0199

THE OPEN UNIVERSITY OF SRI LANKA

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

Open Book Test (OBT)-2024/2025

PURE MATHEMATICS- LEVEL 04

PEU4302/PEE4302 –Linear Algebra

DURATION: ONE (01) HOUR

Date: 24th August 2024 **Time: 04.00 p.m. –05.00 p.m.**

ANSWER ALL QUESTIONS.

1.Prove that $\begin{vmatrix} 1 & a & a^2-bc \\ 1 & b & b^2-ca \\ 1 & c & c^2-ab \end{vmatrix} = 0.$

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

$$\begin{pmatrix} 1 & 2 & -5 & 2 \\ 3 & -1 & 2 & 4 \\ 2 & 3 & -4 & 3 \\ 5 & 2 & -2 & 7 \end{pmatrix}.$$

3. Find the inverse of the matrix A, where

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

4. Find the condition on λ for which the system of equations

$$\begin{aligned} 3x - y + 4z &= 3 \\ x + 2y - 3z &= -2 \\ 6x + 5y + \lambda z &= -3. \end{aligned}$$

has (i) a unique solution. (ii) no solution. (iii) infinite number of solutions.

5. Verify the Cayley-Hamilton theorem and find A^{-1} if $A = \begin{pmatrix} 1 & -1 & 4 \\ 3 & 2 & -1 \\ 2 & 1 & -1 \end{pmatrix}$.