

7. If  $A = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$ , find  $3A^2 - 2B + I$ .

[CBSE 2005]

8. If  $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ , prove that  $(A - 2I)(A - 3I) = O$ .

9. If  $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ , show that  $A^2 = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$  and  $A^3 = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$ .

10. If  $A = \begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$ , show that  $A^2 = O$ .

11. If  $A = \begin{bmatrix} \cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$ , find  $A^2$ .

[CBSE 2000C]

12. If  $A = \begin{bmatrix} 2 & -3 & -5 \\ -1 & 4 & 5 \\ 1 & -3 & -4 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$ , show that  $AB = BA = O_{3 \times 3}$ .

13. If  $A = \begin{bmatrix} 0 & c & -b \\ -c & 0 & a \\ b & -a & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} a^2 & ab & ac \\ ab & b^2 & bc \\ ac & bc & c^2 \end{bmatrix}$ , show that  $AB = BA = O_{3 \times 3}$ .

14. If  $A = \begin{bmatrix} 2 & -3 & -5 \\ -1 & 4 & 5 \\ 1 & -3 & -4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ , show that  $AB = A$  and  $BA = B$ .

15. Let  $A = \begin{bmatrix} -1 & 1 & -1 \\ 3 & -3 & 3 \\ 5 & 5 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ , compute  $A^2 - B^2$ .

16. For the following matrices verify the associativity of matrix multiplication i.e.  $(AB)C = A(BC)$ .

(i)  $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 0 \\ -1 & 2 \\ 0 & 3 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$

(ii)  $A = \begin{bmatrix} 4 & 2 & 3 \\ 1 & 1 & 2 \\ 3 & 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ .

17. For the following matrices verify the distributivity of matrix multiplication over matrix addition i.e.  $A(B + C) = AB + AC$ .

(i)  $A = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} -1 & 0 \\ 2 & 1 \end{bmatrix}$  and  $C = \begin{bmatrix} 0 & 1 \\ 1 & -1 \end{bmatrix}$

(ii)  $A = \begin{bmatrix} 2 & -1 \\ 1 & 1 \\ -1 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$ .

18. If  $A = \begin{bmatrix} 1 & 0 & -2 \\ 3 & -1 & 0 \\ -2 & 1 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 5 & -4 \\ -2 & 1 & 3 \\ -1 & 0 & 2 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 1 & 0 \\ 0 & -1 & 1 \end{bmatrix}$ , verify that

$A(B - C) = AB - AC$ .