Matrices

1. If $A=\begin{bmatrix}1 & -2\\ 3 & 4\end{bmatrix}$. Find 2A and 3A.

2. If $A=\begin{bmatrix}1 & -3 & 5\\ 6 & 2 & 4\end{bmatrix}$ Find $5A^1$.

3. If $A=\begin{bmatrix}1 & 2 & 4\\ -1 & 3 & -2\end{bmatrix}$ and $B=\begin{bmatrix}3 & -4 & -1\\ 1 & 5 & -2\end{bmatrix}$. Find A + B and A – B.

4. If $\begin{bmatrix}x+y & 3\\ 2 & -y+x\end{bmatrix}+\begin{bmatrix}2 & 3\\ 4 & 1\end{bmatrix}=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$. Find x and y.

5. If $\begin{bmatrix}x^2 & 1\\ 2 & -1\end{bmatrix}+\begin{bmatrix}2x & 2\\ -1 & 2\end{bmatrix}=\begin{bmatrix}-1 & 3\\ 1 & 1\end{bmatrix}$. Find x.

6. If $A=\begin{bmatrix}4 & 0 & 0\\ 0 & 4 & 0\\ 0 & 0 & 4\end{bmatrix}$. Find $A-A^1$.

7. If $A=\begin{bmatrix}2 & -x\\ x & -7\end{bmatrix}$. Find $A+A^1$.

8. If $A=\begin{bmatrix}1 & 2\\ 3 & -1\end{bmatrix}$, $B=\begin{bmatrix}2 & 5\\ -3 & -1\end{bmatrix}$, $C=\begin{bmatrix}1 & -1\\ 4 & -3\end{bmatrix}$. Find 2A – 3B – C.

9. Find the matrix A. if $2A+B=\begin{bmatrix}2 & 0\\ 1 & -3\end{bmatrix}$, where $B=\begin{bmatrix}1 & -1\\ 3 & 0\end{bmatrix}$.

10. If $A=\begin{bmatrix}3 & -1\\ 4 & 5\end{bmatrix}$, Find X such that $A-2X=\begin{bmatrix}1 & 4\\ 2 & -3\end{bmatrix}$.

11. If $A+B+C=0$ where $A=\begin{bmatrix}3 & -1\\ 2 & 0\\ 1 & 4\end{bmatrix}$, $B=\begin{bmatrix}2 & -1\\ -4 & 2\\ -3 & 3\end{bmatrix}$. Find C.

12. If $A=\begin{bmatrix}1 & -1\\ 2 & 4\end{bmatrix}$ $B=\begin{bmatrix}3 & 1\\ -3 & 4\end{bmatrix}$ Verify $(A-B)^{I}=A^{I}-B^{I}$

II. Questions carrying two marks each.

1. If $A=\begin{bmatrix}4 & -1\\ 0 & 3\\ 2 & -3\end{bmatrix}$. Find (i) $\frac{5A}{2}$ (ii) $\frac{-2A}{3}$

2. If $A=\begin{bmatrix}1 & 3 & -1\\ -1 & 0 & 2\end{bmatrix}$ and $B=\begin{bmatrix}4 & -1 & 2\\ 1 & 3 & -2\end{bmatrix}$. Find (i) $2A+3B$ (ii) $A-3B$ (iii) $A+\frac{1}{3}B$.

3. If $A=\begin{bmatrix}3 & 2\\ 1 & 4\end{bmatrix}$ $B=\begin{bmatrix}1 & -1\\ -2 & 3\end{bmatrix}$ and $C=\begin{bmatrix}-3 & 4\\ 2 & -1\end{bmatrix}$. Find $3A-2B-4C$

4. If $A=\begin{bmatrix}1 & -3\\ -4 & -1\end{bmatrix}$ and $B=\begin{bmatrix}3 & 4\\ -5 & 1\end{bmatrix}$ and 0 is a null matrix of order 2×2. Find the matrix C such that

   (i) $2C=A+B$ (ii) $A+C=0$ (iii) $B+5C=A$ (iv) $3A+5B+2C=0$

5. Simplify (i) $2\begin{bmatrix}2 & 1\\ 3 & 0\\ 4 & 2\end{bmatrix}+3\begin{bmatrix}0 & 2\\ 1 & 4\\ 2 & 3\end{bmatrix}$

   (ii) $4\begin{bmatrix}1 & -1 & 2\\ 3 & 1 & 0\end{bmatrix}-3\begin{bmatrix}2 & 0 & -1\\ 4 & 2 & 5\end{bmatrix}$

   (iii) $\begin{bmatrix}-1 & 2 & 4\\ 3 & -1 & 3\\ 1 & 1 & 0\end{bmatrix}+\frac{1}{2}\begin{bmatrix}4 & 1 & -2\\ 2 & 2 & 1\\ 3 & 0 & 0\end{bmatrix}$

6. Find x and y given that $\begin{bmatrix}-9\\ 2\end{bmatrix}-\begin{bmatrix}5\\ -1\end{bmatrix}=\begin{bmatrix}x\\ y\end{bmatrix}$.

7. If $A=\begin{bmatrix}3 & 1 & 4\\ 5 & 6 & 3x+1\end{bmatrix}$ and $B=\begin{bmatrix}3 & 5\\ 1 & 6\\ 4 & 3\end{bmatrix}$. Find x given that $A=B^1$.

8. Solve for x and y, $x\begin{bmatrix}2\\1\end{bmatrix}+y\begin{bmatrix}3\\5\end{bmatrix}+\begin{bmatrix}4\\6\end{bmatrix}=\begin{bmatrix}12\\17\end{bmatrix}$.

9. Find x and y given that $\begin{bmatrix}x+y & 3\\ -1 & x-y\end{bmatrix}=\begin{bmatrix}4 & 3\\ -1 & 8\end{bmatrix}$.

10. If $\begin{bmatrix}2 & 3\\ 7 & 5\end{bmatrix}+\begin{bmatrix}2 & x-2\\ y-1 & 5\end{bmatrix}=\begin{bmatrix}4 & 1\\ 7 & 10\end{bmatrix}$ Find x and y.

III. Questions carrying three marks each.

1. Find A and B if

(a) $2A+B=\begin{bmatrix}1 & -1\\ 0 & 1\end{bmatrix}$ and $A-3B=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$.

(b) $2A+B=\begin{bmatrix}2 & 3 & 1\\ 1 & 4 & 0\end{bmatrix}$, $3A+2B=\begin{bmatrix}4 & 6 & 1\\ 2 & 3 & 5\end{bmatrix}$

(c) $2A-3B=\begin{bmatrix}2 & -4\\ -12 & 1\end{bmatrix}$, $A+5B=\begin{bmatrix}1 & 24\\ 33 & 7\end{bmatrix}$

(d) $2A+B=\begin{bmatrix}3 & -1\\ -2 & 5\end{bmatrix}$ and $A-2B=\begin{bmatrix}4 & 2\\ -1 & 5\end{bmatrix}$.

2. If $A=\begin{bmatrix}3 & 8 & 1\\ 2 & -6 & 3\\ 7 & 4 & -5\end{bmatrix}$, $B=\begin{bmatrix}4 & 0 & 2\\ 6 & 2 & 3\\ 1 & 3 & 2\end{bmatrix}$. Verify $3(A+B)=3A+3B$.

3. Find x, y, a, b if $\begin{bmatrix}3x+4y & 2 & x-2y\\ a+b & 2a-b & -1\end{bmatrix}=\begin{bmatrix}2 & 2 & 4\\ 5 & -5 & -1\end{bmatrix}$.

Books for Reference : -

1. Matrices and Algebra – Mittal and Arora
2. Vector algebra – Vasistha A.R.- Wiley Eastern Limited , New York
3. Elements of Discrete Mathematics – Liu
4. Foundation of Discrete Mathematics – Joshi
5. Discrete and Combinotorial mathematics – Grimaldi and Ramanna – Pearson Education.