12425

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 Q_3 for the given distribution :

20, 28, 31, 18, 19, 17, 32, 33, 22, 21

(b) Find H.M. of the daily income of 5 families as given below :

90, 100, 150, 120, 200

(c) If standard deviation of data is 8.5, mean of data is 20.6 and mode of data is 18.52, find the Karl Pearson's coefficient of Skewness.

(d) Find correlation coefficient between X and Y given that n = 25, $\Sigma x = 75$, $\Sigma y = 100$, $\Sigma x^2 = 250$, $\Sigma y^2 = 500$, $\Sigma xy = 325$.

(e) A bag contains 30 balls numbered 1 to 30. One ball is drawn at random. Find the probability that the number on the ball drawn will be a multiple of 5 or 7.

(f) Form the backward difference table of $f(x) = x^3 - 3x^2 + 5x + 7$ for the values of 0, 2, 4, 6, 8.

(g) In a sample of 500 people from Andhra Pradesh, 280 are found to be rice eaters and the rest wheat eaters. Can we assume that both the food articles are equally popular ?

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

   (a) Calculate the median from the following data :

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students	4	4	8	10	12	8	4

   (b) Find measure of skewness from the following table 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

   (c) Calculate Bouley's coefficient of skewness of the following data :

C.I.	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	2	8	10	2	13	4

   (d) Find the mode of following data by graphical method (Histogram) :

Age	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	16	21	20	28	10	3	1	1

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

   (a) Calculate the Spearman's rank correlation coefficient of the data :

x	10	6	9	12	8
y	8	7	5	6	9

   (b) Calculate the measure of Kurtosis based on the moment for the following data :

x	2.0	2.5	3.0	3.5	4.0	4.5	5.0
f	4	36	60	90	70	40	10

   (c) Fit a straight line of the form y = ax + b to the following data, by using the method of least squares :

x	0	1	2	3	4	5	6	7
y	−5	−3	−1	1	3	5	7	9

   (d) Calculate Karl Pearson's coefficient of correlation for the following data :

x	5	9	13	17	21
y	12	20	25	33	35

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

(a) Find the regression lines for the following :

x	2	4	6	8	10
y	11	8	9	7	5

(b) Two ladies were asked to rank lipsticks from 7 known companies. The ranks given by them are as follows :

Lipsticks Companies	A	B	C	D	E	F	G
Deepti (x)	2	1	4	3	5	7	6
Nancy (y)	1	3	2	4	5	6	7

Compute the Spearman's rank correlation coefficient.

(c) A card is drawn from a pack of 52 cards, find the probability that a card is a diamond or a face card.

(d) A bag contains 3 red and 7 black balls. Two balls are drawn at random without replacement. If the second ball is red, what is the probability that the first ball is also red ?

(e) A man is known to speak the truth 2 out of 3 times the throws a die and reports that the number obtained is a four. Find the probability that the number obtained is actually a four.

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

(a) (i) Using Lagrange's interpolation formula, find the value of y when x = 10, from the following table :

x	5	6	9	11
y	12	13	14	16

(ii) Given f(1) = 6, f(2) = 16 and f(3) = 32. Estimate f(2.5) using Lagrange's interpolation formula.

(b) (i) Construct the forward difference table for the following data :

x	0	1	2	3
f(x)	3	6	11	18

Hence, write down the value of $\Delta f(0)$ and $\Delta f(2)$.

(ii) Prove that $\left(\dfrac{\Delta^2}{E} \right) x^3 = 6x$

(c) (i) 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 Newton's Backward difference Interpolation formula.

(ii) Compute y(19) from the following data :

x	8	10	12	14	16	18
y	10	19	32.5	54	89.5	15.4

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

(a) (i) A machine produced 20 defective items in batch of 400. After overhauling, it produced 10 defective items in a batch of 300. Has the machine improved ? Use 1% level of significance.

(ii) A dice was thrown 1500 times and the number 4 was obtained 290 times. Can the dice be considered fair at 0.01 level of significance ?

(b) A survey of 320 families with 5 children each revealed the following distribution :

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 this data consistent with the hypothesis that male and female births are equally probable ?

(χ^2 for 5 d.o.f. at 5% Los = 11.07)

(c) The nine items of a sample had the following values :

45, 47, 50, 52, 48, 47, 49, 53, 51

Does the mean of the nine items differ significantly from the assumed population mean of 47.5 ?

[t for 8 d.f. at 5% Los = 2.31]

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