CHAPTER 4
DETERMINANTS

ASSERTION - REASON TYPE QUESTIONS

1. Assertion: The determinant of a skew symmetric matrix of even order is perfect square.
   Reason: The determinant of skew symmetric matrix of odd order is equal to zero
   (a) Assertion and reason both are correct and reason is correct explanation of assertion
   (b) Assertion and reason both are correct but reason is not correct explanation of assertion
   C. Assertion is correct but Reason is incorrect.
   D. Assertion is incorrect but Reason is correct.
2. Assertion:
   matrix $A=\begin{vmatrix} 4 & 0 & 4 \\ 0 & 3 & 2 \\ 4 & 2 & 1 \end{vmatrix}$ and matrix $B^{-1}=\begin{vmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{vmatrix}$,Then $(AB)^{-1}$ does not exist.
   Reason:
   Since $|A|=0,(AB)^{-1}=B^{-1}A^{-1}$ is meaningless.
   A. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   B. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
   C. Assertion is correct but Reason is incorrect.
   D. Assertion is incorrect but Reason is correct.
3. Assertion:The determinant of a matrix A=[aij]5×5 where aij+aji=0 for all i and j is zero
   Reason:The determinant of a skew-symmetric matrix of odd order is zero.

   A. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   B. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
   C. Assertion is correct but Reason is incorrect.
   D. Assertion is incorrect but Reason is correct.

4. Let A be a 2×2 matrix

   Assertion: adj(adjA)=A

   Reason: $|adjA|=|A|$

   A. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   B. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
   C. Assertion is correct but Reason is incorrect.
   D. Assertion is incorrect but Reason is correct.

5. Assertion: if every element of a third order determinant of value D is multiplied by 5, then the value of new determinant is 125D.

   Reason: if k is a scalar and A is an n×n matrix, then $|kA|=k^n|A|$

   A. Both Assertion and Reason are correct and Reason is the correct explanation for Assertion.
   B. Both Assertion and Reason are correct but Reason is not the correct explanation for Assertion.
   C. Assertion is correct but Reason is incorrect.
   D. Assertion is incorrect but Reason is correct

6. Assertion (A) : If $A=\begin{bmatrix} 2 & 1+2i \\ 1-2i & 7 \end{bmatrix}$ then det(A) is real.

Reason (R) : If $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{21} \end{bmatrix}$, a_{ij} being complex numbers, then |A| is always real

(a) A is true, R is true; R is a correct explanation for A.

(b) A is true, R is true; R is not a correct explanation for A.

(c) A is true, R is False.

(d) A is False, R is true.

7. Assertion (A) Minor of an element of a determinant of order n($n \geq 2$) is a determinant of order n.

Reason (R) If A is an invertible matrix of order 2, then det (A^{-1}) is equal to $\frac{1}{|A|}$.

(a) A is true, R is true; R is a correct explanation for A.

(b) A is true, R is true; R is not a correct explanation for A.

(c) A is true, R is False.

(d) A is False, R is true.

8. Assertion (A) The points A(a, b+c), B(b,c+a) and C(c,a+b) are collinear:

Reason (R) Area of triangle with three collinear points is zero

(a) A is true, R is true; R is a correct explanation for A.

(b) A is true, R is true; R is not a correct explanation for A.

(c) A is true, R is False.

(d) A is False, R is true.

9.Assertion (A): If $A=[11-221-354-9]$, then |A| =0.

Reason (R) | adj A| = $|A|^{n-1}$, where n is order of the matrix.

(a) A is true, R is true; R is a correct explanation for A.

(b) A is true, R is true; R is not a correct explanation for A.

(c) A is true, R is False.

(d) A is False, R is true.

10. Assertion (A): If A is a 3x3 non–singular matrix then $A^{-1} = adjA/|A|$.

Reason (R) If A and B both are invertible matrices such that B is inverse of A, then AB=BA=I

(a) A is true, R is true; R is a correct explanation for A.

(b) A is true, R is true; R is not a correct explanation for A.

(c) A is true, R is False.

(d) A is False, R is true.

11. Assertion: The determinant of a matrix A=[aij]5×5 where aij+aij=0 for all i and j is zero

Reason: The determinant of a skew-symmetric matrix of odd order is zero.

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A

(C) A is true but R is false

(D) A is False and R is True

12. Assertion: M is a skew symmetric matrix of order 3 then |M|=0.

Reason: Determinant of a skew symmetric matrix is 0

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A

(C) A is true but R is false

(D) A is False and R is True

13. Assertion (A) Determinant of a skew-symmetric matrix of order 3 is zero.

Reason (R) For any matrix A, $|A^T| = |A|$ and $|-A| = -|A|$.

(a) Assertion is correct, reason is correct; reason is correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d)Assertion is incorrect, reason is correct.

14. Assertion (A) The equation of the line joining $A(1,3)\ and\ B(0,0)$ is given by $y = 3x$.

Reason (R) The area of the triangle with vertices $((x_1, y_1), (x_2, y_2)\ and\ (x_3, y_3)$ in the form of determinant is

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

(a) Assertion is correct, reason is correct; reason is correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.

(d)Assertion is incorrect, reason is correct.

15. Assertion (A) Minor of an element of a determinant of order n $(n \geq 2)$ is a determinant of order n.

Reason (R) If A is an invertible matrix of order 2, then $\det(A^{-1})$ is equal to $\frac{1}{|A|}$

(a) Assertion is correct, reason is correct; reason is correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.

(d)Assertion is incorrect, reason is correct.

16. For a system of equation $AX = B$

Assertion (A) System having unique solution if B is a non-singular matrix and matrix A can be singular.

Reason (R) Singular matrix have value of its determinant equal to 0.

(a) Assertion is correct, reason is correct; reason is correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.

(d)Assertion is incorrect, reason is correct.

17. Assertion (A) The system of equations $2x - y = -2; 3x + 4y = 3$ has unique solution and $= -\frac{5}{11}$ and $y = \frac{12}{11}$.

Reason (R) The system of equations $AX = B$ has a unique solution, if $|A| \neq 0$.

(a) Assertion is correct, reason is correct; reason is correct explanation for assertion.
(b) Assertion is correct, reason is correct; reason is not correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.

(d)Assertion is incorrect, reason is correct.

18. Assertion (A) : determinant is a number associated with a square matrix.

Reason (R) : determinant is a square matrix.

a. both A and R are true and R is correct explanation of A.

b. both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false and R is also false.

19.Assertion : if A = $\begin{bmatrix} 5-X & X+1 \\ 2 & 4 \end{bmatrix}$, then the matrix A is singular if x = 3.

Reason (R) : A square matrix is a singular matrix if its determinant isd zero

a. both A and R are true and R is correct explanation of A.

b. both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false and R is also false.

20. Assertion (A) : If A IS A 3X3 MATRIX, $|A| \neq 0$ and $|5A| = K|A|$, then the value of K = 125.

Reason (R): if A be any square matrix of order nxn and k be any scalar then $|KA| = K^n|A|$.

a. both A and R are true and R is correct explanation of A.

b. both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false and R is also false.

21. Assertion (A) : if $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then x = +6.

Reason (R) : if A is a skew- symmetric matrix of order, then $|A| = 0$.

a. both A and R are true and R is correct explanation of A.

b. both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false and R is also false.

22. Assertion (A) : If A = $[a_{ij}]$ is a diagonal matrix of order n ≥ 2, then.

Reason (R) : $|A| = a_{11}, a_{22}, a_{33} \ldots\ldots a_{nn}$.

a. both A and R are true and R is correct explanation of A.

b. both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false and R is also false.

23. Assertion: Determinant is a number associated with a square matrix.

Reason: Determinant is a square matrix.

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D)Assertion is false, reason is true.

24. Assertion: If A = $\begin{bmatrix} 5-x & x+1 \\ 2 & 4 \end{bmatrix}$ then A is singular if x = 3

Reason: A square matrix A is a singular if $|A|$=0

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

25. Assertion: If A is a 3x3 matrix, $|A| \neq 0$ and $|5A|$=k$|A|$,then k=25

Reason:If A is any square matrix of order nxn and k be any scalar thaen$|kA|$=$k^n|A|$

(A)Both Assertion and reason are true and reason is correct explanation of assertion.

(B)Assertion and reason both are true but reason is not the correct explanation of assertion.

(C)Assertion is true, reason is false.

(D)Assertion is false, reason is true.

26. Assertion: If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ then $x = \pm 6$

Reason: If A is a skew symmetric matrix of odd order, then $|A|$=0

(A)Both Assertion and reason are true and reason is correct explanation of assertion.

(B)Assertion and reason both are true but reason is not the correct explanation of assertion.

(C)Assertion is true, reason is false.

(D)Assertion is false, reason is true.

27. Assertion: If A is an invertible square matrix ,thenA^t is invertible.

Reason: inverse of invertible symmetric matrix is a symmetric matrix

(A)Both Assertion and reason are true and reason is correct explanation of assertion.

(B)Assertion and reason both are true but reason is not the correct explanation of assertion.

(C)Assertion is true, reason is false.

(D)Assertion is false, reason is true.

28. Assertion (A) If $\Delta = \begin{vmatrix} 1 & 0 & 1 \\ 1 & -2 & 3 \\ 5 & 3 & 8 \end{vmatrix}$, then $\Delta = -12$.

Reason (R) If we expand the determinant either by any row or by any column, then the value of determinant always be same.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false
d) A is false but R is true

29. Assertion (A) The matrix A = $\begin{bmatrix} 1 & 2 \\ 4 & 8 \end{bmatrix}$ is singular.

Reason (R) A square matrix A is said to be singular, if $|A|$ = 0.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false
d) A is false but R is true

30. Assertion (A) The system of equations 2x – y = -2; 3x + 4y = 3 has unique solution and x = $-\frac{5}{11}$ and y = $\frac{12}{11}$.

Reason (R) The system of equations AX = B has a unique solution, if $|A|$ = 0.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false
d) A is false but R is true

31. Assertion (A) Determinant of a skew- symmetric matrix of order 3 is zero.

Reason (R) For any matrix A, $|A'|$ = $|A|$ and $|-A|$ = -$|A|$.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false
d) A is false but R is true

32. Assertion (A) Minor of an element of a determinant of order n ($n \geq 2$)

is a determinant of order n.

Reason (R) If A is an invertible matrix of order 2, then $\det(A^{-1})$ is equal to $\frac{1}{|A|}$.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true and R is not the correct explanation of A.
c) A is true but R is false
d) A is false but R is true

33. Suppose that A be a n x n matrix

Assertion: adj(adjA) = A

Reason: |adjA| = |A|

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

34. Assertion: If every element of a second order determinant of determinant is multiplied by 3, then the value of the new determinant is multiplied by 9 to the actual determinant.

Reason: If k is a scaler and A is an n x n matrix then $|kA| = k^n|A|$

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

35. Assertion: If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ and $A^{-1} = KA$, then $K = \frac{1}{19}$.

Reason: $|A^{-1}| = \frac{1}{|A|}$

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

36. Assertion: $|A| = 0$

Reason: Determinant of skew symmetric matrix is 0.

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

37. Assertion: $|AA^T| = 0$

Reason: A is skew symmetric matrix of odd order.

(A) Both Assertion and reason are true and reason is correct explanation of assertion.

(B) Assertion and reason both are true but reason is not the correct explanation of assertion.

(C) Assertion is true, reason is false.

(D) Assertion is false, reason is true.

38. Assertion :The value of the determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is zero

Reason: If two rows (or columns) of a determinant are identical the value of the determinant is zero.

(a) Assertion and reason both are correct and reason is correct explanation of assertion
(b) Assertion and reason both are correct but reason is not correct explanation of assertion
(c) Assertion is wrong
(d) Reason is wrong

39. Assertion : If a,b,c are in A.P., then the value of $\begin{vmatrix} x+2 & x+3 & x+a \\ x+4 & x+5 & x+b \\ x+6 & x+7 & x+c \end{vmatrix}$ is zero

Reason: a,b,c are in G.P. then b^2=ac

(a) Assertion and reason both are correct and reason is correct explanation of assertion
(b) Assertion and reason both are correct but reason is not correct explanation of assertion
(c) Assertion is wrong
(d) Reason is wrong

40. Assertion : If ω is the cube root of unity, then $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$ = 5

Reason: $1+\omega+\omega^2 = 0$ if ω is the cube root of unity.

(a) Assertion and reason both are correct and reason is correct explanation of assertion
(b) Assertion and reason both are correct but reason is not correct explanation of assertion
(c) Assertion is wrong, reason is correct
(d) Reason is wrong

ANSWERS

1	B	2	D	3	A	4	B	5	A
6	C	7	D	8	A	9	B	10	B
11	A	12	A	13	C	14	C	15	D
16	D	17	C	18	C	19	A	20	A
21	B	22	A	23	C	24	A	25	A
26	B	27	B	28	A	29	A	30	C
31	C	32	D	33	B	34	A	35	A
36	C	37	A	38	A	39	B	40	C

Prepared by : PGT(Maths) of BHUBANESWAR REGION, GUWAHATI REGION, KOLKATA REGION, SILCHAR REGION, RANCHI REGION & TINSUKIA REGION

Vetted by : GUWAHATI REGION