

Certificate/Diploma in Statistical Analysis and Research Methodology

Objective of the Course:

- To make the students familiar with various techniques used in summarization and analysis of data.
- To providing basic knowledge of statistics, which deals with data, collection of data, analysis, interpretation and representation of data.
- To analyse statistical data properly and understand the role of formal statistical theory and informal data analytic methods.
- Give the knowledge regarding probability theory of outcome of real-life experiments through statistical distributions.
- To equip learners with the skills of using appropriate statistical techniques for applications in various fields.

Duration of the Course:

- 1) Certificate course: 6 months
- 2) Diploma: 12 months

Eligibility: Any student enrolled in the degree program of the college.

Sr. No.	Topics	
Topics covered under Certificate Course are Sr No.1, 2 and 3		
1	SARM 1 Introduction to Statistics	Credits: 6
2	SARM 2 Descriptive Statistics	Credits: 6
3	SARM 3 Research Methodology	Credits: 6
Topics covered under Diploma Course are Sr No. 1, 2, 3, 4, 5 and 6		
4	SARM 4 Time Series Analysis and Probability Distributions	Credits: 6
5	SARM 5 Statistical Inference	Credits: 6
6	SARM 6 Research Project/Dissertation	Credits: 6

CERTIFICATE/ DIPLOMA IN STATISTICAL ANALYSIS AND RESEARCH METHODOLOGY

SARM 1: INTRODUCTION TO STATISTICS

Max. Marks: 100

External: 70

Internal: 30

Pass: 40%

Credits: 6

OBJECTIVES:

The objective of the course is to make the students familiar with various techniques used in summarization and analysis of data. The focus will be on providing basic knowledge of statistics, which deals with data, collection of data, analysis, interpretation and representation of data. It deals with how to analyse statistical data properly and understand the role of formal statistical theory and informal data analytic methods.

INSTRUCTIONS FOR THE PAPER SETTER/ EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. Question Paper will have 70 Multiple Choice questions (MCQs) and four choices of answers will be there covering the entire syllabus. Each question will carry 1 mark. All questions will be compulsory; hence candidates will attempt all the questions.
3. Paper-setters/Examiners are requested to distribute the questions from section A and Section B of the syllabus equally i.e., 35 questions from section A and 35 questions from Section B.
4. The examiner shall give clear instructions to the candidates to attempt questions.
5. The duration of each paper will be two hours.

INSTRUCTIONS FOR THE STUDENTS

The question paper shall consist of 70 Multiple Choice questions. All questions will be compulsory and each question will carry 1 mark. There will be no negative marking. Students are required to answer using OMR (Optimal Mark Recognition) sheets.

SECTION A

Unit 1: Statistics: definition, importance and Scope, limitations, Distrust

Unit 2: Collection of data: Types and Sources

Unit 3: Classification and Tabulation of data

Unit 4: Diagrammatic and Graphical presentation of data (with MS-Excel)

SECTION B

Unit 5: Sample, Population, Characteristics of good sample, type of sampling techniques, Sampling errors.

Unit 6: Measures of Central Tendency- Mean (Direct, Short cut and step deviation methods), Merits & Demerits.

Unit 7: Median (Direct, Short cut and step deviation methods) and Mode: Inspection and grouping method, Merits & Demerits

Unit 8: Geometric Mean, Harmonic Mean: Meaning, Merits & Demerits.

Note: Statistical analysis should also be taught with the help of MS Excel, SPSS or any other related software tool.

Suggested Readings

A.M Goon, M.K Gupta and B. Dasgupta, fundamental of statistics Vol-I, World press Calcutta

Gupta SC: Fundamental of statistics, S. Chand & Company. New Delhi

Gupta, SP: Statistical Methods, S. Chand & Company. New Delhi

Monga, GS: Mathematics and Statistics for Economics, Vikas Publishing House, New Delhi.

Singh, D. and Chaudhary, F.S. (1986): Theory and Analysis of Sample Survey Designs. New Age International Publishers.

Cochran, W.G. (1977): Sampling Techniques (3rd edition), Wiley.

CERTIFICATE/ DIPLOMA IN STATISTICAL ANALYSIS AND RESEARCH METHODOLOGY

SARM 2: DESCRIPTIVE STATISTICS

Max. Marks: 100

External: 70

Internal: 30

Pass: 40%

Credits: 6

OBJECTIVES

Descriptive statistics summarize and organize characteristics of a data set, a collection of observations from a sample or entire population.

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. 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.
3. The Question paper will contain 60 percent theory and 40 percent numerical proportion.
4. 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.
5. 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.
6. 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. Simple calculator can be used in the examination.

SECTION A

Unit 1: Dispersion - Objectives and significance of Good Measures, Measures of Dispersion -

Range, Quartile Deviation, Mean Deviation and Standard Deviation (ungrouped data).

Unit 2: Co-efficient of variation (CV), Lorenz Curve, Meaning and Measures of skewness kurtosis, Moments

Unit 3: Correlation: Meaning, Properties and Types.

Unit 4: Methods of Correlation: Scatter Diagram, Karl Pearson's Correlation Co-efficient & Spearman's Rank, Correlation Co-efficient.

SECTION B

Unit 5: Regression- Meaning, Properties, Types, Meaning of Line of Correlation, Difference between correlation and regression.

Unit 6: Measurement of Regression equations X on Y and Y on X

Unit 7: Index Numbers: Meaning and Uses and Types of Index Numbers, problems in the construction, Methods of Index Numbers: Laspayer's, Paasche and Fisher.

Unit 8: Tests of consistency of Index Number Formulae, Chain index or Chain Base Index Numbers, Base Shifting, Splicing and Deflation. Limitations of Index Numbers.

Note: Statistical analysis should also be taught with the help of MS Excel, SPSS or any other related software tool.

Suggested Readings

A.M Goon, M.K Gupta and B. Dasgupta, fundamental of statistics Vol-I, World press Calcutta

Gupta SC: Fundamental of statistics, S. Chand & Company. New Delhi

Gupta, SP: Statistical Methods, S. Chand & Company. New Delhi

Monga, GS: Mathematics and Statistics for Economics, Vikas Publishing House, New Delhi.

CERTIFICATE/ DIPLOMA IN STATISTICAL ANALYSIS AND RESEARCH METHODOLOGY

SARM 3: RESEARCH METHODOLOGY

Max. Marks: 100
External: 70
Internal: 30
Pass: 40%
Credits: 6

INSTRUCTIONS FOR THE PAPER SETTER/ EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. Question Paper will have 70 Multiple Choice questions (MCQs) and four choices of answers will be there covering the entire syllabus. Each question will carry 1 mark. All questions will be compulsory; hence candidates will attempt all the questions.
3. Paper-setters/Examiners are requested to distribute the questions from section A and Section B of the syllabus equally i.e., 35 questions from section A and 35 questions from Section B.
4. The examiner shall give clear instructions to the candidates to attempt questions.
5. The duration of each paper will be two hours.

INSTRUCTIONS FOR THE STUDENTS

The question paper shall consist of 70 Multiple Choice questions. All questions will be compulsory and each question will carry 1 mark. There will be no negative marking. Students are required to answer using OMR (Optimal Mark Recognition) sheets.

SECTION-A

Unit 1: Introduction to Research Methodology: Characteristics, Objectives and Types, Research Design

Unit 2: Literature review, Research problems, Measurement and Scaling Techniques

Unit 3: Ethics – Definition, Moral Philosophy, Nature of Moral Judgements and Reaction, Ethics with respect to Science and Research. Intellectual Honesty and Research Integrity

Unit 4: Scientific Misconduct: Falsification, Fabrication and Plagiarism.Redundant Publications: Duplicate and Overlapping Publication, Salami Slicing. Selective reporting and misrepresentation of data.

Section B

Unit 5: Publication Ethics- Definition, Introduction and Importance. Best Practices/Standard Settings initiatives and guidelines: COPE, WAME etc. Conflict of Interest Software to identify predatory publications developed by SPPU

Unit 6: Publication Misconduct – Definition, Concept, Problems that lead to unethical behaviour and vice-versa. Violation of Publication ethics and authorship and contributor ship, Identification of Publication Misconduct, Complaints and Appeal- Examples and Fraud from India and Abroad, Predatory Publishers and Journals. Use of Plagiarism Software like Turnitin, Urkund and other open-source software tools.

Unit 7: Meaning of Hypothesis, Characteristics of Hypothesis, Basic Concepts: Null Hypothesis and Alternative Hypothesis, One-tailed and Two-tailed, Type-I and Type-II errors, Level of Significance. Power of a test.

Unit 8: Critical Region and Acceptance Region, Hypothesis Testing Procedures (Steps), Introduction to parametric and non-parametric tests.

Note: Statistical analysis should also be taught with the help of MS Excel, SPSS or any other related software tool.

Suggested Readings

- Anderson, D.R.; Sweeney, D.J. and Williams, T.A., “Statistics for Business and Economics”, 2nd edition (2011), Thompson, New Delhi.
- Cooper, D. R., and Schindler, P.S., “Business Research Methods”, 9th Edition, Tata McGraw-Hill, New Delhi.
- Kothari, C. R., “Research Methodology”, 2nd Edition (2008), New Age International.
- Levine, D.M., Krehbiel T.C., and Berenson M.L., “Business Statistics”, 12th Edition (2012), Pearson Education, New Delhi.

Zacks, S. (1971): Theory of Statistical Inference, John Wiley and Sons. New York

CERTIFICATE/ DIPLOMA IN STATISTICAL ANALYSIS AND RESEARCH METHODOLOGY

SARM 4: TIME SERIES ANALYSIS AND PROBABILITY DISTRIBUTIONS

Max. Marks: 100

External: 70

Internal: 30

Pass: 40%

Credits: 6

OBJECTIVE:

Give the knowledge regarding probability theory of outcome of real-life experiments through statistical distributions.

INSTRUCTIONS FOR THE PAPER SETTER/ EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. Question Paper will have 70 Multiple Choice questions (MCQs) and four choices of answers will be there covering the entire syllabus. Each question will carry 1 mark. All questions will be compulsory; hence candidates will attempt all the questions.
3. Paper-setters/Examiners are requested to distribute the questions from section A and Section B of the syllabus equally i.e., 35 questions from section A and 35 questions from Section B.
4. The examiner shall give clear instructions to the candidates to attempt questions.
5. The duration of each paper will be two hours.

INSTRUCTIONS FOR THE STUDENTS

The question paper shall consist of 70 Multiple Choice questions. All questions will be compulsory and each question will carry 1 mark. There will be no negative marking. Students are required to answer using OMR (Optimal Mark Recognition) sheets.

SECTION A

Unit 1: Time series analysis: Introduction, Uses and Importance, Components: Secular trend, short term variations, Random and irregular trends

Unit 2: Measurements of Trend: Graphic, Semi-average, Least square and Moving Average, Merits and Demerits

Unit 3: Basics of Probability: Addition Law, Conditional probability, Multiplication law

SECTION B

Unit 4: Probability Distribution: Binomial distribution and Poisson distribution

Unit 5: Normal distribution- Meaning, Properties and fitting

Unit 6: Interpolation and Extrapolation.

Note: Statistical analysis should also be taught with the help of MS Excel, SPSS or any other related software tool.

Suggested Readings

- A.M Goon, M.K Gupta and B. Dasgupta, fundamental of statistics Vol-I, World press Calcutta
- Anderson, D.R.; Sweeney, D.J. and Williams, T.A., “Statistics for Business and Economics”, 2nd edition (2011), Thompson, New Delhi.
- Gupta SC: Fundamental of statistics, S. Chand & Company. New Delhi
- Gupta, SP: Statistical Methods, S. Chand & Company. New Delhi
- Kothari, C. R., “Research Methodology”, 2nd Edition (2008), New Age International.
- Meyer, P.L. (1990): Introductory Probability and Statistical Applications, Oxford & IBH Pub.
- Monga, GS: Mathematics and Statistics for Economics, Vikas Publishing house, New Delhi.
- Rohatgi, V. K. and Saleh, A.K.M.E. (2010): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.

CERTIFICATE/ DIPLOMA IN STATISTICAL ANALYSIS AND RESEARCH METHODOLOGY

SARM 5: STATISTICAL INFERENCE

Max. Marks: 100

External: 70

Internal: 30

Pass: 40%

Credits: 6

OBJECTIVE:

- To provide core knowledge required for statistical applications.
- To equip learners with the skills of using appropriate statistical techniques for applications in various fields.

INSTRUCTIONS FOR THE PAPER SETTER/ EXAMINER:

1. The syllabus prescribed should be strictly adhered to.
2. Question Paper will have 70 Multiple Choice questions (MCQs) and four choices of answers will be there covering the entire syllabus. Each question will carry 1 mark. All questions will be compulsory; hence candidates will attempt all the questions.
3. Paper-setters/Examiners are requested to distribute the questions from section A and Section B of the syllabus equally i.e., 35 questions from section A and 35 questions from Section B.
4. The examiner shall give clear instructions to the candidates to attempt questions.
5. The duration of each paper will be two hours.

INSTRUCTIONS FOR THE STUDENTS

The question paper shall consist of 70 Multiple Choice questions. All questions will be compulsory and each question will carry 1 mark. There will be no negative marking. Students are required to answer using OMR (Optimal Mark Recognition) sheets.

SECTION A

Unit 1: Theory of Estimation: Point estimation and Interval estimation

Unit 2: Sampling distributions of a Statistics- Small Sample test or student-t test and its

applications: t-test for single mean, difference of means, Paired t-test

Unit 3: Large Sample test: Introduction, Sampling of Attributes- test for Single Proportion, test for difference in proportion

SECTION B

Unit 4: F-statistics: meaning, equity of population variances

Unit 5: Chi-square test- goodness of fit, independent of attributes, test of variance (for population), equality of several population proportions

Unit 6: Analysis of Variance: One-way and Two-way

Unit 7: Interpretation of data and Report writing.

Note: Statistical analysis should also be taught with the help of MS Excel, SPSS or any other related software tool.

Suggested Readings

- A.M Goon, M.K Gupta and B. Dasgupta, fundamental of statistics Vol-I, World press Calcutta
- Anderson, D.R.; Sweeney, D.J. and Williams, T.A., “Statistics for Business and Economics”, 2nd edition (2011), Thompson, New Delhi.
- Cooper, D. R., and Schindler, P.S., “Business Research Methods”, 9th Edition, Tata McGraw-Hill, New Delhi.
- Gupta SC: Fundamental of statistics, S. Chand & Company. New Delhi
- Gupta, SP: Statistical Methods, S. Chand & Company. New Delhi
- Lehmann, E.L. (1986): Testing Statistical hypotheses (Student Edition).
- Monga, GS: Mathematics and Statistics for Economics, Vikas Publishing house, New Delhi.
- Zacks, S. (1971): Theory of Statistical Inference, John Wiley and Sons. New York.

SARM 6: RESEARCH PROJECT (DISSERTATION)

Max. Marks: 100

Project Report: 60 marks

Viva: 40 marks

Credits: 6

1. Dissertation-based paper gives an opportunity for the students to have an experience in data collection, compilation, analysis, and report writing.
2. A list of suggested topics etc. for the Projects shall be provided to the students by the concerned teacher. However, they can undertake projects based on their area of interest.