Reg. Number:

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

CHENNAI

Continuous Assessment Test (CAT) - I – February 2024

Programme	:	B.Tech.	Semester	:	Winter 2023-2024
Course Code & Course Title	:	BMAT202L & Probability and Statistics	Slot	:	F1+TF1
Faculty	:	Dr. Vanchinathan P Dr. Balamurugan B J Dr. Lakshmanan S Dr. Revathi G K Dr. Durga Nagarajan Dr. Padmaja N Ms. Sakthidevi K	Class Number	:	CH2023240500841 CH2023240500842 CH2023240500843 CH2023240500844 CH2023240500845 CH2023240500846 CH2023240500847
Duration	:	90 Mins	Max. Marks	:	50 Marks

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted

Answer all the Questions

Q.No.	Sub Sec.	Description	Marks
1		Consider the following data: The first quartile is given as 21.5. i) Find the missing frequencies (5 marks) ii) Find the mode (5 marks)	10
2	A	The following is the distribution of marks of 80 students in a class. Find the coefficient of variation.	6
2	B	Calculate mean deviation about median for the following data:	4
3	A	A random variable X has the density function $f(x) = \frac{C}{x^2+1}$, $-\infty < x < \infty$ i) Find the constant C (2 marks) ii) Find $P(\frac{1}{\sqrt{3}} \leq X < 1)$ and $P(1 < X \leq \sqrt{3})$ (3 marks) iii) Find the cumulative distribution function of X. (2 marks)	7

Class	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	Total
Frequency	24	–	90	112	–	56	20	33	460

Marks below	50	40	30	20	10
No of Students	80	65	46	25	12

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	6	7	15	16	4	2

3 B When a fair coin is tossed three times, let X denote the number of times it showed up heads

Out comes	HHH	HHT	HTH	THH	THT	TTH	HTT	TTT
Values of X	3	2	2	2	1	1	1	0

3

i) Construct the probability distribution of X. (2 marks)
ii) Find $P(X > 2)$. (1 mark)

4 A The random variable X and Y has the joint density function

$$f(x,y) = \begin{cases} K(2x+y), & 2 < x < 6, \quad 0 < y < 5 \\ 0, & otherwise \end{cases}$$

7 5

i) Find the constant K and the marginal density function $f_Y(y)$. (5 marks)
ii) Find $P(3 < X < 4,\ Y > 2)$. (2 marks)

4 B The joint density function of two random variables X, Y as follows:

$$f(x,y) = \begin{cases} \dfrac{x(1+3y^2)}{4}, & 0 < x < 2, \quad 0 < y < 1 \\ 0, & otherwise \end{cases}.$$

3 0

Find the conditional density function $f(x|y)$ and the conditional probability $P\left(\frac{1}{4} < X < \frac{1}{2} \mid y = 3\right)$.

5 A Let X and Y be two independent random variables. If $Var(2X - Y) = 6$ and $Var(X + 2Y) = 9$, find

5 0

i) $Var(X)$ and $Var(Y)$ (4 marks)
ii) $Var(X + Y)$ (1 mark)

5 B Let X and Y be discrete random variables with probability function $f(x,y) = \frac{x+y}{21}$,

5 0

$x = 1, 2, 3;\ \ y = 1, 2$. Find the Covariance of X and Y.

**********All the best **********