SEMESTER-III

STATISTICS MAJOR

STAT-MD-CC3-3-Th **3 Credits**

(Statistical Inference-I) **THEORY**

Basic concepts of Statistical Inference: population & sample, parameter & statistic, population distribution and sampling distribution. Point estimation, interval estimation and testing of hypothesis. Three useful distributions for statistical Inference:χ^2,t and F(derivations excluded). (5)

Point Estimation: Concepts of estimation, requirements of a good estimator, notions of mean square error, unbiasedness, bias-variance trade off, best linear unbiasedness and minimum variance unbiasedness. Properties of uniformly minimum variance unbiased estimators (UMVUE). Comparison of Estimators, Efficiency. Methods of Estimation: Method of moments, method of maximum likelihood estimation and statements of their small sample properties. Point estimators of theparametersofBinomial,Poisson,andunivariateNormaldistributions. (15)

Elements of hypothesis testing: Null and alternative hypotheses, simple & composite hypotheses, critical region, type I and type II errors, level of significance, size, power, p-value. Exact tests and confidence intervals: classical and p-value approaches. Tests relating to Binomial and Poisson distributions, Fisher's exact test. Chi-square tests for association, homogeneity and goodness of fit. Testsofhypothesesfortheparametersofnormaldistribution(onesampleandtwosampleproblems), pairedt-test.Combination of probabilities in tests of significance. (20)

Interval Estimation: Confidence Interval and Confidence Coefficient, Exact confidence interval for mean(s)and variance(s)for one and two sample problems under the Normal set-up. (5)

STAT-MD-CC3-3-P **1Credit**

(Statistical Inference -I) **PRACTICAL**

List of Suggested Practical

- Maximum Likelihood Estimation.
- Estimation by the method of moments.
- Test of significance for single proportion and difference of two proportions.
- Test of significance for single Poisson mean and difference of two Poisson means.
- Chi square tests for association, homogeneity and goodness of fit.
- Testofsignificanceandconfidenceintervalsforsinglemeananddifferenceoftwo means.
- Test of significance and confidence intervals for single variance and ratio of two variances.

ReferenceBooks

- Goon,A.M.,Gupta,M.K.andDasgupta,B.:FundamentalsofStatistics,Vol.1.TheWorldPress, Kolkata.
- Goon,A.M.,Gupta,M.K.&Dasgupta,B.:AnOutlineofStatisticalTheory,Vol-1.WorldPress.
- Rohatgi, V. K. and Saleh,A.K. Md. E.:An Introduction to Probability and Statistics. 2nd Edn. (Reprint). John Wiley and Sons.
- Hogg, R.V., Tanis, E.A. and Zimmerman, D. L.: Probability and Statistical Inference. Pearson Education.
- Johnson, R.A. and Bhattacharya, G.K.: Statistics-Principles and Methods, 4th Edn. John Wiley and Sons.
- Mood,A.M., Graybill, F.A. and Boes, D.C.: Introduction to the Theory of Statistics, 3rd Edn. (Reprint). Tata McGraw-Hill.
- Hogg,R.V.,McKean,J.W.andCraig,A.T.:IntroductiontoMathematical Statistics,8th Edition. Pearson.
- Gupta, S.C. and Kapoor, V.K. (2020): Fundamentals of Mathematical Statistics. Sultan Chand and Sons.
- Ramachandran,K.M.and Tsokos,C.P.:MathematicalStatisticswith Applications. Academic Press.
- Roychowdhury, S.,Bhattacharya,D.:ProbabilityandStatisticalInferenceTheoryandPractice, U.N.Dhur&Sons. Pvt. Ltd.