The Open University of Sri Lanka
B.Sc. Degree Programme, Level – 04
NBT 2 – 2013/2014
PYU 2165 – Mathematical Method for Physics
Duration: 1 hour

Date: 7th April 2014 **Time: 12.45 pm to 1.45 pm** **Index No:**

Answer ALL the questions.
Non programmable calculators are allowed.

1)

a)

i) If $A = \begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$ *and* $B = \begin{bmatrix} 0 & 0.5 \\ 2 & 2 \end{bmatrix}$; Find A × B

ii) If $\begin{bmatrix} a & 2 \\ 0 & b \\ 3 & 1 \end{bmatrix} + \begin{bmatrix} 4 & c \\ d & 4 \\ -1 & 5 \end{bmatrix} = \begin{bmatrix} 10 & -5 \\ 3 & 0 \\ e & f \end{bmatrix}$

Find the values for a, b, c, d, e and f

b)

$\mathbf{V_1}$ and $\mathbf{V_2}$ are Vectors. (**i,j,k** are unit vectors)

$\mathbf{V_1} = \mathbf{i} + 2\mathbf{j} + 4\mathbf{k}$
$\mathbf{V_2} = 3\mathbf{i} + 2\mathbf{j} + \mathbf{k}$

i) Find $\mathbf{V_1} \times \mathbf{V_2}$
ii) Find $\mathbf{V_1} . \mathbf{V_2}$
iii) Find the magnitude of $\mathbf{V_1}$

2)

a) Find the Eigen values of the following matrix

$X = \begin{bmatrix} -4 & 2 \\ 3 & 1 \end{bmatrix}$

b)

i) Let x be a real value. $f(x) is\ defined\ as\ x^2$ is f(x) an odd function or an even function? Justify your answer.

ii) Expand $f(x) = x^2\ for - \pi \leq x \leq \pi$ in a Fourier series.
Hint: use $u = nx$ to change the variables in integration.

$\int u^2 \cos(u) . du = 2u\cos(u) + (u^2 - 2)\sin(u)$

---------- **End** ----------