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MAULANA AZAD NATIONAL INSTITUTE OF TECHNOLOGY BHOPAL

Department of Mathematics Bioinformatics and Computer Applications

Mid Term Examination (April 01, 2025)

Course: B. Tech. **Semester: II** **Branch: All**

Subject: Mathematics-II **Subject Code: MTH-24110**

Max. Marks: 20 **Max Time: 60 Minutes**

Note: Attempt all the questions. Usual notations are used.

1.	Find all the eigen values and eigen vectors of the matrix $$A = \begin{bmatrix} 4 & 1 & -1 \\ 1 & 3 & 1 \\ 1 & 0 & 4 \end{bmatrix}$$ Using Cayley-Hamilton theorem, express A^{-1} as a function of A.	6
2.	Solve the following system of linear equations using LU decomposition: $$2x + 3y - 2z = 10$$ $$5x + 3y - 3z = 14$$ $$4x - 5y + z = -7$$	4
3.	(a). Find the Laplace transformation of the function: $f(t) = te^{-t}\sin 2t$	2
	(b). Find the inverse Laplace of $\frac{3s}{(s^2+1)^2}$ by using convolution theorem.	3
4.	Solve the following differential equation using Laplace and inverse Laplace transformation: $$y'' - 6y' + 15y = 2\sin 3t\,; \quad y(0) = -1 \text{ and } y'(0) = -4$$	5

**********End **********