NCERT Solutions Class 12 Maths
Chapter 3: Matrices
Exercise 3.4

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Quick Summary: In NCERT Solutions Class 12 Maths Chapter 3 Exercise 3.4, students learn about symmetric and skew-symmetric matrices through advanced problems involving matrix multiplication and transpose properties. This exercise covers essential concepts like conditions for matrix commutativity, properties of symmetric matrices where A^T = A, and characteristics of skew-symmetric matrices where A^T = -A, which are crucial for CBSE board exams and competitive entrance tests.

Key Takeaways:

- A matrix A is symmetric if A^T = A and skew-symmetric if A^T = -A
- For any square matrix A, (1)/(2)(A + A^T) is symmetric and (1)/(2)(A - A^T) is skew-symmetric
- The product of two symmetric matrices is symmetric only if they commute: AB = BA
- All diagonal elements of a skew-symmetric matrix are zero, making the trace equal to zero

Complete Solutions

Question 1

QUESTION

Matrices A and B will be inverse of each other only if

(A) AB = BA

(B) AB = BA = 0

(C) AB = 0,\; BA = I

(D) AB = BA = I

SOLUTION

The question asks us to identify the condition under which two matrices and are inverses of each other. This tests the fundamental definition of inverse matrices.

Step 1: Recall the definition of inverse matrices

Two matrices and are said to be inverses of each other if and only if their product, in either order, results in the identity matrix .

Mathematically, this is expressed as:

and

Step 2: Analyze option (A)

This condition only states that the matrices commute (i.e., the order of multiplication doesn't matter). It doesn't guarantee that and are inverses. For example, consider and . Then , but if and , then , and neither is the inverse of the other.

Step 3: Analyze option (B)

If the product of two matrices is the zero matrix, it means that the matrices are singular or at least one of them is a zero matrix. Inverse matrices must result in the identity matrix, not the zero matrix.

Step 4: Analyze option (C)

This condition is contradictory. If , then is the inverse of , and must also equal , not .

Step 5: Analyze option (D)

This perfectly matches the definition of inverse matrices. If and , then is the inverse of , and is the inverse of .

Final Answer:

The correct answer is (D) .

ANSWER

(D)

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📐 Key Formulas

Important Formulas for Exercise 3.4

Formula / Concept	Description
Symmetric Matrix	A square matrix A is said to be symmetric if A' = A, where A' is the transpose of A. That is, a_ij = a_ji for all possible values of i and j.
Skew-Symmetric Matrix	A square matrix A is said to be skew-symmetric if A' = -A. This means a_ij = -a_ji for all i and j.
Diagonal Elements of a Skew-Symmetric Matrix	All the diagonal elements of a skew-symmetric matrix are zero.
Properties of Transpose: Transpose of a Transpose	For any matrix A, (A')' = A. Taking the transpose of a transposed matrix results in the original matrix.
Properties of Transpose: Scalar Multiplication	For any matrix A and any scalar k, (kA)' = kA'.
Properties of Transpose: Addition of Matrices	For any two matrices A and B of the same order, (A + B)' = A' + B'.
Properties of Transpose: Multiplication of Matrices	For any two matrices A and B for which the product AB is defined, (AB)' = B'A'.
Theorem 1	For any square matrix A with real number entries, A + A' is a symmetric matrix and A - A' is a skew-symmetric matrix.
Theorem 2	Any square matrix can be expressed as the sum of a symmetric and a skew-symmetric matrix. That is, A = (1)/(2)(A + A') + (1)/(2)(A - A').

Formula / Concept	Description
Associative Property of Matrix Multiplication	For any three matrices A, B, and C for which the products are defined, (AB)C = A(BC).
Distributive Property of Matrix Multiplication	For three matrices A, B, and C for which the operations are defined, A(B + C) = AB + AC.

Top FAQs

Q1. How many questions are in NCERT Solutions Class 12 Maths Chapter 3 Matrices Exercise 3.4 for CBSE board exam 2025-26?

Exercise 3.4 of NCERT Solutions for Class 12 Maths Chapter 3 Matrices contains only 1 question with multiple parts focusing on symmetric and skew-symmetric matrices. This question requires students to express given matrices as sum of symmetric and skew-symmetric matrices, which is crucial for CBSE board exam 2025-26 preparation.

Q2. Where can I download free PDF of NCERT Solutions for Class 12 Maths Chapter 3 Matrices Exercise 3.4 with step by step solutions?

You can download free PDF of NCERT Solutions for Class 12 Maths Chapter 3 Matrices Exercise 3.4 from official educational websites and NCERT portals. These PDFs include complete step by step solutions for symmetric and skew-symmetric matrices problems, helping students prepare effectively for CBSE board exam 2025-26.

Q3. How many marks does Matrices Chapter 3 carry in CBSE Class 12 Maths board exam 2025-26 syllabus?

Matrices Chapter 3 carries approximately 5 marks in CBSE Class 12 Maths board exam 2025-26 as part of Unit II - Algebra. Exercise 3.4 focusing on symmetric and skew-symmetric matrices is particularly important as questions from this topic frequently appear in board examinations and contribute to the overall algebra unit weightage.

Q4. Which is the most difficult question in Exercise 3.4 of NCERT Solutions Class 12 Maths Chapter 3 Matrices for CBSE 2025-26?

Since Exercise 3.4 of NCERT Solutions Class 12 Maths Chapter 3 Matrices contains only 1 question with multiple matrix problems, the difficulty lies in applying transpose properties correctly. Students often find expressing matrices as sum of symmetric and skew-symmetric matrices challenging, requiring thorough understanding of matrix multiplication properties and step by step practice for CBSE board exam 2025-26.

Q5. What is Matrix Multiplication Properties in NCERT Solutions for Class 12 Maths Chapter 3 Matrices Exercise 3.4?

Matrix Multiplication Properties in NCERT Class 12 Maths Chapter 3 Exercise 3.4 include concepts like (AB)^T = B^T A^T and properties of symmetric matrices where A^T = A. These properties are essential for solving Exercise 3.4 problems involving symmetric and skew-symmetric matrices decomposition, making them crucial topics for CBSE board exam 2025-26 preparation.

📚 More Exercises

Visit all exercises from Chapter 3:

Exercise 3.1 →

Exercise 3.2 →

Exercise 3.3 →

Exercise 3.4 ✓ →

Miscellaneous Exercise on Chapter 3 →

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