

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: <table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>f(x)</td><td>k</td><td>2k</td><td>2k</td><td>3k</td><td>k²</td><td>2k²</td><td>7k² + k</td></tr></table> Find the value of "k". Using this value of "k", find its mean (E(X)). Determine the cumulative distribution function of X.	x	1	2	3	4	5	6	7	f(x)	k	2k	2k	3k	k ²	2k ²	7k ² + k	10
x	1	2	3	4	5	6	7											
f(x)	k	2k	2k	3k	k ²	2k ²	7k ² + k											

4.

10

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?

5.

10

(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]