

Matrices — CBSE Pattern Test 1

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

Test 1 — 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. A matrix having m rows and n columns has order
 - (A) $m \times n$
 - (B) $n \times m$
 - (C) $m + n$
 - (D) mn
2. A diagonal matrix has
 - (A) all non-diagonal elements zero
 - (B) all elements one
 - (C) all diagonal elements zero
 - (D) no zero elements
3. Two matrices can be added only if
 - (A) they have the same order
 - (B) both are square
 - (C) both are diagonal
 - (D) one is a scalar matrix
4. In scalar multiplication kA , each element of A is
 - (A) multiplied by k
 - (B) added to k
 - (C) divided by k
 - (D) left unchanged
5. The product AB is defined if
 - (A) the number of columns of A equals the number of rows of B
 - (B) A and B have the same order
 - (C) both are square
 - (D) A is a row matrix
6. If A is 2×3 and B is 3×4 , then AB has order
 - (A) 2×4
 - (B) 3×3
 - (C) 4×2
 - (D) 2×3
7. The transpose of a matrix A of order $m \times n$ has order
 - (A) $n \times m$

(B) $m \times n$

(C) $m \times m$

(D) $n \times n$

8. A square matrix A is symmetric if

(A) $A' = A$

(B) $A' = -A$

(C) $A' = 0$

(D) $A = 0$

9. Define the order of a matrix.

10. State the condition for addition of two matrices.

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

11. What is a square matrix?

12. What is an identity matrix?

13. Is matrix multiplication commutative in general?

14. When is a square matrix invertible?

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

15. Construct a 2×2 matrix whose elements are $a_{ij} = i + j$.

16. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, find $2A$.

17. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$, find AB .

18. Show that $A = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$ is symmetric.

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

19. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, find AB and BA and show they differ.

20. Show that $A = \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$ is skew-symmetric. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, verify that $(A')' = A$ and find $|A|$.

Answer Key (Marking Scheme)

Q1 — (A) $m \times n$. Q2 — (A) all non-diagonal elements zero. Q3 — (A) they have the same order. Q4 — (A) multiplied by k .

Q5 — (A) columns of $A =$ rows of B . Q6 — (A) 2×4 . Q7 — (A) $n \times m$. Q8 — (A) $A' = A$.

Q9 — The number of rows and columns ($m \times n$).

Q10 — Same order.

Q11 — Rows equal columns.

Q12 — Diagonal matrix with all diagonal elements 1.

Q13 — No.

Q14 — When $|A| \neq 0$.

Q15 — $\begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$.

Q16 — $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$.

Q17 — $\begin{bmatrix} 4 & 4 \\ 10 & 8 \end{bmatrix}$.

Q18 — $A' = A$.

Q19 — $AB = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$, $BA = \begin{bmatrix} 3 & 4 \\ 1 & 2 \end{bmatrix}$.

Q20 — $A' = -A$; $(A')' = A$; $|A| = -2$.