00198

THE OPEN UNIVERSITY OF SRI LANKA

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

Open Book Test (OBT)-2023/2024

PURE MATHEMATICS- LEVEL 04

PEU4302/PEE4302 –Linear Algebra

DURATION: ONE (01) HOUR

Date: 21st July, 2023 **Time: 10:30a.m. –11:30 a.m.**

ANSWER ALL QUESTIONS.

1. Solve the determinantal equation $\begin{vmatrix} 2x-1 & x+7 & x+4 \\ x & 6 & 2 \\ x-1 & x+1 & 3 \end{vmatrix} = 0$

2. Convert the following matrix to the echelon form and hence find the rank.

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

3. Find the adjoint and inverse of the following matrix.

$$\begin{pmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$$

4. Determine the values of a and b for which the system $\begin{pmatrix} 3 & -2 & 1 \\ 5 & -8 & 9 \\ 2 & 1 & a \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} b \\ 3 \\ -1 \end{pmatrix}$

(i) has a unique solution,

(ii) has no solution and,

(iii) has infinitely many solutions.

5. Verify Cayley-Hamilton theorem, find A^4 and A^{-1} when

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