Class 12: Matrices and Determinants
Test-1, 2026

Maximum Marks 40   Duration: 90 mins

Section A
Questions 1 to 10 carry 1 mark each

1. If $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$ find x

   (A) $\sqrt{5}$ (B) 9   (C) $\sqrt{3}$ (D) 25

2. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, for any natural number n, then the value of $Det(A^n)$ is equal to

   (A) 3   (B) 1   (C) -1   (D) 2

3. Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ be a square matrix such that $adj\ A = A$. Then $(a + b + c + d)$ is equal to

   (A) 2a   (B) 2b   (C) 2c   (D) 0

4. If the determinant is $\begin{vmatrix} -3 & 4 & 1 \\ 2 & 7 & 0 \\ 5 & 6 & -8 \end{vmatrix}$, find the value of $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$, where A_{ij} is the co-factor of the element a_{ij}

   (A) 109   (B) 418   (C) 209   (D) 218

5. If $A = \begin{bmatrix} 1 & 4 & x \\ z & 2 & y \\ -3 & -1 & 3 \end{bmatrix}$ is a symmetric matrix, then value of $x + y + z$ is

   (A) 10   (B) 6   (C) 8   (D) 0

6. If A is a square matrix of order 3 and $|A| = 5$, then the value of $|A.adjA|$ is

   (A) 124   (B) 125   (C) 625   (D) 25

7. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ and $A + A^T = I$, then the value of θ is equal

   (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{5}$ (D) $\frac{\pi}{6}$

8. A and B are skew-symmetric matrices of the same order. AB is symmetric if

   (A) $AB = 0$ (B) $AB = -BA$ (C) $AB = BA$ (D) $BA = 0$

9. If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$, then A^{-1} is

   (A) $\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{5} \end{bmatrix}$ (B) $30\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{5} \end{bmatrix}$ (C) $\frac{1}{30}\begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ (D) $\frac{1}{30}\begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{5} \end{bmatrix}$

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10. If $A = [a_{ij}]$ is an identity matrix, then which of the following is true?

(A) $a_{ij} = \begin{cases} 0, & if\ i = j \\ 1, & if\ i \neq j \end{cases}$

(B) $a_{ij} = 1, \forall\ i, j$

(C) $a_{ij} = 0, \forall\ i, j$

(D) $a_{ij} = \begin{cases} 0, & if\ i \neq j \\ 1, & if\ i = j \end{cases}$

Section B
Questions 11 to 12 carry 2 marks each

11. Given $A.(adjA) = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ then find the value of $|A| + |adj\ A|$.

12. If the area of triangle is 35 sq units with vertices (2, -6), (5, 4) and (k, 4). Then find the value of k.

Section C
Questions 13 to 16 carry 3 marks each

13. If the matrix $A = \begin{bmatrix} 6 & x & 2 \\ 2 & -1 & 2 \\ -10 & 5 & 2 \end{bmatrix}$ is a singular matrix, find the value of x.

14. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = 0$. Hence find A^{-1}.

15. If A, B are square matrices of the same order, then prove that $Adj(AB) = Adj(B)Adj(A)$.

16. Find the value of K, such that the following points are collinear $A(-3, 7), B(7, k)\ and\ C(2, 1)$.

Section D
Questions 17 to 18 carry 5 marks each

17. If $\begin{vmatrix} 3 & 4 & 2 \\ 0 & 2 & -3 \\ 1 & -2 & 6 \end{vmatrix}$, find A^{-1}. Hence solve the system of equations

$$3x + 4y + 2z = 8$$
$$2y - 3y = 3$$
$$x - 2y + 6z = -2$$

18. If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, then show that $A^3 - 6A^2 + 7A + 2I = 0$.

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19. A scholarship is a sum of money provided to a student to help him or her pay for education. Some students are granted scholarships based on their academic achievements, while others are rewarded based on their financial needs.

Every year a school offers scholarships to girl children and meritorious achievers based on certain criteria. In the session 2022–23, the school offered monthly scholarships of ₹3,000 each to some girl students and ₹4,000 each to meritorious achievers in academics as well as sports.

In all, 50 students were given the scholarships, and the monthly expenditure incurred by the school on scholarships was ₹1,80,000.

Based on the above information, answer the following questions:
  (i)   Express the given information algebraically using matrices.
  (ii) Check whether the system of matrix equations so obtained is consistent or not.
  (iii) **(A).** Find the number of scholarships of each kind given by the school using matrices.
        OR
  (iii) **(B).** Had the amount of scholarship given to each girl child and meritorious student been interchanged, what would be the monthly expenditure incurred by the school?

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