

**SV UNIVERSITY: TIRUPATI**  
**B.A/B.Sc., STATISTICS (WM) CBCS REVISED SYLLABUS 2020-21**  
**Semester – III (CBCS With Maths Combination Common to BA/BSc)**

**Paper - III: Statistical Inference**

*UNIT-I*

**Concepts:** Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Student's t-distribution, F – Distribution,  $\chi^2$ -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).

**Small Sample tests:** t-test for single mean, difference of means and paired t-test.  $\chi^2$ -test for goodness of fit and independence of attributes. F-test for equality of variances.

*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. 7<sup>th</sup> edition.Pearson.

Practicals - Paper -III

1. Large sample test for single mean
2. Large sample test for difference of two means
3. Test for difference between two sample means (when  $\sigma^2$  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  $\rho_1, \rho_2 > 0.5$ )
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 ( $\chi^2$  - test)
15. Small sample test for difference of variances (F-test)
16.  $\chi^2$  - test for goodness of fit and independence of attributes (Binomial Distribution)
17.  $\chi^2$  - 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. Wilcoxon-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 of 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.