GAUSS JORDAN METHOD
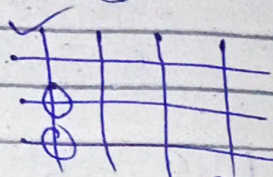
This method is modification of Gauss Elimination Method

Q:- Apply Gauss Jordan Method to solve the equation ①
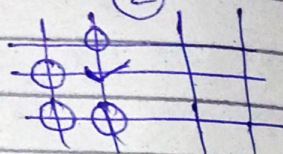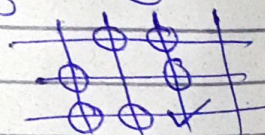
$$x+y+z=9$$
$$2x-3y+4z=13$$
$$3x+4y+5z=40$$

Sol.-

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & -3 & 4 \\ 3 & 4 & 5 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix}=\begin{bmatrix} 9 \\ 13 \\ 40 \end{bmatrix}$$

$$A \qquad\qquad X \quad = B \quad ③$$

$$[A:B]=\begin{bmatrix} 1 & 1 & 1 & : & 9 \\ 2 & -3 & 4 & : & 13 \\ 3 & 4 & 5 & : & 40 \end{bmatrix}\begin{array}{l} R_2 \to R_2-2R_1 \\ R_3 \to R_3-3R_1 \end{array}$$

$$=\begin{bmatrix} 1 & 1 & 1 & : & 9 \\ 0 & -5 & 2 & : & -5 \\ 0 & 1 & 2 & : & 13 \end{bmatrix}\begin{array}{l} R_1 \to 5R_1+R_2 \\ R_3 \to 5R_3+R_2 \end{array}$$

$$=\begin{bmatrix} 5 & 0 & 7 & & 40 \\ 0 & -5 & 2 & : & -5 \\ 0 & 0 & 12 & : & 60 \end{bmatrix}\begin{array}{l} R_2 \to 6R_2-R_3 \\ R_1 \to 12R_1-7R_3 \end{array}$$

$$\begin{bmatrix} 60 & 0 & 0 & \vdots & 60 \\ 0 & -30 & 0 & \vdots & -90 \\ 0 & 0 & 12 & \vdots & 60 \end{bmatrix}$$

$$\begin{bmatrix} 60 & 0 & 0 \\ 0 & -30 & 0 \\ 0 & 0 & 12 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 60 \\ -90 \\ 60 \end{bmatrix}$$

$60x = 60$ $\boxed{x = 1}$

$-30y = -90$ $\boxed{y = 3}$

$12z = 60$ $\boxed{z = 5}$

— x — x —