Board - ICSE	Class – 10th	Topic – Operations on Matrices

Section A: Multiple Choice Questions (1 mark each)

1. If
$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix},$$
then $A + B$ is:
(A) $\begin{bmatrix} 5 & 5 \\ 5 & 5 \end{bmatrix}$
(B) $\begin{bmatrix} -3 & -1 \\ 1 & 3 \end{bmatrix}$
(C) $\begin{bmatrix} 3 & 1 \\ 5 & 7 \end{bmatrix}$
(D) $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

2. The scalar multiplication $3 \cdot \begin{bmatrix} 2 & -1 \\ 0 & 4 \end{bmatrix}$ is:
(A) $\begin{bmatrix} 6 & -3 \\ 0 & 12 \end{bmatrix}$
(B) $\begin{bmatrix} 5 & -2 \\ 1 & 8 \end{bmatrix}$
(C) $\begin{bmatrix} 2 & -1 \\ 0 & 4 \end{bmatrix}$
(D) $\begin{bmatrix} 3 & -1 \\ 0 & 4 \end{bmatrix}$

3. Which of the following is the **additive identity** matrix for a 2×2 matrix?
(A) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$
(B) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$
(C) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
(D) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

4. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then the transpose of A is:
(A) $\begin{bmatrix} d & c \\ b & a \end{bmatrix}$

(B) $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$

(C) $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$

(D) $\begin{bmatrix} -a & -b \\ -c & -d \end{bmatrix}$

5. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$. Then $AB =$:

(A) $\begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Section B: Short Answer Questions (2 marks each)

6. Add the following matrices:
$A = \begin{bmatrix} 5 & -2 \\ 3 & 7 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 4 \\ 0 & 2 \end{bmatrix}$
7. Find the product of:
$A = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$
8. Find the transpose of the matrix:
$A = \begin{bmatrix} 6 & -3 \\ 2 & 0 \end{bmatrix}$

Section C: Short Answer Questions (3 marks each)

9. If $A = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 0 \\ 2 & 5 \end{bmatrix}$, evaluate $2A - 3B$
10. Verify that matrix multiplication is **not commutative** using:
$A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$

Section D: Long Answer Questions (4 marks each)

11. Given $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$, Evaluate AB and BA. Are they equal?
12. If $A = \begin{bmatrix} x & 2 \\ 3 & y \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, and $A + B = \begin{bmatrix} 5 & 4 \\ 6 & 10 \end{bmatrix}$, find the values of x and y.