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Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024
Course Code: MAT102; Course Title: Mathematics II
Sections: 42 (All)

Time: 1 Hour 30 Minutes **Marks: 25**

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.	**Explain** Identity, Permutation, Involuntary, Symmetric and Hermitian matrix with an example.	5×1=5	CLO-1 L-2
2.	**a. Analyze** the nature of the trace of a completely non-zero Skew-Hermitian matrix. **b. Analyze** the relation between the inverse of an orthogonal matrix with its transpose. **c. Analyze** the rank of the matrix $25I_{150}$.	3×1=3	CLO-2 L-4
3.	$A = \begin{pmatrix} 2 & 1 & 3 & 4 \\ 0 & 0 & 0 & 0 \\ 3 & 1 & 2 & 3 \\ 1 & 6 & 1 & 3 \\ 6 & 0 & 1 & 1 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 5 & -3 \\ 3 & 1 & 0 \\ 4 & 2 & 7 \end{pmatrix}$ **a. Compute** $\lvert B \rvert$ by using the cofactor method along 2nd column. **b. Construct** the inverse matrix of B, and verify it. **c. Determine** the rank of A.	2 3+1=4 4	CLO-3 L-3
	Answer question 4 and 5 based on the following: The following diagram describes the traffic flow of a congested area of a city on some day.		
4.	**Illustrate** the system of linear equations from the above scenario.	2	CLO-3 L-3
5.	**Figure out** the solution of the system for unknown flow rates.	5	CLO-4 L-4