

313307

24225

3 Hours / 70 Marks

Seat No.

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- 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.
  - (8) Use of steam tables, logarithmic, Mollier's chart is permitted.

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

- (a) The mean weight of 40 boys in a class is 80 and that of 20 girls is 50. Find the combine mean.

- (b) Find the  $D_5$  for the following data :

19, 12, 16, 1, 14, 09, 6, 1, 12, 13, 10, 19, 7, 5, 8

- (c) Find the co-variance for the following data :

<b>x</b>	1	2	3	4	5
<b>y</b>	2	3	4	6	10

- (d) Karl Pearson coefficient of skewness of a distribution is 80, its mean is 140 & mode is 120. Find standard deviation for the distribution.
- (e) Three unbiased coins are tossed. What is the probability of getting all heads ?



- (f) Construct a forward difference table for the following data :

<b>x</b>	0	1	2	3	4	5	6
<b>f(x)</b>	1	3	11	31	69	131	223

- (g) A random sample of 50 items gives mean 6.2 & standard deviation 10.24 & population mean 5.4. Find the value of standard normal variate Z.

**2. Attempt any THREE :**

**12**

- (a) The mean annual salary paid to all employees in a factory is ₹ 4496. The mean salary of males and females are ₹ 5,000 & ₹ 3,600 respectively. Find the number of males and females if total number of employees was 250.

- (b) Find the median marks of the class :

<b>Class</b>	0-10	10-20	20-30	30-40	40-50
<b>Freq.</b>	2	12	22	8	6

- (c) Calculate the mode graphically and verify analytically :

<b>Class Interval</b>	0-10	10-20	20-30	30-40
<b>Freq.</b>	2	5	9	6

- (d) For a given frequency distribution, the Bowley's coefficient of skewness is 1.5. If the sum of upper and lower quartiles is 180 and median is 75, find the value of upper and lower quartiles.

**3. Attempt any THREE :**

**12**

- (a) Calculate the co-efficient of skewness for the following frequency distribution of ages of employees in a company.

<b>Age</b>	20-25	25-30	30-35	35-40	40-45	45-50	50-55
<b>No. of Employee</b>	08	12	20	25	15	12	08

- (b) For a certain distribution,  $SK_p = 0.5$ , standard deviation = 10 & mean = 40. Find mode and median for the distribution.

- (c) Fit a straight line  $y = a + bx$  to the data below & also estimate  $y$  at  $x = 2.5$ .

$x$	1	2	3	4	5
$y$	2	5	3	8	7

- (d) Calculate Karl Pearson coefficient of correlation for the following data. Also explain type of correlation.

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

**4. Attempt any THREE :**

**12**

- (a) Find Spearman Rank correlation coefficient of the given data :

$x$	82	68	75	61	68	73	65	68
$y$	81	71	71	68	62	69	80	70

- (b) Fit a line of regression for 10 observations on price ( $x$ ) to supply ( $y$ ) if  $\Sigma x = 130$ ,  $\Sigma y = 220$ ,  $\Sigma x^2 = 2288$ ,  $\Sigma y^2 = 5506$ ,  $\Sigma xy = 3467$ . Estimate  $y$  at  $x = 16$ .
- (c) A bag contains 10 red balls, 5 white balls and 5 black balls. Two balls are drawn at random. Find the probability that they are not of same colour.
- (d) The probability that a student passes H.S.C. exam is  $\frac{2}{3}$  and probability that he passes both H.S.C. and IIT entrance exam is  $\frac{14}{45}$ . The probability that he passes at least one exam is  $\frac{4}{5}$ . Find the probability of passing IIT exam.
- (e) A bag-1 contains 4 white & 6 black balls while bag-2 contains 4 white and 3 black balls. One ball is drawn at random from one of the bag and it is found to be black. Find the probability that ball was from 1<sup>st</sup> bag.

**5. Attempt any TWO :**

**12**

- (a) (i) Using Lagrange's formula, find  $f(13)$  for

$x$	0	1	2	5
$y$	2	3	12	147

- (ii) Using Newton's forward difference interpolation, estimate  $f(8)$ .

$x$	5	10	15	20
$f(x)$	50	70	100	145

- (b) Given the cube of integers in the table, find  $(12)^3$ .

$x$	2	5	8	11
$y$	8	125	512	1331

- (c) The following table gives the aircraft accident that occurred during various day of the week. Find the value  $\chi^2$ .

Days	Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.	Total
No. of Accident	14	18	12	11	15	14	14	98

6. Attempt any TWO :

12

- (a) (i) Test whether the sample having values 63, 63, 64, 55, 66, 69, 70, 70, 71 has been chosen from a population mean 65 at 5% level of significance. (value of t for 8 degree of freedom = 2.31)
- (ii) In a sample of 600 men from certain city 450 are found smokers. In another sample of 900 men for another city 450 are smokers. Find standard normal variate Z using sampling distribution of proportions.
- (b) The IQ and Economic conditions of 1000 students of engineering are noted as follows :

<div> <div>IQ →</div> <div>Economic condition ↓</div> </div>	High	Low	Total
Rich	100	300	400
Poor	350	250	600
Total	450	550	1000

Calculate  $\chi^2$  and state whether there is association between economic condition and IQ of students. (Given for 1 dof  $\chi^2$  at  $\alpha = 0.05$  LOS  $\chi^2 = 3.84$ )

- (c) The mean life of sample of 100 electric bulbs produced by a company is computed to be 1570 hours with standard deviation of 120 hours. The company claims that average life of bulbs produced by it is 1600. Find value of t using t distribution & state whether the claim made is acceptable. (Given : Value of t at 5% LOS = 1.96)