SNS ACADEMY
BOARD MATRICES AND DETERMINANTS

12th Standard

Maths

Date : 06-Mar-24

Reg.No. :

Exam Time : 00:02:00 Hrs

Total Marks : 100

10 x 1 = 10

1) If area of triangle is 35 sq units with vertices (2, – 6), (5, 4) and (k, 4). Then k is

(a) 12 (b) –2 (c) –12, –2 (d) 12, –2

2) If $\Delta = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ and A_{ij} is Cofactors of aij, then value of Δ is given by

(a) $a_{11} A_{31} + a_{12} A_{32} + a_{13} A_{33}$ (b) $a_{11} A_{11} + a_{12} A_{21} + a_{13} A_{31}$

(c) $a_{21} A_{11} + a_{22} A_{12} + a_{23} A_{13}$ (d) $a_{11} A_{11} + a_{21} A_{21} + a_{31} A_{31}$

3) Let A be a nonsingular square matrix of order 3 × 3. Then |adj A| is equal to

(a) |A| (b) $|A|^2$ (c) $|A|^3$ (d) 3|A|

4) If A is an invertible matrix of order 2, then det (A^{-1}) is equal to

(a) det (A) (b) $\frac{1}{det(A)}$ (c) 1 (d) 0

5) Total number of possible matrices of order 2 × 3 with each entry 1 or 0 is

(a) 6 (b) 36 (c) 32 (d) 64

6) If A is a square matrix such that $A^2=A$, then $(I + A)^2 – 3A$ is

(a) I (b) 2A (c) 3I (d) A

7) If $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then A^6 is equal to

(a) zero matrix (b) A (c) I (d) none of these

8) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ then A^2 - 5A - 7I iS

(a) a zero matrix (b) an identity matrix (c) diagonal matrix (d) none of these

9) If A and B are invertible matrices, then which of the following is not correct?

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

(d) $(A+B)^{-1} = B^{-1} + A^{-1}$

10) If A is singular matrix and $(\operatorname{adj} A)B \neq O$ then

(a) there is unique solution (b) solution does not exist

(c) there are infinitely many solutions (d) None of the above

10 x 2 = 20

11) If is $A = \begin{bmatrix} 0 & b & -2 \\ 3 & 1 & 3 \\ 2a & 3 & -1 \end{bmatrix}$ skew symmetric matrix, find the values of a and b.

12) If $A = \begin{bmatrix} 0 & x & -4 \\ -2 & 0 & -1 \\ y & -1 & 0 \end{bmatrix}$ is skew symmetric matrix, find the values of x and y.

13) Find $\frac{1}{2}\left(A + A'\right)$ and $\frac{1}{2}\left(A - A'\right)$. If $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$

14) Find the area of the triangle whose vertices are (-2, - 3), (3, 2) and (-1, - 8).

15) If the points (a_1, b_1), (a_2, b_2) and $(a_1 + a_2, b_1 + b_2)$ are collinear, then show that $a_1b_2 = a_2b_1$

16) Find the equation of the line joining (1,2) and (3, 6) using determinants.

17) If area of a triangle is 35 sq units with vertices (2,- 6), (5,4) and (k, 4), then find the values of k.

18) Find the value of k, if the points (k + 1,1), (2k + 1, 3) and (2k + 2, 2k) are collinear.

19) Using matrix method, solve the following system of equations for x, y and z:
$\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10, \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10, \frac{3}{x} - \frac{1}{y} + \frac{2}{z} = 13$

20) Show that $A = \begin{bmatrix} -8 & 5 \\ 2 & 4 \end{bmatrix}$ satisfies the equation $x^2 + 4x - 42 = O$. Hence, find A^{-1}

4 x 3 = 12

21) Solve the system of linear equations, using matrix method in
5x + 2y = 3
3x + 2y = 5

22) Solve the system of linear equations, using matrix method in
2x + 3y + 3z = 5
x - 2y + z = -4
3x - y - 2z = 3

23) If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1}A^{-1}$.

24) Verify A (adj A) = (adj A) A = |A| I in
$\begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & -2 \\ 1 & 0 & 3 \end{bmatrix}$

14 x 5 = 70

25) Express the following matrix as the sum of a symmetric and a skew symmetric matrix, and verify your result : (i) $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$

(ii) $\begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$

(iii) $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

(iv) $\begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$

26) Let $A = \begin{bmatrix} 0 & -tan\frac{\alpha}{2} \\ tan\frac{\alpha}{2} & 0 \end{bmatrix}$ and /the identity matrix of order 2×2, show that

$l + A = (l - A)\begin{bmatrix} cos\alpha & -sin\alpha \\ sin\alpha & cos\alpha \end{bmatrix}$

27) If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, find k so that $A^2 = kA - 2I$

28) If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, prove that $A^3 - 6A^2 + 7A + 2I = 0$

29) Use product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the system of equations. x - y + 2z = 1;
2y - 3z = 1;
3x - 2y + 4z = 2

30) If $A^{-1} = \begin{bmatrix} 3 & -1 & 1 \\ -15 & 6 & -5 \\ 5 & -2 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ find $(AB)^{-1}$

31) If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1} Hence solve the system of equations:
2x - 3y + 5z = 11,
3x + 2y - 4z = -5,
x + y - 2z = -3.

32) $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, then verify that $A^3 - 6A^2 + 9A - 4I = 0$ and hence find A^{-1} .

33) If $A = \begin{bmatrix} 2 & 3 & 10 \\ 4 & -6 & 5 \\ 6 & 9 & -20 \end{bmatrix}$ find A^{-1}Using A^{-1},
solve the system of equations $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 2$, $\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 5$ and $\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = -4$

34) If f(x)=, $\begin{bmatrix} cos\ x & -sin\ x & 0 \\ sin\ x & cos\ x & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then show that f(x) f(y)= f(x+y).

35) $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ $and \quad B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$, find the product AB and use this result to solve the following system of linear equations:
2x - y + z = -1
-x + 2y - z = 4
x - y + 2z = -3

36) Determine the product $\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix} \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$, and use it to solve the system of equations: x - y + z = 4, x - 2y - 2z = 9, 2x + y + 3z = 1.

37) If $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 2 \\ -3 & 1 & -1 \end{bmatrix}$,find $A^{-1}$and hence solve the system of equations 2x + y-3z =13, 3x+2y+z=4 and x+2y-z=8.

38) Use product $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} \begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$ to solve the system of equations x + 3z = 90,- x + 2y - 2z = 4 and 2x - 3Y + 4z = 3.

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