JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B. Tech.-III Semester (ECE/ECS/EEVLSI/MC)

COURSE CODE (CREDITS): 25B11MA311 (4) MAX. MARKS: 15

COURSE NAME: PROBABILITY AND RANDOM PROCESSES

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	A digital communication system transmits a 4-bit binary word. Each bit can be either 0 or 1. **a)** How many different 4-bit words can be transmitted? **b)** Find the probability that a randomly selected 4-bit word contains exactly two 1s. **c)** Find the probability that the word contains at least one 1.	**1**	**3**
Q2	A circuit contains two electronic components A and B. The probability that A fails is 0.10, while the probability that B fails is 0.20. Assume that the failures are independent. **a)** Find the probability that both components fail. **b)** Find the probability that at least one component fails. **c)** Find the probability that A fails given that B has failed.	**1**	**3**
Q3	An electronic fire-monitoring system uses two types of sensors: Sensor A: installed in 60% of the monitored rooms; it detects a fire correctly with probability 0.95. Sensor B: installed in 40% of the rooms; it detects a fire correctly with probability 0.90. Suppose the probability that an actual fire occurs in a randomly selected room is 0.02. When there is no fire, the probability that Sensor A gives a false alarm is 0.03, while for Sensor B it is 0.05. **a)** Find the probability that a randomly selected room produces an alarm. **b)** Find the probability that there is actually a fire given that an alarm has been generated by Sensor A.	**1**	**3**
Q4	The actual tracking weight of a stereo cartridge that is set to track at 3 g on a particular changer can be regarded as a continuous random variable X with probability density function:	**2**	**3**

	$f_X(x) = \begin{cases} k[1-(x-3)^2], 2 < x < 4 \\ 0, otherwise \end{cases}$ **a)** Find the value of k. **b)** What is the probability that the actual tracking weight is greater than the prescribed weight?		
Q5	The probability distribution of X, the number of imperfections per 10 meters of a synthetic fabric in continuous rolls of uniform width, is given as: x: 0, 1, 2, 3, 4 $f(x)$: 0.41, 0.37, 0.16, 0.05, 0.01 **a)** Find the expected number of imperfections per 10 meters of this fabric. **b)** Find the standard deviation of the imperfections per 10 meters of this fabric.	**2**	**3**

UIT TEST-1 EXAMINATION- AUG 2026