## PROBABILITY DISTRIBUTIONS

Time : Three Hours  Maximum : 75 Marks

### SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks   (10 x 2 = 20)

1  Define moment generating function.

2  State the central limit theorem for i.i.d random variables.

3  State the independence of two random variable.

4  Define conditional expectation.

5  State the additive property of poisson distribution.

6  Define multinomial distribution.

7  Define exponential distribution.

8  Define normal distribution.

9  Define F-distribution.

10  Write any two applications of chi-square distribution.

### SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11  a  Define characteristic function and state its properties.
#### OR
  b  A symmetric die is thrown 600 times. Find the lower bound for the probability of getting 80 to 120 sixes.

12  a  A two dimensional random variable (x, y) have a bivariate distribution given by, $P(X = x, Y = y) = \dfrac{x^2 + y}{32}$ for x = 0, 1, 2, 3 and y = 0, 1. Find the marginal distributions of x on y.
#### OR
  b  If x and y are two random variables having joint density function:

$$f(x, y) = \begin{cases} \dfrac{1}{8}(6 - x - y); & 0 \le x \le 2,\ 2 \le y \le 4 \\ 0; & \text{otherwise} \end{cases}$$

find (i) $P(x < 1 \cap y < 3)$, (ii) $P(x + y < 3)$ and (iii) $P(x < 1 / y < 3)$.

13  a  Obtain the m.g.f of binomial distribution and hence find its mean and variable.
#### OR
  b  Obtain the mean and variance of geometric distribution.

14  a  Obtain the median of normal distribution.
#### OR
  b  Obtain the limiting form of Gamma distribution.

15 a    What are the applications of 't' – distribution?

OR

  b    Define chi-square distribution.

## SECTION - C (30 Marks)
Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks  (3 x 10 = 30)

16    State and prove Tchebycher's inequality.

17    A two dimensional random variable (x, y) have a joint probability mass function:  $p(x, y) = \dfrac{1}{27}(2x + y)$  where x and y assume only the integer values 0, 1 and 2.  Find the conditional distribution of y for x = x.

18    Obtain the recurrence relation for the moments of poisson distribution.

19    Find the mean and variance of beta distribution of first kind.

20    Establish the relationship between F and chi-square distributions.

Z-Z-Z                              END