Types of Matrices:

Idempotent Matrix: A symmetric matrix will be an idempotent Matrix, if it reproduces itself when multiplied by itself. If A is a matrix, ~~then A will be an Idempotent matrix~~ that has the property that $A = A'$ and $A = A^2$ ~~is termed~~, then it is termed as an Idempotent matrix.

An Identity Matrix (I) is an example of Idempotent Matrix, because it fulfills both the above mentioned conditions — (1) $I = I'$ and (2) $I = I^2$

Partitioned Matrix: A partitioned matrix (also known an block matrix) is a matrix that is interpreted as having been broken into sections ~~as~~ called blocks or sub-matrices. Any matrix may be interpreted as a partitioned matrix in one or more ways, with each interpretation defined by how its rows and columns are partitioned. For example, if A is a matrix of order (4×6) as

$$A = \left[\begin{array}{cccc:cc} a_{11} & a_{12} & a_{13} & a_{14} & a_{15} & a_{16} \\ a_{21} & a_{22} & a_{23} & a_{24} & a_{25} & a_{26} \\ \hdashline a_{31} & a_{32} & a_{33} & a_{34} & a_{35} & a_{36} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} & a_{46} \end{array}\right]_{(4\times 6)}$$

Now the above given matrix A is partitioned into four parts by two broken lines — one vertical and the other is horizontal. Thus, there are four submatrices such that -

$$A_{11} = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \end{bmatrix}_{(2\times 4)} \qquad A_{12} = \begin{bmatrix} a_{15} & a_{16} \\ a_{25} & a_{26} \end{bmatrix}_{(2\times 2)}$$

$$A_{21} = \begin{bmatrix} a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}_{(2\times 4)} \qquad A_{22} = \begin{bmatrix} a_{35} & a_{36} \\ a_{45} & a_{46} \end{bmatrix}_{(2\times 2)}$$

Thus,
$$A = \begin{bmatrix} \underset{(2\times4)}{A_{11}} & \underset{(2\times2)}{A_{12}} \\ \underset{(2\times4)}{A_{21}} & \underset{(2\times2)}{A_{22}} \end{bmatrix}$$

The basic rules of addition, subtraction and multiplication of matrices is also applicable to the partitioned matrices, but the matrices must have been partitioned conformably.

Orthogonal Matrix: A square matrix ~~with real~~ with real number or elements is said to be an orthogonal matrix, if its transpose equal to ~~the~~ it's inverse matrix or the product of a square matrix and its transpose gives an identity matrix. If A is a square matrix, then A will be an orthogonal matrix if the following condition holds good, i.e., $A' \cdot A = I$ (Identity matrix) or $A' = A^{-1}$.

Identity matrix (I) is an example of orthogonal matrix since the transpose of Identity matrix (I') is equal to it's inverse (I^{-1}), i.e., $I' = I^{-1}$.