12526

3 Hours / 70 Marks   Seat No.

Instructions – (1) All Questions are *Compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1.   **Attempt any FIVE of the following :**   **10**

a) Calculate mean of the following data.
4.8×10^4, 4.2×10^4, 5.1×10^4, 3.8×10^4, 4.4×10^4, 4.7×10^4

b) Calculate Geometric mean of the given data.
25, 50, 30, 70, 42, 34, 36, 48, 34, 60

c) Given $N = 7$, $\Sigma X = 35$, $\Sigma Y = 70$, $\Sigma XY = 409$, $\Sigma X^2 = 203$, $\Sigma Y^2 = 830$ Calculate coefficient of correlation.

d) If the correlation coefficient between x and y is 0.5 and the regression coefficient of y on x is 0.5 Then find the regression coefficient of x on y.

e) Find the probability of getting two tails when five coins are tossed.

P.T.O.

Marks

f) If $f(x) = x^2 - 3x + 1$, construct a forward difference table by taking $x = 0, 1, 2, 3, 4, 5$ verify that the second differences are constant.

g) Inteligence test given to two groups of boys and girls gave the following information.

	Mean score	S.D.	Number
Girls	75	10	100
Boys	70	12	200

On the basis of the above information would you conclude that mean scores of boys and girls are statically significant ?

2. **Attempt any THREE of the following :** **12**

a) In a football season the two teams A and B make the number of goals shown against the number of matches played by them as

No of goals made		0	1	2	3	4
No of matches	Team A	25	8	7	6	4
Played	Team B	12	8	5	3	2

Which team is more constistent?

b) Calculate the coefficient of skewness from the following data.

x	4	7	11	16	22
f	3	5	7	3	2

c) Calculate Bowley's coefficient of skewness of the following giving the wages of 230 persons.

Wages in ₹	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150
No of persons	12	18	35	42	50	45	20	8

d) Find mode of the distribution by drawing histogram.

Marks	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
No of students	4	6	10	5	7	3	9	6

3. Attempt any THREE of the following : 12

a) Calculate coeff. of Q.D. from the data given below.

Profits (Rs lakh)	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60	Less than 70
No of Companies	8	20	70	50	56	59	60

b) The first four moments of a distribution about value 2 are 1, 2.5, 5.5, and 16 respectively, Calculate the first four moments about mean and comment on the skewness and kurtosis.

c) The following data relate to the number of passenger cars (in million) sold from 2007 to 2014.

Year	2007	2008	2009	2010	2011	2012	2013	2014
Passenger Cars	6.7	5.3	4.3	6.1	5.6	7.9	5.8	6.1

Fit a straight line trend to the data through 2012 only

d) The deviations from respective means of X and Y series are given below.

X	−4	−3	−2	−1	0	1	2	3	4
Y	3	−3	−4	0	4	1	2	−2	−1

Calculate Karl Pearson's coefficient of correlation for the data.

4. Attempt any THREE of the following : 12

a) From the following data, obtain the regression equation of Y on X.

X	6	2	10	4	8
Y	9	11	5	8	7

b) Compute the Spearman's rank correlation coefficient for the rank of 10 students assigned by two teachers.

Students	1	2	3	4	5	6	7	8	9	10
Rank (Teacher I)	8	7	6	3	2	1	4	9	10	5
Rank (Teacher II)	10	8	5	2	1	3	8	9	7	4

c) Determine the probability that a card drawn at random from a pack of 52 cards is an ace or a red queen or a king of heart.

d) An urn contains 20 red and 10 blue balls. Two balls are drawn from a bag one after the other without replacement. What is the probability that both the ball drawn are red ?

e) In a bolt factory, Machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Of their output 5, 4, and 2 percent are defective bolts. A bolt is drawn at random from the product and is found 10 be defective. What is the probability that it is was manufactured by Machine B ?

5. **Attempt any TWO of the following :**   12

a) Solve the following.

   i) Apply Langrange's formula to find f(x) from the following data.

x	0	1	4	5
f(x)	4	3	24	39

   ii) Using Langrange's interpolation formula, Find f(g) : Given that f(0)= 3, f(1) = 6, f(2) = 11, f(3) = 18

b) Solve the following

   i) Given that

x	1	2	3	4	5
y	2	5	10	17	26

   Find the value of $\nabla^2 y_5$

   ii) Prove that

   $\triangle^3 (1-x) (1-2x) (1-3x) = 36$, when h $= 1$

c) A certain student administered to each of 12 patients results in the following increases of blood pressure :

   5, 2, 8, −1, 3, 0, −2, 1, 5, 0, 4, 6

   Can it be concluded that the stimulus will in general be accompanied by an increase in blood pressure.
   [Value of t for 11 d.f. at 5% L.O.S. = 2.201]

6. **Attempt any TWO of the following :**   **12**

a) Solve the following :

   i) Sample of 12 values shows the S.D. = 11
      Does this agree with the hypothesis that the population
      S.D. is 10, the population being normal ?

   ii) A coin was tossed 400 times and the head turns up 216
      tosses. Test the hypothesis that the coin is unbiased at
      5% L.O.S.

b) Solve the following :

   i) Using Extrapolation, find the value of $x = 0.4$ from the
      following :

x	1	3	5	7	9
y	2	28	126	244	344

   ii) If $f(1.15) = 1.0723$

        $f(1.20) = 1.0954$

        $f(1.25) = 1.1180$ and

        $f(1.30) = 1.1401$

      Find $f(1.28)$ by using Newtons backward difference
      interpolation formula.

c) A survey of 320 families with 5 children each shows the
   following information.

No of Boys	5	4	3	2	1	0
No of Girls	0	1	2	3	4	5
No of families	14	56	110	88	40	12

   Is the result consistent with the hypothesis that male and
   female births are equally probable ?

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