RK VISION ACADEMY

NEET | IIT – JEE | FOUNDATION

CBSE PRACTICE PAPER(2024)

(Mathematics)

Grade : XII **Marks: 40 marks**

Chapter: DETERMINANTS Set-1 **Time: 90 minutes**

SECTION A

(This section comprises of Multiple-choice questions (MCQ) of 1 mark each.)

1. If A and B are invertible square matrices of the same order, then which of the following is not correct?

(a) adj A = $|A|.A^{-1}$ (b) $\det(A)^{-1} = [\det(A)]^{-1}$ (c) $(AB)^{-1} = B^{-1}A^{-1}$ (d) $(A + B)^{-1} = B^{-1} + A^{-1}$

2. If the area of the triangle with vertices (-3, 0), (3, 0) and (0, k) is 9 sq units, then the value(s) of k will be

(a) 9 (b) ± 3 (c) -9 (d) 6

3. The value of |A|, if

$$A = \begin{bmatrix} 0 & 2x-1 & \sqrt{x} \\ 1-2x & 0 & 2\sqrt{x} \\ -\sqrt{x} & -2\sqrt{x} & 0 \end{bmatrix}, \text{ where } x \in R^+,$$

(a) $(2x + 1)^2$ (b) 0 (c) $(2x +1)^3$ (d) None of these

4. Given that A is a square matrix of order 3 and |A| = -2, then |adj (2A)| is equal to

(a) -2^6 (b) 4 (c) -2^8 (d) 2^8

5. If A is a square matrix of order 3, such that A(adj A) = 10I, then |adj A| is equal to

(a) 1 (b) 10 (c) 100 (d) 101

6. Evaluate the determinant

$$\begin{vmatrix} x-1 & 1 \\ x^3 & x^2+x+1 \end{vmatrix}$$

(a) 3 (b) 0 (c) -1 (d) 1

7. If A is a 3 × 3 matrix such that |A| = 8, then |3A| equals

(a) 8 (b) 24 (c) 72 (d) 216

8. $\text{If } \begin{vmatrix} 2 & 2 \\ 2 & 3 \end{vmatrix} = \begin{vmatrix} 3x & 1 \\ 4x & 2 \end{vmatrix}$, then x equals

(a) 1 (b) 2 (c) 3 (d) 4

9. The value of determinant

$$\begin{vmatrix} 1 & 4 & 3 \\ 9 & -1 & 4 \\ 5 & 0 & 2 \end{vmatrix} \text{ is}$$

(a) 21 (b) 166 (c) 64 (d) None of these

10 $\text{The value of } \begin{vmatrix} x & -7 \\ x & 5x+1 \end{vmatrix} \text{ at } x = -1 \text{ is}$

(a) -1 (b) -3 (c) 2 (d) -5

SECTION B

(This section comprises of very short answer type-questions (VSA) of 2 marks each.)

11 The determinant $\begin{vmatrix} \sin A & \cos A & \sin A + \cos B \\ \sin B & \cos A & \sin B + \cos B \\ \sin C & \cos A & \sin C + \cos B \end{vmatrix}$ is equal to zero.

12 If $\begin{vmatrix} x & \sin A & \cos A \\ -\sin A & -x & 1 \\ \cos A & 1 & x \end{vmatrix} = 8$, write the value of x.

13 In the interval it $\pi/2 < x < \pi$, find the value of x for which the matrix $\begin{bmatrix} 2\sin x & 3 \\ 1 & 2\sin x \end{bmatrix}$ is singular.

SECTION C

(This section comprises of short answer type questions (SA) of 3 marks each)

14 If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 2 & -4 \\ -4 & 2 & -4 \\ 2 & -1 & 5 \end{bmatrix}$,

then find AB. Use this to solve the system of equations
x – y = 3, 2x + 3y + 4z = 17 and y + 2z =7.

15 Show that $A = \begin{bmatrix} 1 & 0 & -2 \\ -2 & -1 & 2 \\ 3 & 4 & 1 \end{bmatrix}$ satisfies the

equation $A^3 - A^2 - 3A - 1 = 0$.

16 Find the inverse of the matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\alpha & \sin\alpha \\ 0 & \sin\alpha & -\cos\alpha \end{bmatrix}.$$

SECTION D

(This section comprises of long answer-type questions (LA) of 5 marks each)

17 Using the matrix method, solve the following system of linear equations.

$$\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4, \frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1,$$

$$\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2$$

18 If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, then find A^{-1}.

Using A^{-1} solve the following system of equations
2x – 3y + 5z = 11
3x + 2y – 4z = -5
x + y – 2z = -3

19 Area of a triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by

$$\Delta = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

Since, area is position quantity, so always we take the absolute value of the determinant Δ. Also, the area of the triangle formed by three collinear points is zero.
Based on above information, answer the following questions.
(i) Find the area of the triangle whose vertices are (- 2, 6), (3, – 6) and (1, 5).
(ii) Find the equation of the line joining the points (1, 2) and (3, 6).
(iii) Find the value of k, if area of a AABC with vertices A(1, 3), 5(0, 0) and C(k, 0) is 3 sq units.
Or

Find the value of k, if the points (2, -3), (k, -1) and (0, 4) are collinear.