Integrated Ph.D. Programe in Statistics

PAPER- II   **Course No: 17STIPHDCR-**02

Title: Recent Advances in the Subject

Min Passing Marks: 50

MM: 100

Unit- I

Some Distributions and Data Analysis:

Logarithmic Series Distribution (LSD), Power Series Distribution (PSD), Generalized Power Series Distribution (GPSD), Bi-variate Normal Distribution Distribution (BVND), Bivariate Exponential Distribution and their properties, relations and applications. Marginal and conditional distributions.

Data Analysis: Testing of hypothesis; Critical Region, Level of Significance, Types of errors. Normal, t, F and Chi-square tests for small and large populations.

Unit- II

Bayesian Statistics

Fundamentals of Bayesian Statistics, Bayes theorem and Sequential nature of Bayes theorem of random variables.

Bayesian method of estimation: Bayes estimation of Binomial, Poisson, Exponential, Weibull and Normal Distributions by using various types of priors. Approximations based on posterior modes by using Newton-Raphson method of maximization. Approximation of posterior densities using normal approximation technique.

Unit- III

Failure Data Analysis

Theory of Reliability, Definition and Concept of Reliability: Failure Rate, Mean Failure Rate, Mean Time to Failure Rate (MTTF), Mean Time Between Failure (MTBF), Mean Time to Failure in terms of Failure Density, Reliability in terms of Hazard Rate and failure density(in integral form).Type I and type II censoring ,System reliability, Series Configuration, Parallel Configuration, Mixed Configuration.

Unit- IV

Advanced Information Theory

Shannon's measure of entropy and its properties, Different approaches for obtaining measures of entropy, Some important generalizations of Shannon's entropy (Reny's , Kapur, Harvda and Charvat, Aczel and Daroczy, Verma, Rathie, Arimoto, Sharma and Mittal). Mean codeword lengths, Monotonic Character of means and entropies, Comparison of different codeword lengths, Monotonic character of codeword lengths, monotonicity of Exponentialized mean of order α and type β, Family of Exponentialized means and their lower bounds, Exponentialized means of order α and type β and their bounds.

References:

- Berger, J.O.: Statistical Decision Theory and Bayesian Analysis, Springer Verlag.
- Robert, C.P. and Casella, G.: Monte Carlo Statistical Methods, Springer Verlag.
- Prem C. Consul and Felix Famoye : Lagrangian Probability Distributions.
- R.D Gupta and D. Kundu (1999). Generalized Exponential Distributions. Austral. And New Zealand J. Statist 41(2), 173-188.
- A.N. Philippou and C. Georghiou (1983). A Generalized Geometric Distribution and some of its properties. Statistics and Probability Letters 1,171-175.
- Entropy and coding (J.N. Kapur).
- A first course in Information theory (R.W. Yeung).
- Casella, G. and Berger, R.L. (2001). Statistical Inference, 2nd ed. Wadsworth/Brooks Cole, Pacific Grove, CA.
- Johnson, N.L., Kotz, S., and Balakrishnan, N. (1995). Continuous Univariate Distributions, Vol. 2. John Wiley & Sons, New York.
- Rohatgi, V.K. (1993). An introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd.