

B. Sc. Part – I Semester – II
DSC-IV
(DISCRETE PROBABILITY DISTRIBUTIONS)
Theory: 30 hrs. Marks -50 (Credits: 02)

Course Outcomes: The students will acquire knowledge of

- i. One point, Two point and Bernoulli distributions,
- ii. Discrete uniform, Binomial and Hypergeometric distributions,
- iii. Poisson, Geometric and Negative binomial distributions.
- iv. Applications of these distributions in real-life situations.

Unit 1:

(15 hrs.)

1.1 Some standard discrete distributions on finite sample space-I:

- One point distribution: p. m. f., mean and variance,
- Two point distribution: p. m. f., mean and variance,
- Bernoulli distribution: p. m. f., p. g. f., mean, variance.
- Discrete Uniform Distribution: p. m. f., mean and variance.

1.2 Some standard discrete distributions on finite sample space-II:

- Binomial Distribution: Genesis of the distribution, Binomial random variable, p. m. f. with parameters (n, p) , recurrence relation for obtaining successive probabilities, mean, variance and mode of the distribution; skewness, p. g. f., Additive property of binomial variates; distribution of sum of independent and identically distributed Bernoulli variables, numerical problems.
- Hypergeometric Distribution: Genesis of the distribution, p. m. f. with parameters (N, M, n) , Computation of probability of different events, recurrence relation for successive probabilities,

mean and variance of distribution assuming $n \leq N - M \leq M$, Approximation of Hypergeometric to binomial distribution (Statement only), numerical problems.

Unit 2: Some standard discrete probability distributions on countable infinite sample space: **(15 hrs)**

2.1 Poisson distribution: Genesis of the distribution; probability mass function (p. m. f.) of Poisson distribution with parameter λ , mean, variance, probability generating function (p. g. f.); Recurrence relation for obtaining successive probabilities; Additive property of Poisson distribution; Poisson distribution as a limiting case of Binomial distribution (Statement Only); numerical problems.

2.2 Geometric and Negative Binomial distributions:

- Geometric Distribution: Genesis of the distribution, probability mass function (p. m. f.) of Geometric distribution with parameter p , mean and variance, cumulative distribution function (c. d. f.), probability generating function (p. g. f.); Lack of memory property; numerical problems.
- Negative Binomial Distribution: Genesis of the distribution, probability mass function (p. m. f.) of Negative binomial distribution with parameters (k, p) . Geometric distribution as a particular case of Negative binomial distribution; mean, variance and p. g. f.; recurrence relation for obtaining successive probabilities; numerical problems.

Books Recommended:

1. Gupta S. C. & Kapoor V.K.: Fundamentals of Mathematical Statistics. Sultan Chand & sons, New Delhi.
2. Goon, A.M., Gupta M.K. and Dasgupta B: Fundamentals of Statistics Vol. I and Vol. II World Press, Calcutta.
3. Hogg R. V. and Criag A.T.: Introduction to Mathematical Statistics (Third edition), Macmillan Publishing, New York.
4. Mood A.M., Graybill F.A.: Introduction to theory of Statistics.
5. Boes D.C. Tata, McGraw Hill, New Delhi. (Third Edition)
6. Parimal Mukhopadhyaya: An Introduction to the Theory of Probability. World Scientific Publishing.
7. Walpole R.E. & Mayer R.H.: Probability & Statistics, MacMillan Publishing Co. Inc, New York.