



## Continuous Assessment Test I - August 2024

Programme : B.Tech.	Semester : Fall 2024-25
Course : Probability and Statistics	Code : BMAT202L
	Slot : E1+TE1
Faculty : Dr.Amit Kumar Rahul Dr.B.Jaganathan Dr.S.Devi Yamini Dr.Sethukumarasamy K Dr.Manimaran J Dr.Dhivya M	Class ID : CH2024250102209 CH2024250102210 CH2024250102211 CH2024250102212 CH2024250102213 CH2024250102214
Time : 90 Minutes	Max.Marks : 50 Marks

1. Find the mean, median, third quartile of the following distribution: [10]

Class	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55
Frequency	8	15	39	47	52	41	28	16	4

2. An incomplete distribution is given below: [10]

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	10	20	?	40	?	25	15

the median is 35, and the total frequency is 170. Find the missing frequencies.

3. (a) The mileage (in thousands of miles) obtained by car owners using a certain type of tire is represented by a random variable with the following probability density function (PDF):(5 Marks) [10]

$$f(x) = \frac{1}{20}e^{-x/20}, \text{ for } x > 0$$

$$= 0, \text{ for } x \leq 0$$

Find the probabilities that one of these tyres will-last

- (i) at most 10,000 miles.(1 Mark)
- (ii) anywhere from 16,000 to 24,000 miles.(2 Marks)
- (iii) at least 30,000 miles.(1 Mark)

- (b) The joint density function of random variables  $X$  and  $Y$  is given by:

$$f(x, y) = \begin{cases} e^{-x-y} & ; x \geq 0, y \geq 0 \\ 0 & ; \text{elsewhere} \end{cases}$$

find  $P(X > 1)$ ,  $E(X)$ ,  $E(Y)$ ,  $E(XY)$ ,  $E(X + Y)$  Check whether  $X$  and  $Y$  are independent or not? (5 Marks)



4. The applications for a post were interviewed by the personnel manager and the training manager.  $H$  was placed first by the personnel manager followed by  $F, D, B, I, C, J, G, A$  and  $E$  in that order. The training manager placed  $F$  first followed by  $D, H, I, C, B, A, J, E$  and  $G$  in that order. Calculate the value of Spearman's rank correlation coefficient. Interpret the value obtained. [10]
5. A security check at an airport has two express lines. Let  $X$  and  $Y$  denote the number of customers in the first and second line at any given time. The joint probability function of  $X$  and  $Y$  is summarized by the following table [10]

$X \backslash Y$	0	1	2	3
0	0.1	0.2	0	0
1	0.2	0.25	0.05	0
2	0	0.05	0.05	0.025
3	0	0	0.025	0.05

- (i) Find the marginal function of  $X$  and  $Y$ . (2 Marks)
- (ii) Find the probability that more than two customers are in line. (2 Marks)
- (iii) Find  $P(|x - y| = 1)$ . (5 Marks)
- (iv) Check whether  $X$  and  $Y$  independent? (1 Mark)