2/09/2026 9:30 AM

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2026

M.Sc. I Semester (Microbiology/Biotechnology)

COURSE CODE (CREDITS): 20MS1MA111 MAX. MARKS: 15

COURSE NAME: BASICS OF MATHEMATICS AND STATISTICS

COURSE INSTRUCTOR: RKB* 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 calculator is not allowed

Q.No	Question	CO	Marks
Q1	In a biological test, a sample contains two hormones A and B. Hormone A produces 3 units of response per mg/L. Hormone B produces 5 units of response per mg/L. The total concentration of both hormones is 8 mg/L. A second experimental measurement, in which their effects are weighted differently, gives a total response of 32 units. Determine the concentrations of two hormones.	CO-1	2
Q2	In a population growth study, the relationship between the concentration x of a nutrient (in mg/L) and a particular biological response is modeled by $12x^2 - 5x - 2 = 0$. The values of x for which the biological response reaches a critical level are obtained by solving this equation. Determine the possible nutrient concentrations x (in mg/L).	CO-1	3
Q3	A laboratory culture contains three nutrients-Nitrogen (N), Phosphorus (P), and Potassium (K). Let • x = amount of Nitrogen (mg) • y = amount of Phosphorus (mg) • z = amount of Potassium (mg) Based on three independent measurements of the nutrient mixture, the following relationships are obtained: $x + y + z = 4; 2x - y + z = 1; 3x + y - z = 4.$ Determining the quantities of three nutrients in a biological culture.	CO-1	4
Q4	In a study of enzyme activity, the growth response of a bacterial culture is given by polynomial $p(x) = x^4 + x^3 - 2x^2 - x + 1$; where x represents the concentration of a particular nutrient (in suitable units), and $p(x) = 0$ represents the nutrient concentrations at which the net growth response becomes zero. Determine the biologically meaningful values of x.	CO-2	3
Q5	A tree casts a horizontal shadow $8\sqrt{3}$ long. If a line were to be drawn from the end of the shadow to the top of the tree it would be inclined to the horizontal at 60 degrees. Calculate the height of the tree.	CO-2	3

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