



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Final Examination, Fall-2025

Course Code: MAT 102, Course Title: Mathematics II

Level: 01 Term: 02 Batch: 69

Time: 2 Hours

Marks: 40

Answer All Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Given $R = \begin{bmatrix} 3 & -2 & 4 & -1 & 8 \\ 2 & 1 & -3 & 2 & 0 \\ 5 & 0 & 7 & -5 & 9 \\ -4 & -2 & 6 & 4 & 0 \end{bmatrix}$	[3+1]	CO2
	b)	Given $N = \begin{bmatrix} 0.5 & 0 & -1 \\ -2 & 1 & 0 \\ 0 & 1 & 4 \end{bmatrix}$ i. Construct N^{-1} (Using Adjoint Matrix). ii. Organize the matrix N^{-1} as the sum of symmetric and skew-symmetric matrix, also justify your answer.	[4+4]	
2.		$\begin{aligned} 2y - 2z - t + x &= 0 \\ 2x + 5y - 3z - t &= 1 \\ 8y + 3x - 4z - t &= 2 \\ x + 5y + z + 2t &= 3 \end{aligned}$ i. Examine the solution type of the given system of linear equations. ii. If there exist any solutions, then discover the solutions.	[4+4]	CO3
3.		Given, $Q = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 2 & -1 \\ -1 & 1 & 4 \end{bmatrix}$ i. List out the eigenvalues of $(Q^{-2})^T$. ii. Inspect the spectrum of Q^{-9} and the trace of $(Q^T)^9$.	[5+3]	
4.	a)	Apply Row Echelon technique to test the linear dependency of the vectors $(1, 3, 5, 0)$, $(-2, 5, 0, 6)$, $(0, 1, 0, 2)$ and $(3, 0, 7, 9)$ in $\mathbb{R}^4$.	[5]	CO4
	b)	$A(a, b, c) = (2a - b + 3c, a - b + c, -a - b - c)$ $B(a, b, c, d) = (2a - b + 3c - d, -a - b - c, a)$ $C(a, b, c) = (2ac - b, ab + c, -a - bc)$ i. Identify the Linear Transformation from the above Transformations. ii. Construct AoB and BoA.	[3+4]	CO4