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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Spring 2026
Course Code: MAT102, Course Title: Mathematics II
Level: 1 Term: 2 Batch: 70

Time: 02:00 Hrs . **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 $M=\begin{bmatrix}2 & 4 & -1\\ 1 & 3 & 5\\ 7 & 0 & 6\end{bmatrix}$ and $Q=\begin{bmatrix}2 & 0.5 & -1\\ 1.5 & 1 & 2\\ -1 & 4 & -2.5\end{bmatrix}$ I. Identify M as a sum of symmetric and skew- symmetric matrix. II. Solve Q^{-1}	[3+5]	CO2
	b)	Construct RREF, and the Rank of $N=\begin{pmatrix}1.5 & -2 & 1 & -1\\ 2 & 2 & 2 & 1\\ 0.5 & -2 & -3 & 2\\ -0.5 & 1 & 2 & 1\end{pmatrix}$	[5]	
2.		$x_1+2x_2-2x_3-x_4=0.5$ $2x_1+5x_2-3x_3-x_4=1.5$ $3x_1+8x_2-4x_3+x_4=3.5$ $x_1-x_2+2x_3-3x_4=2.5$ Discover the conditions for the existence of infinitely many solutions, and no solution of a system of linear equations and examine the system.	[2+5]	CO3
3.		Given, $R=\begin{bmatrix}4 & 2 & 0\\ 1 & 3 & 0\\ 0 & 0 & 5\end{bmatrix}$ I. List out of eigenvalues of R and RR^{-1} **II.** Classify R, inspect spectrum of R and trace of R^{-7}	[5+3]	CO3
4.	***a)***	Assess linear dependency of S where, $S=\{(2,1,3,-1),(2,3,1,2),(3,2,5,6),(2,7,3,8)\}\subset R^4$. Evaluate LDR of S and verify it.	[4+1]	CO4
	b)	Given, $F(a,b,c)=(3a+2b-4c,-4a+3b+c,-5b-c-a,)$, $G(a,b,c,)=(-2b+a+5c,-c-2b-4a,c,)$, $H(a,b)=(a+2b,-a+3b,-a^2)$, $I(a,b,c)=(0,0,0,-2a-b-3c)$ i. Determine which are Linear Transformations ii. Estimate FoG	[4+3]	