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MID TERM EXAMINATIONS – March 2025

Programme	: B.Tech.	Semester	: Winter Semester 2024-25
Course Title/ Course Code	: Probability, Statistics and Reliability/ MAT3003	Slot	: A11+A12+A13
Date	: 03 March 2025, Session I		
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks

1 An MBA applies for a job in two firms X and Y. The probability of his being selected in firm X is 0.7 and being rejected in firm Y is 0.5. The probability of at least one of his applications being rejected is 0.6. What is the probability that he will be selected in one of the firms?   **10**

2 In a bolt factory, machines A, B and C manufacture respectively 25%, 35% and 40% of the total. Out of their output 5%, 4%, and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C?   **10**

3 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   **10**

   i.   neither car is used, and
   ii.   some demand is refused.

4 The diameter of an electric cable, say X, is assumed to be a continuous random variable with probability density function:
$$f(x) = 6x(1-x), \ 0 \le x \le 1.$$
   10

   i.   Check that $f(x)$ is a probability density function, and

   ii.   Determine a number b such that $P(X < b) = P(X > b)$.

5 Three fair coins are tossed. Let X denote the number of heads on the first two coins, and Y denotes the number of tails on the last two coins. Find   **10**

   i.   the joint distributions of X and Y.
   ii.   the conditional distribution of Y given X = 1.
   iii.   the coefficient of correlation.

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