MATHS

JEE MAIN AND ADVANCED

MATRICES

Example 1

1. Consider the following information regarding the number of men and women workers in three factories I, II and III.

	Men workers	Women workers
I	100	70
II	120	50
III	180	90

Represent above information in the form of a 3×2 matrix. What does the entry in the 2^{nd} row and 2^{nd} column represent ?

Watch Video Solution

Example 2

1. We a matrix has 18 elements what are the possible orders it can have ?

Watch Video Solution

Example 3

1. Construct a 3×3 matrix whose elements are given by $a_{ij} = \begin{cases} \frac{1}{2}|2i - 3j|, i \neq j \\ |2i - j|, i = j \end{cases}$

Watch Video Solution

Example 4

1. If $\begin{bmatrix} x-2 & y-3 \\ z+1 & t-4 \end{bmatrix} = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ then find x,y,z and t.

Watch Video Solution

Example 5

1. If $\begin{bmatrix} x-2y & 2x-y \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ 3 & 4 \end{bmatrix}$ then find x and y.

Watch Video Solution

Example 6

1. $A = \begin{bmatrix} 1 & 2 & 3 & -4 \\ -1 & 8 & 3 & 2 \end{bmatrix}$, $B = [b_{ij}]_{m \times n}$. Find the value of m and n for which A+B can be defined.

Watch Video Solution

Example 7

1. Let $A = \begin{bmatrix} \sqrt{3} & -1 \\ 2+\sqrt{3} & a-\sqrt{3} \end{bmatrix}$, $B = \begin{bmatrix} -\sqrt{3} & 2 \\ 2-\sqrt{3} & 1+\sqrt{3} \end{bmatrix}$ Find A+B.

Watch Video Solution

Example 8

1. Let $A = \begin{bmatrix} 3 & 2 & 3 \\ -1 & 4 & -2 \\ 1 & 4 & 2 \end{bmatrix}$ Find additive inverse of A.

Watch Video Solution

Example 9

1. Let $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 4 & 3 \\ 1 & 0 & 0 \end{bmatrix}$ Find 2A +3B.

Watch Video Solution

Example 10

1. Let $A+2B=\begin{bmatrix}3 & 2 & -3\\ 1 & 0 & 4\\ 3 & 1 & 2\end{bmatrix}$ and $-A-B=\begin{bmatrix}1 & 0 & 3\\ -1 & 4 & 1\\ 3 & 2 & 1\end{bmatrix}$. Find A and B.

Watch Video Solution

Example 11

1. $A=\begin{bmatrix}1 & 2\\ 3 & 4\\ 5 & 6\end{bmatrix}, B=\begin{bmatrix}0 & 1\\ -1 & 2\\ -2 & 1\end{bmatrix}$, then find matrix X such that 2A +3X=5B.

Watch Video Solution

Example 12

1. Let $A=\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}, B=\begin{bmatrix}-1 & -2\\ -4 & -3\end{bmatrix}$, find AB and BA.

Watch Video Solution

Example 13

1. If $A = \begin{bmatrix} 1 & 2 & 0 \\ -1 & 0 & 1 \\ 1 & 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ -1 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 2 & 1 & 2 \end{bmatrix}$ Find A(BC), (AB)C and prove that A(BC)=(AB)C.

Watch Video Solution

Example 14

1. If $A + I = \begin{bmatrix} 2 & 2 & 3 \\ 3 & -1 & 1 \\ 4 & 2 & 2 \end{bmatrix}$ then show that $A^3 - 23A - 40I = 0$

Watch Video Solution

Example 15

1. A trust has Rs. 60,000 that must be invested in two different types of bonds. The first type of bond pays $10\,\%$ interest per year and the second type pays $12\,\%$. Using matrix multiplication, determine how to invest Rs. 60,000 into two types of bonds so that the total annual interest received is Rs. 6400.

Watch Video Solution

Example 16

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

(i) $\left(A'\right)' = A$

(ii) $(kB)' = kB'$

(iii) $(A + B)' = A' + B'$

Watch Video Solution

Example 17

1. $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 1 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 \\ 2 & 3 \\ -1 & 1 \end{bmatrix}$, verify (AB)'=B'A'

Watch Video Solution

Example 18

1. If $A = \begin{bmatrix} a & 2 & 3 \\ b & c & 4 \\ d & e & f \end{bmatrix}$ is skew symmetric matrix, then find a,b,c,d,e,f.

Watch Video Solution

Example 19

1. Express the matrix $A = \begin{bmatrix} 2 & -3 & 4 \\ -1 & 4 & 3 \\ 1 & -2 & 3 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix

Watch Video Solution

Example 20

1. Show that every real orthogonal matrix is of any one of the forms

$$\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \text{ or } \begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$$

Watch Video Solution

Example 21

1. Prove that the matrix A= $\begin{bmatrix} \frac{1+i}{2} & \frac{-1+i}{2} \\ \frac{1+i}{2} & \frac{1-i}{2} \end{bmatrix}$ is unitary.

Watch Video Solution

Example 22

1. If A is an idempotent matrix, then show that B=I-A is also idempotent and AB=BA=0

Watch Video Solution

Example 23

1. Let $A = \begin{bmatrix} 4 & 1 \\ -9 & -2 \end{bmatrix}$, then find A^{100}.

Watch Video Solution

Try Yourself

1. If a matrix has 20 elements what are possible orders it can have ?

Watch Video Solution

2. Construct a 3×2matrix whose elements are given by $a_{ij} = \frac{1}{2}|i - 3j|$.

Watch Video Solution

3. Let $A = [a_{ij}]_{3\times 3}$ be a scalar matrix and $a_{11} + a_{22} + a_{33} = 15$ then write matrix A.

Watch Video Solution

4. If $\begin{bmatrix} -5 & 8 \\ -3 & 4 \end{bmatrix} = \begin{bmatrix} a & b \\ c & 4 \end{bmatrix}$ then find the value of $a^3 + b^3 + c^3$

Watch Video Solution

5. Find additive inverse of $A = \begin{bmatrix} 1 & 2 & -1 \\ -4 & 3 & -2 \\ 1 & -1 & 4 \end{bmatrix}$.

Watch Video Solution

6. If $A = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}, B = \begin{bmatrix} 4 & 1 \\ -3 & 2 \end{bmatrix}$ Find 2A+3B.

Watch Video Solution

7. $A = \begin{bmatrix} 1 & 2 & 1 \\ 3 & -1 & 2 \\ 1 & 0 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 1 & 1 \\ 2 & -2 & 2 \end{bmatrix}$ then find matrix X such that 2A+X=2B.

Watch Video Solution

8. $A + B = \begin{bmatrix} 4 & -2 & 2 \\ 6 & 8 & 10 \\ 2 & -4 & 12 \end{bmatrix}, A - B = \begin{bmatrix} 2 & -4 & -2 \\ 6 & -8 & -8 \\ -2 & 4 & -6 \end{bmatrix}$. Find A,B.

Watch Video Solution

9. $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 1 & -1 \\ 2 & 3 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, verify (AB)'=B'A'.

Watch Video Solution

10. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & -1 & 4 \\ 2 & 3 & 1 \end{bmatrix}$, verify that

(i) (B')'=B , (ii) (a-B)'=A'-B'

(iii) (A+B)'=A'+B' , (iv) (kA)'=kA', where k is any constant

(v) (2A+3B)'=2A'+3B'

Watch Video Solution

11. $A = \begin{bmatrix} 1 & 4 & 9 \\ -1 & 2 & 0 \\ 3 & 1 & 9 \end{bmatrix}$. Represent A as sum of symmetric and skew symmetric matrix

Watch Video Solution

12. Let $A = \begin{bmatrix} 1 & a & 4 \\ 2 & 3 & c \\ b & -2 & 4 \end{bmatrix}$. If A is symmetric matrix, then find a,b,c.

Watch Video Solution

Assignment Section A Objective Type Questions One Option Is Correct

1. Let A be 5×8 matrix, then each column of A contains

A. 5 elements

B. 8 elements

C. 40 elements

D. 13 elements

Answer: A

Watch Video Solution

2. If A is matrix of order 10×15, then each row of A contains

A. 25 elements

B. 15 elements

C. 10 elements

D. 150 elements

Answer: B

Watch Video Solution

3. The number of all possible matrices of order 2×3 with each entry 1 or -1 is

A. 32

B. 12

C. 6

D. 64

Answer: D

Watch Video Solution

4. If A is of order $m \times n$ and B is of oredr $p \times q$, then AB is defined only if

A. m=q

B. m=p

C. n=p

D. n=q

Answer: C

Watch Video Solution

5. Question 1: If P is of order 2 x 3 and Q is of order 3 x 2, then P Q is of order

A. 2×3

B. 2×2

C. 3×2

D. 3×3

Answer: B

Watch Video Solution

6. If $A = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix}$, then

A. $A^2 = 0$

B. $A^2 = A$

C. $A^3 = A$

D. $A^2 = 2A$

Answer: A

Watch Video Solution

7. If A is a square matrix, then A is symmetric, if

A. $A^2 = A$

B. $A^2 = l$

C. $A^T = A$

D. $A^T = -A$

Answer: C

Watch Video Solution

8. If A is a square matrix, then A is skew symmetric if

A. $A^2 = A$

B. $A^2 = l$

C. $A^T = A$

D. $A^T = -A$

Answer: D

Watch Video Solution

9. If A is any square matrix, then $A + A^T$ is skew symmetric

A. $A + A^T$ is skew symmetric

B. $A - A^T$ is symmetric

C. AA^T is symmetric

D. AA^T is skew symmetric

Answer: C

Watch Video Solution

10. If A and B are symmetric matrices of the same order then (AB-BA) is always

A. AB is a symmetrix matrix

B. A-B is a skew - symmetric matrix

C. AB+BA is a symmetric matrix

D. AB-BA is a symmetric matrix

Answer: C

Watch Video Solution

11. Let A be a square matrix. Then which of the following is not a symmetric matrix -

A. $A + A^T$

B. $A - A^T$

C. AA^T

D. $A^T A$

Answer: B

Watch Video Solution

12. Each diagonal elemetn of a skew symmetric matrix is (A) zero (B) negative (C) positive (D) non real

A. Zero

B. Positive and equal

C. Negative and equal

D. any real number

Answer: A

Watch Video Solution

13. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, then A^{2008} is equal to

A. $\begin{bmatrix} 2008 & 0 \\ 1 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 0 \\ 2008 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 0 \\ 1 & 2008 \end{bmatrix}$

D. $2007\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$

Answer: B

Watch Video Solution

14. If $A = [xyz], B = \begin{bmatrix} a & h & g \\ h & b & f \\ g & f & c \end{bmatrix}, C = [\alpha\beta\gamma]^T$ then ABC is

A. Not defined

B. Is a 3×3 matrix

C. Is a 1×1 matrix

D. Is a 3×2 matrix

Answer: C

Watch Video Solution

15. if for a matrix A, $A^2 + I = O$, where I is the identity matrix, then A equals

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} i & 0 \\ 0 & -i \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2 \\ -1 & 1 \end{bmatrix}$

D. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

Answer: B

Watch Video Solution

16. If A and B are two matrices such that AB=B and BA=A, then

A. 2AB

B. 2BA

C. AB

D. A+B

Answer: D

Watch Video Solution

17. If $A+B=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}$ and $A-2B=\begin{bmatrix}-1 & 1\\ 0 & -1\end{bmatrix}$, then $A=$

A. $\frac{1}{3}\begin{bmatrix}1 & 1\\ 2 & 1\end{bmatrix}$

B. $\frac{1}{3}\begin{bmatrix}2 & 1\\ 1 & 2\end{bmatrix}$

C. $\begin{bmatrix}1 & 1\\ 2 & 1\end{bmatrix}$

D. $\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$

Answer: A

Watch Video Solution

18. $\begin{bmatrix}7 & 1 & 2\\ 9 & 2 & 1\end{bmatrix}\begin{bmatrix}3\\ 4\\ 5\end{bmatrix}+2\begin{bmatrix}4\\ 2\end{bmatrix}$ is equal to

A. $\begin{bmatrix}45\\ 44\end{bmatrix}$

B. $\begin{bmatrix}43\\ 45\end{bmatrix}$

C. $\begin{bmatrix}44\\ 43\end{bmatrix}$

D. $\begin{bmatrix}43\\ 44\end{bmatrix}$

Answer: D

Watch Video Solution

19. If $f(x) = x^2 + 4x - 5$ and $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, then f(A) is equal to

A. $\begin{bmatrix} 0 & -4 \\ 8 & 8 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 8 & 4 \\ 8 & 0 \end{bmatrix}$

Answer: D

Watch Video Solution

20. Multiplicative inverse of the matrix $\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$ is (i) $\begin{bmatrix} 4 & -1 \\ -7 & -2 \end{bmatrix}$ (ii) $\begin{bmatrix} -4 & -1 \\ 7 & -2 \end{bmatrix}$ (iii) $\begin{bmatrix} 4 & -1 \\ 7 & 2 \end{bmatrix}$ (iv) $\begin{bmatrix} 4 & -1 \\ -7 & 2 \end{bmatrix}$

A. $\begin{bmatrix} 4 & -1 \\ -7 & -2 \end{bmatrix}$

B. $\begin{bmatrix} -4 & -1 \\ 7 & -2 \end{bmatrix}$

C. $\begin{bmatrix} 4 & -1 \\ 7 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 4 & -1 \\ -7 & 2 \end{bmatrix}$

Answer: D

Watch Video Solution

21. If the matrix A is such that $\begin{pmatrix} 1 & 3 \\ 0 & 1 \end{pmatrix} A = \begin{pmatrix} 1 & 1 \\ 0 & -1 \end{pmatrix}$, then what is A equal to ?

A. $\begin{bmatrix} 1 & 0 \\ -3 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -4 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & -3 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -1 \\ -3 & 1 \end{bmatrix}$

Answer: B

Watch Video Solution

22. If A is a squqre matrix such that $A^2 = l$, then A^{-1} is equal to

A. I

B. O

C. A

D. I+A

Answer: A

Watch Video Solution

23. If $X + \begin{bmatrix} 2 & 1 \\ 6 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ then 'X' is equal to

A. $\begin{bmatrix} 0 & 1 \\ 0 & 6 \end{bmatrix}$

B. $\begin{bmatrix} 0 & -1 \\ 0 & -6 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 0 \\ -6 & 0 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 \\ 6 & 0 \end{bmatrix}$

Answer: C

Watch Video Solution

24. If $A = \begin{bmatrix} 1 & 2 & 3 \\ -2 & 5 & 7 \end{bmatrix}$ and $2A - 3B = \begin{bmatrix} 4 & 5 & -9 \\ 1 & 2 & 3 \end{bmatrix}$ then B is equal to

A. $\frac{1}{3}\begin{bmatrix} -2 & -1 & 15 \\ 5 & 8 & -11 \end{bmatrix}$

B. $\frac{1}{3}\begin{bmatrix} 2 & 1 & -15 \\ 5 & -8 & -11 \end{bmatrix}$

C. $\frac{1}{3}\begin{bmatrix} 2 & -1 & 15 \\ 5 & 8 & 11 \end{bmatrix}$

D. $\frac{1}{3}\begin{bmatrix} -2 & -1 & 15 \\ -5 & 8 & 11 \end{bmatrix}$

Answer: D

Watch Video Solution

25. If $\begin{bmatrix} x & 1 \\ -1 & -y \end{bmatrix} + \begin{bmatrix} y & 1 \\ 3 & x \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$, then

A. x=-1, y=0

B. x=1, y=0

C. x=0, y=1

D. x=1, y=1

Answer: B

Watch Video Solution

26. Let $A = \begin{bmatrix} 2 & 3 & 5 \\ 1 & 0 & 2 \\ 3 & 4 & 5 \end{bmatrix}$ and $A + B - 4I = 0$, then B is equal to

A. $\begin{bmatrix} 2 & -3 & -5 \\ -1 & 4 & -2 \\ -3 & -4 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 3 & 5 \\ 1 & -4 & 2 \\ 3 & 4 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -3 & -5 \\ -1 & 4 & -2 \\ -3 & -4 & -1 \end{bmatrix}$

D. $\begin{bmatrix} 2 & 3 & 5 \\ -1 & 4 & -2 \\ 3 & 4 & 1 \end{bmatrix}$

Answer: A

Watch Video Solution

27. If $A = \begin{bmatrix} 1 & 2 \\ -1 & 8 \\ 4 & 9 \end{bmatrix}$ and $X + A = 0$, then X is equal to

A. $\begin{bmatrix} 1 & 2 \\ 1 & 8 \\ 4 & 9 \end{bmatrix}$

B. $\begin{bmatrix} -1 & -2 \\ 1 & 8 \\ 4 & 9 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2 \\ 1 & -8 \\ 4 & 9 \end{bmatrix}$

D. $\begin{bmatrix} -1 & -2 \\ 1 & -8 \\ -4 & -9 \end{bmatrix}$

Answer: D

Watch Video Solution

28. Show that $\cos\theta.\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}+\sin\theta.\begin{bmatrix}\sin\theta & -\cos\theta\\ \cos\theta & \sin\theta\end{bmatrix}=I.$

A. $\begin{bmatrix}-1 & 0\\ 0 & -1\end{bmatrix}$

B. $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

C. $\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$

D. $-\begin{bmatrix}1 & 1\\ 1 & 1\end{bmatrix}$

Answer: B

Watch Video Solution

29. If $\begin{bmatrix}x+y & y-z\\ z-2x & y-x\end{bmatrix}=\begin{bmatrix}3 & -1\\ 1 & 1\end{bmatrix}$, then

A. x=2,y=1,z=3

B. x=3,y=1,z=2

C. x=1,y=2,z=3

D. x=1,y=3,z=2

Answer: C

Watch Video Solution

30. If $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & -1 \\ 1 & 0 & -1 \end{bmatrix}$, find a matrix C such that

$(A + B + C)$ is a zero matrix.

A. $\begin{bmatrix} -3 & 4 & -1 \\ -3 & 0 & -1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 2 & 3 \\ -1 & -2 & 3 \end{bmatrix}$

C. $\begin{bmatrix} -1 & -2 & 3 \\ 1 & 2 & -3 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 4 & 1 \\ 3 & 0 & 1 \end{bmatrix}$

Answer: A

Watch Video Solution

Assignment Section B Objective Type Questions One Option Is Correct

1. If A is a matrix of order $[x-1] \times 3$ and B is matrix of order $3 \times [y-2]$,where [ ] represent greatest integer function, such that AB is a matrix of order 4×5 then

A. $x \in [5, 6)$

B. $x \in [5, 6]$

C. $y \in [7, 8]$

D. $y \in [8, 9]$

Answer: A

Watch Video Solution

2. If A is a diagonal matrix of order 3×3 is commutative with every square matrix or order 3×3 under multiplication and $tr(A) = 12,$ then the value of $|A|^{1/2}$ is _____.

A. A diagonal matrix with atleast two diagonal elements different

B. A scalar matrix

C. A unit matrix

D. A diagonal matrix with exactly two diagonal elements different

Answer: B

Watch Video Solution

3. If the square matrices A and B are such that $AB = A$ and $BA = B$, then

A. A is an idempotent matrix but B is not

B. B is an idempotent matrix but A is not

C. A and B are both idempotent matrices

D. Neither A nor B are idempotent matrices

Answer: C

Watch Video Solution

4. Which of the following about the trace of a matrix is false?

A. tr(ABC)=tr(BCA)=tr(ACB)=tr(BAC)=tr(CBA)

B. tr(AB)=tr(BA)

C. tr(A-B)=trA-trB

D. $tr\left(A^2\right) = (trA)^2$

Answer: D

Watch Video Solution

5. If A, B and $A + B$ are idempotent matrices, then

A. AB=BA

B. AB+BA=O

C. AB-BA=I

D. AB+BA=I

Answer: B

Watch Video Solution

6. If $A = [a \quad b], B = [-b \quad -a]$ and $C = \begin{bmatrix} a \\ -a \end{bmatrix}$, then correct statement is

A. A=-B

B. A+B=A-B

C. AC=BC

D. CA=CB

Answer: C

Watch Video Solution

7. Let $A = \begin{bmatrix} 1 & \frac{x}{n} \\ -\frac{x}{n} & 1 \end{bmatrix}$, then $\lim_{n \to \infty} A^n$ is

A. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$

C. $\begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$

D. $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$

Answer: B

Watch Video Solution

8. Let A be a squarematrix of order n.

l= maximum number of different entries if A is a upper triangular matrix.

m= minimum number of zeros if A is a triangular matrix.

p = minimum number of zeros if A is a diagonal matrix.

If $l + 2m = 2p + 1$, then n=

A. 1

B. 2

C. 3

D. 4

Answer: C

View Text Solution

9. let $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $P = \begin{bmatrix} \cos\left(\frac{\pi}{6}\right) & \sin\left(\frac{\pi}{6}\right) \\ -\sin\left(\frac{\pi}{6}\right) & \cos\left(\frac{\pi}{6}\right) \end{bmatrix}$ and $Q = PAP^T$ then $P^T Q^{2013} P$ (i) $\begin{bmatrix} 1 & 2013 \\ 0 & 1 \end{bmatrix}$ (ii) $\begin{bmatrix} 0 & 2013 \\ 0 & 1 \end{bmatrix}$ (iii) $\begin{bmatrix} 2013 & 0 \\ 0 & 2103 \end{bmatrix}$ (iv) $\begin{bmatrix} 0 & 2103 \\ 2013 & 0 \end{bmatrix}$

A. $\begin{bmatrix} 1 & 2013 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 0 & 2013 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 2013 & 0 \\ 0 & 2013 \end{bmatrix}$

D. $\begin{bmatrix} 0 & 2013 \\ 2013 & 0 \end{bmatrix}$

Answer: A

Watch Video Solution

10. Let t be the trace of matrix A $\left[\left[\frac{|x+y|}{|x|+|y|}, \alpha_1, \beta_1\right], \left[\alpha_2, \frac{|y+z|}{|y|+|z|}, \beta_2\right], \frac{\alpha_3, |x+z|}{|x|+|z|}, \beta_3\right)\Big]\Big]$ then

A. $0 \leq t < 3$

B. $1 \leq t \leq 2$

C. $1 \leq t \leq 3$

D. $-1 \leq t \leq 1$

Answer: C

Watch Video Solution

11. Let A be the set of all 3×3 symmetric matrices all of whose entries are either 0 or 1. Five of these entries are 1 and four of them are 0. The number of matrices in A is

A. 6

B. 12

C. 9

D. 18

Answer: B

Watch Video Solution

12. The number of matrices of A of order 2×2 such that AB-BA=I, where B is a given matrix,

A. 0

B. 1

C. 2

D. Infinite

Answer: A

Watch Video Solution

13. Let A be an involutary matrix and S be the set containing solution of $A^x = 1$ where $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$ Then minimum value of $\sum_{x \in S}^{\infty} (\sin^x \theta + \cos^x \theta)$

A. 2

B. 4

C. 0

D. -2

Answer: A

Watch Video Solution

Assignment Section C Objective Type Questions More Than One Options Are Correct

1. $A(\theta)=\begin{bmatrix}\cos^2\theta & \cos\theta\sin\theta\\ \cos\theta\sin\theta & \sin^2\theta\end{bmatrix}$ and $C(\theta,\phi)=A(\theta)A(\phi)$, then which of the following matrices is a null matrix?

A. $C\left(\frac{2\pi}{5},-\frac{11\pi}{10}\right)$

B. $C\left(\frac{11\pi}{10},-\frac{2\pi}{5}\right)$

C. $C\left(\frac{3\pi}{7},-\frac{41\pi}{14}\right)$

D. $C\left(\frac{7\pi}{3},-\frac{29\pi}{6}\right)$

Answer: A::B::C::D

Watch Video Solution

2. If A and B are commuting square matrices of the same order, then which of the following is/are correct ?

A. A and B^n commute, $n\in N$

B. A^n and B commute, $n\in N$

C. $A-\lambda$ and $B+\mu$ commute, $\lambda,\mu\in R$

D. $A + \lambda$ and $B - \mu$ commute,$\lambda, \mu \in R$

Answer: A::B::C::D

Watch Video Solution

3. A matrix $A = [a_{ij}]_{m \times n}$ is

A. Horizontal matrix if $m > n$

B. Horizontal matrix if $m < n$

C. Vertical matrix if $m > n$

D. Vertical matrix if $m < n$

Answer: B::C

Watch Video Solution

4. If $A = [a_{ij}]$ is a square matrix of even order such that $a_{ij} = i^2 - j^2$, then

A. A is skew - symmetric

B. $|A|$ is perfect square

C. A is symmetric and $|A| = 0$

D. A is neither symmetric nor skew - symmetric

Answer: A::B

Watch Video Solution

5. If A and B are two square matrices such that they commute, then which of the following is true?

A. $AB^{2013} = B^{2013}A$

B. $(AB)^{2013} = A^{2013}B^{2013}$

C.

$$(A+B)^n = .^n C_0 A^n + .^n C_1 A^{n-1} B + .^n C_2 A^{n-2} B^2 + \ldots + .^n C_n$$

D. $A^2 - B^2 = (A-B)(A+B)$

Answer: A::B::C::D

Watch Video Solution

6. If A is a nilpotent matrix of odd order r, then which of the following is true?

A. $l = (l-A)\left(l^{r-2}A + l^{r-3}A^2 + \ldots + A^{r-1}\right)$

B. $l = (l+A)\left(l^{r-1} + l^{r-2}A + l^{r-3}A^2 + \ldots + A^{r-1}\right)$

C. $l = (l+A)\left(l^{r-1} - l^{r-2}A + l^{r-3}A^2 - \ldots + A^{r-1}\right)$

D. $l = (l=A)\left(l^{r-1} - l^{r-2}A + l^{r-3}A^2 - \ldots + A^{r-1}\right)$

Answer: A::C

Watch Video Solution

7. If A is any square matrix such that $A + \frac{I}{2}$ and $A - \frac{I}{2}$ are orthogonal matrices, then

A. A is symmetric

B. A is skew-symmetric

C. $A^2 = \frac{3l}{2}$

D. $A^2 = \frac{-3l}{2}$

Answer: B::D

Watch Video Solution

Assignment Section D Linked Comprehension Type Questions

1. Let ψ_A be defined as trace of a matrix which is sum of diagonal elements of a square matrix.$\psi_{\lambda A + \mu B}$=

A. $\lambda\Psi_A + \mu\Psi_B$

B. $\lambda\Psi_B + \mu\Psi_A$

C. $\lambda\Psi_{AB} + \mu\Psi_{BA}$

D. none of these

Answer: A

Watch Video Solution

2. Let ψ_A be defined as trace of a matrix which is sum of diagonal elements of a square matrix.$\psi_{\lambda A+\mu B}$=

A. $\Psi_{A+B} = \Psi_{A-B}$

B. $\Psi_{A+B} = \Psi_{AB}$

C. $\Psi_{AB} = \Psi_{BA}$

D. $\Psi_{A-B} = \Psi_{BA}$

Answer: C

Watch Video Solution

3. Let ψ_A be defined as trace of a matrix which is sum of diagonal elements of a square matrix.$\psi_{\lambda A+\mu B}$=

A. $\Psi_{ABC}=\Psi_{BAC}$

B. $\Psi_{ABC}=\Psi_{CBA}$

C. $\Psi_{ABC}=\Psi_{BCA}$

D. none of these

Answer: C

Watch Video Solution

Assignment Section E Assertion Reason Type Questions

1. Let A and B be n-rowed square matrices

STATEMENT - 1 The identity $(x+y)^2=x^2+2xy+y^2$ doesn't hold when

x and y are substituted by A and B.

and

STATEMENT- 2 : Matrix multiplication is not commutative

A. Statement -1 is True, Statement -2 is True , Statement -2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement -2 is True , Statement -2 is NOT a correct explanation for Statement-1

C. Statement -1 is True, Statement -2 is False

D. Statement -1 is False , Statement -2 is True

Answer: A

Watch Video Solution

2. If $A = \begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ then A is `1) an idempotent matrix 2) nilpotent matrix 3) involutary 4) orthogonal matrix

A. Statement -1 is True, Statement -2 is True , Statement -2 is a correct explanation for Statement-2

B. Statement-1 is True, Statement -2 is True , Statement -2 is NOT a correct explanation for Statement-2

C. Statement -1 is True, Statement -2 is False

D. Statement -1 is False , Statement -2 is True

Answer: A

Watch Video Solution

3. STATEMENT -1 : $a = \frac{1}{3}\begin{bmatrix} 1 & -2 & 2 \\ -2 & 1 & 2 \\ -2 & -2 & -1 \end{bmatrix}$ is an orthogonal matrix and

STATEMENT-2 : If A and B are otthogonal, then AB is also orthogonal.

A. Statement -1 is True, Statement -2 is True , Statement -2 is a correct explanation for Statement-3

B. Statement-1 is True, Statement -2 is True , Statement -2 is NOT a correct explanation for Statement-3

C. Statement -1 is True, Statement -2 is False

D. Statement -1 is False , Statement -2 is True

Answer: B

Watch Video Solution

Assignment Section F Matrix Match Type Question

1. Match the following

	Column-I
(A)	If A and B are otthogonal, then AB is
(B)	If A and B are nilpotent matrices of order r and s and A and B comm
(C)	If A is a hermitian matrix such that $A^2 = 0$, then A is
(D)	If A and B are unitary matrices, then AB is

View Text Solution

Assignment Section G Integer Answer Type Questions

1. Let $A=\begin{bmatrix}0 & 2\\ 0 & 0\end{bmatrix}$ and $(A+1)^{100}-100A=\begin{bmatrix}\alpha & \beta\\ \gamma & \delta\end{bmatrix}$, then $\alpha+\beta+\gamma+\delta=\ldots$

Watch Video Solution

2. Let $A=\begin{bmatrix}\omega & -\omega\\ -\omega & \omega\end{bmatrix}$ where w is a complex cube root of unity, $B=\left[(1,\ -1),(-1,1)\right.$ and $A^9=2^kB$, where $k=\ldots.$

Watch Video Solution

3. If A is a 3×3 skew-symmetric matrix, then trace of A is equal to -1 b. 1 c. $|A|$ d. none of these

Watch Video Solution

4. Let A be a square matrix of $2x2$ satisfyinga. $a_{ij} = 1$ or -1 and $a_{11} \cdot a_{21} + a_{12} \cdot a_{22} = 0$ then the no. of matrix

Watch Video Solution

Assignment Section H Multiple True False Type Questions

1. STATEMENT -1 All positive odd integral powers of a skew - symmetric matrix are symmetric.

STATEMENT-2 : All positive even integral powers of a skew - symmetric matrix are symmetric.

STATEMENT-3 If A is a skew - symmetric matrix of even order then $|A|$ is perfect square

A. F T T

B. T T T

C. T F T

D. T T F

Answer: A

Watch Video Solution

2. If A and B are symmetric matrices of same order, then

STATEMENT-1: A+B is skew - symmetric matrix.

STATEMENT -2 : AB-BA is skew - symmetric matrix.

STATEMENT-3 A-B is skew - symmetric matrix .

A. T T T

B. F T F

C. F T T

D. F F F

Answer: B

Watch Video Solution

Assignment Section I Subjective Type Questions

1. If A and B are two square matrices of the order 3, then the value of 998 $tr(I) - 999tr(AB) + 999tr$ (BA) is

Watch Video Solution

2. The matrix $A = \begin{bmatrix} \lambda_1^2 & \lambda_1\lambda_2 & \lambda_1\lambda_3 \\ \lambda_2\lambda_1 & \lambda_2^2 & \lambda_2\lambda_3 \\ \lambda_3\lambda_1 & \lambda_3\lambda_2 & \lambda_3^2 \end{bmatrix}$ is idempotent if $\lambda_1^2 + \lambda_2^2 + \lambda_3^2 = k$ where $\lambda_1, \lambda_2, \lambda_3$ are non-zero real numbers. Then the value of $(10 + k)^2$ is ...

Watch Video Solution

3. Find all solutions of the matrix equation $X^2 = 1,$ where 1 is the 2-rowed unit matrix, and X is a real matrix,i.e. a matrix all of whose elements are real.

Watch Video Solution

Assignment Section J Aakash Challengers Questions

1. The matrix $A = \begin{bmatrix} \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \\ \frac{-1}{\sqrt{2}} & \frac{-1}{\sqrt{2}} \end{bmatrix}$ is

A. Unitary

B. Orthogonal

C. Nilpotent

D. Involutary

Answer: C

Watch Video Solution

2. Let A be an idemopotent matrix and $(l + A)^{100} = l + \left(2^{20k} - 1\right)A$, then k = ...

Watch Video Solution

3. Let $A = \begin{bmatrix} \alpha & \beta \\ \gamma & \delta \end{bmatrix}$ such that $A^3 = 0,$ then sum of all the elements of A^2 is

Watch Video Solution