CHAPTER 3

MATRICES

ASSERTION REASONING QUESTIONS

1. **Assertion (A)** : If $A = \begin{pmatrix} 0 & -2 & 3 \\ 2 & 0 & 6 \\ -3 & -6 & 0 \end{pmatrix}, then\ A^{-1}\ does\ not\ exit$

   Reason (R) : If A is a skew symmetric matrix of odd order, then A is singular.

   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 but R is true

2. **Assertion (A)** : If $(A+B)^2 \neq A^2 + 2AB + B^2$

   Reason (R) : Generally AB=BA

   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 but R is true

3. **Assertion (A)** : If $A\ is\ a\ square\ matrix\ such\ that\ A^2 = I, then\ (I+A)^3 - 3A = I$

   Reason (R) : AI=IA=A, where I is the identity matrix.

   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 but R is true

4. **Assertion (A)**: Let $A\ and\ B\ are\ 2 \times 2\ matrices, AB = I_2 \Longrightarrow A = B^{-1}$

   Reason (R): AB=O $\Longrightarrow A = O\ or\ B = O$

   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 but R is true

5. Assertion: The matrix A = $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ is a scalar matrix

   Reason: Any matrix is scalar if its principal diagonal elements are same

   (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.

6. Assertion: The matrix $\begin{bmatrix} 0 & 1 & -2 \\ -1 & 0 & 3 \\ 2 & -3 & 0 \end{bmatrix}$ is a skew symmetric matrix

   Reason: All the diagonal elements of a skew symmetric matrix are zero.

   (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.

7. Assertion: For two matrices A and B, $(A+B)(A-B) \neq A^2 - B^2$

   Reason: AB≠BA, for matrix multiplication.

   (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.

8. Assertion: If A and B are skew symmetric matrices then AB -BA is a symmetric matrix.

   Reason: For a matrix to be symmetric A^T = - 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.

9. Assertion: If the order of matrices A, B and C are 2×3,3×4,4×2 then order of matrix ABC is 2×2.

   Reason: We can multiply two matrices if number of columns of first matrix is equal to number of rows of second 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.

10. ASSERTION (A): Matrix $\begin{bmatrix} 0 & 3 & 2 \\ -3 & 0 & -7 \\ -2 & 7 & 0 \end{bmatrix}$ is a skew-symmetric matrix.

    REASON(R): A matrix A is skew-symmetric if A^T = A.

    (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 but R is true.

11. Let A, B, C are three matrices of same order.

    Now, consider the following statements

    Assertion (A): If A = B, then AC = BC

    Reason (R): If AC = BC, then A = B

    (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 but R is true.

12. A and B are two matrix such that both AB and BA are defined.

Assertion(A): $(A+B)(A-B)=A^2-B^2$

Reason(R): $(A+B)(A-B)=A^2-AB+BA-B^2$

(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 but R is true.

13. A , B and C are three matrices such that

Assertion (A): A+(B+C) = (A+B) + C

Reason (R): Matrices follow commutative law.

(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 but R is true.

14. Assertion (A):If $A=\frac{1}{3}\begin{bmatrix}1 & -2 & 2\\ -2 & 1 & 2\\ -2 & -2 & -1\end{bmatrix}$, then $A^TA=I$

Reason (R): For any square matrix A, $(A^T)^T=A$

(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 but R is true.

15. Assertion (A): If A is a square matrix such that $A^2=A\ and\ (I+A)^2-3A=I$

Reason (R): $AI=IA=A$

(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 but R is true.

16. Assertion (A): For any two matrix A and B $(A+B)(A-B)=A^2-B^2$

Reason (R): (x+y)(x-y) = $x^2-y^2\ \ \forall x,y\in\mathcal{R}$

(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 but R is true.

17. Assertion (A):If $A\ is\ a\ symmetric\ matrix\ then\ BAB'\ is\ symmetric\ matrix$

Reason (R): For any three matrix A, B ,C$(ABC)'=C'B'A'$

(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 but R is true.

18. A: Let A and B be two symmetric matrix of order 3

$A(BA)$ and $(AB)A$ are symmetric matrices.

R: AB is symmetric matrix if multiplication of A and B is commutative.

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 but R is true.

19. Assertion (A): If A = $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$, B = $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then $(A + B)^2 = A^2 + B^2 + 2AB$.

Reason (R) In the above, AB = BA

(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.

20. Assertion (A): M = $\begin{pmatrix} 5 & 4 \\ 10 & 8 \end{pmatrix}$is invertible.

Reason (R): M is singular.

(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.

21. Assertion (A): $A + A^T$ is a symmetric matrix

Reason (R): $A - A^T$ is skew symmetric

(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.

22. Assertion (A) :A = $\begin{pmatrix} 1 & 2 \\ 5 & 9 \end{pmatrix}$is neither symmetric nor anti-symmetric.

Reason (R) : The matrix A cannot be expressed as a sum of symmetric and anti-symmetric matrices.

(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.

23. Assertion (A) :A = $\begin{pmatrix} \cos x & \sin x \\ \cos x & \sin x \end{pmatrix}$ and B = $\begin{pmatrix} \cos x & \cos x \\ \sin x & \sin x \end{pmatrix}$, then $AB \neq I$.

Reason (R) : The product of two matrices can never be equal to an identity 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(A) : The possible dimensions of a matrix containing 32 elements is 6.

Reason(R) :The No. of ways of expressing 32 as a product of two positive integers is 6.

(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(A) : The order of the matrix A is 3 × 5 and that of B is 2 × 3. Then the matrix AB is not possible.

Reason(R) : No. of columns in A is not equal to no. of rows in B.

(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(A) : Addition of matrices is an example of binary operation on the set of matrices of the same order.

Reason(R) : Addition of matrix is commutative.

(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. . For any square matrix A with real number entries, consider the following statements.

Assertion(A) : $A + A^T$ is a symmetric matrix

Reason(R) : $A - A^T$ is a skew-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) : The matrix A= $\begin{bmatrix} 0 & -1 & -2 \\ 1 & 0 & -3 \\ 2 & 3 & 0 \end{bmatrix}$ is a skew symmetric matrix.

Reason(R) : For the given matrix A we have A' = 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.

Assertion(A): A and B are square matrices such that A = B then A.B=B.A

Reason(R) :multiplication of matrices is commutative

(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.

29. Assertion: A and B are square matrices such that A = B then A.B=B.A

Reason: multiplication of matrices is commutative

(A) Both Assertion and reason are true and reason is correct

(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

30. Assertion(A): A and B are symmetric matrices, then AB =BA and AB is also symmetric

Reason(R): A and B are symmetric matrices

(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.

31. Assertion(A): A and B are square matrices then A.B=B.A may not be true

Reason(R): multiplication of matrices is not commutative

(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.

32. Assertion(A): The diagonal elements of a matrix are 2,4,7

Reason(R): Every scalar matrix is a diagonal 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.

33. Assertion(A): There are two matrices A and B ,A has order 4 x 3 and B has order 3 x 4 . Then we can multiply A and B and the order of the matrix obtained will be 4 x 4

Reason(R): No of columns in pre factor is equal to the no of rows of post factor

(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 (A): If A(BA) and (AB)A are symmetric matrices.

Reason (R): AB is symmetric matrix if matrix multiplication of A with B is commutative.

(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(A):If A is a square matrix such that A2 = A, then (I + A)2 – 3A = I

Reason (R): AI = IA = 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): $(A + B)(A – B) = A^2 – B^2$

Reason (R): $(A + B)(A – B) = A^2 – AB + BA – B^2$

(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(A): A matrix A=[1 5 7 8 9]is a row matrix of order 1x4.

Reason(R): A matrix having one row and any number of column is called a row 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.

38. Assertion (A): $(A + B)^2 \neq A^2 + 2AB + B^2$.

Reason (R): Generally $AB \neq BA$

(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.

39. Assertion(A): If If$\begin{pmatrix} x+y & 2x+z \\ 2x-y & 3z+w \end{pmatrix} = \begin{pmatrix} -1 & 5 \\ 0 & 13 \end{pmatrix}$, then x= -1/3, y= -2/3, z= 17/3, w= -4.

Reason (R): Two Two matrices $A=[a_{ij}]$, $B= [b_{ij}]$ of the same type are said to be equal if $a_{ij}=b_{ij}$ for all i, j.

(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.

40. Assertion(A): If $\begin{pmatrix} x-y & z \\ 2x-y & w \end{pmatrix}$ = Transpose of $\begin{pmatrix} -1 & 0 \\ 4 & 5 \end{pmatrix}$, then x=3, y=4, z=5, w=6.

Reason (R): An m x n matrix is called a square matrix if m=n.

(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.

41. Assertion(A): If Y= $\begin{pmatrix} 3 & 2 \\ 1 & 4 \end{pmatrix}$ and X+Y= $\begin{pmatrix} 1 & 0 \\ -3 & 2 \end{pmatrix}$, then X=$\begin{pmatrix} -2 & -2 \\ -4 & -2 \end{pmatrix}$

Reason (R): If A, B and C are three matrices of the same order, then A+ (B+C) = (A+B) + C.

(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.

42. Assertion(A): The possible dimensions of a matrix containing 24 elements are 8.

Reason (R): The number of ways of expressing 24 as a product of two positive integers is 8.

(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.

43. Assertion(A): The order of the matrix A is 4 x 6 and that of B is 2 x 4. Then the matrix AB is not possible.

Reason (R): Number of columns in A is not equal to number of rows in B.

(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.

ANSWERS

1	A	2	C	3	D	4	C	5	D
6	B	7	A	8	C	9	B	10	C
11	D	12	D	13	B	14	B	15	A
16	D	17	A	18	B	19	A	20	D
21	B	22	C	23	C	24	C	25	A
26	B	27	B	28	C	29	C	30	C
31	A	32	D	33	B	34	B	35	A
36	D	37	A	38	A	39	A	40	D
41	B	42	C	43	A				

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