



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Final Examination, Summer-2025

Course Code: MAT 102, Course Title: Mathematics II

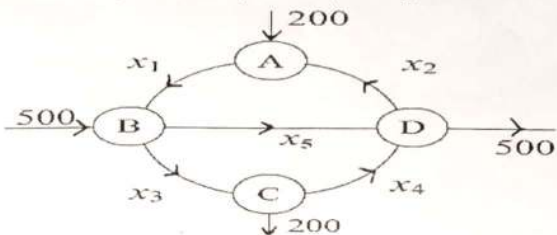
Level: 01 Term: 02 Batch: 68

Time: 2 Hours

Marks: 40

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)	Given $R = \begin{pmatrix} 2 & 4 & -6 & 8 & 0 \\ -1 & -2 & 3 & 0 & 1 \\ 3 & 6 & -9 & 10 & -2 \end{pmatrix}$.	[2+2+1]	CO2
	i)	Identify REF, RREF and rank of the matrix R.		
	b)	Given $M = \begin{pmatrix} 3 & 4 & -1 \\ 1 & 0 & 3 \\ 2 & 5 & -4 \end{pmatrix}$.	[5+2]	
	i)	Construct M^{-1} (Using Adjoint Matrix).		
	ii)	Identify whether the matrix M is orthogonal or not.		
2.		Figure shows the flow of traffic (in vehicles per hour) through a network of streets. 	[2+5+1]	CO3
	i)	Discover a system of linear equations that represents this network.		
	ii)	Examine the general solution of the SLE that describe the flow.		
	iii)	Simplify the traffic flow when $x_4 = 100$ and $x_5 = 500$.		
3.		Given, $P = \begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$.	[6+2]	CO3
	i)	List out the eigenvalues of $(P^{-1})^T$.		
	ii)	Inspect the spectrum of P^5 and the trace of P^{-3} .		
4	a)	Determine whether or not the vector $(2, -5, 9)$ is a linear combination of the $(1, -3, 2)$, $(2, -4, -2)$ and $(1, -5, 7)$ in R^3 .	[5]	CO4
	b)	$A(x, y, z) = (x + 2y - 9z, 3x - y + 7z, -5x + y - 2z)$; $B(x, y, z, t) = (x - y - 2z + 8t, 2x + y - 7t, y - 3t)$; $C(x, y, z) = (x - y - z, xy, yz - x)$; $D(x, y, z) = (2x - y, -x + 3z, y - z)$ i) Explain which are Linear Transformation. ii) Evaluate DoAoB and AoD.	[4+3]	CO4