

**Second Semester
DSC - PAPER –II**

Random variable & Probability Distributions (Theory)

TOTAL MARKS – 100
(Theory – 70, Practical-30)

Unit I (Random variable & Expectation)

Definition of discrete and continuous random variables. Probability mass function (p.m.f.). Probability density function (p.d.f). Cumulative distribution function (c.d.f.) and its properties. Expectation and moments, Theorem on sum and product of expectations of variables. Bi-variate frequency distribution. The p.m.f., p.d.f. and c.d.f. in the bivariate case. Marginal and conditional distributions. Independence, conditional expectation and conditional variance. Cauchy-Schwarz inequality. Tchebycheff's Inequality. Moment generating function (m.g.f.).

Unit II (Discrete Probability distributions)

Uniform, Bernoulli, Binomial, Poisson, Hypergeometric and Geometric distributions.

Unit III (Continuous Probability distributions)

Uniform, Exponential, Normal, Gamma, Beta and Log-normal distributions.

Unit IV (Sampling distribution and Multivariate Regression Analysis)

Concepts of Random sampling, statistic and parameter. Sampling distribution of statistic and its Standard Error. Definition, properties and applications of Chi-square, t and F statistics.

Multiple linear regression, Multiple correlation and Partial correlation in tri-variate cases.

Practical

List of Practical (Computational tools: Electronic Calculator, Spreadsheet Softwares & SPSS)

1. Numerical problems based on random variables & Expectation.
2. Numerical problems based on Bi-variate frequency distribution.
3. Fitting of discrete probability distributions: Binomial, Poisson & Geometric.
4. Fitting of continuous probability distributions: Exponential, Normal & Log-normal.
5. Numerical problems based on discrete probability distributions.
6. Numerical problems based on continuous probability distributions.
7. Computation of Multiple linear regression, Multiple correlation coefficient & Partial correlation coefficient in tri-variate cases.

Suggested Reading

1. Goon A.M., Gupta M.K. & Dasgupta B. (2002): Fundamentals of Statistics (Vol-I), World Press, Kolkata.
2. Goon A.M., Gupta M.K. & Dasgupta B. (1994): An Outline of Statistical Theory (Vol-I), World Press, Kolkata.
3. Rohatgi V.K. (1984): An Introduction to Probability Theory & Mathematical Statistics, John Wiley.
4. Kendall M.G. & Stuart A. (1966): Advanced Theory of Statistics (Vol-I&II).
5. Gupta S. C., Kapoor V. K.: Fundamentals of Mathematical Statistics, Sultan Chand & Sons.