B.A/ B.Sc. COURSE IN STATISTICS (OPTIONAL)
(WITH EFFECT FROM : 2018-19)

THIRD SEMESTER: THEORY PAPER

Total: 50 Hours.

STTH-3: SAMPLING DISTRIBUTIONS AND NON PARAMETRIC TESTS

Unit: 1.Sampling Distribution and Large Sample Tests:

Definition of population, Sample, Parameter and Statistic. Sampling distribution of $\bar{x}$ and s^2 for sample from normal distribution. Central Limit Theorem (without proof). Definition of Null and Alternative Hypothesis, Critical region, Type-I and Type-II errors and level of significance.

Large sample tests: Large sample tests-for mean and difference of means, proportion and difference of proportions.

10 Hours.

Unit: 2. Exact Sampling Distributions:

Chi-square (χ^2)–distribution: Definition, and derivation, Properties-moments, recurrence relation for moments and approximation to normal distribution. Independence of sample means and sample variances in random sampling from a normal distribution. Applications of χ^2 - distribution.

10 Hours.

Unit: 3 Student's 't' and Snedecore's 'F' distributions:

Definition, and derivation Moments of student's t-distribution. Recurrence relation for moments, limiting form of t-distribution. Applications of t-distribution. Theorotical examples.F- distribution: Definition and derivation of F- distribution. Moments of F-distribution. Recurrence relation for moments. Applications of F - distribution. Statement of inter relationship between χ^2, t and F –distributions.

10 Hours

Unit:4. Non-parametric tests:

Order statistics – distribution of maximum and minimum statistics. Need for non-parametric tests. Advantages and dis-advantages of non-parametric methods over parametric methods. Assumptions in non-parametric methods. Sign test for quantiles, Sign test based on paired observations, Wilcoxon signed rank test for one sample and paired samples. Comparison of the sign-test and Wilcoxon signed-rank test, Man-Whitney-Wilcoxon test, Wald-Wolfowitz run test, Median test , Run test for randomness, Test for independence based on Spearman's rank correlation coefficient.

10 Hours.

Unit: 5. Multiple and Partial Correlation and Regression:

Trivariate data, Yule's notation. Equation of the plane of regression. Residuals and their properties, residual variance. Multiple correlation and partial correlation coefficients. Derivations and their properties, standard examples.

10 Hours

THIRD SEMESTER:

STPR-3: PRACTICAL PAPER.

1. Applications of Chi-square distribution-I: Goodness of fit.
2. Applications of Chi-square distribution-II: Independence of attributes.
3. Applications of t-distribution.
4. Applications of F- distribution.
5. Non-parametric tests-I
6. Non-parametric tests-II
7. Partial and Multiple correlation-I
8. Partial and Multiple correlation-II
9. Large sample tests.

Books for study:

1. Gupta S.C and Kapoor V.K.: Fundamentals of Mathematical Statistics- Sultan Chand & Sons' publications.
2. Hogg .R.V.and Craig.A.T(1978):Introduction to Mathematical Statistics.-4/e Macmillan .
3. Mood.A.M.,Graybill.F A. and Boes D.C.(1974): Introduction to the Theory of Statistics. McGrawHill.
4. Mukyopadhyay.P. (1996) .Mathematical Statistics.-Kolkotta Publishing House.
5. Goon AM, Gupta M.K., Das Gupta.B.(1991): Fundamentals of Statistics Vol-I World Press Kolkatta..

Books for Reference:

1.Rohatgi.V.K. and A.K.Md.Ehsanes Saleh (2002):An introduction to probability theory and Mathematical Statistics. John Wiley.

2.Murry R.Speigel (1982): Theory & Problems of Statistics, Schaum's publishing Series.

3. P.G.Hoel (1971): Introduction to Mathematical Statistics, Asia publishing house.

4. Dudewicz EJ and Mishra S.N (1980): Modern Mathematical Statistics-John Wiley.