Maths | JEE

Class 12 Maths - Matrices

JEE track | Short Notes + 5 CBSE-based questions + 5 JEE Main PYQ-based questions with solutions

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Format: Quick revision + solved practice	Chapter scope: Class 12 Maths

1. Quick Short Notes

- A matrix is a rectangular arrangement of numbers in rows and columns. Order of matrix A is m x n.
- Matrices of same order can be added or subtracted element-wise.
- For multiplication AB to exist, number of columns of A must equal number of rows of B.
- Matrix multiplication is generally not commutative: AB need not equal BA.
- Transpose of matrix A is obtained by interchanging rows and columns; denoted A'.
- Identity matrix I behaves like 1 in multiplication: AI = IA = A.
- A square matrix A is invertible only if det(A) is non-zero.
- For a 2 x 2 matrix [[a,b],[c,d]], inverse is (1/(ad-bc)) [[d,-b],[-c,a]].
- Systems of linear equations can be solved by matrix equation AX = B using X = A^-1 B when A is invertible.
- Exam tip: first check order compatibility before attempting multiplication.

2. CBSE-based Board Practice

Q1. Add the matrices A = [[1, 2], [3, 4]] and B = [[5, 6], [7, 8]].

Solution: A + B = [[1+5, 2+6], [3+7, 4+8]] = [[6, 8], [10, 12]].

Q2. Find AB if A = [[1, 2], [3, 4]] and B = [[2, 0], [1, 5]].

Solution: AB = [[1x2 + 2x1, 1x0 + 2x5], [3x2 + 4x1, 3x0 + 4x5]] = [[4, 10], [10, 20]].

Q3. Find the transpose of [[1, -2, 3], [0, 4, 5]].

Solution: Transpose is obtained by interchanging rows and columns: [[1, 0], [-2, 4], [3, 5]].

Q4. State the condition for existence of inverse of a 2 x 2 matrix A = [[a,b],[c,d]]. Also write the inverse formula.

Solution: Inverse exists when ad - bc != 0. Then A^-1 = (1/(ad-bc)) [[d,-b],[-c,a]].

Q5. Solve x + y = 5 and x - y = 1 by matrix method.

Solution: Adding the equations gives 2x = 6, so x = 3. Then y = 2. Therefore solution is x = 3, y = 2.

3. JEE Main PYQ-based Practice

Q1. If A = [[1, 2], [0, 1]], find A^2.

Solution: A^2 = A x A = [[1, 4], [0, 1]].

Q2. If det(A) = 3 for a 2 x 2 matrix, find det(2A).

Solution: For an n x n matrix, det(kA) = k^n det(A). Here n = 2, so det(2A) = 2^2 x 3 = 12.

Q3. What can you say about diagonal entries of a skew-symmetric matrix?

Solution: In a skew-symmetric matrix, A' = -A. Therefore every diagonal entry must satisfy aii = -aii, so aii = 0.

Q4. Find the inverse of A = [[2, 1], [5, 3]].

Solution: det(A) = 2x3 - 1x5 = 1. Hence A^-1 = [[3,-1],[-5,2]].

Q5. Solve the system 2x + y = 7 and 3x - y = 3 using matrix method.

Solution: Adding the equations gives 5x = 10, so x = 2. Substituting in 2x + y = 7 gives y = 3. Hence solution is x = 2, y = 3.

Practice tip: First revise the short notes, then attempt CBSE board questions in written format, and finally solve the exam-specific section in timed mode.