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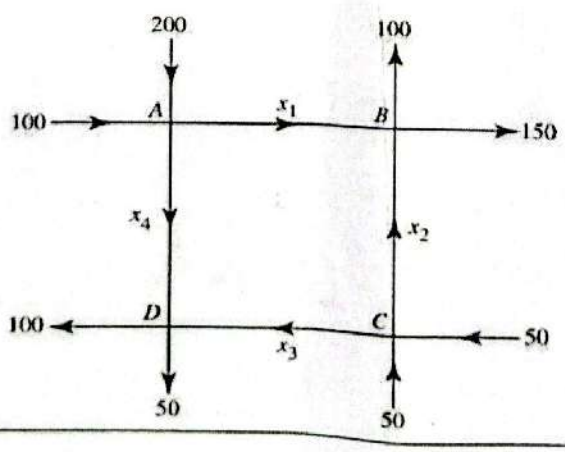
Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring 2025
Course Code: MAT102; Course Title: Mathematics II
Sections: 43 (A-Q), Teachers Initial: MMH, MSU, MIA, NA

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** Scaler, Involuntary, Orthogonal, Hermitian, and Nilpotent 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. Point out** a 5×4 matrix for which REF=RREF=NF. **c. Examine** the diagonal of $-2I_4 + \frac{1}{2}I_4$.	3×1=3	CLO-2 L-4
3.	$A = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 3 & 0 & 2 & 2 \\ 1 & -1 & 2 & 1 \\ 1 & 0 & 1 & 1 \end{pmatrix}$ $B = \begin{pmatrix} 0 & 4 & 2 \\ -3 & 8 & 3 \\ 4 & -8 & -2 \end{pmatrix}$ **a. Compute** the rank of A. **b. Construct** the inverse of B and verify it. **c. Determine** all the Eigen values and Eigen vectors of the matrix B.	 3 4 5	CLO-3 L-3
4.	The following diagram describes the traffic flow of a congested area of a city on some day. Construct the system of linear equations from this scenario. Then, **Identify** the solution of the system for the unknown flow rates.  	5	CLO-4 L-4