

**XII****MIND CURVE** Mid Term Maths Test Series 2026-27**Test 02**

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S no	Syllabus Covered	Chapters(In Half Yearly)	Marking Scheme
1.	Chapter 3	Matrices	24
2	Chapter 4	Determinants	16

Note: Students/Teachers can refer to this Sample Paper for practice purpose. However, students may find or experience different exam pattern as syllabus or marking scheme may vary school to school.

MM:40

GENERAL INSTRUCTIONS

Time 1.5Hrs

READ CAREFULLY ALL INSTRUCTIONS

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 10 MCQs carrying 1 mark each
3. Section B has 3 questions carrying 02 marks each.
4. Section C has 2 questions carrying 03 marks each.
5. Section D has 2 case based integrated units of assessment (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.
6. Section E has 2 questions carrying 05 marks each
7. All Questions are compulsory.
8. This paper consists of 19 questions.
 - a. Write your answers neatly and legibly.
 - b. Ensure you have not left any question unanswered

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If $\begin{pmatrix} a & c & 0 \\ b & d & 0 \\ 0 & 0 & 5 \end{pmatrix}$ is a scalar matrix, then the value of $a+2b+3c+4d$ is

(a) 0 (b) 5 (c) 10 (d) 25

2. If $\begin{pmatrix} -2 & 0 & 0 \\ 1 & 2 & 3 \\ 5 & 1 & -1 \end{pmatrix}$, then the value of $|A(adjA)|$

(a) 10001 (b) 101 (c) 10 (d) 1000

3. The maximum value of determinant of $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 1 + \sin x & 1 \\ 1 & 1 & 1 + \cos x \end{pmatrix}$ is

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}$ (c) $\frac{\sqrt{2}}{2}$ (d) $2\sqrt{3}$

4. If $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then A^{10} is

(a) 512A

(b) 9A

(c) 29A

(d) 210A

5. If a matrix A is both symmetric and skew – symmetric, then A is necessarily a

(a) diagonal matrix

(b) Zero square matrix

(c) square matrix

(d) identity matrix

6. Which of the following statements is not correct?

(a) A row matrix has only one row.

(b) A diagonal matrix has all diagonal elements equals to zero.

(c) A symmetric matrix is a square matrix satisfying certain conditions

(d) A skew –symmetric matrix has all diagonal elements equal to zero.

7. If M and N are square matrices of order 3 where $\det(M) = 2$ and $\det(N) = -3$ then $\det(4MN)$ is

(a) -24

(b) -64

(c) -196

(d) -384

8. If $A \cdot (\text{adj } A) = \begin{bmatrix} -3 & 0 & 0 \\ 0 & -3 & 0 \\ 0 & 0 & -3 \end{bmatrix}$ then the value of $|A| - |\text{adj } A|$ is equal to:

(a) 3

(b) -12

(c) 6

(d) 9

Question numbers 9 and 10 are Assertion and Reason based questions

Two statements are given, one labelled as Assertion (A) and the other is labelled as Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion.

(c) Assertion (A) is true, but Reason (R) is false.

(d) Assertion (A) is false, but Reason (R) is true.

9. **Assertion (A):** For any two matrices of the same order, $(A + B)^T = A^T + B^T$.

Reason (R): For any two matrices such that AB is defined, then $(AB)^T = A^T B^T$

10. **Assertion (A):** If the matrix A is $\begin{pmatrix} 1 & 3 & K+2 \\ 2 & 4 & 8 \\ 3 & 5 & 10 \end{pmatrix}$ singular, then $k=4$

Reason (R) : If A is a singular matrix, then $|A| = 0$.

SECTION – B

Questions 11 to 13 carry 2 mark each.

11(A). If B is skew symmetric matrix, check where the matrix (ABA^T) is symmetric or skew symmetric
Or

11(B). Express $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ as the sum of symmetric and skew symmetric matrices.

12. If $\begin{bmatrix} 9 & -1 & 4 \\ -2 & 1 & 3 \end{bmatrix} = A + \begin{bmatrix} 1 & 2 & -1 \\ 0 & 4 & 9 \end{bmatrix}$, then find the matrix A

13(A). If A and B are symmetric matrices such that AB and BA are both defined, then prove that AB+BA is symmetric matrix and AB-BA is a skew-symmetric matrix.

or

13(B). If $A = \begin{bmatrix} 3 & 9 & 0 \\ 1 & 8 & -2 \\ 7 & 5 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 0 & 2 \\ 7 & 1 & 4 \\ 2 & 2 & 6 \end{bmatrix}$ then find the matrix $B^T A^T$.

SECTION – C

Questions 14 to 15 carry 3 mark each

14 (A). If $X \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$, then find the matrix X

Or

14 (B). If $\cos 2\theta = 0$, then prove that $\begin{vmatrix} 0 & \cos\theta & \sin\theta \\ \cos\theta & \sin\theta & 0 \\ \sin\theta & 0 & \cos\theta \end{vmatrix}^2 = \frac{1}{2}$

15. Using determinants, find the area of ΔPQR with the vertices P(3,1), Q(9,3) and R (5,7). Also find the equation of line PQ using determinants.

SECTION – D

Questions 16 to 17 carry 4 mark each.

16. Ashish wants to purchase a rectangular plot from his neighbour to construct a house. He asked about the dimensions of the plot, his neighbour told that if the length is decreased by 20m and breadth is increased by 30 m, the area will increase by 1400m^2 , but If the length is decreased by 50m and the breadth is increased by 50m, then the area will remain the same.

Based on the information given above, answer the following questions

- (i) Let x and y denote the length and breadth of the plot, find equations in terms of.
- (ii) Represent the information in matrix form.

(iii)(a) If $A = \begin{bmatrix} 3 & -2 \\ 1 & -1 \end{bmatrix}$, Find AA^T .

OR

(iii)(b) If $P = \begin{bmatrix} 1 & -1 \\ 3 & -2 \end{bmatrix}$, and $Q = \begin{bmatrix} 200 \\ 50 \end{bmatrix}$ Find PQ and QP.

17. A company produces three products every day. Their production on certain day is 45 tons. It is found that the production of the third product exceeds the production of first product by 8 tons while the total production of first and third product is twice the production of second product.

Based on the above information answer the following questions:

- (i) If x , y and Z respectively denote the quantity (in tons) of first, second and third product produced. represent the system of equation.

(ii) If $A = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 0 & -2 \\ 1 & 1 & 1 \end{bmatrix}$ and its inverse is $\frac{1}{6} \begin{bmatrix} 2 & 2 & 2 \\ -3 & 0 & 3 \\ 1 & -2 & 1 \end{bmatrix}$ using the result solve x , y and z from the obtained system of equation by matrix method.

SECTION – E

Questions 18 to 19 carry 5 mark each.

18. If $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ then prove that $A^3 - 6A^2 + 9A - 4I = 0$.

19(A). Use the product of matrix $\begin{pmatrix} 1 & 1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{pmatrix} \begin{pmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{pmatrix}$ to solve the system of equations.

$$x + 3z = 9$$

$$x + 2y - 2z = 4$$

$$2x - 3y + 4z = -3$$

Or

19(B). Find A^{-1} , if $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 1 & 0 & 1 \end{pmatrix}$ Hence, solve the following system of equations:

$$x + 2y + z = 5$$

$$2x + 3y - z = 1$$

$$x + z = 8$$

_____end_____



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