



ST JOSEPH'S UNIVERSITY, BENGALURU - 27
M.Sc (MATHEMATICS) – 2nd SEMESTER
SEMESTER EXAMINATION: APRIL 2024
(Examination conducted in May / June 2024)
MT8621 – STATISTICS
(For current batch students only)

Reg. Number:
Date & session:

Time: 2 Hours

Max Marks: 50

This paper contains TWO printed pages.

- ONE Graph Sheet is to be provided with answer script.
- Statistical tables are to be provided for reference.

Answer any FIVE full questions

(5 x 10 = 50)

1. a) The number of students in each group are given below. Express the categorial data in pie chat. [5]

Group	A	B	C	D	E
No. of students	15	25	35	10	5

- b) Find the quartile deviation for the given data. [5]

Class Interval	1-10	11-20	21-30	31-40	41-50	51-60
Frequency	10	12	20	15	10	8

2. a) Calculate Karl Pearson's coefficient of skewness from the given data. [5]

Profit (in lakhs):	Below 20	Below 40	Below 60	Below 80	Below 100
No of firms	8	20	50	64	70

- b) If $P(X = x) = \begin{cases} kx, & x = 1,2,3,4,5 \\ 0, & \text{otherwise} \end{cases}$ represents a probability mass function. Find [5]

- the value of k
- $P(x \text{ being a prime number})$
- $P\left(\frac{1}{2} < x < \frac{5}{2} / x > 1\right)$.

3. a) There are 3 true coins and 1 false coin with 'head' on both sides. A coin is chosen at random and tossed 4 times. If 'head' occurs all the 4 times, what is the probability that the false coin has been chosen and used? [5]

- b) Explain the various method of sampling techniques. [5]

OR

3. c) 6 dice are thrown 729 times. How many times do you expect atleast three dice to show 5 or 6? [5]

- d) The lifetime X of particular brand of batteries is exponentially distributed with a mean of 4 weeks. Determine the probability that [5]

- the battery life exceeds 2 weeks?
- it will last at least another 5 weeks, given that the battery has lasted 6 weeks?

4. a) Messages arrive at a switch board in a Poisson manner at an average rate of six per hour. Find the probability for each of the following events. [4]

- Exactly two messages arrive within one hour.
- no message arrives within one hour.
- at least three messages arrive within one hour.

- b) The marks obtained by a number of students for a certain subject is assumed to be normally distributed with mean 65 and standard deviation of 5. If 3 students are taken at random from this set, what is the probability that exactly 2 of them will have marks over 70? [6]

5. a) A sample of 900 members has a mean 3.4 cm and standard deviation 2.61 cm. Is the sample from a large population of mean 3.25 cm and standard deviation 2.61 cm? Test at 5 % level of significance. (The value of z at 5 % level is $|z_{\alpha}| = 1.96$) [5]

- b) Test made on the breaking strength of 10 pieces of a metal gave the following results 578, 572, 570, 568, 572, 570, 570, 572, 596 and 584 units. Test if the mean breaking strength of the metal can be assumed as 577 units. [5]

6. a) Time taken by workers in performing a job are given below: [5]

Type I:	21	17	27	28	24	23	-
Type II:	28	34	43	36	33	35	39

Test whether there is any significant difference between the variances of time distribution.

- b) Mechanical Engineers testing a new arc welding technique, classified welds both with respect to appearance and X-ray inspection. Test for independence using 0.05 level of significance. [5]

		Appearance		
		Bad	Normal	Good
X-ray	Bad	20	7	3
	Normal	13	51	16
	Good	7	12	21

7. Find the equation of regression line Y on X from the following data and hence find the correlation coefficient. [10]

X	3	5	6	8	9	11
Y	2	3	4	6	5	8