



# Daffodil International University

Department of Electrical and Electronic Engineering, Faculty of Engineering  
Mid-Term Examination, Fall – 2023

Course Code: 0541-121

Course Title: **Linear Algebra and Complex variable**

Section: **A, B, C, D**

Level-Term: L1-T2

Full Marks: 25

Date: 25 September, 2023

Teacher's Initial: MAA, SB

Time: 1.5 Hours

[Answer all the following questions]

- Q1. Express  $(-2 - 3i)^5 - 7.3 (4.9, 169^\circ)$  in Matrix form. Also, locate the complex number in the complex plane. CO-3 [5]  
C(4)

- Q2. i) Find  $BA - 4I_3$ , where CO-1 [2]  
C(2)

$$A = \begin{pmatrix} -3 & 2 & -1 \\ 0 & 4 & 2 \\ 2 & \frac{1}{2} & -1 \end{pmatrix} \quad B = \begin{pmatrix} -3 & 1 & \frac{1}{4} \\ 1 & 0 & -4 \\ 0 & -2 & 0 \end{pmatrix}$$

- ii) Write  $A$  as the sum of a symmetric & a skew-symmetric matrix, where CO-1 [3]  
C(2)

$$A = \begin{pmatrix} \sin 90^\circ & (-1)^3 & 0 \\ \ln 1 & \int_{-\infty}^0 e^x dx & -2 \\ |-2| & -\frac{7}{2} & 3! \end{pmatrix}$$

- Q3. Find the REF, RREF and NF of the matrix CO-1 [5]  
C(2)

$$B = \begin{pmatrix} 1 & -2 & 2 & -1 \\ 3 & -6 & 6 & 1 \\ -1 & -2 & 3 & -2 \\ -2 & 4 & -4 & 2 \end{pmatrix}$$

- Q4. i) Find the inverse of the matrix  $M$ . Also find  $MM^{-1}$ , Where CO-1 [3+2]  
C(2)

$$M = \begin{pmatrix} 1 & -\frac{2}{3} & 3 \\ 0 & 9 & 2 \\ -1 & 0 & -7 \end{pmatrix}$$

- ii) Check the orthogonality for the matrix  $M$ , where  $M = \begin{pmatrix} 1 & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & 1 \end{pmatrix}$

- Q5. i)  $L$  is  $13 \times 32$ ,  $M$  is  $12 \times 13$  order matrix. What will be the dimension of  $ML$  and  $LM$ ? CO-1 [1\*5]  
C(2)

- ii) Write 1 difference between symmetric and orthogonal matrix.

- iii) How many matrices we can find with 165 entries?

- iv) Find the argument of the complex number  $-9i$

- v) Write a sparse and a dense matrix with 16 elements.