

**VIT**Vellore Institute of Technology
(Decemed to be University under section 3 of UGC Act 1956)

Slot: E1+TE1

SCHOOL OF ADVANCED SCIENCES**Department of Mathematics**

Fall Semester 2023-2024

Continuous Assessment Test – I

Programme Name & Branch: B. Tech

Course Name & code: Probability and Statistics (MAT1017)

Exam Duration: 90 Min.

Maximum Marks: 50

Answer All the Questions (5X10=50)

1. (a) In a certain town, 40% have brown hair, 25% have brown eyes, and 15% have both brown hair and brown eyes. A person is selected at random from the town.
 - i. If he has brown hair, what is the probability that he has brown eyes also?
 - ii. If he has brown eyes, determine the probability that he does not have brown hair?(b) A and B throw alternatively with a pair of ordinary dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is $30/61$.
2. Box I contains 1 white, 2 red, 3 green balls, Box II contains 2 white, 3 red, 1 green balls, Box III contains 3 white, 1 red, 2 green balls. Two balls are drawn from a box chosen at random. These are found to be one white and one red. Determine the probability that the balls so drawn come from Box II.
3. For the following probability distribution,

x	-3	-2	-1	0	1	2	3
p(x)	0.001	0.01	0.1	?	0.1	0.01	0.001

Find (a) the missing probability (b) Mean (c) Variance (d) $E(X^2 + 2X + 3)$.

4. For the following density function $f(x) = ae^{-|x|}$, $-\infty < x < \infty$, find (i) the value of 'a', (ii) variance.
5. Let 'X' be a random variable with p.d.f

$$f(x) = \begin{cases} \frac{1}{3}e^{-\frac{x}{3}} & x > 0 \\ 0, & \text{Otherwise} \end{cases}$$

Find (a) $P(X > 3)$ (b) MGF of 'X' (c) $E(X)$ and $\text{Var}(X)$