

1. Using MATRIX METHOD, solve system of eqⁿ

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

$$x + 2y + 3z = 6$$

$$2x - y + z = 2$$

Solⁿ

$$AX = B$$

$$\begin{bmatrix} 3 & 2 & -2 \\ 1 & 2 & 3 \\ 2 & -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 6 \\ 2 \end{bmatrix}$$

A X B

$$\Rightarrow X = A^{-1}B$$

$$|A| = 3(2+3) - 2(1-6) - 2(-1-4) = 15 + 10 + 10 = 35$$

Here minor of elements are

$$\Rightarrow M_{11} = \begin{vmatrix} 2 & 3 \\ -1 & 1 \end{vmatrix} = 5, \quad M_{12} = \begin{vmatrix} 1 & 3 \\ 2 & 1 \end{vmatrix} = -5, \quad M_{13} = \begin{vmatrix} 1 & 2 \\ 2 & -1 \end{vmatrix} = -5$$

$$\Rightarrow M_{21} = \begin{vmatrix} 2 & -2 \\ -1 & 1 \end{vmatrix} = 0, \quad M_{22} = \begin{vmatrix} 3 & -2 \\ 2 & 1 \end{vmatrix} = 7, \quad M_{23} = \begin{vmatrix} 3 & 2 \\ 2 & -1 \end{vmatrix} = -7$$

$$\Rightarrow M_{31} = \begin{vmatrix} 2 & -2 \\ 2 & 3 \end{vmatrix} = 10, \quad M_{32} = \begin{vmatrix} 3 & -2 \\ 1 & 3 \end{vmatrix} = 11, \quad M_{33} = \begin{vmatrix} 3 & 2 \\ 1 & 2 \end{vmatrix} = 4$$

$$\Rightarrow A_{ij} = (-1)^{i+j} M_{ij}$$

$$\Rightarrow A_{11} = (-1)^{1+1} M_{11} = 5, \quad A_{12} = 5, \quad A_{13} = -5$$

$$\Rightarrow A_{21} = 0, \quad A_{22} = 7, \quad A_{23} = 7$$

$$\Rightarrow A_{31} = 10, \quad A_{32} = -11, \quad A_{33} = 4$$

$$P = \begin{bmatrix} 5 & 5 & -5 \\ 0 & 7 & 7 \\ 10 & -11 & 4 \end{bmatrix} \Rightarrow \text{adj } A = [P]^T = \begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix}$$

$$A^{-1} = \frac{1}{35} \begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix}$$

$$X = A^{-1}B$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{35} \begin{bmatrix} 5 & 0 & 10 \\ 5 & 7 & -11 \\ -5 & 7 & 4 \end{bmatrix} \begin{bmatrix} 3 \\ 6 \\ 2 \end{bmatrix} = \frac{1}{35} \begin{bmatrix} 15+0+20 \\ 15+42-22 \\ -15+42+8 \end{bmatrix} = \frac{1}{35} \begin{bmatrix} 35 \\ 35 \\ 35 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$$

$$x=1; y=1; z=1$$