Name....................

Reg. No...................

SECOND YEAR B.Sc. DEGREE EXAMINATION, SEPTEMBER/OCTOBER 2010

Statistics (Subsidiary)

Paper I—DESCRIPTIVE STATISTICS AND PROBABILITY

(2000 Admission onwards)

Time : Three Hours **Maximum: 60 Marks**

Each question carries 5 *marks.*
Scientific calculators and tables are permitted.

1. Define simple random sampling. Also explain the lottery method of selecting a simple random sample.

(5 marks)

2. State any *three* mathematical properties of arithmetic mean. Also, find the combined mean from the following data :

$= 70$; $n_2 = 30$; $\bar{X}_1 = 75$; $X_2 = 65$

(5 marks)

3. Define mean deviation from mean. If the observations are 1, 2, 3, 4, 5, find the mean deviation from mean.

(5 marks)

4. Define skewness and Kurtosis. What are the measures used for studying them ? (5 marks)

5. Fit a parabola of the form $y = a + bx \quad cx^2$ to the following data by the method of least squares.

x	1	2	3	4	5
y		3	5	9	14

(5 marks)

6. Explain "Scatter diagram". (5 marks)

7. The marks secured by recruits in the selection test (X) and in the proficiency test (Y) are given below. Calculate rank correlation coefficient.

x :	10	15	12	17	12	16	24	14	22	20
y :	30	42	45	46	33	34	40	35	39	38

(5 marks)

Turn over

8. Define :

(i) random experiment ; (ii) sample space ;

(iii) mutually exclusive events ; (iv) equally likely events.

(5 marks)

9. State and prove the multiplication theorem of probability. **(5 marks)**

10. For any *three* events A, B and C prove that :

$$P\left[(A \cup B)/C\right] - P(A/C) + P(B/C)\ \mathbf{P}\left[(A\ n\ B)/C\right].$$

(5 marks)

11. Three machines X, Y and Z with capacities proportional to 2: 3 4 are producing bullets. A bullet is taken from a day's production and found to be defective. What is the probability that it came from machine X? The probability that the machines produce defective are : 0.1, 0.2 and 0 1 respectively.

(5 marks)

12. Define distribution function of a random variable and mention the properties of a distribution function. If $F(x) = 1 - e^{-2x}, x > 0$, is the distribution function of a centinuous r.v. X, find the p.d.f of X.

(5 marks)

13. The probability function of a r.v. X is given below. Obtain the distribution function of X.

$$f(x \left|\begin{array}{ll} \frac{6}{29}x^2, & 1 \leq x \leq 2 \\ \frac{6}{29}x & 2<x<3\ . \\ & \text{otherwise} \end{array}\right.$$

(5 marks)

14. Suppose that X has p.d.f. :

$$f(x) = \begin{cases} 2x, & 0<x<1 \\ 0, & \text{elsewhere} \end{cases}$$

Find the p.d.f. of Y = 3x + 1.

(5 marks)

15. Let X be a r.v. having density function,

$$f(x) = \begin{cases} Cx, & 0 < x < 2 \\ 0, & \text{otherwise} \end{cases}$$

Find :

(i) the value of C.

P $_{2}$< < ^{3} [.

(5 marks)

16. The joint probability function of two discrete random variables X and Y is given by :

$$f(x, y) = c\,(2x + y), \quad x = 0, 1, 2 \;\; y = 0, 1, 2, 3$$
$$= 0, \quad \text{otherwise}$$

Find :

(i) the value of C.

(ii) P (X = 2, Y 1).

(iii) Marginal distribution of X.

(5 marks)

17. The joint density function of two continuous random variables X and Y is

$$f(x, y) = c\,xy, \quad 0 < x < 4, 1 \text{ c } y < 5$$
$$= 0, \quad \text{otherwise}$$

Find :

(i) the value of C.

(ii) the marginal p.d.f. of X.

(5 marks)

18. Let X and Y be two random variables with the joint p.d.f. :

$$f(x, y) = \begin{cases} 8xy, & 0 < x < y < 1 \\ 0, & \text{otherwise} \end{cases}$$

Find (i) conditional p.d.f. of X given Y =y (ii) conditional p.d.f. of Y gives X = x. (5 marks)