SRI VENKATESWARA UNIVERSITY

B.A. / B.Sc. DEGREE COURSE IN SATISTICS WITH MATHS

FIRST YEAR - SECOND SEMESTER
(Revised Syllabus under CBCS w.e.f. 2020-21)

OBJECTIVE OF THE COURSE

Statistics is a key to success in the field of science and technology. Today, the students need a thorough knowledge of fundamental basic principles, methods, results and a clear perception of the power of statistical ideas and tools to use them effectively in modeling, interpreting and solving the real life problems. Statistics plays an important role in the context of globalization of Indian economy, modern technology, computer science and information technology.

The main objectives of the course are

- To build the basis for promoting theoretical and application aspects of statistics.
- To underline the statistics as a science of decision making in the real life problems with the description of uncertainty.
- To emphasize the relevance of statistical tools and techniques of analysis in the study of inter-disciplinary sciences.
- To acquaint students with various statistical methods and their applications in different fields.
- To cultivate statistical thinking among students.
- To develop skills in handling complex problems in data analysis and research design.
- To prepare students for future courses having quantitative components.

This course is aimed at preparing the students to hope with the latest developments and compete with students from other universities and put them on the right track.

Paper Wise Objectives

PAPER-I: Descriptive Statistics and Probability

- The objective of this paper is to throw light on the role of statistics in different fields with special reference to business and economics.
- It gives the students to review good practice in presentation and the format most applicable to their own data.
- The measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.

PAPER-II: Probability Distributions and Statistical Methods

- This paper deals with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable and mathematical expectation which are essential in all research areas.
- This paper gives an idea of using various standard theoretical distributions, their chief characteristics and applications in analyzing any data.
- The measures of dispersion throw light on reliability of average and control of variability
- The concept of Correlation and Linear Regression deals with studying the linear relationship between two or more variables, which is needed to analyze the real life problems.
- The attributes gives an idea that how to deal with qualitative data.

PAPER-III: Statistical Inference

- This paper deals with standard sampling distributions like Chi Square, t and F and their characteristics and applications.
- This paper deals with the different techniques of point estimation for estimating the parameter values of population and interval estimation for population parameters.
- In this paper, various topics of Inferential Statistics such as interval estimation, Testing of Hypothesis, large sample tests (Z-test), small sample tests (t-test, F-test, chi-square test) and non-parametric tests are dealt with. These techniques play an important role in many fields like pharmaceutical, agricultural, medical etc.

PAPER-IV: Sampling Techniques and Design of Experiments

- The sampling techniques deals with the ways and methods that should be used to draw samples to obtain the optimum results, i.e., the maximum information about the characteristics of the population with the available sources at our disposal in terms of time, money and manpower to obtain the best possible estimates of the population parameters
- This paper throw light on understanding the variability between group and within group through Analysis of Variance
- This gives an idea of logical construction of Experimental Design and applications of these designs now days in various research areas.
- Factorial designs allow researchers to look at how multiple factors affect a dependent variable, both independently and together.

PAPER-V: Applied Statistics

- This paper deals the time series on simple description methods of data, explains the variation, forecasting the future values, control procedures.
- It gives an idea of using index numbers in a range of practical situations, limitations and uses
- The vital statistics enlighten the students in obtaining different mortality, fertility rates thus obtaining the population growth rates and construction and use of life tables in actuarial science.

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PAPER - II: PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

UNIT-I

Discrete Distributions: Binomial, Poisson, Negative Binomial, Geometric distributions: Definitions, means, variances, M.G.F, C.F, C.G.F, P.G.F, additive property if exists. Possion approximation to Binomial distribution. Hyper-geometric distribution: Defination, mean and variance.

UNIT - II

Continuous Distributions: Rectangular, Exponential, Gamma, Beta Distributions: mean , variance, M.G.F, C.F. **Normal Distribution**: Definition, Importance, Properties, M.G.F, additive property.

UNIT-III

Correlation: Meaning, Types of Correlation, Measures of Correlation: Scatter diagram, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient (with and without ties), Bi-variate frequency distribution, correlation coefficient for bi-variate data and simple problems.

Regression : Concept of Regression, Linear Regression: Regression lines, Regression coefficients and it's properties, Regressions lines for bi-variate data and simple problems. Correlation vs regression.

UNIT IV

Curve fitting: Bi- variate data, Principle of least squares, fitting of degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, Fitting of power curve and exponential curves.

UNIT-V

Attributes : Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only , Independence of attributes , Association of attributes and its measures, Relationship between association and colligation of attributes, Contingencytable: Square contingency**,** Mean square contingency, Coefficient of mean square contingency, Tschuprow's coefficient of contingency.

Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, NewDelhi.
2. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy -

Dr M. Jaganmohan Rao, Dr. N. Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.

3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books:

1. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley Goon AM, Gupta
2. MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolakota.
3. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
4. M. Jagan Mohan Rao and Papa Rao: A Text book of Statistics Paper-I.
5. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , NewDelhi.
6. Hogg Tanis Rao: Probability and Statistical Inference. 7thedition.Pearson.

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PRACTICALS PAPER – II

Credits 2

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 Exponential distribution.
8. Fitting of Normal distribution – Areas method.
9. Fitting of Normal distribution – Ordinates method.
10. Computation of correlation coefficient and regression lines direct method
11. Computation of correlation coefficient, forming regression lines –Deviation method
12. Calculation of Correlation Coefficient for Bivariate table
13. Fitting of straight line by the method of least squares(for even observations)
14. Fitting of parabola by the method of least squares(for odd observations)
15. Fitting of power curve of the type by the method of least squares.
16. Fitting of exponential curve of the type and by the method of least squares.
17. Computation of Yule's coefficient of association
18. Computation of Pearson's, Tschprovs coefficient of contingency

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall be exported to MS word for writing inference.

Course Learning Outcomes Students will acquire

1) Ability to distinguish between random and non-random experiments,
2) Knowledge to conceptualize the probabilities of events including frequentist and axiomatic approach. Simultaneously, they will learn the notion of conditional probability including the concept of Bayes' Theorem,
3) Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments,
4) Knowledge of important discrete and continuous distributions such as Binomial, Poisson, Geometric, Negative Binomial and Hyper-geometric, normal, uniform, exponential, beta and gamma distributions,
5) To apply standard discrete and continuous probability distributions to different situations.

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PAPER - II: PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

MODEL QUESTION PAPER

Section-A

Answer any **FIVE** questions. Each question carry **FIVE** marks **5X5 = 25**

1. 1.Define Binomial distribution and find its Mean and Variance
2. Find Mean deviation about mean in Uniform distribution
3. Explain about curve fitting and principle of least squares method
4. 4.Distinguish between correlation and regression
5. Describe various types of association ?
6. Find Mean and variance of N.B.D fro m.g.f. of N.B.D
7. 7.Derive distribution function of exponential distribution
8. Derive the angle between two regression lines

Section – B

Answer all questions and each question carries 10 marks **5 x 10 = 50**

Unit-I

9. Derive poisson distribution as a limiting case of Binomial and Negative Binimial Distribution with specified conditions

(OR)

10. State and prove Lack of memory property of Geometric distribution

Unit-II

11. A) State and prove additive property of Geometric distribution b) Deduce mean and variance of Beta distribution

(OR)

12. A) Derive m.g.f. of Normal Distribution
b) Prove that in Normal distribution odd ordered moments does not exists but even order moments exists

Unit III

13. Explain method of fitting parabola by least squares method

(OR)

14. Fit an exponential curve $y=ab^{bx}$ to the following data

X	5	7	9	11	13	15	17	19	21	23
Y	1.3	13.8	40.2	101.4	350	604	1017	1638	3021	6451.7

Unit IV

15. a) prove that correlation coefficient always less lies between -1 and +1
    b) Discuss the effect of origin and scale on correlation coefficient

(OR)

16. a) Explain Regression , Regression lines, regression coefficients, regression analysis with examples
    b) Derive regression line of y on a by least squares method

Unit-V

17. a) Prove that $Q_{AB}= 2 Y_{AB}/(1+ Y^2_{AB})$ with usual notation ?
    b) For n attributes prove that $(A_1, A_2, A_3, \ldots A_n) \geq (A_1)+ (A_2)+ (A_3)+. . + (A_n)-(n-1)N$

(OR)

18. a) Define consistency of a data ? Derive Necessary and sufficient condition for existence of consistency in case of three attributes ?
    b) Explain Manifold classification ? Mention various coefficients of consistency