

DEPARTMENT OF MATHEMATICS & STATISTICS
VEERANARI CHAKALI ILAMMA WOMEN'S UNIVERSITY

Koti, Hyderabad – 500095

B.A/B.Sc. I Year I Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - I)

Paper – I : Descriptive Statistics and Probability

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Objectives: To learn various methods of data collection, various measures of statistics.

To learn Probability concepts, Random variable, Mathematical Expectation, various generating functions and their applications

Outcomes: After learning the course the students will be equipped with fundamental statistical knowledge in collecting data, statistical measures and Probability concepts

Unit-I

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

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

Unit-II

Probability: Basic concepts of probability, deterministic and random experiments, trial, outcome, sample space, event, operations of events, mutually exclusive and exhaustive events, equally likely and favorable events with examples, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Properties of probability based on axiomatic definition.

Conditional probability and independence of events, Addition and multiplication theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on probability using counting methods and theorems.

Unit-III

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass function and probability density function with illustrations. Distribution function and its properties, Transformation of one-dimensional random variable (simple 1-1 functions only).

Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables.

Unit-IV

Mathematical Expectation: Mathematical expectation of a function of a random variable, Raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

Definitions of moment generating function (m.g.f), characteristic function (c.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and statements of their properties with applications.

Reference books:

1. **Fundamentals of Statistics, (Vol-I)** - Goon A M, Gupta M K, Das Gupta B, The World Press (Pvt) Ltd., Kolkata.
2. **Fundamentals of Mathematical Statistics** - V. K. Kapoor and S. C. Gupta, Sultan Chand & Sons, New Delhi.

Additional References:

1. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
2. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
3. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics (Paper-I).
4. Hogg, Tanis, Rao: Probability and Statistical Inference, (7th edition), Pearson.
5. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC, PHI.
6. Gerald Keller: Applied Statistics with Microsoft Excel, Duxbury, Thomson Learning.
7. Levine, Stephen, Krehbiel, Berenson: Statistics for Managers using Microsoft Excel (4th edition), Pearson Publication.

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(Examination at the end of Semester - I)

Practical-1 : Descriptive Statistics and Probability

[2 HPW :: 1 Credit :: 50 Marks]

Part - 1 (Using Calculator)

1. Graphical presentation of data (Histogram, frequency polygon, Ogives) and its interpretation.
2. Diagrammatic presentation of data (Bar and Pie).
3. Computation of central tendency and dispersion measures for ungrouped and grouped data.
4. Computation of non-central and central moments – Sheppard's corrections for grouped data.
5. Computation of coefficients of Skewness - Karl Pearson's, Bowley's, β_1 and Kurtosis – β_2 and their interpretation.

Part - 2 (Using MS-Excel)

1. **Basics of Excel** - Data entry, editing and saving, establishing and copying formulae, Built in Functions - copy and paste, Find and Replace, Sorting.
2. **Basics of Excel** - Built in Functions - Filtering, Conditional formatting and creating Hyperlinks, Exporting to MS word document
3. Computation of descriptive Statistics using Pivote table - Univariate.
4. Data visualization through diagrams.
5. Computation of central tendency and dispersion measures, Coefficient of Variation for ungrouped and grouped data.
6. Computation of Coefficients of Skewness, Kurtosis using MS-Excel and interpretation.

**Note : Training shall be on establishing formulae in Excel cells and deriving the results.
The Excel output shall be exported to MSWord for writing inferences.**

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B.A/B.Sc. I Year II Semester (CBCS) : Statistics Syllabus

(w.e.f.2022-23)

(With Mathematics Combination)

(Examination at the end of Semester - II)

Paper – II : Probability Distributions

[4 HPW :: 4 Credits :: 100 Marks (External:80, Internal:20)]

Objectives: To learn various discrete and continuous distributions with their properties and applications

Objectives: By the time students complete the course they will be able to apply the distributions in real situations

Unit-I

Discrete distributions – I : Uniform and Bernoulli distributions : definitions, mean, variance and simple examples. Definition and derivation of probability mass functions of Binomial distribution, Poisson distribution, properties of these distributions: median, mode, m.g.f, c.g.f., p.g.f., c.f., and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Poisson approximation to Binomial distribution.

Unit-II

Discrete distributions – II: Negative binomial, Geometric distributions: Definitions and real life applications, properties of these distributions: m.g.f, c.g.f., p.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists), lack of memory property for Geometric distribution. Poisson approximation to Negative binomial distribution.

Hyper-geometric distribution: definition, real life applications, derivation of probability function, mean, variance. Binomial approximation to Hyper-geometric distribution.

Unit-III

Continuous distributions – I : Normal distributions – definition, properties such as m.g.f., c.g.f., c.f. and moments up to fourth order, reproductive property, wherever exists and their real life applications. Normal distribution as a limiting case of Binomial and Poisson distributions.

Unit-IV

Continuous distributions – II : Rectangular, Exponential, Gamma distributions - definition, properties: m.g.f., c.g.f., c.f. and moments upto fourth order, reproductive property (wherever exists) and their real life applications. Beta distribution of two kinds: Definitions, mean and variance.

Reference books:

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Practical-2 : Probability Distributions
(2 HPW :: 1 Credit :: 50 Marks)

Part - 1 (Using Calculator)

1. Fitting of Binomial distribution-Direct method.
2. Fitting of Binomial distribution-Recurrence relation Method.
3. Fitting of Poisson distribution-Direct method
4. Fitting of Poisson distribution-Recurrence relation Method.
5. Fitting of Negative Binomial distribution.
6. Fitting of Geometric distribution.
7. Fitting of Normal distribution-Areas method.
8. Fitting of Normal distribution - Ordinates method.
9. Fitting of Exponential distribution.

Part - 2 (Using MS-Excel)

1. Data Visualization through graphs (Histogram, frequency polygon, Ogives) using MS-Excel and their interpretation.
2. Computation of descriptive Statistics using Pivot table – Bivariate.
3. Fitting of Binomial distribution-Direct method.
4. Fitting of Poisson distribution-Direct method.
5. Fitting of Normal distribution-Areas method.
6. Fitting of Exponential distribution.

**Note : Training shall be on establishing formulae in Excel cells and deriving the results.
The Excel output shall be exported to MSWord for writing inferences.**
