



Daffodil International University
Department of Electrical and Electronic Engineering
Faculty of Engineering
Final Examination Spring 2026

Course Code: 0541-121

Section: A, B, C

Full Marks: 25

Course Title: Linear Algebra and Complex Variable

Level-Term: L1-T1

Exam Date: 25 th April, 2026

Teacher's Initial: IJM,SS

Time: 2:00 Hours

[The second right most column indicates the Cos with respective Bloom's Level. The right most column indicates the assigned marks]

Q1

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|---|------|-----|
| (a) Describe LD and LI of vectors | CO2 | 02+ |
| (b) Identify $\{1 + x, x + x^2, 1 + x^2\}$ the vector space LD or not in $P_2(x)$. | (C2) | 03+ |
| (c) Identify Condition on 'r' and 's' so that $\{1, 1, 1\}, (1, s, 1), (r-s, r+s, s-1)$ becomes LD in R^3 . | | 04 |

Q2

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|--|------|-----|
| (a) Given Matrix | CO2 | 04 |
| $U = \begin{pmatrix} 3 & -5 & 2 \\ 8 & -1 & 7 \\ 14 & -11 & -11 \end{pmatrix}$ | (C2) | +02 |
| | | +02 |

- (i) Indicate (i) an spectrum of U , U^4 (ii) an spectrum of U^{-1} (iii) illustrate U^{-1} by Cayley – Hamilton Theorem.

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|---|--|----|
| (b) Interpret Eigen values and Eigenvectors of the given matrix | | 06 |
|---|--|----|

$$\begin{pmatrix} -3 & -7 & -6 \\ 1 & 5 & 6 \\ -1 & -1 & -2 \end{pmatrix}$$

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|--|------|----|
| (c) A linear mapping $T: R^3 \rightarrow R^3$ defined by | CO2 | |
| $T(x, y, z) = (3x + y, -2x - 4y + 3z, 5x + 4y - 2z)$ | (C2) | 07 |

Determine T is linear and find $T^{-1}(x, y, z)$. Verify your answer with a non-zero vector.

Q3

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|---|------|-----|
| (i) Evaluate the value of $ e^{iz} $ where $z = 6e^{\frac{\pi i}{3}}$. and say the signal increasing or decreasing | CO3 | 03+ |
| | (C4) | 03+ |
| | | 04 |

- (ii) Evaluate $\oint \frac{\sin^6 z}{(z - \frac{\pi}{6})^3} dz$ where closed curve is $|z|=1$.

- (iii) Evaluate $\oint \frac{z+3}{z^2-2z+5} dz$ where closed curve is $|z-1|=1$.