JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B.Tech.-III Semester (CSE/IT Backlog)

COURSE CODE (CREDITS):18B11MA313 (3) MAX. MARKS: 15

COURSE NAME: PROBABILITY AND STATISTICS

COURSE INSTRUCTOR: SST MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

(c) Use of a scientific calculator is allowed.

Q. No.	Question	CO	Marks
Q1	In a dataset of 1000 computer network connections, 200 connections are from mobile devices, 300 use encrypted communication, and 80 are both from mobile devices and encrypted. Let M denote the event that a connection is from a mobile device and E denote the event that it uses encryption. **a)** Find the probability that a connection uses encryption given that it is from a mobile device. **b)** Determine whether M and E are independent events. **c)** Find the probability that a connection is from a mobile device or uses encryption.	**1**	**3**
Q2	An online platform uses two machine-learning models to detect fraudulent transactions. Model M1 processes 70% of the transactions and flags a transaction as fraudulent with probability 0.04. Model M2 processes 30% of the transactions and flags a transaction as fraudulent with probability 0.08. A transaction is randomly selected. **a)** Find the probability that the transaction is flagged as fraudulent. **b)** Given that a transaction is flagged as fraudulent, find the probability that it was processed by M2.	**1**	**3**
Q3	Let X denote the number of errors detected in a computer program after testing. The probability mass function of X is:	**2**	**3**

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	$$p_X(x) = \begin{cases} 0.20, x = 0 \\ 0.35, x = 1 \\ 0.25, x = 2 \\ 0.15, x = 3 \\ 0.05, x = 4 \\ 0, otherwise \end{cases}$$ **a)** Construct the cumulative distribution function. **b)** Find $P(X \leq 2)$ and $P(X > 2)$.		
Q4	The processing time X, in milliseconds, of a particular computer algorithm is modeled by the probability density function: $$f_X(x) = \begin{cases} \frac{x}{8}, 0 \leq x \leq 4 \\ 0, else \end{cases}$$ **a)** Find the mathematical expectation $E(X)$. **b)** Find the variance $Var(X)$.	**2**	**3**
Q5	The total number of hours, measured in units of 100 hours, that a family runs a vacuum cleaner over a period of one year is a continuous random variable X that has the density function: $$f_X(x) = \begin{cases} x, & 0 \leq x < 1 \\ 2 - x, & 1 \leq x < 2 \\ 0, & elsewhere \end{cases}$$ Find the probability that over a period of one year, a family runs their vacuum cleaner **a)** less than 120 hours; **b)** between 50 and 100 hours.	**2**	**3**

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