Sl. No. : 6678

FC

Unique Paper Code : 62371101

Name of the Paper : Basic Statistics and Probability

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

Semester : I(...

Duration : 3 hours

Maximum Marks : 75 Marks

Instruction for Candidates

Question No. 1 is compulsory. Attempt ***six*** questions in all. Use of simple calculator is allowed.

1(a) Fill in the blanks :

(i) Mean deviation is least when taken about _____.

(ii) For a symmetrical distribution, Mean_____Mode.

(iii) If 25% of the items are less than 10 and 25% are more than 40, the coefficient of quartile deviation is _____.

(iv) If A and B are two independent events then $P(A \cap B) =$ _____.

(v) Correlation coefficient is the _____ between regression coefficients.

(b) A, B and C are three mutually exclusive and exhaustive events associated with a random experiment. Find P(A), if

$$P(B) = \frac{3}{2}P(A) \quad \text{and} \quad P(C) = \frac{1}{2}P(B).$$

(c) The regression line of Y on X is $Y = a X + b$ and that of X on Y is $X = c Y + d$. Find

(i) means of X and Y,

(ii) correlation coefficient between X and Y.

(d) Define the following terms as used in statistics:

(i) Discrete and continuous variables,

(ii) Quantitative and qualitative variables. 5,2,4,4

2. (a) State and prove properties of arithmetic mean.

(b) The average weight of a group of 25 boys was found to be 78.9 lbs. It was later discovered that one weight was misread as 69 lbs instead of 96 lbs. Find the correct mean and correct standard deviation. 6,6

3. (a) Let r be the range and s be the standard deviation of a set of values $x_1, x_2, ..., x_n$. Show that $s \leq r$.

(b) What is skewness? How is it measured? Distinguish between positive and negative skewness with the help of graphs. 6,6

4. (a) If A and B are two non-disjoint events (subsets of sample space S), then

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

(b) If the letters of the word 'REGULATIONS' are arranged at random then what is the chance that there will be exactly four letters between R and E. 6,6

5. (a) One shot is fired from each of the three different guns. E_1, E_2 and E_3 denote the events that the target is hit by the first, second and third gun respectively. If $P(E_1) = 0.5$, $P(E_2) = 0.6$ and $P(E_3) = 0.8$ and E_1, E_2 and E_3 are independent, then find the probability that (i) exactly one hit is registered , (ii) at least two hits are registered.

(b) State Bayes' theorem. In 2015 there will be three candidates, Mr. Chatterji, Mr. Ayengar and Dr. Singh, for the position of principal of a college whose chances of getting the appointment are in the proportion 4 : 2 : 3 respectively. The probability that Mr. Chatterji if selected would introduce co-education in the college is 0.3. The probabilities of Mr. Ayangar and Dr. Singh if selected doing the same are 0.5 and 0.8 respectively.

(i) What is the probability that there will be co-education in the college in 2016?

(ii) If there is co-education in the college in 2016, what is the probability that Dr. Singh is the principal? 4,8

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

(b) Derive the expression for Spearman's rank correlation coefficient. 6,6

7. (a) Define regression coefficients? Show that if one of them is greater than unity, the other must be less than unity.

(b) Define multiple and partial correlations. In a trivariate distribution, if

$r_{12} = 0.7$, $r_{23} = r_{13} = 0.5$.

Find (i) $r_{23.1}$ (ii) $R_{1.23}$ 6,6