AU–246

M.A./M.Sc. (Part—I) Semester—I (C.B.C.S. Scheme) Examination

1SCA1 : STATISTICS

(Elementary Probability and Distribution)

Paper—I

Time : Three Hours] [Maximum Marks : 80

1. (A) (i) Define probability of an event under Classical and Axiomatic approach. State and prove multiplication theorem of probability.

(ii) What is meant by the conditional distribution of y given that X = x ? Consider separately the cases where :

(a) X and Y are both discrete

(b) X and Y are both continuous. 8+8

OR

(B) (i) Let X be a random variable with pdf :

$$f(x) = \begin{cases} 6x(1-x) & , 0 < x < 1 \\ 0 & , 0.w \end{cases}$$

Obtain pdf of $y = x^2$, obtain E(y) and V(y).

(ii) Explain the joint distribution of two random variables. If F(x, y) is the joint distribution function of x and y, what will be the distribution function for the marginal distribution of x and of y ? 8+8

2. (A) (i) Obtain m.g.f. of the binomial distribution with parameters n and p. Hence obtain mean and variance of the distribution.

(ii) Define Geometric distribution. Obtain its mean and variance. State and prove the memoryless property of Geometric distribution. 8+8

OR

(B) (i) Define Poisson distribution. Give two examples of the distribution. State properties of the distribution.

(ii) Define hypergeometric distribution. Obtain mean and variance of the distribution. How is this distribution related to the binomial distribution ? 8+8

3. (A) (i) Derive the pdf of a Cauchy distribution. Show that moments of order ≥ 1 do not exist.

(ii) Define a Gamma distribution with parameter α and β. Obtain the mean and variance of the distribution of a r.v. 8+8

OR

(B) (i) Define normal distribution. State properties of the distribution.

(ii) Define Weibull distribution and derive its mean and variance. 8+8

4. (A) (i) Derive the p.d.f. of χ^2 distribution with n degrees of freedom.

(ii) State and prove Markov inequality. 8+8

OR

(B) (i) Define a Fisher's 't' variate. Derive its p.d.f. State the important properties of this distribution.

(ii) State and prove Jeuseu's inequality. 8+8

5. (A) (i) Derive the p.m.f. of compound binomial distribution.

(ii) If $x_1, x_2, \ldots, x_n$ is a random sample of size n from a population having continuous distribution function f(x). Define rth order statistic $X_{(r)}$. Obtain its distribution function and its pdf. 8+8

OR

(B) (i) Derive the mean and variance of Poisson distribution truncated at $x = 0$.

(ii) Explain the concept of extreme values and their asymtotic distributions. State its applications. 8+8