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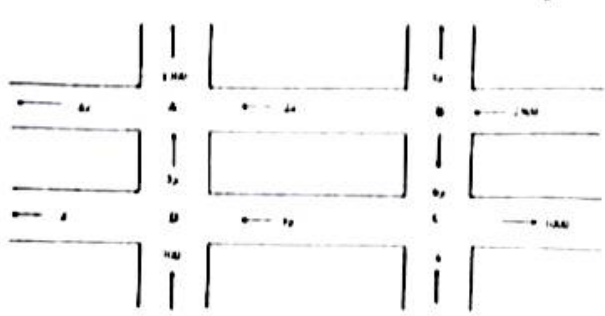### Course Code: MAT102; Course Title: Mathematics II
Sections: 42 (All)

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]

No.	Question	Marks	CLO
1.	Explain Identity, Permutation, Involuntary, Symmetric and Hermitian matrix with an example.	$5\times1=5$	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 $25I_{150}$.	$3\times1=3$	CLO-2 L-4
3.	$A = \begin{pmatrix} 2 & 1 & 3 & 4 \\ 0 & 0 & 0 & 0 \\ 3 & 1 & 2 & 3 \\ 1 & 6 & 1 & 3 \\ 6 & 0 & 1 & 1 \end{pmatrix}$ $\qquad$ $B = \begin{pmatrix} 1 & 5 & -3 \\ 3 & 1 & 0 \\ 4 & 2 & 7 \end{pmatrix}$ a. Compute $|B|$ 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