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Total No. of Pages : 02

Total No. of Questions : 07

M.Sc (Applid Math) (Sem.–3) MATHEMATICAL STATISTICS-I Subject Code : MSM-303 M.Code : 75383

Time: 3 Hrs.

Max. Marks : 80

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of EIGHT questions carrying TWO marks each.
- 2. SECTION B & C have THREE questions in each section carrying SIXTEEN marks each.
- 3. Select atleast TWO questions from SECTION B & C EACH.

SECTION-A

1. Answer all the questions briefly :

- a) What is the probability that a rectangle chosen on chessboard is a square.
- b) Two dice are rolled. Find the probability that either odd or prime number appears on the face of the one die.
- c) Find the mean and the standard deviation of the following function :

 $f(x) = Ce^{\frac{-1}{24}(x^2 - 6x = 9)} -\infty \le x \le \infty, c \text{ being a constant}$

- d) The mean and third moment of binomial distribution is 4 and 0.48 respectively. Find its mode.
- e) A random variable X has probability density function $f(x) = C e^{-x} x \ge 0$. Find its median and mode.
- f) Two random variables X and Y are independent. Show that E(XY) = E(X) E(Y).
- g) State Cauchy- Schwartz inequality.
- h) State Chebychev's inequality.

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SECTION-B

- 2. a) A and B are two independent events. The probability that both A and B occur is $\frac{1}{6}$ and the probability that neither of them occurs is $\frac{1}{3}$. What is the probability of occurrence of either of the event?
 - b) State and prove Bayes' theorem.
- 3. Show that Poisson distribution is a limiting case of Binomial distribution when n is very large and p is small such that np is fixed. Also, using Poisson distribution, find the chance that there will be less than three accidents in a day if 10 accidents took place in a span of 50 days in a town.
- 4. The first four moments of a distribution about the value 5 of the variable are 2, 20, 40 and 50 respectively. Find the mean and all the four moments about the mean. Also comment upon skewness and kurtosis.

SECTION-C

5. The joint probability function of random variable *x* and *y* is

 $f(x, y) = 8xy, 0 \le x \le 1, 0 \le y \le x$

Find density function and marginal density function of X+Y.

- 6. Which distribution $\frac{X}{Y}$ and $\frac{X}{X+Y}$ follow, when X and Y are two gamma variates having parameter n₁ and n₂.
- 7. Find the moment generating function and distribution function of the exponential function.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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