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S. No. of Question Paper : 5177

Unique Paper Code : 237151

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Name of the Paper : **Basic Statistics and Probability**

Name of the Course : **B.A. (Programme) Statistics**

Semester : **I**

Duration : **3 Hours**

Maximum Marks : **75**

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

Q. No. 1 is compulsory.

Attempt Six 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) If A and B are independent events, then A and \bar{B} are.....
- (iii) In any distribution standard deviation is always.....the mean deviation from mean.
- (iv) In a symmetric distribution mean, mode and median are.....
- (v) The sign of correlation coefficient is.....as that of the regression coefficients.

P.T.O.

- (b) If A, B and C are mutually exclusive and exhaustive events associated with a random experiment, find $P(A)$ given that $P(B) = \frac{3}{2}P(A)$, $P(C) = \frac{1}{2}P(B)$. 5
- (c) Find the coefficient of correlation for distribution in which standard deviation of $X = 3.0$ units, standard deviation of $Y = 1.4$ units and coefficient of regression of Y on $X = 0.28$. 5
2. (a) Find mode and median for the following frequency distribution : 6

Class Interval	Frequency
0-10	5
10-20	8
20-30	7
30-40	12
40-50	28
50-60	20
60-70	10
70-80	10

(b) Let r be the range and s be the standard deviation of a set of observations x_1, x_2, \dots, x_n . Then prove that $s \leq r$. 6

3. (a) Goals scored by two teams A and B in a football season were as follows. Find out which team is more consistent. 6

No. of Goals scored in a Match	No. of Matches	
	A	B
0	27	17
1	9	9
2	8	6
3	5	5
4	4	3

- (b) 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 :

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

4. (a) A and B alternatively cut a pack of cards and the pack is shuffled after each cut. If A starts and the game is continued until one cuts a diamond, what are the respective chances of A and B first cutting a diamond ? 6
- (b) If A and B are independent events, then show that \bar{A} and \bar{B} are also independent events. 6
5. (a) If two dice are thrown, what is the probability that the sum is greater than 8 ? 6
- (b) State Bayes' Theorem. In 2012 there were three candidates for the position of principal—Mr. Chatterji, Mr. Ayangar and Dr. Singh—whose chances of getting the appointments are in the proportion 4 : 2 : 3 respectively. The probability that Mr. Chatterji if selected would introduce co-education in the college is 0.8. The probabilities of Mr. Ayangar and Dr. Singh doing the same are respectively 0.5 and 0.3. What is the probability that there was co-education in the college in 2013 ? 6

6. (a) Define Karl Pearson correlation coefficient $r(x, y)$ between two variables X and Y and show that it is independent of change of origin and scale. 6
- (b) Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y) : 6

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

7. (a) Given that $X = 4Y + 5$ and $Y = kX + 4$, are the lines of regression of X on Y and Y on X respectively. Show that $0 < 4k < 1$. If $k = \frac{1}{16}$, find the means of the two variables and coefficient of correlation between them. 6
- (b) If $r_{12} = 0.80$, $r_{13} = -0.40$, and $r_{23} = -0.56$, find the values of $r_{23.1}$ and $R_{1.23}$. 6