Time: 2.00 Hours   Max.Marks:35

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of calculator and statistical tables is allowed.

4) Symbols and abbreviations have their usual meaning.

Q1) Choose the most appropriate alternative for each of the following: [1 each]

a) Which of the following indicates the strongest relationship?

(i) r = 0.5   ii) r = 0.09

(iii) r = −0.7   iv) r = 0.2

b) The number of normal equations required to fit the curve $Y = ab^X$ are

    i) Four   ii) Two

    iii) One   iv) Three

c) Increase in the number of patients in the hospital due to heat stroke is

    i) Seasonal Variation   ii) Cyclic variation

    iii) Trend   iv) Irregular Variation

d) The limits for partial correlation coefficients are

    i) $-\infty$ to 1   ii) $-\infty$ to ∞

    iii) -1 to 1   iv) 0 to 1

e) The purpose of Simulation technique is to

    i) Imitate the real word situation

    ii) Understand Properties and operating characteristics of complex real life problem.

    iii) Reduce the cost of experiment on a model of real situation.

    iv) All of the above

Q2) Attempt any TWO of the followings.   [5 Each]

a) What is the principle of least square method? Describe the procedure of fitting equation $Y = aX^b$ for a bivariate data.

b) Explain correlation with the help of Scatter diagram.

c) For a trivariate data, $\sigma_1 = 4$, $\sigma_2 = 8$, $\sigma_3 = 7$, $r_{12} = 0.45$, $r_{13} = 0.55$, $r_{23} = 0.65$. Find the values of $b_{12.3}$ and $r_{12.3}$.

Q3) Attempt any TWO of the followings.   [5 Each]

a) Explain Simulation. Describe procedure of drawing a sample of size n from $N(\mu, \sigma^2)$ using

Box-Muller transformation.

b) What is time series? Explain 'Seasonal Variation' as a component of time series.

c) Define Karl Pearson's coefficient of correlation. Consider the following calculations for a bivariate data of size 10 :

$$\Sigma X = 165, \quad \Sigma Y = 178, \quad \Sigma X^2 = 3591, \quad \Sigma Y^2 = 3788, \quad \Sigma XY = 3606$$

Find the correlation coefficient between X and Y and interpret its value.

Q.4 Attempt any ONE of the following [10 each]

a) i) A teacher of mathematics wants to determine the relationship between grades in the final examination and two internal tests given during the semester. Let Y , X1 and X2 denote the grades of a student in the final examination, first test and second test respectively. He obtained the following computation for a total of 120 students

$: \bar{Y} = 7.4$ $\qquad \bar{X}_1 = 6.8$, $\qquad \bar{X}_2 = 7.0$

$\sigma_1 = 0.9$, $\qquad \sigma_2 = 1$, $\qquad \sigma_3 = 0.8$

$r_{12} = 0.60$ $\qquad r_{13} = 0.70$ $\qquad r_{23} = 0.65$

1) Find the equation of plane of regression of Y on X1 and X2 .

2) Estimate Y when X1 = 6 and X2 = 6.5.

3) Find R1.23

b) i) Estimate trend value using method of moving averages with m = 4 for the following data on the number of students studying in a college during years 2001 to 2010:

[7 Marks]

Year	2001	2002	2003	2004	2005	2006	2007	2008
Number of Students	3320	3170	3570	3920	4020	4050	4100	4270

ii) Draw a random sample of size 4 from U (-2,4). Use random numbers
0.3977, 0.2806, 0.9767, 0.6930 [3Marks]

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