

## PAPER-XI

### MATHEMATICAL THEORY OF STATISTICS

TIME: 3 hours

Max. Marks: 100

#### UNIT-I

Elements of theory of probability; sample space, various definitions of probability, addition and multiplication laws of probability, conditional probability and statistical independence of events. Baye's theorem and its applications. Mathematical expectations, conditional expectations, Moments and cumulates. Moments generating and characteristic functions.

#### UNIT-II

Binomial, Negative -binomial, Poisson and Hyper geometric distributions Rectangular, Normal, Cauchy, Gamma and Beta distributions Elementary idea of Exponential and Lap lace distributions.

#### UNIT-III

Inversion theorem. Chebyshev's inequality, control limit theorem for i.e. random variables. Curve fitting and principle of least squares, Scatter diagram, linear regression and correlation.

#### UNIT-IV

Chi-square, t and F sampling distributions with derivations, properties and applications, large sample theory.

#### UNIT-V

Elements of theory of estimation: Point estimation, criterion of good estimators for one arameter; Consistency, Efficiency, sufficiency and unbiasedness. Method of maximum likelihood estimation properties of maximum likelihood estimators (without proof). M.L.E. for Binomial, Poisson and Normal populations.

Interval estimation for mean and variance in cage of Normal population.

Elements of testing of hypothesis: Two kinds of error in testing of hypothesis. Critical region, Neyman-Pearson Lemma and determination of BCR in Neyman sense for testing simple v/s simple hypothesis in uniform and normal populations.

**Note:** Candidates who have offered Mathematical Statistics / Statistics / Applied Statistics as an optional subject / paper in their B.A. /B.Sc. examination will not be permitted to offer this course.

#### Books recommended:

1. Gupta and Kapoor : Fundamentals of Mathematical Statistics.
2. Kapoor and Saxena : Mathematical Statistics.
3. Goon and Others : Outline of Statistical Theory, Vol. I, II.