

Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Final Examination, Fall-2023

Course Code: MAT 102, Course Title: Mathematics II

Level: 01 Term: 02 Batch: 64

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 $M = \begin{bmatrix} 6 & 2 & 0 \\ -2 & -1 & 4 \\ 3 & -5 & 6 \end{bmatrix}$. [3+5+5] CO3

(i) Divide M into symmetric and skew-symmetric matrix.

(ii) Determine the Rank, the RREF and the NF of M .

(iii) Compute M^{-1} .

b) List examples: [2]

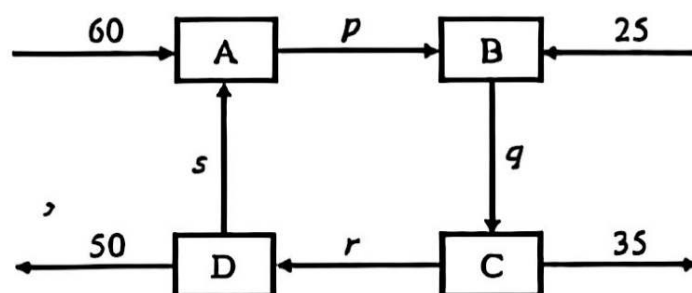
(i) an Orthogonal matrix (5×5). (ii) a Symmetric matrix (6×7).

2. a) The following figure describes the outskirts of a residential area. [3+4] CO4

Here p , q , r and s denote the number of vehicles passing everyday along given paths.

(i) Demonstrate the scenario by a SLE.

(ii) Evaluate p , q , r and s when there exists no congestion at the intersecting points.



b) Examine whether the vectors $(5, -2, 4)$, $(2, -3, 5)$ and $(4, 5, -7)$ are linearly independent or dependent. [3]

3. Given $M = \begin{bmatrix} 1 & 1 & 2 \\ -1 & 2 & 1 \\ 0 & 1 & 3 \end{bmatrix}$. [4+2+2] CO3

(i) Identify the eigenvalues of M .

(ii) Estimate the spectrum of M^{-5} .

(iii) Identify the trace of M^{-3} .

4. $P(x, y, z) = (2x, 4x - y, 3y - z)$, $Q(x, y, z) = (2x - y, xy + z, z - x)$, $R(x, y, z) = (3x, x - y, 2x + y + z)$, $S(x, y, z) = (x + y - z, 2y + z)$. [4+3] CO4

(i) Examine which are LT.

(ii) Evaluate RoP and PoS .

$$-1 + 6 - 11 + 6$$