



Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology

Midterm Examination, Spring 2025

Course Code: MAT102; Course Title: Mathematics II

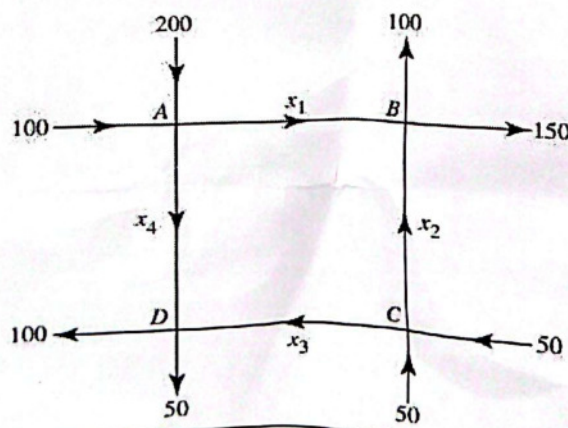
Sections: 43 (A-Q), Teachers Initial: MMH, MSU, MIA, NA

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 <u>Scalar</u> , Involuntary, Orthogonal, <u>Hermitian</u> , 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.	$A = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 3 & 0 & 2 & 2 \\ 1 & -1 & 2 & 1 \\ 1 & 0 & 1 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 0 & 4 & \frac{1}{2} \\ -3 & 8 & 3 \\ 4 & -8 & -2 \end{pmatrix}$ 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