00162

THE OPEN UNIVERSITY OF SRI LANKA

B.Sc. /B.Ed DEGREE PROGRAMME

OPEN BOOK TEST-2017/2018

PURE MATHEMATICS- LEVEL 04

PEU4302/PEE4302 –Linear Algebra

DURATION: ONE (01) HOUR

Date: 07.06.2018 **Time: 4.15 p.m. –5.15 p.m.**

ANSWER ALL QUESTIONS.

(01) (a) Show that $\begin{vmatrix} \sin\alpha & \cos\alpha & \sin(\alpha+\delta) \\ \sin\beta & \cos\beta & \sin(\beta+\delta) \\ \sin\delta & \cos\delta & \sin(\gamma+\delta) \end{vmatrix} = 0.$

(b) Find A^{-1} if $A = \begin{pmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{pmatrix}$

(c) Transform $\begin{pmatrix} 1 & 3 & 3 \\ 2 & 4 & 10 \\ 3 & 8 & 4 \end{pmatrix}$ into a unit matrix.

(02) (a) Verify that $A = \frac{1}{3}\begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{pmatrix}$ is orthogonal,

(b) Find the general solutions of the system of equations:

$$\begin{aligned} 3x_1 + 2x_3 + 2x_4 &= 0 \\ -x_1 + 7x_2 + 4x_3 + 9x_4 &= 0 \\ 7x_1 - 7x_2 - 5x_4 &= 0 \end{aligned}$$

(c) Use elementary transformations to reduce the following matrix A to triangular form and hence find the rank of A.

$$A = \begin{pmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{pmatrix}$$