Integrated Ph.D. Programme in Statistics

PAPER- 1   **Course No: 17STIPHDCR- 01**   **Title: Research Methodology**

Min Passing Marks: 50   **MM: 100**

UNIT-I

Definition and genesis of **Standard Univariate discrete distributions**: Discrete Uniform, Bernoulli, Binomial, Poisson, Negative Binomial, Geometric, their properties, relations and applications. Marginal and conditional distributions, **reproductive property of standard distributions**. Basic idea of truncation (with reference to above distributions)

UNIT-II

Definition and genesis of **Standard Univariate Continuous distributions**: parameter estimation of Uniform, Beta, Gamma, Exponential, Normal, Lognormal and their structural properties, relations and applications. Marginal and conditional distributions.

UNIT-III

Point Estimation: The general statistical decision problem, Example (Point estimation, Interval estimation etc.). Criteria of unbiasedness, consistency and efficiency. Cramer-Rao Inequality. Minimum variance unbiased (MVU) estimation, Cramer Rao lower bound. and Rao-Blackwell theorem.

UNIT-IV

Sufficient and Complete Statistics: Sufficiency, Minimal sufficient statistic, Factorization theorem, Fisher–Neyman criterion.

Estimation: Method of moments, Minimum Chi-Square (MC), Modified Minimum Chi-Square, Maximum likelihood estimation (MLE) method and their properties.

Suggested Readings:

1. Casella, G. and Berger, R.L. (2001). Statistical Inference, 2nd ed. Wadsworth/Brooks Cole, Pacific Grove, CA.
2. Gunst, R.F. and Mason, R.L. Regression analysis and its Applications- A Data Oriented Approach. Marcel and Decker. (1980).

3. Johnson, N. L. and Kotz, S. (1970). Continuous Univariate Distributions, vol. 1 and 2. Houghton-Mifflin, Boston.

4. Johnson, N.L., Kotz, S., and Balakrishnan, N. (1994). Continuous Univariate Distributions, Vol. 1. John Wiley & Sons, New York.

5. Johnson, N.L., Kotz, S., and Balakrishnan, N. (1995). Continuous Univariate Distributions, Vol. 2. John Wiley & Sons, New York.

6. Lawless, J.F. (2003). Statistical Models and Methods for Lifetime Data. Wiley, New York.

7. Morris, H., DeGroot and Mark J. Schervish (2002). Probability and Statistics (third ed.). Addison-Wesley.

8. Rohatgi, V.K. (1993). An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern Ltd.