Reg. No.: [redacted]

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Continuous Assessment Test I - January 2023

Programme	**B.Tech.**	Semester	**Winter 2022-2023**
Course	**Probability and Statistics**	Code	**BMAT202L**
Faculty	**Dr. Kaliyappan M, Dr. Nathiya N, Dr. Vidhya V, Dr. Devi Yamini S, Dr. Durgaprasad P, Dr. Mythili G Y, Dr. Pulak Konar, Dr. Surath Ghosh, Dr. Avinash Kumar Mittal Dr. Rajivgandhi C, Dr. Ashis Bera, Dr. Sethukumarasamy K**	Class ID	**CH2022235002640, 2643, 2648, 2650, 2653, 2655, 2657, 2663, 2665, 2668, 2670, 2710**
		Slot	**E2**
Duration	**90 Mins**	Max.Marks	**50**

Answer all questions

(Non-programmable calculators are permitted)

1. Find the coefficient of variation and quartile deviation for the following data: **[10]**

Marks :	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Number of students :	2	5	7	13	21	16	8	3

2. The following table shows the frequency distribution of weights of 175 students: **[10]**

Weights (kg) :	30-37	38-45	46-53	54-61	62-69	70-77	78-85	86-93
Frequency :	8	19	37	51	29	17	9	5

Calculate the mean, mode and standard deviation. Is the given data skewed? Justify.

3. (a) A quality inspector checked for imperfections in rolls of fabric for one week. The random variable X represents the number of imperfections found. **[5]**

X :	0	1	2	3	4
$P(X = x)$:	$\frac{3}{4}$	$\frac{1}{10}$	$\frac{1}{k}$	$\frac{2}{25}$	$\frac{3}{100}$

Find the value of k and obtain the cumulative distribution function of X.

(b) Let X be a random variable with probability density function [5]

$$f(x) = \begin{cases} \frac{1}{2}\sin x, & x \in [0, \pi], \\ 0, & \text{otherwise.} \end{cases}$$

Find the variance of X.

4. (a) The joint probability mass function of a bivariate random variable (X, Y) is [5]

$$p(x, y) = \begin{cases} k(2x + y), & x = 1, 2; \quad y = 1, 2, \\ 0, & \text{otherwise.} \end{cases}$$

(i) Find the value of k.

(ii) Are X and Y independent?

(b) If the joint probability density function of a bivariate random variable (X, Y) is [5]

$$f(x, y) \begin{cases} x^2 + \frac{xy}{3}, & 0 < x < 1; \quad 0 < y < 2, \\ 0, & \text{otherwise,} \end{cases}$$

then find $P\left(Y < \frac{1}{2} \middle| X < \frac{1}{2}\right)$.

5. (a) The correlation between a general intelligence test and school achievement in a group of children from 6 to 15 years old is 0.80. The correlation between the general intelligence test and age in the same group is 0.70 and the correlation between school achievment and age is 0.60. Find the correlation between general intelligence and school achievement by controlling the effect age factor. Also, find the coefficient of correlation between age and the combined effect of general intelligence and school achievement. [5]

(b) Obtain the rank correlation coefficient for the following data: [5]

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

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