



Code: ST122

BHAVAN'S VIVEKANANDA COLLEGE

of Science, Humanities and Commerce, Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' Grade by NAAC

60hrs
(4hrs/ week)
4 Credits

B.Sc. I Year (CBCS): Statistics Syllabus

(Examination at the end of I Semester)

(Wef academic year: 2025-26)

Semester I

Course Name: Descriptive Statistics & Probability

Course Objectives:

This course aims to,

COB1: Understand the historical evolution of Statistics in India, Analyze and compare different sets of data using graphs, charts, tables, and numerical measures, and write about them in clear and precise sentences using statistical vocabulary.

COB2: Calculate and interpret the various descriptive measures for centrality and dispersion.

COB3: Provide strong foundation of probability theory and theorems including Bayes theorem.

COB4: Understand the concept of random variables, how to identify them and use them to solve probabilistic problems

UNIT - I

(15)

History of Statistics: Origins of Indian Statistics, Early development of Statistical methods, Contribution of P.C. Mahalanobis, C.R. Rao and P.V. Sukhatme.

Introduction: Importance of statistics, concepts of statistical population and a sample -quantitative and qualitative data - collection of primary and secondary data. Measurement scales- nominal, ordinal, interval and ratio. Classification and tabulation of data. Construction of univariate and bivariate frequency distributions. Diagrammatic and graphical representation of data. Designing a questionnaire and a schedule.

UNIT - II

(15)

Descriptive Statistics: Measures of central tendency (mean, median, mode, geometric mean and harmonic mean) with simple applications. Absolute and relative measures of dispersion (range, quartile deviation, mean deviation and standard deviation) with simple applications.

Moments -Importance of moments, central and non-central moments, and their interrelationships, Sheppard's corrections for moments for grouped data. Measures of skewness based on quartiles and moments and kurtosis based on moments with real life examples.

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UNIT - III

(15)

Probability: Basic concepts in probability—deterministic and random experiments, trial, outcome, sample space, event, and operations of events, mutually exclusive and exhaustive events, and equally likely and favorable outcomes with examples. Mathematical, statistical and axiomatic definitions of probability with merits and demerits. Conditional probability and Independent events. Addition and multiplication theorem for n events. Boole's inequality and Bayes' Theorem – numerical problems.

UNIT - IV

(15)

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations and expectation of a random variable and rules of expectation. Distribution function and its properties. Definition of moment generating function (m.g.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and characteristic function (c.f) and statements of their properties with applications. Chebyshev's, and Cauchy-Schwartz's inequalities and their applications.

Course Outcomes:

Upon successful completion of the course, students are able to:

CO1: *Understand the history of statistics, and develop skills in presenting quantitative and qualitative data using appropriate diagrams, tabulations, and frequency distribution construction.*

CO2: *Evaluate and interpret measures of central tendency, spread of data, central & Non central moments.*

CO3: *Utilize basic concepts of probability and theorems in probability, including Bayes' theorem to calculate, interpret, and communicate event probabilities.*

CO4: *Apply key concepts of probability, including discrete and continuous random variables, Probability functions, Generating functions, expectations and variances.*

List of Reference Books:

1. V.K. Kapoor and SC. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. Contributions to Statistics- P. C. Mahalanobis and C. R. Rao, Pergamon Press, Statistical Publishing Society, Kolkata
3. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley
4. Goon A M, Gupta and Das Gupta B: Fundamentals of Statistics, Vol-I, the World press pvt. Ltd., Kolkata
5. Hoel PG: Introduction to Mathematical Statistics, Asia Publishing house.
6. M. Jagan Mahon Rao and Papa Rao: A Text book of statistics paper-I.
7. Sanjay Arora and Bansilal: New mathematical Statistics: Satya Prakashan, New Delhi
8. Hogg, Tanis, Rao: Probability and Statistical Inference. 7th edition, Pearson Publication.
9. Statistics for B.Sc I year, Telugu Academy.
10. Statistics for Management - Levin & Rubin


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Code: ST122P

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30hrs
(2hrs/ week)
1 Credit

B.Sc. IYear (CBCS): Statistics Syllabus

(Examination at the end of III Semester)

(Wef academic year: 2025-26)

Semester I

Course Name: Descriptive Statistics & Probability – Practical

Course Objective:

This course will provide practical knowledge to the students on Descriptive statistics elaborated using MS- Excel and R programming.

COB1: Analyze patterns and trends in data using graphical representation generated in MS-Excel and R-Programming

COB2: Analyze and interpret the first, second, and higher-order measures of central tendency Using MS-Excel and R programming.

List of practicals:

1. Graphical Presentation of data (Histogram, Frequency polygon, Ogives) (MS-Excel, R-Programming).
2. Diagrammatic Presentation of data (Bar, Pie, Box Plot) (MS-Excel and R-Programming).
3. Computation of Measures of Central Tendency (MS-Excel and R-Programming).
4. Computation of Measures of dispersion (MS-Excel and R-Programming).
5. Computation of non-central and central moments – Sheppard's correction for grouped data. (MS-Excel and R-Programming).
6. Computation of co-efficient of Skewness and Kurtosis (MS-Excel and R-Programming).
7. Preparation of Statistical Analysis Report based on the descriptive statistics.

Course Outcomes:

Upon successful completion of the course, students are able to:

CO1: Explore experiments with new visualization techniques and stay updated with emerging trends in data visualization.

CO2: Analyze various types of data and evaluate summary measures such as central tendency, dispersion, skewness, and kurtosis.

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Code: ST222

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60hrs
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4 Credits

B.Sc. I Year (CBCS): Statistics Syllabus

(Examination at the end of I Semester)

(Wef academic year: 2025-26)

Semester II

Course Name: Probability distribution

Course Objectives:

The objective of this course is,

- COB1:** *To learn the basic concepts of bivariate random variables, and derive the marginal and conditional distributions of bivariate random variables.*
- COB2:** *To apply the concepts of various discrete probability distributions to various business problems.*
- COB3:** *how to apply concepts of the Continuous probability distributions to find probabilities and applications.*
- COB4:** *To translate real-world problems into probability models and Solve the problems using appropriate tools.*

UNIT - I

(15)

Bivariate Random variables: Notion of bivariate random variable, bivariate distribution and statement of its properties. Joint, marginal and conditional distributions. Independence of random variables. Transformation of one and two-dimensional random variable(s), simple problems on transformation of the random variable(s).

Discrete distributions: Uniform, Bernoulli, Binomial distributions. Properties of these distributions such as m.g.f., c.g.f., p.g.f., c.f., and moments up to fourth order and their real life applications.

UNIT - II

(15)

Discrete distributions (Continued): Poisson, Negative binomial, Geometric and Hyper-Geometric (mean and variance only) distributions. Properties of these distributions such as m.g.f., c.g.f., p.g.f., c.f., and moments up to fourth order and their real life applications. Reproductive property wherever exists. Binomial approximation to Hyper-geometric, Poisson approximation to Binomial and Negative binomial distributions

UNIT - III

(15)

Continuous distributions: Rectangular, Exponential, and Normal distributions. Importance of Normal distribution. Normal distribution as a limiting case of Binomial and Poisson distributions. Properties of these distributions such as m.g.f., p.g.f., c.g.f., c.f., and moments up to fourth order and their real-life applications and reproductive productive property wherever exists.

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UNIT - IV

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Continuous distributions (Continued): Gamma, Beta of two kinds (mean and variance only) and Cauchy (definition and c.f. only) distributions. Properties of these distributions such as m.g.f., c.g.f., c.f., and moments up to fourth order, their real-life applications and reproductive property wherever exists.

Definition of Central Limit Theorem (CLT) for identically and independently distributed (i.i.d) random variables with finite variance.

Course Outcomes:

Upon successful completion of the course, students able to:

CO1: *Transfer Knowledge and Skills to solve practical problems involving bivariate random variables and Binomial Distribution.*

CO2: *Apply the concepts and techniques to solve practical problems involving discrete distributions*

CO3: *Define and calculate the probabilities of the continuous probability distributions*

CO4: *Determine the continuous probability distribution based on experiment conditions and assumptions (including the gamma, beta and Cauchy distributions).*

List of Reference Books:

1. V.K.Kapoor and SC.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi
2. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley
3. GoonAM, Gupta and Das Gupta B: Fundamentals of Statistics, Vol-I, the World press pvt.Ltd., Kolkata
4. Hoel PG: Introduction to Mathematical Statistics, Asia Publishing house.
5. M.Jagan Mahon Rao and Papa Rao: A Text book of statistics paper-I
6. Sanjay Arora and Bansilal: New mathematical Statistics: Satya Prakashan, New Delhi
7. Hogg, Tanis, Rao: Probability and Statistical Inference. 7th edition, Pearson Publication.
8. Statistics for B.Sc I year, Telugu Academy.
9. Sambhavyata Avadhi Siddantalu—Telugu Academy
10. Sahasambandham-Vibhajana Siddantamulu – Telugu Academy
11. K.V.S. Sarma: statistics Made Simple: do it yourself on PC. PHI
12. Statistics for Management - Kevin & Rubin

17/4/2025
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Semester II

Course Name: Probability Distributions – Practical

Course Objective:

This course will provide practical knowledge to the students on Discrete and Continuous distributions to apply the relevant concepts to real-life problems through Ms- Excel and R- Programming.

COB1: Apply standard discrete probability distribution to real-life situations.

COB2: Apply standard Continuous probability distribution to real-life data.

List of practicals:

1. Computation of Binomial Probabilities (MS-Excel and R-Programming).
2. Computation of Poisson Probabilities (MS-Excel and R-Programming).
3. Computation of Negative Binomial Probabilities (R-Programming).
4. Computation of Geometric Probabilities (R-Programming).
5. Computation of Hyper Geometric Probabilities (R-Programming).
6. Computation of Exponential Probabilities (MS-Excel and R-Programming).
7. Computation of Normal Probabilities (R-Programming).
8. Computation of Cauchy Probabilities (MS-Excel and R-Programming).

Course Outcomes:

Upon successful completion of the course, students able to:

CO1: Learn how to fit various discrete probability distributions In MS-Excel and R- programming

CO2: Learn how to fit various Continuous probability distributions In MS-Excel and R-Programming

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