PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2019
(Third Semester)
Branch – MATHEMATICS

MATHEMATICAL STATISTICS - I

Time : Three Hours   Maximum : 75 Marks

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

1   Define sample space and event.

2   State multiplication theorem for two events.

3   Define continuous random variable.

4   Define mathematical expectation.

5   Show that $M_{cx}(t) = m_x(tc)$.

6   Define marginal distribution.

7   Define binomial distribution.

8   Write any two assumptions of Poisson distribution.

9   Write any two applications of t distribution.

10   Define regression.

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

11 a   If A and B are independent events, then prove that $\bar{A}$ and $\bar{B}$ are independent.

             OR

   b   Two students X and Y work independently on a particular problem. The probability that X will solve the problem is ¾ and the probability Y will solve it is 2/3. What is the probability that the problem will be solved?

12 a   Let X be a random variable with the following probability distribution

         x :   -3   6   9
         P(x) :   1/6   1/2   1/3
      Find $E(X)$, $E(X^2)$ and Var (X).

             OR

   b   The pdf is given by
      $f(x) = Ax^2$ $0 < x < 1$
          $= 0$ otherwise
      Find the value of A and find $P(0.2 \le x \le 0.5)$.

13 a   Let the random variable X assume the value r with the probability law $P(X = r) = q^{x-1}p$; $x = 1, 2, 3, \ldots$ Find the mgf of X.

             OR

   b   The joint density function of x, y is given by
      $f(x, y) = 2$; $0 < x < 1$, $0 < y < x$
      Find the marginal density function of X and Y?

14 a   Obtain the mgf of Binomial distribution.

OR

    b   Find the mean of normal distribution.

15 a   Calculate the Karl Pearson's coefficient of correlation for the following data

X	2	4	6	8	10
Y	20	18	16	14	12

OR

    b   Calculate the spearman rank correlation coefficient for the following data

X	7	3	9	1	6	8	5	4	10	2
Y	6	9	3	10	5	2	4	7	1	8

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

16   State and Prove addition theorem for three events.

17   A random variable X ahs the following probability distribution

x :	0	1	2	3	4	5	6	7	8
p(x) :	k	3k	5k	7k	9k	11k	13k	15k	17k

(i) Find the value of k   (ii) Find P(x<3) and P(x≥3)   (iii) P(0<x<5).

18   The joint pdf of two random variable X & Y is given by
      $f(x, y) = k\, x(x-y)$ $0 \le x \le 2, -x \le y \le x$
      Find the value 'k' and marginal density function of X and Y.

19   Derive the recurrence relationship of binomial distribution with moments

$$\mu_{r+1} = pq\left[nr\mu_{r-1} + \frac{d\mu r}{dp} \right]$$

20   Find the two regression equations from the data given below

X	1	2	3	4	5	6	7
Y	9	8	10	12	11	13	14

Z-Z-Z   END