

Sl. No. of Ques. Paper : 1974

GC-3

Unique Paper Code : 62371101

Name of Paper : Basic Statistics and Probability

Name of Course : B.A. (Prog.) Statistics (CBCS)

Semester : I

Duration : 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 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 $P(A \cap B) = \dots\dots\dots$ 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 \bar{x}_i ($i = 1, 2, \dots, k$) are the means of k -component series of sizes n_i ($i = 1, 2, \dots, k$) respectively, then show that the mean \bar{x} of the composite series obtained on combining the component series is given by the formula:

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2 + \dots + n_k \bar{x}_k}{n_1 + n_2 + \dots + n_k} = \frac{\sum_{i=1}^k n_i \bar{x}_i}{\sum_{i=1}^k n_i}$$

6

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

<i>Batsman A</i>	37	26	40	55	201	90	50	62
<i>Batsman B</i>	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. 6

- (b) Show that:

$$(1 - R_{1,23}^2) = (1 - r_{12}^2)(1 - r_{13,2}^2) \quad 6$$

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

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

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

X	Y	Instead of	X	Y
8	14		8	10
8	6		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:

	<i>Kolkata</i>	<i>Mumbai</i>
<i>Average Price</i>	65	67
<i>Standard Deviation</i>	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. 6

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

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) \quad 6$$

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