

Matrices — CBSE Pattern Test 2

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Maths · Matrices · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.
 (2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.
 (3) For MCQ questions choose the single correct option; for VSA answers write a single line.
 (4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

1. An identity matrix is a diagonal matrix with
 - (A) all diagonal elements equal to 1
 - (B) all diagonal elements equal to 0
 - (C) all elements equal to 1
 - (D) only one non-zero element
2. Matrix addition is
 - (A) commutative
 - (B) not commutative
 - (C) not defined
 - (D) only for square matrices
3. If A is of order 2×3 , then $3A$ has order
 - (A) 2×3
 - (B) 6×9
 - (C) 3×2
 - (D) 3×3
4. Matrix multiplication is
 - (A) associative but not commutative in general
 - (B) always commutative
 - (C) never associative
 - (D) only commutative
5. For the identity matrix I, AI equals
 - (A) A
 - (B) I
 - (C) 0
 - (D) 2A
6. A square matrix A is skew-symmetric if
 - (A) $A' = -A$
 - (B) $A' = A$
 - (C) $A' = I$
 - (D) $A = I$
7. A square matrix A is invertible if
 - (A) $|A| \neq 0$

- (B) $|A| = 0$
 (C) A is symmetric
 (D) $A = I$
8. A square matrix has
 (A) number of rows equal to number of columns
 (B) only one row
 (C) only one column
 (D) all elements zero
9. Define scalar multiplication of a matrix.
10. Define the transpose of a matrix.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. State the condition for the product AB to be defined.
12. Is matrix addition commutative?
13. When is a matrix symmetric?
14. If A is 2×3 and B is 3×2 , find the order of AB.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Write an example of a diagonal matrix of order 3.
16. If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, find $A + B$.
17. Find the transpose of $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$.
18. Find X if $2X + A = B$, where $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Construct a 3×2 matrix whose elements are $a_{ij} = 2i - j$. If $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, find $2A + 3B$.
20. Find the matrix $X = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$. Show that $A = \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$ is skew-symmetric.

Answer Key (Marking Scheme)

- Q1 — (A) all diagonal elements 1. Q2 — (A) commutative. Q3 — (A) 2×3 . Q4 — (A) associative but not commutative in general.
- Q5 — (A) A. Q6 — (A) $A' = -A$. Q7 — (A) $|A| \neq 0$. Q8 — (A) rows equal columns.
- Q9 — Multiply each element by the scalar.
- Q10 — Interchange rows and columns.
- Q11 — Columns of A = rows of B.
- Q12 — Yes.
- Q13 — When $A' = A$.
- Q14 — 2×2 .
- Q15 — $\text{diag}(1, 2, 3)$.
- Q16 — $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$.
- Q17 — $\begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$.
- Q18 — $\begin{bmatrix} 1 & -1 \\ -1 & -1 \end{bmatrix}$.

Q19 — 3×2 with $a_{ij} = 2i - j$; $2A + 3B = \begin{bmatrix} 7 & 8 \\ 6 & 11 \end{bmatrix}$.

Q20 — $X = \begin{bmatrix} 2 & 7 \\ 6 & 15 \end{bmatrix}$; $A' = -A$.