CHAPTER-4

DETERMINANTS

01 MARK TYPE QUESTIONS

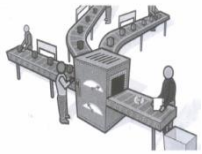
Q. NO	QUESTION	MARK
1.	If $\begin{vmatrix} 3x & 3 \\ 8 & x \end{vmatrix} = \begin{vmatrix} 2 & 4 \\ -3 & 9 \end{vmatrix}$, then x=? a. -2 b.3√2 c.2√2 d.2	1
2.	At a Party, there were some sandwiches of the same size, Alia took 1 slice of a sandwich. Now to find the area of the sandwich which is taken by Alia? (Using the concept of determinants)  a. 5 c.m^2 b. 1 c.m^2 C. 2 c.m^2 4. 4 c.m^2	1
3.	For what value of x, the following matrix is singular? $\begin{bmatrix} 3-x & 2 \\ x+1 & 3 \end{bmatrix}$ a. 4/2 b. 7/2 c. 7/5 d. 9/5	1
4.	A matrix A of order 3 x 3 has determinant 8. What is the value of |4A| a. 613 b. 421 c. 512 d. 291	1
5.	A Boy Monty brought 2 Bags, 1 Pen and 3 pencils and Paid 25 rupees, In same shop Nihar bought 3 bags, 2 pens & 1 Pencil and Paid 40 rupees and Pabitra brought 1 Bag, 3 pens & 2 Pencil and paid 30 rupees. Now construct the matrix formation.	1

	  a $\begin{bmatrix}2 & 1 & 3\\3 & 1 & 1\\1 & 2 & 3\end{bmatrix}$ b. $\begin{bmatrix}2 & 1 & 3\\2 & 3 & 1\\3 & 1 & 2\end{bmatrix}$ c. $\begin{bmatrix}2 & 1 & 3\\3 & 2 & 1\\1 & 3 & 2\end{bmatrix}$ d. $\begin{bmatrix}2 & 3 & 1\\3 & 1 & 2\\2 & 1 & 3\end{bmatrix}$	
6.	Write the value of $\begin{vmatrix} cos40 & sin50 \\ sin40 & cos50 \end{vmatrix}$ a.0 b. 1 C. 2 d. None of the above	1
7.	Find values of K if area of triangle is 9 sq. units and vertices are (4, k), (2,0), (3,1) a. K= 16 b. K = 8 c. k= 7 d. k = -16	1
8.	Assertion & Reason based questions (i) Assertion: A square matrix is called determinant. R= Reason: A matrix has order 3 X 3, which is known as square matrix a. Both A and R are individually true and R is the correct explanation of A b. Both A and R are individually true & R is not the correct explanation of A c. A is true but R is false d. A is false but R is true	1
9.	Rita went to market and bought 2 Kurtis and 1 jean, and Preeti also went to market and bought 1 Kurti and 3 jeans Solve the above question using determinant method	1

	 (I) The order of the above matrix. a. 3 X 3 b. 2 X 2 c. 2 X 1 d. 1 X 2	
10.	Find the determinant of above matrix a. |A|= 3 b. |A| = 4 c. |A| = 5 d. |A|= 7	1
11.	Let A be a square matrix of order 3×3 such that $\|A\| = 2$, then the value of $\|4A\|$? (a) 128 (b) 64 (c) 8 (d) 16	1
12.	The co-factor of a_{32} in the determinant $\begin{vmatrix} 2 & 0 & 1 \\ 5 & 3 & 8 \\ 3 & 2 & 1 \end{vmatrix}$ is ? (a) 11 (b) -11 (c) 12 (d) 10	1
13.	If $\begin{bmatrix} 3p & -6 \\ 1 & 2 \end{bmatrix}$ is a singular matrix, then the value of 'p' is (a) 2 (b) 3 (c) 0 (d) 1	1
14.	If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$, then the value of $\|adj.A\|$ is ? (a) 2^4 (b) 2^6 (c) 2^3 (d) 2^{12}.	1
15.	If $A = \begin{bmatrix} 1 & 2 \\ 3 & 8 \end{bmatrix}$, then $\|A^T\| = ?$ (a) 2 (b) -2 (c) $\frac{1}{2}$ (d) $\frac{-1}{2}$	1
16.	If A is a skew symmetric matrix of order 3, then the value of $\|A\|$ is ? (a) 1 (b) 3 (c) 2 (d) 0	1

17.	The system of equations $2x+y-3z=5;\ 3x-2y+2z=5\ ;\ 5x-3y-z=16$ is ? (a) consistent (b) consistent with a unique solution (c) consistent with infinitely many solutions (d) has its solution lying along x-axis in 3D space	1
18.	Let matrix B be the adjoint of a square matrix A, I be the identity matrix of same order as A. If k $(\neq 0)$ is the determinant of the matrix A, then what is AB equal to? (a) I (b) kI (c) k^2I (d) $(1/k)I$	1
19.	If $(p,q),(r,s)\ and\ (t,u)$ are the vertices of ΔABC and Δ denotes the area of ΔABC then $\begin{vmatrix} p & r & t \\ q & s & u \\ 1 & 1 & 1 \end{vmatrix}^2$ is equal to ? (a) $2\Delta^2$ (b) $4\Delta^2$ (c) 2Δ (d) 4Δ	1
20.	If A is a square matrix of order 3 and det A =5 then what is the determinant of $2A^{-1}$? (a) $\frac{1}{10}$ (b) $\frac{2}{5}$ (c) $\frac{8}{5}$ (d) $\frac{1}{40}$	1
21.	A is a square matrix of order 3 and $\|A\|$ = 6 ,what be the value of $\|3\ adj\ A\|$. (a) 972 (b) 216 (c) 36 (d) 27	1
22.	If $\begin{vmatrix} 2 & 4 \\ 5 & 1 \end{vmatrix} = \begin{vmatrix} 2x & 4 \\ 6 & x \end{vmatrix}$,then the possible value(s) of x is /are (a) 3 (b) $\sqrt{3}$ (c) - $\sqrt{3}$ (d) $\sqrt{3}$ &-$\sqrt{3}$	1
23.	If A and B are two non - singular matrices of same order ,then (a) AB is non singular (b) AB is singular (c) $(AB)^{-1} = A^{-1}B^{-1}$ (d) AB is not invertible	1
24.	If A is a square matrix of order 3 such that A (adj A) = $\begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$,then $\|\ adj\ A\|$ is equal to (a) -2 (b) -4 (c) 4 (d) -8	1
25.	The matrix $\begin{bmatrix} -2 & -1 & 3 \\ k & 0 & 7 \\ -1 & 1 & 4 \end{bmatrix}$ is not invertible for (a) k= -1 (b) k = 1 (c) k = 0 (d) k ∈ R –{1}	1
26.	Three points P(2x,x+3) ,Q(0,x) and R(x+3,x+6) are collinear ,then x is (a) 0 (b) 2 (c) 3 (d) 1	1
27.	If x = -4 is a root of $\begin{bmatrix} x & 2 & 3 \\ 1 & x & 1 \\ 3 & 2 & x \end{bmatrix}$ = 0 then the sum of other two root is (a) 4 (b) -3 (c) 2 (d) 5	1
28.	If A is a non singular square matrix of order 3 such that $\|adjA\|$ = 64 then the value of $\|A\|$ is	1

	(a) 8 (b) –8 (c) 8, -8 (d) 4	
29.	If A and B are square matrices of the order 3 ,such that $\|A\| = 2$ and AB = 2I , Then the value of $\|B\|$. (a) 2 (b) 1 (c) 4 (d) 8	1
30.	If $A = (a_{ij})$ is a square matrix of order 3 and A_{ij} is the cofactor of a_{ij} , then $\|A\|$ 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) $a_{11}A_{11} + a_{21}A_{21} + a_{31}A_{31}$	1
31.	If the points (2, -3), (k, -1) and (0, 4) are collinear, then find the value of 4k. (a) 4 (b) 7/140 (c) 47 (d) 40/7	1
32.	If A is a singular matrix, then A(adjA) is (a) null matrix (b) scalar matrix (c). identity matrix (d) none of these	1
33.	If A and B are invertible matrices, 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) $(A + B)^{-1} = B^{-1} + A^{-1}$	1
34.	If A is a skew- symmetric matrix of order 3 and $\|A\| = x, then\ (2023)^x$ is equal to (a) 2023 (b) $\frac{1}{2023}$ (c) $(2023)^x$ (d) 1	1
35.	Which of the following is not true (A). If A= $[a_{ij}]$ is a diagonal matrix of order n≥2,then $\|A\| = a_{11}.\ a_{22} \ldots . a_{nn}$ (B).If A and B are square matrix of same order, then $\|AB\| = \|A\|\|B\|$ (C).If A is a square matrix of order n then $\|kA\| = k^n\|A\|$ (D). If A and B are square matrix of same order, then $\|A + B\| = \|A\| + \|B\|$	1
36.	A system of linear equations AX = B is said to be inconsistent, if the system of equations has (a) Trivial Solution (b) Infinite Solutions (c) No Solution (d) Unique Solutions	1
37.	If $A = (a_{ij})$ be a square matrix of order 3 and $\|A\| = -7$, then the value of $a_{11}A_{31} + a_{12}A_{32} + a_{13}A_{33}$, where A_{ij} is the cofactor of a_{ij}, is 7 (b) -7 (c) 0 (d) 1	1
38.	If $A = \begin{bmatrix} x & 4 \\ 3 & x \end{bmatrix}$ and $\|A^3\| = 64$, then the value of x is ± 2 (b) ± 4 (c) ± 8 (d) ± 1	1
39.	If A is an invertible matrix, then which of the following is not true (a) $(A^{-1})^2 = (A^2)^{-1}$ (b) $(A^t)^{-1} = (A^{-1})^t$ (c) $\|A\| \neq 0$ (d) $\|A^{-1}\| = \|A\|^{-1}$	1
40.	A= $\begin{bmatrix} \mathbf{1} & \mathbf{-1} & \mathbf{2} \\ \mathbf{0} & \mathbf{2} & \mathbf{-3} \\ \mathbf{3} & \mathbf{-2} & \mathbf{4} \end{bmatrix}$,find the co-factors of elements of A.	1
41.	If $\|A\| = \begin{vmatrix} 2 & 5 \\ 3 & -2 \end{vmatrix}$ then find $\|A^{-1}\|$.	1
42.	If A and B are square matrices of order 3 such that $\|A\| = -1$, $\|B\| = 3$, then find the value of $\|2AB\|$.	1
43.	Let A be a square matrix of order 3 × 3 and k is a scalar,then find $\|kA\|$.	1
44.	Let A be a non-angular square matrix of order 3 × 3,then find $\|A\ .\ adj\ A\|$.	1

45.	If A is a skew-symmetric matrix of order 3,then find the value of |A|.	1
46.	Let A = $[a_{ij}]$ be a square matrix of order 3×3 . Find the value of $a_{11}A_{21} + a_{12}A_{22} + a_{13}A_{23}$ where A_{ij} is the cofactor of element a_{ij} .	1
47.	If A is a square matrix of order 2 such that A^2=2A, then find the value of |A|.	1
48.	A company produces three products every day. Their production on a certain day is 45 tons. It is found that the production of the third product exceeds the production of the first product by 8 tons while the total production of the first and third product is twice the production of the second product.  Using the concepts of matrices and determinants, answer the following question. If x, y and z respectively denote the quantity (in tons) of first, second and third product produced, then which of the following is true? (a) x + y + z = 45 (b) x + 8 = z (c) -2y+z=0 (d) all of these	1
49.	How many solutions does the system of equations x + 2y=11 , -2x-4y=22 have?	1
50.	Which of the following is not correct? (a) $\|A\| = \|A^T\|$, where A = $[a_{ij}]_{3\times3}$ (b) $\|kA\| = k^3\|A\|$, where A = $[a_{ij}]_{3\times3}$ (c) If A is a skew-symmetric matrix of odd order, then $\|A\| = 0$. (d) $\begin{vmatrix} p+q & r+s \\ t+u & v+w \end{vmatrix} = \begin{vmatrix} p & r \\ t & v \end{vmatrix} + \begin{vmatrix} q & s \\ u & w \end{vmatrix}$	1
51.	If A is a invertible matrix, then which of the following is not true (a) $(A^2)^{-1} = A^{-2}$ (b) $\|A^{-1}\| = \|A\|^{-1}$ (c) $(A^T)^{-1} = (A^{-1})^T$ (d) $\|A\| \neq 0$	1
52.	The system of linear equations $x + y + z = 2$ $2x + y - z = 3$ $3x + 2y + kz = 4$ has a unique solution if (a) $k \neq 0$ (b) (b) $-1 < k < 1$ (c) $-2 < k < 2$ $k = 0$	1
53.	For any 2× 2 matrix, if A (adj A) = $\begin{bmatrix} 10 & 0 \\ 10 & 10 \end{bmatrix}$, then $\|A\| =$ (a) 20 (b) 100 (c) 10 (d) 0	1
54.	Which of the following is not correct in a given determinant of A, where A = $[a_{ij}]_{3\times3}$ (a) Order of minor is less than order of the det (A) (b) Minor of an element can never be equal to cofactor of the same element (c) Value of a determinant is obtained by multiplying elements of a row or column by corresponding cofactors	1

	(d) Order of minors and cofactors of elements of A is same	
55.	The existence of the unique solution of the system of equations: $x + y + z = \beta$ $5x - y + \mu z = 10$ $2x + 3y - z = 6$ depends on μ only (b) β only (c) μ and β both (d)neither μ nor β	1
56.	If $\begin{bmatrix} 1 & -\tan\theta \\ tan\,\theta & 1 \end{bmatrix}\begin{bmatrix} 1 & tan\,\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then (a) $a = 1, b = 1$ (b) $a = \cos 2\theta, b = \sin 2\theta$ (c) $b = \cos 2\theta$, a= $\sin 2\theta$ None of these	1
57.	Let A = $\begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$, where $0 \leq \theta \leq 2\pi$. Then (a) Det(A) = 0 (b) (b) Det(A) $\in (2, \infty)$ (c) (c) Det(A) $\in$ (2,4) (d) Det(A) $\in$ [2, 4]	1
58.	If A and B are invertible matrices, which of the following statement is not correct (a) Adj A = $\lvert A\rvert A^{-1}$ (b) Det (A^{-1}) = $(DetA)^{-1}$ (c) $(A + B)^{-1} = A^{-1} + B^{-1}$ $(AB)^{-1} = B^{-1}A^{-1}$	1
59.	If A is an invertible matrix of order 3, then which of the following is not true (a) $\lvert adjA\rvert = \lvert A\rvert^2$ (b) $(A^{-1})^{-1} = A$ (c) If BA = CA, then B $\neq C$, where B and C are square matrices of order 3. $(AB)^{-1} = B^{-1}A^{-1}$, where B= $[b_{ij}]_{3\times3}$ and $\lvert B\rvert \neq 0$.	1
60.	1. If A is a Singular Matrix then A(adjA) is (a) Scalar matrix (b) Null matrix (c) Identity matrix (d) None of these	1
61.	If P is a square matrix of order 3,such that P(adjoint P) =10I , then the determinant of adjoint P is equal to (a) 0 (b)1 (c) 10 (d) None of these	1
62.	If A is a square matrix of order 3 and det A=7 what is the value of det (adjoint A) ? (a) 39 (b) 49 (c) 30 (d) None of these	1
63.	If A is a non- singular matrix of order 3 and determinant value of A is 3 then determinant value of (2A) is (a) 24 (b) 12 (c) 40 (d) None of these	1
64.	The sum of the products of elements of any row with the co-factors of corresponding elements is equal (a) Adjoint of the matrix (b) 0 (c)1 (d) Value of the determinant	1

65.	The area of a triangle with vertices (-3,2), (5,4), (k,-6) is 42 sq units . What is the value of k? (a) 6 (b) 5 (c) 7 (d) None of these	1
66.	If A is a square matrix such that square of A = I then inverse of A is (a) A (b) 2A (c) A/2 (d) None of these	1
67.	If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then x is equal to: a)6 b) ±6 c)-1 d)-6	1
68.	If A(3,4), B(-7, 2) and C(x, y) are collinear, then: a) x+5y+17=0 b) x+5y+13=0 c)x-5y+17=0 d) none of these	1
69.	Which of the following is a correct statement? a) Determinant is a square matrix b) Determinant is a number associated to a matrix c) Determinant is a number associated with the order of the matrix d) Determinant is a number associated to a square matrix	1

ANSWERS:

Q. NO	ANSWER	MARKS
1.	b	1
2.	b	1
3.	c	1
4.	c	1
5.	c	1
6.	a	1
7.	d	1
8.	a	1
9.	b	1
10.	c	1
11.	(a)	1
12.	(b)	1
13.	(d)	1
14.	(b)	1
15.	(a)	1
16.	(d)	1
17.	(b)	1
18.	(b)	1
19.	(b)	1
20.	(c)	1
21.	(a)	1
22.	(a)	1
23.	(a)	1
24.	(c)	1
25.	(b)	1
26.	(d)	1
27.	(a)	1
28.	(c)	1
29.	(c)	1
30.	d	1
31.	d	1
32.	a	1
33.	d	1
34.	d	1
35.	D	1
36.	c	1
37.	c	1
38.	b	1
39.	a	1
40.	The co-factors of elements of A are 2, 9, -6, 0, -2, -1, -1, 3, 2.	1
41.	$\|A\| = \begin{vmatrix} 2 & 5 \\ 3 & -2 \end{vmatrix} = -19$	½

	$\|A^{-1}\|=1/\|A\|=-1/19$	½
42.	$\|2AB\|=8\|A\|\|B\| =8x(-1)x3=-24$.	½ +½
43.	$\|kA\|=k^3 \|A\|$	1
44.	$\|A$. adj $A\|=\|A\|^3 \|I\|=\|A\|^3$	1
45.	$A'=-A \Rightarrow \|A'\|= \|-A\|=(-1)^3 \|A\|=- \|A\|$ But $\|A'\|= \|A\|$ $\Rightarrow \|A\|=- \|A\| \Rightarrow \|A\|=0$	½ ½
46.	$a_{11} A_{21}+ a_{12}A_{22}+ a_{13} A_{23}$ =0	1
47.	$\|A^2\|=\|2A\| \Rightarrow \|A\|\|A\|=2^2 \|A\| \Rightarrow$ $\|A\| =0$ Or $\|A\| =4$.	½ ½
48.	(a) $x + y + z = 45$	
49.	$x + 2y=11$, $-2x-4y=22$ $\begin{pmatrix} 1 & 2 \\ -2 & -4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}=\begin{pmatrix} 11 \\ 22 \end{pmatrix}$ i e AX=B Det A=0, but det$\begin{pmatrix} 11 & 22 \\ -2 & -4 \end{pmatrix}$ and det $\begin{pmatrix} 1 & 2 \\ 11 & 22 \end{pmatrix}$ both zero So $x + 2y=11$, $-2x-4y=22$ have infinite solutions.	
50.	(d)	1
51.	(a)	1
52.	(a)	1
53.	(c)	1
54.	(b)	1
55.	(a)	1
56.	(b)	1
57.	(d)	1
58.	(c)	1
59.	(c)	1
60.	b	1
61.	c	1
62.	b	1
63.	a	1
64.	d	1
65.	c	1
66.	a	1
67.	b	1
68.	c	1
69.	d	1