SRI VENKATESWARA UNIVERSITY
B.A. / B.Sc. DEGREE COURSE IN SATISTICS WITH MATHS
III – SEMESTER
(Revised Syllabus under CBCS w.e.f. 2021-22)

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.
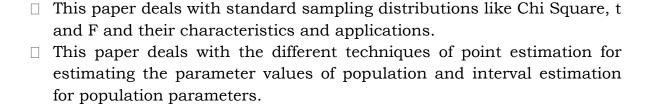
PAPER WISE OBJECTIVES

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 - III: STATISTICAL INFERENCE

UNIT-I

Concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Student's t- distribution, F – Distribution, x^2-Distribution: Definitions, properties and their applications.

UNIT-II

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, &sufficiency and. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Binomial, Poisson &Normal Population parameters estimate by MLE method. Confidence Intervals for mean and variance in Normal Distribution

UNIT-III

Testing of Hypothesis: Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman-Pearson's lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

UNIT – IV

Large sample Tests: large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. standard deviation(s) and correlation coefficient(s**).**

SmallSampletests: t-testforsinglemean,differenceofmeansandpairedt-test. 2-testforgoodness of fit and independence of attributes. F-test for equality ofvariances.

UNIT – V

Non-parametric tests- their advantages and disadvantages, comparison with parametric tests. Measurement scale- nominal, ordinal, interval and ratio. Two independent sample tests: Median test, Wilcoxon –Mann-Whitney U test, Wald Wolfowitz's runs test**.** Sign test for large sample case

TEXT BOOKS

1. BA/BSc II year statistics - statistical methods and inference - Telugu Academy by A.Mohanrao, N.Srinivasa Rao, Dr R.Sudhakar Reddy, Dr T.C. RavichandraKumar.

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

REFERENCE BOOKS:

1. Fundamentals of Mathematics statistics : VK Kapoor and SCGuptha.
2. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das GupthaB.
3. Introduction to Mathematical Statistics :HoelP.G.
4. Hogg Tanis Rao: Probability and Statistical Inference. 7thedition.Pearson.

Practicals - Paper –III

1. 1. Large sample test for single mean   Credits: 2

2. Large sample test for difference of two means

3. Test for difference between two sample means (when σ^2 unknown)

4. Large sample test for single proportion

5. Large sample test for difference of two sample proportions

6. Large sample test for difference of two sample proportions(When P is unknown)

7. Large sample test for single correlation coefficient(when $\rho > 0.5$)

8. Test for difference between two sample correlation coefficients(when ρ_1, $\rho_2 > 0.5$)

9. Test for difference between two sample Standard Deviations

10. Small sample test for single mean

11. Small sample test for difference of means

12. Paired t-test(paired samples).

13. Small sample test for correlation coefficient

14. Small sample test for single variance(x^2 - test)

15. Small sample test for difference of variances(F-test)

16. x^2 - test for goodness of fit and independence of attributes(Binomial Distribution)

17. x^2 - test for goodness of fit and independence of attributes(Poisson Distribution)

18. Two sample Sign test

19. Two sample Run test

20. Two sample Median test

21. Wilcoxin-Mann Whitney U-test on Ranks

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

Course Learning Outcomes

The students will acquire

1) Concept of law large numbers and their uses
2) Concept of central limit theorem and its uses in statistics
3) concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions,
4) knowledge about important inferential aspects such as point estimation, test of hypotheses and associated concepts,
5) knowledge about inferences from Binomial, Poisson and Normal distributions as illustrations,
6) concept about non-parametric method and some important non-parametric tests.