

**School of University Polytechnic**  
**Diploma in Computer Science and Engineering**  
**Mid Term Examination - Nov 2023**

**Duration : 90 Minutes**  
**Max Marks : 50**

**Sem III - N1DF301T - Applied Mathematics-III**

General Instructions

*Answer to the specific question asked*

*Draw neat, labelled diagrams wherever necessary*

*Approved data hand books are allowed subject to verification by the Invigilator*

- 1) Explain complex matrix and Hermitian matrix. K2 (2)
- 2) Show that the matrix  $A + A^T$  is symmetric matrix for every square matrix  $A$ . K1 (3)
- 3) Illustrate symmetric & skew Hermitian matrix. K2 (4)
- 4) Show that the matrix  $(A - A^T)$  is skew symmetric matrix for the matrix  $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$ . K2 (6)
- 5) K3 (6)  

$$\begin{vmatrix} 1 & bc & a(b+c) \\ 1 & ca & b(a+c) \\ 1 & ab & c(a+b) \end{vmatrix} = 0$$

Apply the properties of determinants, show that
- 6) Identify the symmetric matrix  $P$  and skew symmetric matrix  $Q$  for the matrix  $A = \begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$  such that  $A = P + Q$ . K3 (9)
- 7) Simplify the matrix polynomial  $A^4 - 4A^3 - 5A^2 + A + 2I$  for the matrix  $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ . K4 (8)
- 8) Simplify the matrix polynomial  $A^5 - 6A^4 + 6A^3 - 11A^2 + 2A + 3I$  for the matrix  $A = \begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$ . K4 (12)

**OR**

- Examine the Caley Hamilton Theorem for the matrix  $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$  K4 (12)