



Bharatiya Vidya  
**Bhavan**

## BHAVAN'S VIVEKANANDA COLLEGE

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

Syllabus – B.Sc. I Year Statistics  
(w.e.f. academic year: 2026-27)  
Semester I

**Course:** Basic Statistics & Probability

Hour/week: 4

**Course Code:** ST122(60 Hours)

Credits: 4

**Course Objectives:** The objectives of this course are,

1. Able to compute and analyse the data sets (with different measurement of scales of variables in data sets, nominal, ordinal, interval, Ratio scales) based descriptive statistics like, Central tendencies, Dispersions, Moments, Skewness and Kurtosis.
2. Able to familiar into prepare the Basic descriptive statistical report using descriptives.
3. Strong foundations on the computation of the probability for the events and usage of addition, multiplication and Bayes theorems for probability computation, where ever the situation occurs.
4. Understanding the concept of one dimensional random variable, probability mass/density/ distribution functions and their properties and transformation of one dimensional random variable.
5. Understanding the procedure of evaluation Central and Non-central Moments for the random variables and also its evaluation from various generating functions.
6. Develop the ability to interpret statistical results and apply appropriate statistical methods for decision-making in real-life situations using analytical tools.

### 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.

**Basic Statistics:** Definitions, Measures, Properties and Importance of Central tendencies, Dispersions, Absolute and Relative measures of dispersions, Central and Non-central moments, Skewness and kurtosis and their inter-relationships and computations to the raw & grouped data.

### UNIT - II

(15)

**Probability:** Basic concepts used for defining probability, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Marginal, Joint and Conditional probabilities and independence of events, Multiplication & Addition theorems for 'two' and 'n' events, Boole's inequality and Bayes' theorem. Problems on computation of Probability and including the applications of theorems.

CHAIRPERSON  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

Professor, Dept. of Statistics  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-57. TS

### UNIT - III

(15)

**Random Variables:** Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass, density and distribution functions with their properties and simple problems and illustrations. Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables. Transformation of one dimensional random variables and simple problems.

### UNIT - IV

(15)

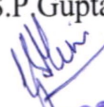
**Mathematical Expectation:** Mathematical expectation of a random variable, function of a random variable, Computation of raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Generating function, Definitions of moment generating function (MGF), cumulant generating function (CGF), probability generating function (PGF) and characteristic function (Ch.F), their basic properties, applications and computation of those for simple probability functions, Moment inequalities: Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

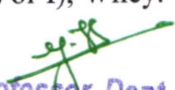
**Course Outcomes:** By the end of the course, the students will be able to,

- ST122.CO1: Understand the development of statistical methods and contributions of Indian statisticians
- ST122.CO2: Analyse the data sets by choosing appropriate statistical technique and preparing basic statistical report.
- ST122.CO3: Compute the probability using counting methods / appropriate probability theorems.
- ST122.CO4: Evaluate the distribution function from probability mass / density functions and vice-versa and also evaluation of probability function for the transformations of random variables.
- ST122.CO5: Evaluate the Moments, MGF, CGF PGF and ChF for the random variables and evaluation Moments from the generating functions (MGF, CGF and ChF).
- ST122.CO6: Identify the real time applications in various domains like Finance, business, insurance, clinical, medical, health, biosciences, engineering and technology etc.

### List of Reference Books:

1. V.K. Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan, New Delhi.
3. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
4. S.P.Gupta: Statistical Methods, S Chand, New Delhi.

  
**CHAIRPERSON**  
**BOB in Mathematics and Statistics**  
**Phavan's Vivekananda College**  
**Sainikonda**

  
**Professor, Dept. of Statistics**  
**UNIVERSITY COLLEGE OF SCIENCE**  
**Osmania University**  
**HYDERABAD-07. TS**



## BHAVAN'S VIVEKANANDA COLLEGE

of Science, Humanities and Commerce, Sainikpuri  
Autonomous College | Affiliated to Osmania University

Reaccredited with 'A' Grade by NAAC

Syllabus – B.Sc. I Year Statistics Practical

(w.e.f. academic year: 2026-27)

Semester I

**Course:** Basic Statistical Analysis

Hour/week: 2

**Course Code:** ST122P(30 Hours)

Credits: 1

**Course Objectives:** This course aims to,

1. To develop an understanding of fundamental data visualization techniques and their interpretation using both conventional methods and software tools like Excel and R.
2. To enable students to compute and analyze descriptive statistics, including measures of central tendency, dispersion, moments, skewness, and kurtosis.
3. To train students in preparing statistical analysis reports and interpreting results effectively using manual methods as well as Excel and R.

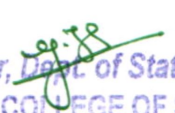
**Basics of EXCEL:** Excel- Data entry, editing and saving, establishing and copying formulae, creation of filters, sorting data, creation of data bases usage of mathematical, statistical built in functions in excel, copy and paste and exporting to MS word document. Writing formulas for computation, drawing diagrams.

**Basics of R-programming:** Installation of R & R-studio, data importing / exporting, Basic Mathematical and statistical functions, writing simple programs and libraries/ usage packages.

**List of practicals:**

1. a) Data Visualization Techniques (Histogram, Frequency curves & Polygon, Ogive curves, Bar (Simple. Component, Multiple, Percentage Bars) and Pie (Simple & multiple) and its interpretation.  
b) Data Visualization Techniques (Histogram, Frequency curves & Polygon, Ogive curves, Bar (Simple. Component, Multiple, Percentage Bars) and Pie (Simple & multiple) using Excel & Rand its interpretation.
2. a) Computation of Central Tendencies, Dispersions, Moments (non-central and central) and its interpretation.  
b) Computation of Central Tendencies, Dispersions, Moments (non-central and central) using Excel & Rand its interpretation.
3. a) Computation of coefficients of Skewness and Kurtosis and its interpretation.  
b) Computation of coefficients of Skewness and Kurtosis using Excel & Rand its interpretation.

  
**CHAIRPERSON**  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

  
**Professor, Dept. of Statistics**  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-07. TS

4. a) Preparation of Statistical Analysis Report based on the descriptive statistics and its interpretation.
- b) Preparation of Statistical Analysis Report based on the descriptive statistics using Excel & R and its interpretation.

**Note: Here (a) denotes the Conventional Practical, and (b) denotes the Excel & R Practical.**

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

ST122P.CO1: Apply various data visualization techniques (histograms, bar charts, pie charts, ogives, etc.) and interpret graphical representations using both conventional and software-based approaches.

ST122P.CO1: Compute and interpret descriptive statistical measures, including central tendency, dispersion, moments, skewness, and kurtosis using manual calculations and tools like Excel and R.

ST122P.CO1: Analyze datasets and prepare comprehensive statistical reports, demonstrating the ability to interpret and communicate findings effectively using Excel and R.

  
CHAIRPERSON  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

  
Professor, Dept. of Statistics  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-07. TS.



Code: ST222

## BHAVAN'S VIVEKANANDA COLLEGE

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

Syllabus – B.Sc. I Year Statistics  
(w.e.f. academic year: 2026-27)  
Semester II

**Course:** Probability Distributions  
**Course Code:** ST222(60 Hours)

Hour/week: 4  
Credits: 4

**Course Objectives:** The objective of this course is ,

1. Able to choose / identify an appropriate standard probability distribution to fit the data.
2. Able to know and derive the properties of standard probability distributions (discrete and continuous) and knowing perfectly on the usage of each probability distribution in different domains.
3. Able to analyze relationships and approximations between distributions
4. Able to understand the concept of sampling distributions
5. Able to understand the exact sampling distributions, their properties and applications.
6. Develop the ability to analyze and interpret the behavior, shape, and characteristics of probability distributions through graphical and analytical approaches.

### UNIT - I

(15)

**Discrete distributions:** Discrete Uniform and Bernoulli distributions: definitions, mean, variance and simple examples. Binomial, Poisson, Negative-Binomial and Geometric distributions: Physical conditions. derivation of probability mass functions, central and moments up to fourth order, M.G.F, C.G.F., P.G.F., Ch.F. nature of the curve and, reproductive property (wherever exists) special properties if any and real-life applications in various domains and probability problems related to these distributions. Poisson approximation to Binomial distribution, Poisson approximation to Negative binomial distribution, Relation between Geometric to Negative Binomial distribution .

### UNIT - II

(15)

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

**Continuous distributions:** Rectangular and Normal distributions - definition, properties such as M.G.F, C.G.F., Ch.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.

  
**CHAIRPERSON**  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

  
**Professor, Dept. of Statistics**  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-07. TS.

### UNIT - III

(15)

Exponential, single and two parameter Gamma distributions: Definition, Moments up to fourth order, M.G.F, C.G.F., Ch. F., reproductive property (wherever exists), nature of the curves and their real-life applications, special properties (if any) and problems. Beta distribution of two kinds: Definitions, mean and variance, nature of the curve, special properties (if any) & applications. Cauchy distribution: Definition, nature of the curve, Ch. F. and its special properties and its statistical significance.

### UNIT - IV

(15)

**Exact Sampling Distributions:** Concepts of Population, Parameter, sample, Statistic, Sampling distribution and Standard error. Standard errors for various statistics. Exact sampling distributions:  $\chi^2$ , t and F Definitions, curves and properties of distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.

**Course Outcomes:** Upon successful completion of the course, students able to:

ST222.CO1: Evaluate the probability analyse the datasets by choosing appropriate statistical tool and preparing basic statistical report.

ST222.CO2: Compute the probability using counting methods/appropriate probability theorems.

ST222.CO3: Evaluate the distribution function from probability mass / density functions and vice-versa and also evaluation of probability function for the transformations of random variables.

ST222.CO4: Evaluate the Moments, MGF, CGF, PGF and Ch.F. for any probability function.

ST222.CO5: Identify the real time applications for each distribution in various domains like Finance, business, insurance, clinical, medical, health, bio sciences, engineering and technology etc.

ST222.CO6: Apply sampling distribution concepts and standard distributions ( $\chi^2$ , t, F) to draw inferences and solve practical problems in statistical analysis.

### List of Reference Books:

1. V.K. Kapoor and S.C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan, New Delhi.
3. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
4. Goon A M, Gupta M K, Das Gupta B: Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.

  
CHAIRPERSON  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

  
Professor, Dept. of Statistics  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-07. TS.



Code: ST122P

## BHAVAN'S VIVEKANANDA COLLEGE

of Science, Humanities and Commerce, Sainikpuri  
Autonomous College | Affiliated to Osmania University

Reaccredited with 'A' Grade by NAAC

Syllabus – B.Sc. I Year Statistics

(w.e.f. academic year: 2026-27)

Semester II

30hrs  
(2hrs/ week)  
1 Credit

**Course:** Probability Distributions

Hour/week: 2

**Course Code:** ST222P(30 Hours)

Credits: 1

**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.

1. To provide a comprehensive understanding of discrete and continuous probability distributions and their fitting using conventional and computational methods.
2. To develop practical skills in fitting statistical distributions and generating random samples using Excel and R.
3. To enable students to interpret statistical results and apply distribution models in real-world data analysis.

### List of practicals:

1. a) Fitting of Binomial distribution.  
b) Fitting of Binomial distribution using Excel & R.
2. a) Fitting of Poisson distribution.  
b) Fitting of Poisson distribution using Excel & R.
3. a) Fitting of Negative Binomial.  
b) Fitting of Negative Binomial using Excel & R.
4. a) Fitting of Geometric distribution.  
b) Fitting of Geometric distribution using Excel & R.
5. a) Fitting of Normal distribution.  
b) Fitting of Normal distribution using Excel & R.
6. a) Fitting of Exponential distribution.  
b) Fitting of Exponential distribution using Excel & R.
7. a) Fitting of Cauchy distribution.  
b) Fitting of Cauchy distribution using Excel & R.
8. Generation of random samples from Uniform(0,1) and Uniform(a,b) distributions using Excel & R.
9. Generation of random samples from Binomial, Poisson, Negative Binomial Distributions using Excel & R.
10. Generation of random samples from Normal and Exponential Distributions using Excel & R.

CHAIRPERSON  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

Professor, Dept. of Statistics  
UNIVERSITY COLLEGE OF SCIENCE  
Osmania University  
HYDERABAD-07, TC

**Course Outcomes:** Upon successful completion of the course, students able to:

- ST222P.CO1: Fit various probability distributions (Binomial, Poisson, Negative Binomial, Geometric, Normal, Exponential, and Cauchy) using both conventional methods and software tools like Excel and R.
- ST222P.CO1: Generate random samples from standard probability distributions using Excel and R for simulation and analysis purposes.
- ST222P.CO1: Interpret the results of distribution fitting and random sample generation, and apply them effectively in statistical analysis and decision-making.

**Note:** In this syllabus, (a) refers to Conventional Practical and (b) refers to Excel and R Practical. Interpretation of results is mandatory for all practicals.

  
CHAIRPERSON  
BOS in Mathematics and Statistics  
Bhavan's Vivekananda College  
Sainikpuri

  
Professor, Dept. of Statistics  
UNIVERSITY COLLEGE OF SCIENCES  
Osmania University  
HYDERABAD-07. TS.