Seat No. : _____

FF-125

February-2025

Int. M.Sc., (CA & IT), Sem.-I

Mathematical Concepts (NEP)

Time : 1:00 Hour] **[Max. Marks : 25**

Instruction : Use of simple calculator is allowed.

1. (A) Find a point on Y-axis which is at an equidistant from A(–5, –2) and B(3, 2). **5**

1. (B) Find a vector of length 9 and which is perpendicular to both Vectors $\vec{a} + 2\vec{b}$ and $\vec{a} - 3\vec{b}$, where $\vec{a} = -3\hat{i} + 4\hat{j} + 2\hat{k}$ and $\vec{b} = -\hat{i} + 3\hat{j} - 4\hat{k}$. **5**

OR

1. (A) Dot product of a vector with vectors $3\hat{i} - 5\hat{k}$, $2\hat{i} + 3\hat{j}$ and $\hat{i} + \hat{j} + \hat{k}$ are –1, 6 and 5 respectively. Find a vector. **5**

1. (B) Find the area of the pentagon whose vertices are A(4, 3), B(–5, 6), C(–7, –2), D(0, –7) and E(3, –6). **5**

2. (A) Using RRE form, find the rank of the matrix **5**

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

2. (B) If $A = \begin{bmatrix} 3 & 1 & -2 \\ -2 & -4 & 2 \\ 2 & 3 & 5 \end{bmatrix}$, then find **5**

$A^3 - 4A^2 - 17A + 68I_{3\times 3}$, where $I_{3\times 3}$ is the identity matrix of order 3×3.

OR

2. (A) Using RRE form solve the following system of linear equations. **5**

$2x + y + z = 1$,

$x + 2y + 3z = 2$,

$3x - y + 2z = 5$

2. (B) Find the inverse of a matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ using adjoint method. **5**

3. Attempt any **five**. **5**

(1) Find the equation of a line parallel to the line $2x + y = 1 = 0$ and passing through $(1, -3)$.

(2) If A is $m \times n$ matrix and both A^TB and BA^T are defined then B is a matrix of the size _____.

(3) If $\vec{a} = 2\hat{i} - 5\hat{j} + 2\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$, find $\vec{a} \cdot \vec{b}$.

(4) Find two matrices A and B of order 2×2 such that $A + B = 0_{2 \times 2}$ but neither A nor B are zero matrix.

(5) Find slope of a line $\overleftrightarrow{l_1}$ if $\overleftrightarrow{l_1}$ is perpendicular to $-2x + y - 1 = 0$.

(6) Find two matrices A and B of order 2×2 such that $AB = 0_{2 \times 2}$ but neither A nor B are zero matrix.
