THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. /B.Ed., Continuing Education Degree Programme
No Book Test (NBT)-2024/2025
PURE MATHEMATICS- LEVEL 04
PEU4302/PEE4302 –Linear Algebra

**DURATION: ONE (01) HOUR**

**Date: 28.09. 2024** **Time: 4.00.p.m. – 5:00 p.m.**

**ANSWER ALL QUESTIONS.**

1. (i) Find the eigen values and eigen vectors of the following matrix.

$$A=\begin{pmatrix}5 & 4 & 2\\ 4 & 5 & 2\\ 2 & 2 & 2\end{pmatrix}.$$

(ii) Hence find the eigen values of $A^2$ and $A^{-1}$.

2. Consider the matrix

$$B=\begin{pmatrix}3 & 2 & 0\\ 2 & 0 & 0\\ 1 & 0 & 2\end{pmatrix}.$$

(i) Show that $B$ is diagonalizable.

(ii) Find an invertible matrix $P$ such that $P^{-1}AP$ is a diagonal matrix. Also find the diagonal matrix.

3. Solve the following system of equations by LU-decomposition.

$$\begin{aligned} 2x + y + 5z \quad + t &= 5 \\ x \; + y - 3z - 4t &= -1 \\ 3x + 6y - 2z + t \; &= 8 \\ 2x + 2y + 2z - 3t &= 2. \end{aligned}$$

4. Find the eigen values and eigen vectors of the following matrix:

$$\begin{pmatrix} 5 & -5 \\ 1 & 1 \end{pmatrix}.$$