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 Paper- 7; Mathematical Economics
 Topic- Types of Matrix
 Date-05-02-2024

4. Diagonal Matrix 3.

A square matrix having leading diagonally elements are non-zero & rest elements are zero is called Diagonal matrix.
 Leading diagonal is also called Principle diagonal.

Ex - $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ \rightarrow Principle diagonal or leading diagonal 3×3

5. Scalar Matrix

A square matrix having leading diagonally element are equal & rest elements are zero, is called Scalar matrix.

$A = \begin{bmatrix} 6 & 0 & 0 \\ 0 & 6 & 0 \\ 0 & 0 & 6 \end{bmatrix}$ \rightarrow diagonal elements are equal 3×3 .

6. Unit Matrix & Identity Matrix

A square matrix having leading diagonal elements are unity (1) & rest element are zero 0, is called Unit matrix or Identity Matrix.

$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ \rightarrow leading diagonal element are unity 3×3

7. Null Matrix or zero Matrix

A matrix having all elements are zero is called zero matrix or Null Matrix. It may be square & not be.

$$0 = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}_{2 \times 3}$$

8. Singular Matrix

A square matrix having determinant is zero, is called singular matrix
i.e., $|A| = 0$

9. Non Singular Matrix -

A square matrix having determinant is not zero is called ^{Non} singular matrix.
i.e., $|A| \neq 0$

10. Symmetric Matrix

A square matrix which is in the form of $a_{ij} = a_{ji}$ & $i \neq j$, then it is called symmetric matrix.

i.e., $A = A'$

E.g. - $A = \begin{bmatrix} 3 & 5 & 9 \\ 4 & 8 & 6 \\ 9 & 8 & 6 \end{bmatrix}_{3 \times 3} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$

$$a_{12} = a_{21} = 5$$

$$a_{13} = a_{31} = 9$$

$$a_{23} = a_{32} = 8$$

11. Skew Symmetric matrix

A square matrix which is in the form of $a_{ij} = -a_{ji}$ & leading diagonally elements are zero is called skew symmetric matrix. i.e., $A = -A'$

$$A = \begin{bmatrix} 0 & 2 & 9 \\ -2 & 0 & 8 \\ -9 & -8 & 0 \end{bmatrix}_{3 \times 3}$$

$$a_{12} = -a_{21} = 2$$

$$a_{13} = -a_{31} = 9$$

$$a_{23} = -a_{32} = 8$$