THE OPEN UNIVERSITY OF SRI LANKA

B.Sc/B.Ed., Continuing Education Degree Programme

Applied Mathematics – Level 04

ADU4303/ADE4303 – Applied Linear Algebra & Differential Equations

Open Book Test (OBT) – 2024/2025

DURATION: ONE (01)–HOUR

Date:16.02.2025. **Time: 09.00a.m.-10.00 a.m.**

ANSWER **ALL** QUESTIONS.

1. Without expanding the determinant, prove that $\begin{vmatrix} x+y & y+z & z+x \\ z & x & y \\ 1 & 1 & 1 \end{vmatrix} = 0.$

2. Find the inverse of the following matrix:

$$\begin{pmatrix} 3 & -1 & 4 \\ 0 & 2 & 1 \\ 1 & -1 & -2 \end{pmatrix}.$$

3. Find the normal form of the following matrix:

$$\begin{pmatrix} 1 & 1 & -3 & 2 \\ 2 & -1 & 2 & -3 \\ 3 & -2 & 1 & -4 \\ -4 & 1 & -3 & 1 \end{pmatrix}.$$

4. Discuss the consistency of the following system of simultaneous equations:

$$\begin{aligned} x+2y-z &= 1 \\ 3x-2y+2z &= 2 \\ 7x-2y+az &= b. \end{aligned}$$

Obtain the complete solution for the consistent cases.

5. Determine the eigen values and eigen vectors of the matrix

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