

Certificate/ Diploma Course in Artificial Intelligence and Data Science

Semester I

CCAD-1-03T: Statistical Foundation

Total Marks: 100

External Marks: 70

Internal Marks: 30

Credits: 4

Pass Percentage: 40%

Objective: This course will enable students to understand the fundamentals of statistics to apply descriptive measures and probability for data analysis. Students will be able to infer the concept of correlation and regression for relating two or more related variables and probabilities for various events.

Section A

Unit I: Origin and development of Statistics, Scope, limitation and misuse of statistics. Types of data: primary, secondary, quantitative and qualitative data. Types of Measurements: nominal, ordinal, discrete and continuous data.

Unit II: Presentation of data by tables: construction of frequency distributions for discrete and continuous data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions. Classification and Graphical representation of data (Pie Chart, Bar Diagram, Histogram, Frequency Polygon, Ogive Curve, etc.).

Unit III: Measures of Central Tendency – Arithmetic Mean, Median and Mode and its Graphical representation, Measures of dispersion – range, variance, mean deviation, standard deviation and coeff. of variation, Concepts and Measures of Skewness and Kurtosis.

Unit IV: Descriptive and Exploratory Analysis: Descriptive Statistics, Exploratory data analysis, Coefficient of variation, Data **visualization**, Scatter diagram, Grouped data,

Section B

Unit V: Correlation: Scatter plot, Karl Pearson coefficient of correlation, Spearman's rank correlation coefficient, multiple and partial correlations (for 3 variates only). Regression: Introduction to regression analysis: Modelling a response, overview and applications of regression analysis, Simple linear regression (Two variables)

Unit VI: Mathematical and Statistical probability: Introduction, Elementary events, Sample space, Compound events, Types of events, Random experiment, sample point and sample space, event, algebra of events.

Unit VII: Definition of Probability: Introduction, classical, empirical and axiomatic approaches to probability, properties of probability. Theorems on probability, conditional probability and independent events

Unit VIII: Statistical inference: Introduction, Concept of Random Variable, Probability Mass Function & Density Function, Mathematical Expectation (meaning and properties), Moments, Moment Generating Function and Characteristic Function

Suggested Readings

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Mathematical Statistics, Sultan & Chand & Sons, New Delhi, 11th Ed,
2. Hastie, Trevor, et al. The elements of Statistical Learning, Springer,
3. Ross, S.M., Introduction to Probability and Statistics, Academic Foundation,
4. Papoulis, A. and Pillai, S.U. , Probability, Random Variables and Stochastic Processes, TMH