POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.

Name _____ _____ **Enrollment No.**_____ _____

Jaypee Institute of Information Technology, Noida

Test-1 Examination, Even Sem 2024

B.Tech IVth Semester

Course Title: Probability and Random Process **Maximum Time : 01 Hour**

Course Code: 15B11MA301 **Maximum Marks : 20**

CO1	Recall the concept of probability theory and probability distribution.
CO2	Explain random variables, probability distribution and reliability models.
CO3	Solve the problems concerning random variables, their distributions, reliability models and random process.
CO4	Examine random process models and solve the related problems.

Note: Attempt all questions.

Q1. (i) If A, B and C are three events such that $P(A) = 0.6, P(B) = 0.4, P(C) = 0.5$, $P(A \cup B) = 0.8, P(A \cap C) = 0.3, P(A \cap B \cap C) = 0.2$ and $P(A \cup B \cup C) \geq 0.85$, then find the range of $P(B \cap C)$.

(ii) Two persons A and B, who are playing a game in which each of them is asked to select a number from 1 to 50. If the two numbers match, both of them win the prize in a single trial. Find the probability that they will not win a prize in a single trial. **[CO1, Remembering, 4M]**

Q2. A person goes to his office by three means, i.e. metro, taxi and his own car. The chances of using metro, taxi and own car by him are in the ratio 2 : 3 : 5, respectively. It is observed that he is late 5% of time when he goes by metro, 7% of time when he uses taxi and 3% of time when he drives his own car for reaching office. Find the probability that (i) he took the taxi if he was late, (ii) he came by metro if he was on time. **[CO1, Remembering, 4M]**

Q3. Let X be random variable with probability density function is given by

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ C(x-1)^2, & 1 \leq x \leq 2 \\ 0, & otherwise. \end{cases}$$ **[CO3, Applying, 4M]**

Make use of concept of continuous random variable to find the following:

(i) value of C, (ii) Cumulative distribution function of X, (iii) mean of X, (iv) variance of X.

Q4. Find the moment generating function of the random variable X with probability density function is given by $f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2-x, & 1 \leq x \leq 2 \\ 0, & otherwise \end{cases}$, and hence, compare the value of first and second moment about the mean. **[CO2, Understanding, 4M]**

Q5. Three coins are tossed, where X is the number of heads on the first two coins and Y is the number of heads on the last two coins. Make use of bivariate discrete random variable, find the following: (i) marginal distribution of X and Y. (ii) correlation coefficients of X and Y. **[CO3, Applying, 4M]**