	DPP – 04

Class - 12th

Matrices

Topics:
- **Transpose of matrices.**

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1. If $A = \begin{bmatrix} -1 \\ 2 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & -1 & -4 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$.

2. If $A = \begin{bmatrix} 3 \\ 5 \\ 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 4 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$.

3. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$, then find the values of θ satisfying the equation $A^T + A = I_2$.

4. Find the values of x, y, z if the matrix $A = \begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ satisfy the equation $A^T A = I_3$.

5. If $A^T = \begin{bmatrix} 3 & 4 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$, find $A^T - B^T$.

6. Show that the elements on the main diagonal of a skew – symmetric matrix are all zero.

7. If the matrix $A = \begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is skew – symmetric, find the values of a, b and c.

8. Show that the matrix $B^T A B$ is symmetric or skew – symmetric according as A is symmetric or skew – symmetric.

9. Express the matrix $A = \begin{bmatrix} 4 & 2 & -1 \\ 3 & 5 & 7 \\ 1 & -2 & 1 \end{bmatrix}$ as the sum of a symmetric and a skew – symmetric matrix.

10. Express the matrix $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ as the sum of a symmetric and a skew – symmetric matrix.

11. If A and B are symmetric matrices, then show that AB is symmetric iff $AB = BA$ i.e A and B commute.