This question paper contains 2 printed pages.

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

Question No. 1 is compulsory. Attempt 6 questions in all.
Simple calculator can be used.

1. (a) Fill in the blanks:

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

    (ii) The relationship between A.M., G.M. and H.M. is ....

    (iii) The relationship between root mean square deviation and standard deviation is ....

    (iv) If one of the regression coefficients is greater than unity, then other must be ....

    (v) If A and B are mutually exclusive events, then $P(A \cap B) = $ ....
    5

   (b) The probabilities of A, B and C solving a problem are $\frac{1}{2}$, $\frac{2}{7}$ and $\frac{3}{8}$ respectively. If all the three try to solve the problem simultaneously, find the probability that the problem will be solved. 5

   (c) Find the coefficient of correlation for distribution in which $\sigma_x = 4.0$ units, $\sigma_y = 2.4$ units and coefficient of regression of Y on X = 0.38.
    5

2. (a) Determine the mean and mode from the following data:

Marks (less than)	10	20	30	40	50	60	70	80
No. of students	25	40	60	75	95	125	190	240

    6

   (b) Prove that, for any discrete distribution, standard deviation is not less than mean deviation from mean.

    6

3. (a) If x_i $(i = 1, 2, ..., k)$ are the means of k-component series of sizes n_i $(i = 1, 2, ..., k)$ respectively, then show that the mean $\bar{x}$ of the composite series obtained on combining the component series is given by the formula:

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2 + ... + n_k \bar{x}_k}{n_1 + n_2 + ... + n_k} = \left. \sum_{i=1}^{k} n_i \bar{x}_i \middle/ \sum_{i=1}^{k} n_i \right.$$

    6

P.T.O.

(b) Below are given the number of runs scored by two batsmen in eight matches:

Batsman A   37   26   40   55   201   90   50   62

Batsman B   0   200   90   15   70   50   20   221

Indicate who is better run scorer. Also find which of the two batsmen is more consistent in scoring.

6

4. (a) Define Karl Pearson's correlation coefficient and show that it is independent of change of origin and scale.

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(b) Show that:

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$$\left(1 - R_{1.23}^2\right) = \left(1 - r_{12}^2\right)\left(1 - r_{13.2}^2\right)$$

6

5. (a) Fifteen pairs of values of variates X and Y led to following results:

$N = 15$, $\Sigma X = 117$, $\Sigma Y = 90$, $\Sigma X^2 = 750$, $\Sigma Y^2 = 439$ and $\Sigma XY = 490$

A subsequent scrutiny showed that two pairs of values were copied down as:

X	Y
8	14
8	6

Instead of

X	Y
8	10
5	8

Obtain the correct value of the correlation coefficient.

6

(b) Find the most likely price in Mumbai corresponding to the price of Rs. 70 at Kolkata from the following:

	Kolkata	Mumbai
Average Price	65	67
Standard Deviation	2·5	3·5

6

6. (a) If A and B are independent events then show that:

(i) A and $\bar{B}$

(ii) $\bar{A}$ and $\bar{B}$

are also independent events.

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(b) If A and B are any two events and are not disjoint then show that:

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

6

7. (a) In a class 40% students study statistics, 25% study mathematics and 15% study both statistics and mathematics. One student is selected at random. Find the probability that:

(i) he studies statistics if it is known that he studied mathematics

(ii) he studies mathematics if it is known that he studied statistics.

6

(b) State Baye's theorem. A factory has three machines X, Y and Z producing 1000, 2000 and 3000 bolts per day respectively. The machine X produces 1% defective bolts, Y produces 1·5% defective bolts and Z produces 2% defective bolts. At the end of the day, a bolt is drawn at random and it is found to be defective. What is the probability that this defective bolt has been produced by the machine X?

6