Matrices

(ix) Transpose of a matrix : The matrix obtained interchanging rows and columns of a matrix A is called the transpose of A and is denoted by A'. Thus if $A = (a_{ij})_{m,n}$ then $A' = (a'_{ji})_{n,m}$ where $a'_{ji} = a_{ij}$

(x) Symmetric matrix : A matrix A is called symmetric if $A' = A$. Note that a symmetric matrix must be square.

(xi) Scalar product of a matrix : If $A = (a_{ij})_{m,n}$ and K any number (i.e. scalar) then the scalar product of A with K is denoted by KA (or AK) and is defined by $KA = AK = (Ka_{ij})_{m,n}$

(xii) Skew symmetric matrix : A matrix A is called symmetric if $A' = -A$

Note that a skew symmetric matrix must be a square. Its diagonal element should be zero.

(xiii) Orthogonal matrix : A square matrix A is called orthogonal if $A'A = AA' = I$ where I is the unit matrix.

(xiv) Conjugate of a matrix : Let $A = (a_{ij})_{m,n}$ be a matrix. Let $\overline{a}_{ij}$ denote the Complex Conjugate of a_{ij}. Then the matrix $(\overline{a}_{ij})_{m,n}$ is called the Conjugate of A and is denoted by $\overline{A}$.

(xv) Transposal Conjugate of a matrix : The transpose of $\overline{A}$ is called the transposed Conjugate of A and is denoted by A^{θ}.
Thus $A^{\theta} = (\overline{A})' = (\overline{A'})$

(xvi) Hermition matrix : A square matrix A is called a Hermition matrix if $A^{\theta} = A$. i.e. if $(i,j)^{th}$ element of A is the Complex Conjugate of the $(j,i)^{th}$ element of A.

(xvii) Skew - Hermitian matrix : A square matrix A is called skew Hermitian if $A^{\theta} = -A$.

(xviii) Unitary matrix : A square matrix A is called a unitary matrix if $A^{\theta}A = AA^{\theta} = I$.