Roll No. $\square$
Total No. of Questions : 07

# M.Sc (Applid Math) (Sem.-3) <br> MATHEMATICAL STATISTICS-I <br> Subject Code : MSM-303 <br> 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 :
$f(x)=C e^{\frac{-1}{24}\left(x^{2}-6 x=9\right)}-\infty \leq x \leq \infty, c$ 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 $f(x)=C e^{-x} x \geq 0$. Find its median and mode.
f) Two random variables X and Y are independent. Show that $\mathrm{E}(\mathrm{XY})=\mathrm{E}(\mathrm{X}) \mathrm{E}(\mathrm{Y})$.
g) State Cauchy- Schwartz inequality.
h) State Chebychev's inequality.

## 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 $n p$ 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
$f(x, y)=8 x y, 0 \leq x \leq 1,0 \leq y \leq x$
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 $\mathrm{n}_{1}$ and $\mathrm{n}_{2}$.
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.

