III/V (B.Tech.)

Er. No...2018354

Academic Year: 2022-23

Jaypee University of Engineering & Technology, Guna

T-1 (Odd Semester 2022)

18B11MA511- Probability Theory and Random Processes

Maximum duration: 1 Hour

Maximum Marks: 15

Notes:

1. This question paper has three questions.
2. Write relevant answers only.
3. Do not write anything on question paper (Except your Er. no.)
4. Freehand sketch of graph or diagram to be made if asked for.

Marks

Q1. State the following with suitable diagram: **[05]**

(a) Mutually exclusive events and independent events

(b) Bayes Theorem

(c) De Morgan's first law

(d) Total Probability

Q2. In a certain city, 40% of people consider themselves conservatives (C), 35% consider themselves to be liberals (L), and 25% consider themselves to be independent (I). During a particular election, 45% of the conservatives voted, 40% of the liberals voted and 60% of the independents voted. Suppose that a person is randomly selected. **[05]**

(a) Construct the venn diagram of the problem and find the probability that the person voted

(b) If the person voted, find the probability that the voter is (i) Conservative, (ii) Liberal, (iii) Independent.

Q3. The distribution of the amount of gravel (in tons) sold by a particular construction supply company in a given week is a continuous random variable X with probability density function (pdf). **[05]**

$$f(x) = \begin{cases} \frac{3}{2}(1-x^2), & 0 \le x \le 1 \\ 0, & \text{Otherwise} \end{cases}$$

Find the following:

(a) Graph of probability density function (pdf)

(b) Cumulative distribution function (cdf) and its graph

(c) Probability $P(0.25 \le x \le 0.75)$

(d) Expected weekly gravel sales and variance of weekly sales.