JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

B. Tech. III Semester (BT/BI)

COURSE CODE (CREDITS): 25B11MA313 (4) MAX. MARKS: 15

COURSE NAME: PROBABILITY AND STATISTICAL TECHNIQUES

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	The following data represent the DNA concentration (ng/μL) measured from 15 biological samples: 42, 45, 47, 49, 50, 52, 54, 55, 57, 59, 61, 63, 65, 68, 110 For this dataset, the quartiles are given as: Q1 = 49 ng/μL, Q2= 55 ng/μL, Q3 = 63 ng/μL. **a)** Calculate the IQR. **b)** Identify the lower and upper fences. **c)** Draw a box plot for the DNA concentration data, clearly indicating the outlier.	**1**	**3**
Q2	In a bioinformatics study, researchers analyze 100 patients to investigate the relationship between a specific gene mutation (M) and response to a drug (R). The results are: 35 patients have the mutation. 40 patients respond to the drug. 18 patients have both the mutation and a positive drug response. **a)** Find the probability that a randomly selected patient either has the mutation or responds to the drug. **b)** Determine whether the events "having the mutation" and "responding to the drug" are independent. **c)** If the two events were independent, how many patients would you expect to have both the mutation and a positive drug response?	**2**	**3**
Q3	A biotechnology laboratory receives blood samples from two sources: Lab A supplies 60% of the samples, with a contamination rate of 2%. Lab B supplies 40% of the samples, with a contamination rate of 5%. A randomly selected sample is tested for contamination. **a)** Find the probability that a randomly selected sample is contaminated. **b)** Given that a sample is found to be contaminated, find the probability that it came from Lab B.	**2**	**3**

JUIT EXAMINATION AUG-2026

Q4	The error involved in making a certain measurement is a continuous random variable X with probability density function: $$f_X(x) = \begin{cases} 0.9375(4-x^2), -2 \le x \le 2 \\ 0, otherwise \end{cases}$$ **a)** Compute $P(X > 0)$ **b)** Compute $P(-1 < X < 1)$	**2**	**3**
Q5	An appliance dealer sells three different models of upright freezers having 13, 16, and 19 cubic feet of storage space, respectively. Let X= amount of storage space purchased by the next customer to buy a freezer. Suppose that X has probability mass function: $$p_X(x) = \begin{cases} 0.2, x = 13 \\ 0.5, x = 16 \\ 0.3, x = 19 \\ 0, else \end{cases}$$ **a)** Compute $E(X)$ **b)** Compute $V(X)$ **c)** If the price of a freezer having capacity X cubic feet is $25X - 8.5$, what is the expected price paid by the next customer to buy a freezer?	**2**	**3**

UNIT TEST-1 EXAMINATION- AUG-2016