What is the role of an individual while performing negative and positive duties?

# BACHELOR OF COMMERCE (Hons.)

## (Accounting and Taxation)

### SEMESTER-II
### COURSE: HUMAN RIGHTS AND DUTIES

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## UNIT 4: FUNDAMENTAL DUTIES IN INDIAN CONSTITUTION

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### STRUCTURE

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### 4.0 OBJECTIVES:
The objective of this lesson is to discuss the scope and significance of Fundamental Duties provided under Part IV in the Indian Constitution. Besides studying the historical development of the concept of Fundamental Duties in Indian Constitution, it will also discuss the enforceability of these duties by referring to various case laws.

### 4.1 INTRODUCTION:
Constitution being supreme in itself creates the fundamental right with remedy to enforce them under Article 32 or 226 of the Constitution of India. The right may be that of citizens and/or aliens. The corresponding duty is with the state. The right is enforceable against the state and/or against the instrumentalities of state as the case may be. Likewise Directive principles though were said to be non-justiciable but their justiciability in some situations has not been ruled out. Likewise the Constitution creates some aspect of democratic process and also provides mechanism for compliance. The said mechanism may be by a constitutional process itself or through statute (s). The fundamental Duties are the latest addition to the Constitution, making such duties explicit. Among the various constitutions in Indian Sub-Continent some duties on citizens are inbuilt in the Constitution while in others they are by law, custom and/ or precedent.

Impregnating the high sounding and zealously guarded domain of fundamental rights with a moderate dose of ethical citizenship responsibilities, the fundamental duties were inserted in

the Constitution in 1976 through the Constitution's Forty-second Amendment. Placed in Part IV-A of the Constitution under Article 51-A, the set of ten fundamental duties is supposed to be only moral exhortation to the citizens of the country to inculcate a sense of patriotic and sensible citizenship, without any legal justiciability.

The inclusion of Fundamental Duties brought our Constitution in line with article 29 (1) of the Universal Declaration of Human Rights which states that "Everyone has duties to the community in which alone the free and full development of his personality is possible" and with provisions in several modern Constitutions of other countries. Similarly, the constitution of many other countries has enumerated many duties of the citizens. For instance, Article 17 of the Constitution of Morocco of December 1962, Article 48(1) of the Constitution of Somalia of July 1960, Article 16 of the Constitution of Tunisia of June 1959, Article 44 of the Constitution of UAR of March 1964, Article 102 of the Constitution of People's Republic of China of September 1954, Article 48 of the Constitution of State of Kuwait of November 1962 emphasize duties of citizens, in particular the duty to pay taxes and to contribute to the public exchequer according to his capacity. The concept of Fundamental duties was taken in Indian Constitution from the former USSR. Fundamental duties are intended to serve as a constant reminder to every citizen that while the constitution specifically conferred on them certain Fundamental Rights, it also requires citizens to observe certain basic norms of democratic conduct and democratic behaviour because rights and duties are co-relative.

## 4.2 : HISTORICAL EVOLUTION:

Mahatma Gandhi always emphasized on the relevance of duties in an individual's life. He always stated that: '*the true source of rights is duty, if we all discharge our duties, rights will not be far to seek*'. However, the fundamental duties were not part of the Indian Constitution when it came into effect on 26 January 1950. After laying down fundamental rights, it goes on to say that '*all these rights shall be contingent on the performance of the following fundamental duties*'. It is interesting to note that while fundamental rights were given immense constitutional importance in both the historical constitutions and the constituent assembly debates, there were only few instances when members of the Constituent Assembly deliberated upon the Gandhian idea on rights and duties. Fundamental duties became part of the Constitution as Part – IV A through the 42nd amendment in 1976. The then Prime Minister Mrs Indira Gandhi set up a committee chaired by then-External Affairs Minister Swaran Singh '*to study the question of amendment of the Constitution in the light of experience...*' The All India Congress Committee (AICC) suggested to the Swaran Singh Committee to '*formulate some proposals for inclusion in the Constitution certain fundamental duties and obligations which every citizen owes to the nation...*'. The Committee suggested that steps needed to be taken to ensure that the individual did not overlook his duties while in exercise of his Fundamental Rights. The Committee then drew up a list of fundamental duties. By November 1976, both Houses of Parliament passed the 42nd amendment, which included a new fundamental duties chapter to the Constitution containing ten duties. The rationale behind introducing the 42nd amendment was that the Constitution is a living document that evolves with the society. Considering the erosion of culture and ethics at that time, the parliamentarians thought it best to introduce Part IV-A to spell out explicitly the implicit characteristics of our Constitution. According to them, incorporating these duties would be helpful in removing the

difficulties that create hindrance in social-economic revolution of removing poverty, diseases and inequality of opportunity. In 2002, one more duty was added to the list. It said that every citizen '*who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen year*'. This lesson will study these Fundamental Duties in detail.

## 4.3 : FUNDAMENTAL DUTIES IN INDIA

The Directive Principles of State Policy and Fundamental Duties are sections of the Constitution of India that prescribe the fundamental obligations of the State to its citizens and the duties of the citizens to the State. The Fundamental Duties are defined as the moral obligations of all citizens to help promote a spirit of patriotism and to uphold the unity of India. These duties, set out in Part IV–A of the Constitution concern individuals and the nation. Citizens are morally obligated by the Constitution to perform these duties. The Fundamental Duties are however, not legally enforceable, i.e. without any legal sanction in case of their violation or non-compliance. Each Fundamental Duty along with its significance as elaborated by the Kerala Legal Services Authority has been discussed below.

It shall be the duty of every citizen of India:

(a) **To abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem:** It is the Fundamental Duty of every citizen to respect the National Flag and to desist from any act which would subject it to ridicule or that which would diminish its value. The Fundamental Duty to respect the National Flag is augmented by separate statutes enacted to ensure that National symbols including the National Flag are respected and honoured. Violation of those legal mandates would attract punishment. Just as the National Flag, our National Anthem evokes in us patriotic fervour and reminds us of the diversity, unity and integrity of our great Nation. The National Anthem too commands respect and the Constitution makes it the Fundamental Duty of every citizen to respect the National Anthem. Whenever the National Anthem is sung in public, respect to the same is to be demonstrated either by standing up respectfully or by joining in the singing. Intentionally preventing or causing disturbance to any assembly engaged in singing the National Anthem is a punishable offence.

(b) **To cherish and follow the noble ideals which inspired our national struggle for freedom:** India's freedom struggle is unique when compared to other freedom struggles across the world. The Constitution deems it to be the Fundamental Duty of every citizen of India to retain, cherish and follow all those ideals and principles which were the bedrock of our freedom struggle.

(c) **To uphold and protect the sovereignty, unity and integrity of India:** To cherish the noble ideals of India as a sovereign, socialist, secular, democratic, republic, its sovereignty, unity and integrity should not be allowed to be eroded. The Constitution envisages each citizen to realize this fact as his basic duty and act accordingly.

(d) **To defend the country and render national service when called upon to do so:** Every citizen is liable to serve the nation in such emergent situation for protection of the vegetation, livestock and natural resources. It is one of the Fundamental Duties as per the Constitution. We shall wholeheartedly take pledge to serve the Nation in

emergent situation for defending the Nation and for rendering national service when called upon to do so.

(e) **To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women:** We find every facet of diversity in our country – be it geographical, linguistic, social, cultural or religious – and such diversity or heterogeneity is often described as an amazing peculiarity of our country by those who have seriously studied the Indian history and culture. In order to achieve harmony and common brotherhood, the status of women, who account for almost fifty per cent of the population, also has to be seriously considered. The Indian citizen should realize and recognize that women are entitled to equality and dignity in all spheres of life. It is, in fact, a pre-condition for the natural growth of humanity, and formation of unity, in our society.

(f) **To value and preserve the rich heritage of our composite culture:** Compassion and equality are the two fundamental tenets of Indian culture, and citizens have a duty to strengthen those ideals in our society by following them and nurturing them in all spheres of their personal life.

(g) **To protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures**: A country that protects and preserves environment, birds and animals alone will have wholesome development. Human beings and Nation are irreparable from environment. Uncontrolled exploitation of natural and common resources is a serious danger to the existence of the country. So is annihilation of other living creatures. Hence, protection of environment is imperative for the national development.

(h) **To develop the scientific temper, humanism and the spirit of inquiry and reform:** Constitutional goal is not only confined to build a strong and permanent Nation. It also strives to ensure that her citizens are intellectually superior. Scientific temper, humanism and the spirit of inquiry and reform are fundamental to individual development.

(i) **To safeguard public property and to abjure violence:** Every citizen of our country has the obligation to protect public property and it is not the responsibility of the public authorities alone. Article 51A (i) has identified the said responsibility of a citizen as his important and key constitutional obligation. Our Constitution mandates that each and every citizen has an obligation and bounden duty to stay away from violent protests and also from committing damage to public properties.

(j) **To strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement:** This is a Fundamental Duty which mandates that we have to go all out, selfless, for raising our standards in every activity in which we are engaged so that our achievements will be a part of the national achievement. Excellence in common parlance means surpassing merit and virtues. Article 51(A) (j) requires every citizen to perform his duties in a more superior way or in way that the citizen has surpassed in performance of his duties. In *Dr. Dasarathi v. State of Andhra Pradesh,* the Court held that it is the duty of every citizen to constantly strive towards excellence in the various spheres of

life and continuously make relentless efforts to achieve accolades and that is how the nation as a collective body of its citizens will constantly move towards new levels of excellence.

**(k) Who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years:** It is the duty of every parent or the guardian to provide opportunities to the child for educating him and make him understand the complexities of life, need for education and also to guide him so that he/she can choose his/her own path to contribute his/her best to the development of the Nation. Article 51A(k) is sufficiently supported and supplemented by Article 21A of the Indian Constitution which provides that "the State shall provide free and compulsory education to all children of the age of 6 to 14 years in such manner as the State may, by law, determine".

## 4.4 CHECK YOUR PROGRESS-I
(a) **Explain the Fundamental Duty "To uphold and protect the sovereignty, unity and integrity of India".**
(b) **What does Article 51A(k) talk about?**

## 4.5 RELEVANCE OF FUNDAMENTAL DUTIES
The Fundamental Rights, the Directive Principles of State Policy the Fundamental Duties in must be read together to understand the spirit of Indian Constitution. The Fundamental duties are essentially taken from the Indian tradition, mythology, religions and practices. Essentially these were the duties that are the codification of tasks integral to the Indian way of life. These are statutory duties, not enforceable by law, but a court may take them into account while adjudicating on a matter. The idea behind their incorporation was to emphasise the obligation of the citizen in exchange for the Fundamental Rights that he or she enjoys. It reminds every citizen that besides being conscious about our rights, we should also comply with our duties.

The fundamental duties are reflection of the ancient developed concepts of east but least adhered in modern era. Some are mere declaratory, while few can be treated as remedial duties and some others as hybrid of declaratory and remedial duties. The declaratory duties declare the right without providing any remedy for its breach. The remedial duties create the duties and/or affirm the duties with remedy for the breach either in same statute or in already existing statute. For hybrid duties remedy may address only to part of breach and not whole of the duties. Applying this criteria, the declaratory duties fall under Article 51-A(b),(d),(f),(h) & (j) while remedial duties seem to be covered by Article 51-A(c),(e) & (g) . The duties referred to as hybrid are the amalgam of both the declaratory and remedial duties falling under 51-A (a) & (i).

Some of the duties and their breach do create a statutory offence for prosecution. For example the breach of remedial duties under 51-A(c), (e) & (g) constitute offences under Indian Penal Code and like law, besides this, the breach of duty under 51-A(k) is again strengthened by Section-10 of the Right to Free and Compulsory Education Act, 2009 where it says 'It shall be the duty of every parent or guardian to admit or cause to be admitted his or her child or ward, as the case may be, to an elementary education in the neighbourhood school'. The remedy for breach is provided in Chapter VI of the Act read with Article 21-A of the constitution of

India. The remedy is curative and not punitive, perhaps in view of the delicate relations. But for declaratory duties in other areas, there does not seem to be any corresponding remedial statute whether curative or punitive to prevent the breach and/or punishment for any deviation. In the words of Austin: "*There do exist laws which may not be command but still are within the province of jurisprudence*". To this category he refers to declaratory or explanatory laws, laws to repeal laws, besides laws of imperfect obligation meaning the law which does not have sanction. The analytical approach can make declaratory duties as not a law while the remedial duties as perfect law with sanctions in other statutes. The hybrid duties fall under both the arenas.

It is the basic principle of jurisprudence that every right has a correlative duty and every duty has a correlative right. But the rule is not absolute. It is subject to certain exceptions in the sense that a person may have a right, but there may not be a correlative duty. Though these duties are not obligatory in nature and no legal sanction is attached to the violation or non-performance of Fundamental Duties and there is neither specific provision for enforceability nor any specific prohibition; these Fundamental Duties have an inherent element of compulsion regarding compliance. Out of the eleven clauses in article 51A, six comprise of positive duties and the other five are more in the nature of negative duties. Clauses (b), (d), (f), (h) and (j) require the citizens to perform these Fundamental Duties actively. It is said that by their nature, it is not practicable to enforce the Fundamental Duties and they must be left to the will and aspiration of the citizens. However, in the case of citizens holding public office, each and all Fundamental Duties can be enforced by suitable legislation and departmental rules of conduct.

### 4.6 : ENFORCEABILITY OF FUNDAMENTAL DUTIES

The Indian Penal Code does not cover all the breaches of Fundamental Duties, but provides criminal remedy for breach at 51-A (c), (e) & (i) related to the sovereignty, unity and integrity of India, harmony and the spirit of common brotherhood, besides, practices derogatory to the dignity of women. As far as Articles 51-A (e) & (k) are concerned, law exists for the protection of environment including compassion for living creatures and also for safeguarding public property and to abjure violence, besides the Right to Education Act . The provisions for criminal remedy towards 51-A (c), (e) & (i) is covered in respective statutes especially the Indian Penal Code while those for environment referred to in 51-A(g) have the remedy under the Environmental Protection Act ,1986. Besides this, the remedy in part for Fundamental Duties under 51-A(a), is covered by respective Acts of parliament relating to National Flag and the National Anthem. There seems no remedy for the breach under Article 51-A b),(d),(f),(h) & (j). Even for those Articles of Fundamental Duties where remedy is provided in statutes, they appear to cover the acts /omissions of gravity making such acts / omissions an offence which can be put under trial by court of law as bailable / non-bailable and summon/warrant case. Accordingly difficulties do emerge as far as burden of proof and components of offence are concerned. Firstly motive and intention is to be established and secondly burden of proof on the person in whom right vests and/or collectively resides. Keeping all this aside, there is a need for adopting curative measures for inculcating duties instead directly adopting coercive measures except in exceptional cases squarely and clearly satisfying the components of offence. All this depends on gravity of breach of duty. Thus a need arises to make the act as an

actionable wrong of a 'civil misconduct' desired to be cured rather punished. Accordingly, innovative solutions may be carved out.

As discussed above, Fundamental Duties play a key role in the interpretation of various statutes. Although, the judiciary restrained itself from enforcing these duties initially but the recent trend in judicial decision shows that judiciary is actively enforcing these duties. The Supreme Court through various judgements has made these duties enforceable. For example in *M.C. Mehta v. Union of India* (1988), the Supreme Court has held that to enforce Article 51-A (g) of Indian Constitution i.e. "to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures", it is the duty of the Central Government to introduce compulsory teaching of lessons at least for one hour in a week on protection and improvement of natural environment in all the educational institution of the country.

In *AIIMS Students Union v. AIIMS*, The Supreme Court emphasized on the significance of Fundamental Duties provided in Article 51-A and struck down the institutional reservation of 33% in AIIMS coupled with 50% reservation discipline wise by stating that fundamental duties, though not enforceable by a writ of the court, yet provide valuable guidance and aid to interpretation and resolution of constitutional and legal issues. In case of doubt, peoples' wish as expressed through Article 51-A can serve as a guide not only for resolving the issue but also for constructing or moulding the relief to be given by the courts. The fundamental duties must be given their full meaning as expected by the enactment of the Forty-second Amendment and they are equally important like fundamental rights.

Fundamental Duties help in the interpretation of the law/statues made by the legislature. It is held in many cases that the need for Fundamental Duties in interpreting the Fundamental Right is pivotal. In the case of *Mohan Kumar Singhania v. Union of India*, a governmental decision to give utmost importance to the training programme of the Indian Administrative Service selectees was upheld by deriving support from Article 51-A (i) of the Constitution, holding that the governmental decision was in consonance with one of the fundamental duties. The court held that statues made according to Article 51(A) of our Constitution are valid. The Court further stated that one should resort to Article 51-A in situations where the constitutionality of any legislation has been questioned and need to be determined.

In *Chandra Bhawan Boarding v. State of Mysore*, the Supreme court made the following observation prior to the insertion of Article 51-A: "It is a fallacy to think that in our Constitution, there are only rights and no duties. The provisions in Part IV enables the legislature to build a welfare society and that object may be achieved to the extent the Directive Principles are implemented by legislation."

In *Rural Litigation and Entitlement Kendra v. State of Uttar Pradesh*, a complete ban and closing of mining operation carried on in Mussoorie hills was held to be sustainable by deriving support from the fundamental duty as enshrined in Article 51-A (g) of the Constitution. The court held that preservation of the environment and keeping the ecological balance unaffected is a task which not only government but also every citizen must undertake. It is a social obligation of the state as well as of the individuals.

The scope of the article 51A was extended in *Ashoka Kumar Thakur v UOI*, Justice Bhandari said that "State is all the citizens placed together and hence though article 51A does not expressly cast any fundamental duty on the State, the fact remains that the duty of every citizen

of India is the collective duty of the State" and also the Court held that it is the duty of State to make sure that free education is given to children between the age of six to fourteen years and compulsory duty of parents or guardians to give education to their respective wards (children). In the case of *KRK Vara Prasad v UOI*, the High Court has said that the Constitution commands the citizens of India to follow the duties enumerated under the article 51A of PART – IV A.

The purpose behind having fundamental duties was explained by the committee headed by Justice J.S. Verma in its report (1999): "*In order to strike the balance between the citizen's demands and the civil society's claims, it is necessary to educate and update citizens regarding their social and civil responsibilities. This would help shape the modern civil society*".

On analysing the case laws of the Supreme Court and different High Courts, it can be seen that the interpretations so made are not in line with the main purpose with which these duties were introduced, i.e., to deal with the anti-national activities in the nation. Rather, judiciary is stepping forward to enforce these duties in a manner that it ends up curtailing the Fundamental Rights of other citizens. The fundamental duties provided in the Constitution are not enforceable by law but they are to be made enforceable by the citizens themselves. An onerous responsibility is, thus, cast upon the citizens and they can either make or mar the destiny of this country. As the citizen is going to be answerable to his own conscience, his inner sense should be developed to such an extent that he may himself perform the duty without fear of any sanction or reminder.

### 4.7 : SUMMARY

There is a need to make the Fundamental Duties obligatory for all citizens, subject to the State enforcing the same by means of a valid law, or else the law stands in a very disadvantageous position. The Supreme Court has finally, issued directions to the State in this regard, with a view towards making the provisions effective and enabling a citizens to properly perform their duties properly.

Though not justiciable and therefore, with little consequence in practical terms, the provision of fundamental duties was opposed by many people who also brought out several inconsistencies in these duties. For instance, one of the fundamental duties asks every citizen of the country to develop a scientific temper and spirit of enquiry. But with bulk of the people still illiterate, how is it possible to imbibe the habit of thinking with clarity and precision if they are unable to get the basic inputs of such thinking. The duties ought to be respected otherwise law becomes paper tiger when it loses the sanction and enforcement. As such the fundamental duties to be the form of law ought to have sanction in whatsoever form. To make India great, emphasis must be laid to inculcate obedience to duty. Nevertheless, the fundamental duties have become a part of the Constitution and despite their non-justiciability; they continue to exercise some sort of social and collective restriction on those who are fond of enjoying unfettered rights without discharging even an iota of duty to the society and the nation. For the proper enforcement of duties, it is necessary that it should be known to all. This should be done by a systematic and intensive education of people that is by publicity or by making it a part of education.

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## 4.10 : MODEL QUESTIONS:
1. What is the significance of Fundamental Duties?
2. Whether Fundamental Duties are enforceable or not? Justify your answer by referring to various case laws.
3. When were Fundamental Duties added in Indian Constitution?
4. Discuss the Fundamental Duties provided in Indian Constitution in detail.
5. Discuss the ideology behind introducing the concept of Fundamental Duties in Indian Constitution.