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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

(a) Describe LD and LI of vectors — **CO2 (C2)** — **02+**

(b) Identify $\{1+x, x+x^2, 1+x^2\}$ the vector space LD or not in $P_2(x)$. — **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

(a) Given Matrix

$$U=\begin{pmatrix} 3 & -5 & 2 \\ 8 & -1 & 7 \\ 14 & -11 & -11 \end{pmatrix}$$

(i) **Indicate (i)** an spectrum of U , U^4 (ii) an spectrum of U^{-1} (iii) ***illustrate*** U^{-1} by Cayley – Hamilton Theorem. — **CO2 (C2)** — **04 +02 +02**

(b) Interpret Eigen values and Eigenvectors of the given matrix — **06**

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

(c) A linear mapping $T:R^3 \rightarrow R^3$ defined by — **CO2 (C2)** — **07**

$$T(x,y,z) = (3x+y, -2x- 4y+3z, 5x+4y-2z)$$

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

Q3

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

(ii) **Evaluate** $\oint \frac{Sin^6 z}{(z-\frac{\pi}{6})^3} dz$ where closed curve is $|z|=1$. — **04**

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