SEMESTER-III

COURSE 6: INFERENTIAL AND APPLIED STATISTICS

Theory Credits: 3 3 hrs/week

Course Learning Outcomes
After completion of this course, the students will know about

- Concept of law large numbers and their uses
- knowledge about important inferential aspects such as point estimation, test ofhypotheses and associated concepts,
- knowledge about inferences from Binomial, Poisson and Normal distributions as illustrations,
- concept about non-parametric method and some important non-parametric tests.

- Time series data, its applications to various fields and components of time series,
- Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation, Construction and implementation of life tables, Population growth curves, population estimates and projections,
- Real data implementation of various demographic concepts as outlined above through practical assignments.

UNIT I:
Concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error. convergence in probability and convergence in distribution, law of large numbers, central limit theorem (statements only).Student's t- distribution, F – Distribution, χ^2-Distribution: Definitions, properties and their applications.

UNIT II:
Theory of estimation and Hypothesis: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, &sufficiency and. Binomial, Poisson &Normal Population parameters estimate by MLE method. Confidence Intervals. Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. Examples in case ofBinomial, Poisson and Normal distributions.

UNIT III:
Sample tests: t-test for single mean, difference of means and paired t-test. □2. confidence intervalsfor mean(s). standard deviation(s) and correlation coefficient(s).Test for goodness of fit andindependence of attributes. F-test for equality of variances.
Non-parametric tests- their advantages and disadvantages, comparison with parametric tests. Measurementscale- nominal, ordinal, interval and ratio.

UNIT IV:
Time Series: Time Series and its components with illustrations, additive, multiplicative models. Trends:Estimation of trend by free hand curve method, method of semi averages. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

UNIT V:

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics. measures ofdifferent Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

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.
3. Fundamentals of applied statistics : VK Kapoor and SCGupta.
4. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by prof.K.SrinivasaRao,Dr D.Giri. Dr A.Anand, Dr V.PapaiahSastry.

REFERENCE BOOKS:

1. Brockwell, P.J. and Devis, R.A. (2003). Introduction to Time Series Analysis. Springer.
2. Chatfield, C. (2001). Time Series Forecasting., Chapman & Hall.
3. Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications
4. Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House
5. Fundamentals of Mathematics statistics : VK Kapoor and SCGuptha.
6. Outlines of statistics, Vol II : Goon Guptha, M.K.Guptha, Das GupthaB.
7. Introduction to Mathematical Statistics : HoelP.G.
8. Hogg Tanis Rao: Probability and Statistical Inference. 7th edition.Pearson.

CO-CURRICULAR ACTIVITIES:

- Quiz Competition
- Expert Lectures
- Seminars

EXTRA CURRICULAR ACTIVITIES:

- Formal Examination
- Lab Practical
- Presentation
- Simple Projects

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List of Experiments:

1. Large sample test for difference of means.
2. Large sample test for single proportion
3. Large sample test for difference of proportions , standard deviations , correlation coefficient.
4. Small sample test for single mean, difference of means and correlation coefficient
5. Paired t-test(pairedsamples).
6. Small sample test for single variance(χ 2 - test)

Time Series:

7. Measurement of trend by method of moving averages(odd and evenperiod)
8. Measurement of trend by method of Least squares(linear andparabola)
9. Determination of seasonal indices by method simpleaverages
10. Determination of seasonal indices by method of Ratio to movingaverages

Vital Statistics:

11. Computation of various Mortalityrates
12. Computation of various Fertilityrates
13. Computation of various Reproductionrates.
14. Construction of Life Tables