VIT

Vellore Institute of Technology

School of Advanced Sciences

Fall Semester 2024-2025

Continuous Assessment Test – I

Programme Name & Branch: B.Tech

Slot: B1+TB1

Course Name & code: Probability and Statistics [MAT1017]

Class Number (s): VL2024250106382 & 6384

Faculty Name (s): Dr. Rajendran P & Dr. Rajesh Moharana

Exam Duration: 90 Min. **Maximum Marks: 50**

General instruction(s): (i) Answer all questions.

(ii) Allow use of non-programmable calculator.

Q.No.	Question	Max Marks
1.	(i) Box A contains 5 red and 3 white marbles, and box B contains 2 red and 6 white marbles. If a marble is drawn from each box, what is the probability that they are both of the same colour? [5Marks] (ii) A speaks truth 60% of the time and B speaks truth 70% of the time. Find the probability that they will say the same thing while describing a single event. [5Marks]	10
2.	The probabilities of X, Y and Z becoming managers are $\frac{4}{9}, \frac{2}{9}$ and $\frac{1}{3}$, respectively. The probabilities that the Bonus Scheme will be introduced if X, Y and Z become managers are $\frac{3}{10}, \frac{1}{2}$ and $\frac{4}{5}$, respectively. (i) What is the probability that Bonus Scheme will be introduced? (ii) If the Bonus Scheme has been introduced, what is the probability that the manager appointed was X?	10
3.	A random variable X has the following probability distribution function: x: 1 2 3 4 5 6 7 $f(x)$: k $2k$ $2k$ $3k$ k^2 $2k^2$ $7k^2+k$ Find the value of "k". Using this value of "k", find its mean ($E(X)$). Determine the cumulative distribution function of X.	10

4.	A petrol pump is supplied with petrol once a day. If its daily volume of sales (X) in thousands of litres is distributed by $$f(x) = 5(1-x)^4, 0 \leq x \leq 1.$$ Check that $f(x)$ is a probability density function of X. What must be the capacity of its tank in order that the probability that its supply will be exhausted in a given day shall be 0.01?	10
5.	(i) The probability of a man hitting a target is $\frac{1}{2}$. How many times must he fire so that the probability of hitting the target at least once is more than 90%? [5Marks] (ii) A car-hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which neither car is used and the proportion of days on which some demand is refused. [5Marks]	10

*** All The Best ***