

22397

23124

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each Section on same / separate answer sheet.
 - (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.

Marks

1. Attempt any FIVE of the following :

10

- (a) Determine the harmonic mean for the following data sets : 2, 5, 7 and 9.
- (b) Find the D6 for the following data :
11, 25, 20, 15, 24, 28, 19, 21
- (c) For a distribution Karl Pearson's coefficient of skewness is 0.64, standard deviation is 13 and mean is 59.2. Find mode and median.
- (d) Calculate covariance for the following data :

X	2.1	2.5	3.6	4.0
Y	8	10	12	14

- (e) In a single throw of a pair of dice, what is the probability of getting the sum a perfect square ?
- (f) If the random variable X follows a Poisson distribution with mean 3.4, find $P(X = 6)$.
- (g) Random samples of size 225 are drawn from population with mean 100 and standard deviation 20. Find the mean and standard deviation of the sample mean.



2. Attempt any THREE of the following :

12

- (a) If the average marks for a group of 30 girls are 80, the group of boys is 70 and the combined average is 76, how many boys are in the group ?
- (b) Find the median marks for the following distribution :

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	2	12	22	8	6

- (c) Following data gives the marks obtained by the student. Draw histogram and find modal marks obtained by student, check your result analytically :

Marks	51-60	61-70	71-80	81-90	91-100
No. of students	4	8	15	8	5

- (d) Karl Pearson's coefficient of skewness for a data set is -0.6 . If mean = 60 and $S = 10$, find median and mode for the data.

3. Attempt any THREE of the following :

12

- (a) Calculate the coefficient of skewness from the following data :

x	3	6	9	12	15	18
f	10	23	18	15	22	18

- (b) Calculate Bowley's coefficient of skewness from the following data :

No. of children	2	4	6	8	10	12
No. of families	11	22	18	15	10	4

- (c) Using least square method, fit the straight line $Y = a + bx$ for following data :

x	1	2	3	4	5
y	0.5	1.7	3.4	5.7	8.4

- (d) Calculate coefficient of correlation between x & y series from the following data :

x	1	3	5	6	7
y	4	2	1	3	5

4. Attempt any THREE of the following :

12

- (a) Calculate the coefficient of correlation for the following data :

Age of husband (x)	21	22	28	32	35	36
Age of wife (y)	18	20	25	30	31	32

- (b) Fit the regression line for the data :

x	2	3	5	7	9
y	4	5	7	10	15

- (c) How many 3-digit even numbers can be made using the digits 1, 2, 3, 4, 6, 7 if no digit is repeated ?
- (d) A and B appear for an interview for two vacancies in the same post. The probability of A's selection is $\frac{1}{6}$ and that of B's selection is $\frac{1}{4}$. Find the probability that only one of them is selected.
- (e) John has two bags. Bag I has 7 red and 2 blue balls and bag II has 5 red and 9 blue balls. John draws a ball at random and it turns out to be red. Determine the probability that the ball was from the bag I using the Baye's theorem.

5. Attempt any TWO of the following :

12

- (a) (i) Attempt the following :

The probability that a mountain-bike travelling along a certain track will have a tyre burst is 0.05. Find probability that among 17 riders; exactly one has a burst tyre.

- (ii) The average number of earthquakes in a city is 3 per year. What is the probability that exactly 5 earthquakes will occur in a city next year ?

- (b) A manufacturer produces light-bulbs that are packed into boxes of 100. If quality control studies indicate that 0.5% of the light-bulbs produced are defective, what percentage of the boxes will contain 2 or more defectives ?
- (c) A manufacturer knows from experience that the resistance of resistors he produces is normal with mean $\mu = 100$ ohms and standard deviation $\sigma = 2$ ohms. What percentage of resistors will have resistance between 98 ohms and 102 ohms ?

$$\text{Given } A(1) = 0.3413$$

P.T.O.

6. Attempt any TWO of the following :

- (a) (i) A machine has produced washers having a thickness of 0.50 mm. A sample of 10 washers has an average thickness 0.53 with standard deviation 0.03 mm. Find the value of t using t-distribution.
- (ii) In 120 throws of a single die the following distribution of faces was obtained. Find the value of χ^2 (chi square) :

Faces	1	2	3	4	5	6	Total
Frequencies	30	25	18	10	22	15	120

- (b) Test whether the sample having the values 63, 63, 64, 55, 66, 69, 70, 70, 71 has been chosen from a population with mean 65 at 5% level of significance (value of t for 8 degree of freedom is 2.31).
- (c) In an anti malaria campaign in a certain area, quinine was administered to 812 persons out of a total population of 3248. The number of fever cases is shown below :

Treatment	Fever	No fever	Total
Quinine	140	30	170
No Quinine	60	20	80
Total	200	50	250

Calculate the value of χ^2 (chi-square) and discuss the usefulness of quinine in checking malaria (Given for 1 degree of freedom value of χ^2 (chi square) at $\alpha = 0.05$ level of significance 3.84).
