Roll No.

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

Attempt *six* questions in all.

Question No. **1** is compulsory.

Attempt *five* more questions, selecting at least

two questions from each of Sections A and B.

Use of simple calculator is allowed.

(a)   Do the following :

    (i)   For a platykurtic distribution γ_2 is ....

(ii) Limits of Bowley's coefficient of skewness are ....

(iii) Attributes A and B are said to be independent if ....

(iv) The limits for coefficient of association are ....

(v) Name the type of correlation coefficient which can never be negative.

(b) *(i)* 10 is the mean of 7 observations and 8 is the mean of 3 observations. Mean of the combined set is ....

(ii) As part of an environmental impact study, fishes were captured, tagged and released. The following information was recorded for each fish : sex (0 = female, 1 = male), length (cm),

maturation (0 = young, 1 = adult), weight (gm). The scale of measurement of these variables respectively is :

(a) nominal, ratio, nominal, ratio;

(b) nominal, interval, ordinal, ratio;

(c) nominal, ratio, ordinal, ratio;

(d) ordinal, ratio, nominal, ratio.

(iii) Examine the consistency of the following data :

N = 1500; (A) = 700; (B) = 600; (AB) = 160,

the symbols having their usual meaning.

(iv) Can $Y = 0.8X + 5$ and $X = -2.5Y + 10$ represent lines of regression of Y on X and X on Y ? Justify the answer.

(v) Compue the Geometric mean of first n natural numbers.

1×5, 2×5

Section A

2. (a) The means of two samples of size 50 and 100 respectively are 54 and 50 and the standard deviations are 8 and Obtain mean and standard deviation of sample of size obtained by combining the two samples.

(b) The following data gives the age distribution of a group of workers in a factory :

Ages	Number of Workers
20—25	35
25—30	45
30—35	70
35—40	105
40—45	90
45—50	74
50—55	51
55—60	30

Compute third quartile, forty seventh percentile and sixth decile.

7,5

3. (a) Find the mean deviation from mean and standard deviation of the arithmetic progression $a, a + d, a + 2d,$ ....., $a + 2nd$ and prove that standard deviation is greater than mean deviation about mean.

(b) Milk is sold at the rates of 8, 10 and 12 rupees per litre in three different months. Assuming that equal amounts were spent on milk by a family in the three months, find the average price of milk in rupees per month using the most appropriate measure of central tendency.   7,5

4. (a) Explain with the help of a suitable example the term "dispersion". Discuss different measures of dispersion in detail.

(b) Mean weight of 50 students in a certain class is 60 kilograms. The mean weight of boys in the class is 64 kilograms and that of girls is 55 kilograms. Find the number of boys and girls in the class.

7,5

5. (a) First three moments about point A = 4 are 1, 4 and 10. Determine mean and first three moments about the mean.

(b) Karl Pearson's coefficient of skewness of a distribution is 0.32, the standard deviation is 6 and mean is 29. Find the mode and hence median of the distribution. 6,6

Section B

6. (a) The equations of two regression lines obtained in a correlation analysis are as follows :

$$3X + 2Y = 19, \; 3Y + 9X = 46.$$

Obtain :

(i) The value of the correlation coefficient,

(ii) Mean values of X and Y,

(iii) The ratio of the coefficient of variability of X to that of Y,

(iv) Estimate Y when X = 12 and estimate X when Y = 25.

(b) Define Spearman's rank correlation coefficient (ρ). Obtain it for the following data :

Rank (X)	Rank (Y)
4	5
6	7
2.5	3.5
9	10
6	1
1	6
2.5	3.5
10	9
8	8
6	2

6,6

7. (a) State the principle of least squares. Obtain the normal equations for fitting the exponential curve $y = ab^x$. Given the following data :

$N = 10$, $\sum U_i = 5.56$, $\sum X_i = 55$, $\sum U_i X_i = 39.83$ and $\sum X_i^2 = 385$ where $U_i = \log Y_i$.

Obtain the estimates of $A = \log a$ and $B = \log b$.

(b) Can vaccination be regarded as a preventive measure for small-pox from the data given below :

'Of 1,500 persons in a locality exposed to small-pox, 400 in all were attacked.'

'Of 1,500 persons, 350 had been vaccinated and of these only 40 were attacked.'

6,6

8. (a) Given the following data, find the frequencies of :

(i) the remaining positive classes, and

(ii) the ultimate classes;

$N = 1800$, $(A) = 850$, $(B) = 780$, $(C) = 326$, $(AB\Upsilon) = 200$, $(A\beta C) = 94$, $(\alpha BC) = 72$ and $(ABC) = 50$.

(b) In a tri-variate distribution, $r_{12} = r_{23} = r_{13} = r$. Obtain $r_{13.2}$ and $R^2_{1.23}$.

(c) Give the expression for the angle between lines of regression of X on Y and Y on X. Also discuss the cases when X and Y are :

(i) Uncorrelated, and

(ii) Prefectly correlated.

6,3,3