

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -I EXAMINATION- 2026

B.Tech-I Semester (BT/BI)

COURSE CODE (CREDITS): 25B11MA112 (4)

MAX. MARKS: 15

COURSE NAME: Mathematics for Life Sciences-I

COURSE INSTRUCTOR: P K Pandey

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 simplified interaction model for three biological signals, reciprocal effects are idealized as equal in magnitude and opposite in sign and represented by $A = \begin{bmatrix} 0 & 4 & -2 \\ -4 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$ Compute $A + A^T$ and $ A $.	1	3
Q2	Two linear calibration corrections for a glucose-lactate biosensor are represented by $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$, and $B = \begin{bmatrix} 1 & 0 \\ 4 & 1 \end{bmatrix}$ Compute AB and BA . Does $AB = BA$?	1	3
Q3	In a simplified gene-expression data matrix, the rows represent three genes and the columns represent three samples $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 1 & 1 \\ 2 & 1 & 3 \end{bmatrix}$ Using row-echelon form, find $\text{rank}(A)$ and determine whether the three gene-expression profiles are linearly independent.	1	3
Q4	Three food sources F_1, F_2, F_3 are combined in servings x, y, z to prepare a nutritional blend containing 8 g protein, 12 g carbohydrate, and 7 g fat, giving the system $2x + y + z = 8, x + 3y + z = 12, x + y + 2z = 7.$ Using Cramer's rule, find x, y, z .	1	3
Q5	A simplified linearized two-variable biological response model is represented by $A = \begin{bmatrix} 2 & 2 \\ 0.5 & 2 \end{bmatrix}$ Find the eigenvalues and corresponding eigenvectors of A .	1	3
