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Daffodil International University

Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination, Fall 2026
Course Code: MAT102; Course Title: Mathematics II
Sections: 47 (A, B-E, F), Teachers Initial: DMMK, SST, MMH

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

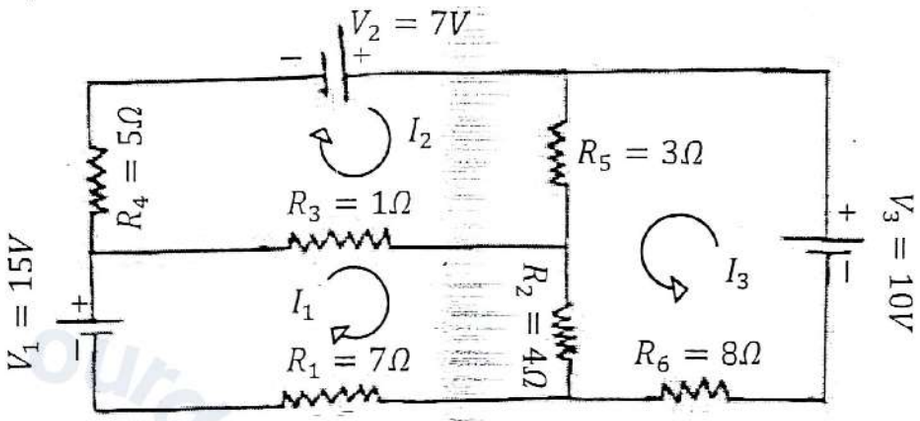
Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially]

1.	a. **Define** a scalar matrix.	1	CLO-1 L-2
	b. **Describe** a skew-Hermitian matrix.	1	
	c. **Explain** the concept of a leading entry in a matrix.	1	
	d. **Write** down an orthonormal matrix.	1	
	e. **Define** a permutation matrix.	1	
2.	a. **Analyze** the nature of solutions to the system of linear equations.	1	CLO-2 L-4
	b. **Point out** the trace of $0.5\, I_4$.	1	
	c. **Explain** the conditions required for matrix multiplication and matrix subtraction.	1	
3.	$A = \begin{pmatrix} 0 & -1 & -2 & 9 \\ 6 & 7 & -5 & 3 \\ -2 & 1 & 1 & 1 \\ 1 & 0 & -1 & 0 \end{pmatrix}$ $B = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$		CLO-3 L-3
	a. **Derive** the Row Echelon Form (REF) of the matrix A and **comment** on its rank.	2+1	
	b. **Examine** the validity of the Cayley-Hamilton theorem for the matrix B and use it to **compute** B^{-1}.	2+3	
	c. **Determine** Eigen vector related to the largest Eigen value of the matrix B and also **determine** $\lvert B \rvert$.	3+1	

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4.	Form a system of linear equations from the given electric circuit and **identify** the unknown currents (I_1, I_2 *and* I_3).  	5	CLO-4 L-4