Continuous Assessment Test (CAT) – I - August 2024

Programme	:	MCA			
			Semester	:	Fall 24-25
Course Code & Course Title	:	PMAT501L & Probability and Statistics	Class Number	:	CH2024250103122
Faculty	:	Dr. G.K. Revathi Anbalagan	Slot	:	E1+TE1
Duration	:	90 Minutes	Max. Mark		50

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 questions

Q. No	Sub Sec.	Description	Marks
1.	a	Given that $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$ & $P(A \cap B) = \frac{1}{6}$. Find (i) $P(\bar{A})$ (1Mark) (ii) $P(\bar{A} \cup B)$ (1.5 Marks) (iii) $P(A/B)$ (1 Mark) (iv) $P(\bar{A} \cup \bar{B})$ (1.5 Marks)	5
	b	A and B throw a pair of dice alternately. A wins the game, if he gets a total of 7 and B wins the game, if he gets a total of 10. If A starts the game, then find the probability that B wins.	5
2.	a	A certain firm has plant A,B and C producing IC chips. Plant A produces twice the output from B and B produces twice the output from C. The probability of a non – defective product produced by A, B and c are respectively 0.85, 0.75 and 0.95. A customer receives a defective product. Find the probability that it came from plant B.	7
	b	A is known to hit the target in 2 out of 5 shots. B is known to hit the target in 3 out of 4 shots. Find the probability of the target being hit when both try?	3
3.		Consider the following joint probability mass function of the random variable (X, Y) where X takes the values 0, 1 and 2 and Y takes the values 0,1,2 and 3.	10

X↓ Y→	0	1	2	3
0	0.840	0.030	0.020	0.01
1	0.06	0.01	0.008	0.002
2	0.01	0.005	0.004	0.001

Find
(i) Marginal distribution functions of X and Y respectively. (2 Marks)

(ii)   The probability distribution of (X+Y) (2 Mark)
(iii) $P(X/Y = 2)$ (1 Mark)
(iv) $P(X + Y > 2)$ (2 Marks)
(v) $P(X \leq 2/Y \leq 1)$ (2 Marks)
Also, check the independency of X and Y (1 Mark)

4.	a	The diameter of an electric cable say X is assumed to be a continuous random variable with pdf $6x(1 - x), 0 \leq x \leq 1$. (i) Check that the above is p.d.f (1.5 Marks) (ii) Find the distribution function of X (1.5 Marks) → (iii) Find $P(X \leq 1/2/1/3 < X < 2/3)$ (2 Marks)	5
	b	A bag contains 3 red and 4 white balls. Find the probability distribution of the number of red balls in 3 draws with replacements.	5
5.		Two random variables X and Y have the following joint probability density function $f(x, y) = \begin{cases} 2 - x - y & 0 \leq x \leq 1 \ \& \ 0 \leq y \leq 1 \\ 0 & otherwise \end{cases}$. Find (i) $E(X)$ and $E(Y)$ (5 marks) (ii) Covariance of X and Y (3 Marks) Also, check the independency of the random variables X and Y by using the properties of mathematical expectations. (2 Marks)	10

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