* **Gauss Jorden Method :-**
    - Gauss Jorden Method also known as Gauss-Jorden elimination Method
    - This method is very useful in solving a linear equation
    - This Method allows the isolation of the coefficient of a system of linear eq^n.
    - In Gauss-Jorden method, given matrix into can be transformed into reduced row echolon form by performing some Row operation

    <u>Note</u>:- Row operation — There are 3 kind of elementry Row operation
    (1) Switching of Rows :- A row can be Interchange with another row $R_i \Longleftrightarrow R_j$

② Row multiplication:- A non zero Number can be multiplied or to every eliminate in a row.

$$aR_j \longrightarrow R_i \quad \text{where } a \neq 0$$

② Row addition (subtraction):-

me may replaced a row by the sum of element of row and a multiple of corresponding element of another row.

$$R_i + aR_j \longrightarrow R_i \quad \text{when } a \neq 0, \; i \neq j$$

$$RREF \rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \rightarrow$$

* Working Rule *

step-I consider the system of linear eq^n

$$a_1 x + b_1 y + c_1 z = d_1$$
$$a_2 x + b_2 y + c_2 z = d_2$$
$$a_3 x + b_3 y + c_3 z = d_3$$

i.e $Ax = B$

$$\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

Step-II Find augumented matrix for given system.
as : $C = [A : B]$

Step-III Transform 'c' into normal form (Reduced Row echolon form).

step-IV find solⁿ of the eqⁿ.

Q: $6x - y + z = 13$
      $x + y + z = 9$
      $10x + y - z = 19$

solⁿ given $6x - y + z = 13$
              $x + y + z = 9$
              $10x + y - z = 19$

step-I find augumented matrix of given form.

$$C = [A : B]$$

$$= \begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 6 & -1 & 1 & | & 13 \\ 10 & 1 & -1 & | & 19 \end{bmatrix}$$

step-II Transform 'C' into normal form by using
Row operation.

$R_2 \rightarrow R_2 - 6R_1$ & $R_3 \rightarrow R_3 - 10R_1$

$$C \sim \begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & -7 & -5 & | & -41 \\ 0 & -9 & -11 & | & -71 \end{bmatrix}$$

$R_3 \rightarrow R_3 - R_2$ $R_3 \leftrightarrow R_2$

$$C \sim \begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & -2 & -6 & | & -30 \\ 0 & -7 & -5 & | & -41 \end{bmatrix}$$

$R_2 \rightarrow -\frac{1}{2} R_2$ $R_3 \rightarrow (-1) R_3$

$$\begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & 1 & 3 & | & 15 \\ 0 & +7 & +5 & | & +41 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & 1 & 3 & | & 15 \\ 0 & 7 & 5 & | & 41 \end{bmatrix}$$

$$R_3 \rightarrow R_3 - 7R_2$$

$$\begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & 1 & 3 & | & 15 \\ 0 & 0 & -16 & | & -64 \end{bmatrix}$$

$$-\frac{1}{16} \text{ at } R_3 \qquad R_3 \rightarrow -\frac{1}{16} R_3$$

$$\begin{bmatrix} 1 & 1 & 1 & | & 9 \\ 0 & 1 & 3 & | & 15 \\ 0 & 0 & 1 & | & 4 \end{bmatrix}$$

$$R_2 \rightarrow R_2 - 3R_3 \qquad R_1 \rightarrow R_1 - R_3$$

$$\begin{bmatrix} 1 & 1 & 0 & | & 5 \\ 0 & 1 & 0 & | & 3 \\ 0 & 0 & 1 & | & 4 \end{bmatrix}$$

$$R_1 \rightarrow R_1 \rightarrow R_2$$

$$\begin{bmatrix} 1 & 0 & 0 & | & 2 \\ 0 & 1 & 0 & | & 3 \\ 0 & 0 & 1 & | & 4 \end{bmatrix}$$

$$x = 2, \quad y = 3 \mid z = 4.$$