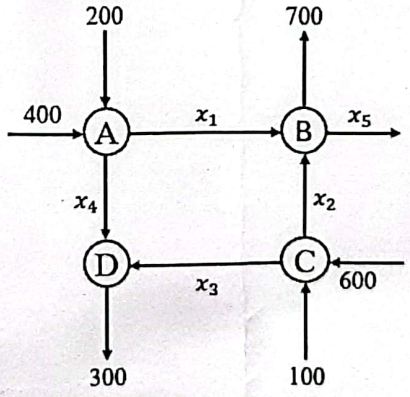
Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring-2024
Course Code: MAT 102, Course Title: Mathematics II
Level: 01 Term: 02 Batch: 65

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 $P = \begin{bmatrix} 3 & -7 & 1 \\ 0 & 4 & -5 \\ 2 & -3 & 6 \end{bmatrix}$. (i) Organize P as a sum of symmetric and skew-symmetric matrix. (ii) Construct P^{-1}.	[3+5]	CO2
	b)	Identify the Rank, the RREF and the NF of $M = \begin{bmatrix} 1 & 2 & -1 & 2 & 1 \\ 2 & 4 & 1 & -2 & 3 \\ 3 & 6 & 2 & -6 & 5 \end{bmatrix}$.	[6]	
2.		The network in the figure shows the traffic flow (in vehicles per hour) over several one-way streets in the downtown area of a certain city during a typical lunch time. Analyze the flow and find the general solution of the system of equations that describes flow.  	[6]	CO3
3.		Given $M = \begin{bmatrix} -1 & 18 & 0 \\ 1 & 2 & 0 \\ 5 & -3 & -1 \end{bmatrix}$. (i) List out the eigenvalues of M^{-2}. (ii) Inspect the trace of M^{-4} and the spectrum of M^5.	[4+4]	CO3
4.	a)	Determine whether the vectors $(2,1,3,-1), (2,3,1,2)$, $(3,2,5,6)$ and $(-2,-7,3,-8)$ are linearly independent or dependent. Find a LDR among them and verify it.	[3+2]	CO4
	b)	$P(x,y,z) = (4x-3z, 2x+y, -z)$, $Q(x,y,z) = (y, x+3z, z-x)$, $R(x,y,z) = (3xy, x-y, x-5y+z)$, $S(x,y,z) = (x+y-z, 3y+z)$. (i) Examine which are LT. (ii) Evaluate QoP and PoS.	[4+3]	