PRACTICE PAPER

ICSE CLASS 10 – MATHEMATICS

Chapter 9 : Matrices

(Algebra)

Maximum Marks: 40 ***Time allowed: One and a half hours***

1. *Answers to this Paper must be written on the paper provided separately.*
2. *You will not be allowed to write during the first 10 minutes. This time is to be spent in reading the question paper.*
3. ***The time given at the head of this Paper is the time allowed for writing the answers.***
4. *Attempt* ***all*** *questions from* ***Section A*** *and* ***any two*** *questions from* ***Section B****.*
5. ***All working, including rough work, must be clearly shown, and must be done on the same sheet as the rest of the answer.***
6. ***Omission of essential working will result in loss of marks.***
7. *The intended marks for questions or parts of questions are given in brackets [ ].*
8. *I denotes the unit (identity) matrix of order 2 × 2 and O denotes the null (zero) matrix. Show the multiplication of matrices step by step.*

SECTION A (20 Marks)

*(Attempt **all** questions from this Section.)*

Question 1

Choose the correct answers to the questions from the given options. [8]

(Do not copy the question, write the correct answers only.)

(i) A matrix has 12 elements. Which of the following **cannot** be its order?

(a) 3×4

(b) 2×6

(c) 4×3

(d) 5×2

(ii) If $\begin{pmatrix} x+1 & 3 \\ 2 & y-2 \end{pmatrix} = \begin{pmatrix} 4 & 3 \\ 2 & 5 \end{pmatrix}$, then $x + y$ is:

(a) 8

(b) 10

(c) 12

(d) 14

(iii) If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, the element in the 2nd row and 1st column of the transpose A^t is:

(a) 2

(b) 3

(c) 1

(d) 4

(iv) **Assertion (A):** If A is a 2×3 matrix and B is also a 2×3 matrix, the product AB is possible.

Reason (R): The product AB is defined only when the number of columns of A is equal to the number of rows of B.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

(v) The product $\begin{pmatrix} 2 & 3 \end{pmatrix} \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ is:

(a) $\begin{pmatrix} 23 \end{pmatrix}$

(b) $\begin{pmatrix} 8 & 15 \end{pmatrix}$

(c) $\begin{pmatrix} 8 \\ 15 \end{pmatrix}$

(d) not possible

(vi) If $A = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$, then A^2 is:

(a) $\begin{pmatrix} 1 & 4 \\ 0 & 1 \end{pmatrix}$

(b) $\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$

(c) $\begin{pmatrix} 1 & 4 \\ 0 & 2 \end{pmatrix}$

(d) $\begin{pmatrix} 2 & 4 \\ 0 & 2 \end{pmatrix}$

(vii) If $2X = \begin{pmatrix} 4 & -6 \\ 2 & 8 \end{pmatrix}$, then the matrix X is:

(a) $\begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix}$

(b) $\begin{pmatrix} 8 & -12 \\ 4 & 16 \end{pmatrix}$

(c) $\begin{pmatrix} 2 & -6 \\ 1 & 8 \end{pmatrix}$

(d) $\begin{pmatrix} -2 & 3 \\ -1 & -4 \end{pmatrix}$

(viii) **Assertion (A):** For any two 2×2 matrices A and B, $AB = BA$.

Reason (R): Matrix multiplication is not commutative in general.

(a) (A) is true and (R) is false.
(b) (A) is false and (R) is true.
(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).
(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

Question 2

(i) Find the values of x, y and z if $\begin{pmatrix} x + 2y & 3 \\ z - 1 & 2x - y \end{pmatrix} = \begin{pmatrix} 7 & 3 \\ 4 & 4 \end{pmatrix}$. [4]

(ii) Given $A = \begin{pmatrix} 2 & -1 \\ 3 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 4 \\ -2 & 5 \end{pmatrix}$, find the matrix $2A - 3B$. [4]

(iii) If $A = \begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 0 \\ 1 & 4 \end{pmatrix}$, find AB and BA. Is $AB = BA$? [4]

SECTION B (20 Marks)

*(Attempt **any two** questions from this Section.)*

Question 3

(i) Find x and y if $x\begin{pmatrix} 2 \\ 1 \end{pmatrix} + y\begin{pmatrix} -1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$. [3]

(ii) Find the matrix X such that $3X + \begin{pmatrix} 2 & -1 \\ 0 & 4 \end{pmatrix} = \begin{pmatrix} 5 & 2 \\ 6 & 13 \end{pmatrix}$. [3]

(iii) If $A = \begin{pmatrix} 3 & 1 \\ -2 & 0 \end{pmatrix}$ and I is the unit matrix of order 2×2, show that $A^2 - 3A + 2I = O$, where O is the null matrix. [4]

Question 4

(i) Find x and y if $\begin{pmatrix} 2 & 1 \\ 3 & -2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \end{pmatrix}$. [3]

(ii) Find the order and the elements of the matrix M such that $M\begin{pmatrix} 2 & 1 \\ 3 & -1 \end{pmatrix} = \begin{pmatrix} 12 & 1 \end{pmatrix}$. [3]

(iii) Given $A = \begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -3 \\ -1 & 2 \end{pmatrix}$, find AB, BA and A^2. What do you conclude about AB and BA? [4]

Question 5

(i) Find x and y if $\begin{pmatrix} x & 2 \\ 2 & y \end{pmatrix} + \begin{pmatrix} 1 & -2 \\ 4 & 3 \end{pmatrix} = 2\begin{pmatrix} 3 & 0 \\ 3 & 3 \end{pmatrix}$. [3]

(ii) If $A = \begin{pmatrix} 2 & x \\ 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 15 \\ 0 & 1 \end{pmatrix}$, find the value of x given that $A^2 = B$. [3]

(iii) Given $A = \begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 \\ -2 & 1 \end{pmatrix}$ and $C = \begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}$, find the matrix $A^2 - AB + 2C$. [4]

Question 6

(i) Find the order and the elements of the matrix P such that $\begin{pmatrix} 3 & 1 \\ 2 & 1 \end{pmatrix}P = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$. [3]

(ii) A, B and C are matrices of order 2×2. State, with a reason, whether each statement is true or false: [3]

(a) $AB = BA$

(b) $A(BC) = (AB)C$

(c) $(A + B)^2 = A^2 + 2AB + B^2$

(iii) Find the matrices X and Y if $2X + Y = \begin{pmatrix} 5 & 4 \\ 2 & 1 \end{pmatrix}$ and $X - Y = \begin{pmatrix} 1 & -1 \\ 4 & 2 \end{pmatrix}$. [4]

— End of Question Paper —