CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Mathematics

Total : 11 Marks (expected) [MCQ-1 Mark, VSA-2 Marks, SA-3 Marks, LA-5 Marks]

Chapter Name : *Determinant* (Chap : 4)

Level 1 & 2 Combined

SECTION – A

MCQ Type (1 mark each):

1. The value of $\begin{vmatrix} a & b & a \\ a & b & b \\ a & b & c \end{vmatrix}$ is

Ⓐ –1 Ⓑ 1 Ⓒ 0 Ⓓ 2

[Hints : Properties of determinant]

2. The determinant $\begin{vmatrix} a & b & a\alpha+b \\ b & c & a\alpha+c \\ a\alpha+b & b\alpha+c & 0 \end{vmatrix} = 0$ if a, b, c are in

Ⓐ A.P Ⓑ G.P Ⓒ H.P Ⓓ none of these

[Hints : Properties of determinant]

3. Let A be a square matrix of order 3 × 3, then |KA| is equal to

Ⓐ K|A| Ⓑ $K^2|A|$ Ⓒ $K^3|A|$ Ⓓ 3K|A|

[Hints : Properties of determinant]

4. Let A be a square matrix of order 3 × 3 then (adj KA) is equal to

Ⓐ K(adj A) Ⓑ K^2(adj A) Ⓒ K^3(adj A) Ⓓ 3K(adj A)

[Hints : Properties of adjacent]

5. Let A be a square matrix of order 3 × 3 and |A| ≠ 0 then (adj A^{-1}) is equal to,

Ⓐ $\frac{A}{|A|}$ Ⓑ $\frac{|A|}{A}$ Ⓒ A|A| Ⓓ none of these

[Hints : Properties of adjoint]

6. Let $p\lambda^4+q\lambda^3+r\lambda^2+s\lambda+t = \begin{vmatrix} \lambda^2+3\lambda & \lambda-1 & \lambda-3 \\ \lambda-1 & -2\lambda & \lambda-4 \\ \lambda-3 & \lambda+3 & 3\lambda \end{vmatrix}$ be an identity in λ, where p, q, r, s and t are constants. Then the value of t is

Ⓐ –3 Ⓑ 3 Ⓒ –6 Ⓓ 6

[Hints : put $\lambda = 0$]

7. Homogeneous system of equation will have non-trival solution iff

Ⓐ D = 0 Ⓑ D ≠ 0 Ⓒ D = –1 Ⓓ D = 1

[Hints : Homogeneous system]

SECTION – B

Very Short Answer (VSA) (2 marks each questions):

1. Evaluate : $\begin{vmatrix} 0 & \sin\alpha & -\cos\alpha \\ \sin\alpha & 0 & \sin\beta \\ \cos\alpha & -\sin\beta & 0 \end{vmatrix}$.

[Hints : Expansion of determinant]

2. Without expanding show that $\begin{vmatrix} 0 & x & y \\ -x & 0 & z \\ -y & -z & 0 \end{vmatrix} = 0$.

[Hints : Properties of determinant]

3. Find the real values of K for which the following system of linear equations has non-trivial solutions:

   $x - ky - z = 0,\ kx - y - z = 0,\ x + y - z = 0.$

[Hints : Determinant = 0]

4. Find the reciprocal determinant of $\begin{vmatrix} 4 & 1 \\ 7 & 3 \end{vmatrix}$

[Hints : $\dfrac{\mathbf{adj(A)}}{\mathbf{|A|}}$]

5. Solve by Cramer's rule: $\left.\begin{aligned} 2x + y &= 3 \\ x - 2y &= -1 \end{aligned}\right\}$

[Hints : Cramer's rule]

6. Calculate the area of the ΔABC where A = (1, 0), B = (0, 1) and C(1, 1) using determinant.

[Hints : Area $= \dfrac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$ **]**

7. Find the equation of the straight line passing through the point (–1, –1) and (1, 1) using determinant.

[Hints : $\begin{vmatrix} x & y & 1 \\ -1 & -1 & 1 \\ 1 & 1 & 1 \end{vmatrix} = 0$ **]**

SECTION – C

Short Answer (SA) (3 marks each questions):

1. Let, $A = \begin{vmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{vmatrix}$. Prove that $2 \le A \le 4$.

[Hints : Determinant]

2. If $A = \begin{bmatrix} 2 & 5 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -3 \\ 2 & 5 \end{bmatrix}$, verify that $|AB| = |A|\,|B|$.

[Hints : |AB| = |A| |B|]

3. Show that $\begin{vmatrix} 1 & a & a^2 \\ a^2 & 1 & a \\ a & a^2 & 1 \end{vmatrix}$ is a perfect square.

[Hints : expanding by using property]

4. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+a & 1 \\ 1 & 1 & 1+a \end{vmatrix} = a^3 + 3a^2$.

[Hints : Properties of determinant]

5. Find the adjugate of the determinant $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 2 \end{vmatrix}$.

[Hints : Concept of adjugate]

6. Find the reciprocal of the determinant $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 1 \\ 3 & 2 & 3 \end{vmatrix}$.

[Hints : Concept of reciprocal]

7. Find the area of the triangle whose vertices are $(at_1^2, 2at_1)$, $(at_2^2, 2at_2)$, $(at_3^2, 2at_3)$.

[Hints : Area $= \frac{1}{2}\begin{vmatrix} at_1^2 & 2at_1 & 1 \\ at_2^2 & 2at_2 & 1 \\ at_3^2 & 2at_3 & 1 \end{vmatrix}$ **]**

SECTION – D

Long Answer (LA) (5 marks each questions):

1. Solve by Cramer's rule: $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=1$

$$\frac{2}{x}+\frac{5}{y}+\frac{3}{2}=0$$

$$\frac{1}{x}+\frac{2}{y}+\frac{4}{2}=3$$

[Hints : Use Cramer's rule]

2. Evaluate $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix}$ and hence show that $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ca & bc & -c^2 \end{vmatrix} = 4a^2b^2c^2$

[Hints : $\Delta' = \Delta^2$]

3. If $f(x)=\begin{vmatrix} \sin x & \cos x & \tan x \\ x^3 & x^2 & x \\ 2x & 1 & 1 \end{vmatrix}$ then show that $\lim_{x\to 0}\frac{f(x)}{x^2}=1$

[Hints : Properties of determinant]

4. If $\begin{vmatrix} -a^2 & ab & ac \\ ab & -b^2 & bc \\ ac & bc & -c^2 \end{vmatrix} = \lambda a^2 b^2 c^2$, then find the value of λ.

[Hints : Properties of determinant]

5. If $f(\theta) = \begin{vmatrix} \cos^2\theta & \cos\theta.\sin\theta & -\sin\theta \\ \cos\theta.\sin\theta & \sin^2\theta & \cos\theta \\ \sin\theta & -\cos\theta & 0 \end{vmatrix}$, then find the value of $f\left(\frac{\lambda}{6}\right)$

[Hints : Properties of determinant]

6. Prove that $\begin{vmatrix} \alpha & \beta & \gamma \\ \alpha^2 & \beta^2 & \gamma^2 \\ \beta+\gamma & \gamma+\alpha & \alpha+\beta \end{vmatrix} = (\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)(\alpha+\beta+\gamma)$

[Hints : Properties of determinant]

7. Evaluate: $\begin{vmatrix} a & a+b & a+b+c \\ 2a & 3a+2b & 4a+3b+2c \\ 3a & 6a+3b & 10a+6b+3c \end{vmatrix}$

[Hints : Properties of Determinant]

ANSWER

SECTION — A

1. (C)	**2.** (B)	**3.** (C)	**4.** (B)	**5.** (A)	**6.** (A)	**7.** (A)

SECTION — B

1. 0, **3.** 1, -1, **4.** $\begin{vmatrix} \frac{3}{5} & -\frac{1}{5} \\ \frac{-7}{5} & \frac{4}{5} \end{vmatrix}$, **5.** x = 1, y = –1, **6.** $\frac{1}{2}$, **7.** y = x

SECTION — C

5. $\begin{vmatrix} -2 & 10 & -7 \\ 2 & -7 & 4 \\ -3 & 6 & -3 \end{vmatrix}$, **6.** $\begin{vmatrix} -\frac{4}{9} & \frac{1}{3} & \frac{2}{9} \\ \frac{1}{36} & \frac{1}{6} & -\frac{5}{36} \\ \frac{7}{12} & -\frac{1}{2} & \frac{1}{12} \end{vmatrix}$, **7.** $a^2 |(t_1 - t_2)(t_2 - t_3)(t_3 - t_1)$ sq unit.

SECTION — D

4. $\lambda = 4$, **5.** $f\left(\frac{\lambda}{6}\right) = 1$, **7.** a^3