Reg. No.: 21BPS1364

Name : Mubin Chinchwadkar

VIT

Vellore Institute of Technology

Continuous Assessment Test (CAT)- I– May 2023

Programme	:	B.Tech.	Semester	:	Fall Inter Semester Year III 2022-2023
Course Title	:	Probability and Statistics	Code	:	BMAT202L
			Slot	:	A2+TA2
Faculty	:	Dr.Sethukumarasamy K, Dr.Durga Nagarajan, Dr. Ashis Bera, Dr. Pulak Konar, Dr. Biswajit Mallick, Dr. Surath Ghosh, Dr. Mohit Kumar, Dr. Tharasi Dilleswar Rao, Dr. Prasannalakshmi, Dr. P Durgaprasad, Dr. Parthiban V, Dr. Jaganathan B, Dr. Dhivya P, Dr.Uma Maheswari S	Class Number	:	CH2022232500568, 569,570, 586, 571, 572, 573, 574, 575, 576, 577, 460, 578, 461
Duration	:	1 ½ Hours	Max. Marks	:	50

Answer all the Questions (50 marks)

Q. No.	Question Description	Marks

1. (i) Find the mean, median and mode of the following data:

Class Interval	410-419	420-429	430-439	440-449	450-459	460-469	470-479
Frequency	14	20	42	54	45	18	7

[7+3]

(ii) Find the missing frequency from the following distribution of daily sales of shops, given that the median sale of shops is Rs. 2400.

Sales (in hundred rupees)	0-10	10-20	20-30	30-40	40-50
No. of shops	5	25	?	8	7

2. (i) From the following data, find out which of the two teams (T_1 or T_2) has more variation.

Points	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Team T_1	9	17	32	33	40	10	9
Team T_2	10	20	30	25	43	15	7

[6+4]

(ii) Find the quartiles Q_1 and Q_3 for the following data:

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	3	8	20	12	7

3. The joint probability density function of the random variable X and Y is

$$f(x, y) = \begin{cases} k(3x + y) & 1 \le x \le 3, 0 \le y \le 2 \\ 0 & otherwise \end{cases}$$

[10]

(1) Find the value of k.
(2) P (X + Y < 2)
(3) Find the marginal distribution of X.

4. (i) The time required, in hours, to repair a car at a garage is a continuous random variable X with the density function

$$f(x) = \begin{cases} c(4x - x^2); & 0 < x \le 4 \\ 0; & \text{Otherwise} \end{cases}$$

[6+4]

a) Find the value of the constant c.

b) Find the probability that for a car which arrives now at the garage, the amount of time needed to get repaired will be

(a) at least one but less than three hours;
(b) more than two hours

(ii) A random variable X may assume four values with probabilities $\frac{1+3x}{4}, \frac{1-x}{4}, \frac{1+2x}{4}$ and $\frac{1-4x}{4}$. Determine the range of x so that these values represent the probability function of X.

5. (i) A computer, while calculating the correlation coefficient between the variables X and Y, obtained the following results: $N = 36, \sum X = 125, \sum X^2 = 620, \sum Y = 90, \sum Y^2 = 250$ and $\sum XY = 345$. It was, however, later discovered at the time of checking that it had copied down two pairs of observations $(9, 10)$ and $(13, 7)$ in place of the observations $(8, 12)$ and$(10, 9)$. Obtain the correct value of the correlation coefficient between X and Y. [5+5]

(ii) The ranks of same 15 students in Statistics and Bioinformatics are as follows: Calculate the rank correlation coefficient for efficiency in Statistics and Bioinformatics:

Statistics(x)	10	21	23	14	5	6	7	18	29	10	11	22	13	24	15
Bioinformatics (y)	1	10	31	4	5	7	2	6	28	11	15	9	14	12	16

⇔⇔⇔