MATRICES

DATE

1. Trace of a matrix

= Sum of elements of the principal diagonal of a square matrix A, denoted by $tr(A)$ or $Tr(A)$.

2. Symmetric matrix

$\rightarrow$ $A = A'$ where A is a square matrix

3. Skew Symmetric matrix

$\rightarrow$ $A = -A'$, A is a square matrix

4. CONJUGATE OF A MATRIX

Replacing each element of a matrix A by its conjugate complex number gives the conjugate of A, denoted by $\bar{A}$.

So, if $A = [a_{ij}]_{m \times n} \Rightarrow \bar{A} = [\bar{a}_{ij}]_{m \times n}$

where $\bar{a}_{ij}$ = conjugate complex of a_{ij}.

5. TRANSPOSE CONJUGATE OF A MATRIX

It is Transpose of the conjugate of a matrix A, denoted by A^θ.

$\therefore A^\theta = (\bar{A})' = \overline{(A')}$

If $A = [a_{ij}]_{m \times n}$ then $A^\theta = [b_{ji}]_{n \times m}$

where $b_{ji} = \bar{a}_{ij}$

i.e. $(j,i)^{th}$ element of A^θ = conjugate complex of $(i,j)^{th}$ element of A.

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PROPERTIES OF TRANSPOSE

DATE

1. $(A')' = A$
2. $(A+B)' = A' + B'$
3. $(KA)' = KA'$, K being any Sca or complex no.
4. $(AB)' = B'A'$
5. $\overline{(\bar{A})} = A$
6. $\overline{(A+B)} = \bar{A} + \bar{B}$
7. $\overline{(KA)} = \bar{K}\,\bar{A}$, K is any complex no.
8. $\overline{(AB)} = \bar{A}\,\bar{B}$
9. $A^{\theta} = (\bar{A})' = \overline{(A')}$
10. $(A^{\theta})^{\theta} = A$
11. $(A+B)^{\theta} = A^{\theta} + B^{\theta}$
12. $(KA)^{\theta} = \bar{K}\,A^{\theta}$, K is a complex no.
13. $(AB)^{\theta} = B^{\theta}A^{\theta}$

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