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Your Roll No.....

5548

B.A. Prog./Sem. I

B

STATISTICS—Paper A

(Basic Statistics and Probability)

Time : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory. Attempt six

questions in all. Simple calculator can be used.

1. (a) Fill in the blanks :

(i) Mean deviation is least when taken about

(ii) If $\beta_2 > 3$, the distribution is said to be

(iii) If A and B are independent events, then $P(A \cap B) = \dots\dots\dots$

(iv) Correlation coefficient is the between regression coefficients.

(b) Let A and B be two events such that :

$$P(A) = \frac{3}{4} \quad \text{and} \quad P(B) = \frac{5}{8}$$

Show that :

$$(i) \quad P(A \cup B) \geq \frac{3}{4}$$

$$(ii) \quad \frac{3}{8} \leq P(A \cap B) \leq \frac{5}{8}$$

(c) Out of the two lines of regression $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$, which one is the line of regression of X on Y ? Also find r_{xy} . 4,3,3

2. (a) Show that the sum of the squares of the deviations of a set of values is minimum when taken about mean.

(b) The following table gives the weekly expenditure of 100 families. Find the median weekly expenditure : 6,7

Weekly Expenditure No. of Families

(in Rs.)

0—10	14
10—20	23
20—30	27
30—40	21
40—50	15

3. (a) Prove that for any discrete distribution, standard deviation is not less than mean deviation from mean.
- (b) What do you understand by skewness? How is it measured? Distinguish clearly, by giving figures between positive and negative skewness. For positively and negatively skewed distributions, show the relative positions of mean, median and mode in the figures. 6,7

4. (a) State the axioms of probability. For any two events A and B, prove that :

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

- (b) If four squares are chosen on a chess board, find the probability that they lie on a diagonal. 6,7
5. (a) For a fixed B with $P(B) > 0$, show that $P(A|B)$ is a probability function.
- (b) An urn contains four tickets marked with numbers 112, 121, 211, 222 and one ticket is drawn at random. Let A_i ($i = 1, 2, 3$) be the event that i th digit of the number of the ticket drawn is 1. Discuss the independence of the events A_1, A_2 and A_3 . 6,7

6. (a) Define Pearson's coefficient of correlation and show that it is independent of change of origin and scale.
- (b) Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y) : 6,7

X	Y
65	67
66	68
67	65
67	68
68	72
69	72
70	69
72	71

7. (a) If the two lines of regression are $8X - 10Y + 66 = 0$,
 $40X - 18Y = 214$ and variance (X) = 9, find :

(i) The mean values of X and Y

(ii) The correlation coefficient between X and Y

(iii) The standard deviation of Y.

- (b) Define multiple correlation and partial correlation. In a trivariate distribution, the following correlation coefficients were obtained :

$$r_{12} = 0.77, r_{13} = 0.72, r_{23} = 0.52$$

Find the partial correlation coefficient $r_{12.3}$ and multiple correlation coefficient $R_{1.23}$.

6,7

