Vernacular

ULTIMATE KCET CRASH COURSE 2026

MATHS

DPP: 1

Matrices and Determinants

Q1 If A and B are two matrices such that AB is an identity matrix and the order of matrix B is 3×4, then the order of matrix A is

(A) 4 × 4 (B) 3 × 4

(C) 4 × 3 (D) 4 × 3

Q2 If $\begin{bmatrix} x & 2 & -3 \\ 5 & y & 2 \\ 1 & -1 & z \end{bmatrix}\begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 2 & 0 & 3 \end{bmatrix}$ then the $= \begin{bmatrix} 5 & 3 & 3 \\ 19 & -5 & 16 \\ 1 & -3 & 0 \end{bmatrix}$

values of x, y, z are respectively

(A) 1, 0, 1 (B) 1, 1, 0

(C) 0, 1, 1 (D) 1, 1, 1

Q3 If the product of two matrices is a zero matrix, then

(A) Both the matrices are zero matrices

(B) Any one of them is a zero matrix

(C) Both the matricesneed not be zero matrices

(D) None of these.

Q4 If *A* and *B* are two square matrices of the same order such that *AB* = *B* and *BA* = *A*, then $A^2 + B^2$ is always equal to

(A) A + B (B) I

(C) 2BA (D) 2AB

Q5 If $A = \begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$ then A^{40} is equal to

(A) $\begin{bmatrix} 0 & 40i \\ -40i & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 20i \\ -20i & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 20 & 0 \\ 0 & 20 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Q6 If $A = \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$, then x equals

(A) 2 (B) -1/2

(C) 1 (D) 1/2

Q7 If $\begin{bmatrix} a+b & 2 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 6 & 5 \\ 2 & 5 \end{bmatrix}'$, then find a.

(A) 4 (B) 2

(C) 3 (D) 0

Q8 If $A_x = \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$, then $A_x A_y =$

(A) A_{x+y} (B) A_{xy}

(C) A_{x-y} (D) A_{yx}

Q9 Suppose A is any 3 × 3 non-singular matrix and (A - 3I)(A - 5I) = O, where I = I_3 and O = O_3. If αA + βA^{-1} = 4I, then α + β is equal to

(A) 13 (B) 7

(C) 12 (D) 8

Q10 If matrix $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$ is a skew symmetric matrix, then find the values of and . Find the value of a + b + 2c.

(A) -8 (B) 6

(C) -3 (D) -5

Q11 The number of all possible matrices of order 3 × 3 with each entry 0 or 1 is

(A) 18 (B) 512

(C) 81 (D) None of these

Q12 If $f(\alpha) = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$ and α, β, γ are angles of triangle then $f(\alpha)\cdot f(\beta)\cdot f(\gamma) =$

(A) I_2 (B) $-I_2$

(C) 0 (D) None

Q13 If $3\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & b \\ -1 & 2d \end{bmatrix} + \begin{bmatrix} 4 & a+b \\ c+d & 3 \end{bmatrix}$, then a + b + c + d =

(A) 5 (B) 8

(C) 50 (D) 6

Q14 If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ then $(B^{-1}A^{-1})^{-1}$ = ________

(A) $\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$

(B) $\begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & -3 \\ 2 & 2 \end{bmatrix}$

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

Q15 If $A = \begin{pmatrix} 1 & 1 \\ 0 & i \end{pmatrix}$ and $A^{2018} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then $(a + d)$ equals

(A) 1 + i (B) 0

(C) 2 (D) 2018

Q16 If $\begin{bmatrix} x+y & y \\ 2x & x-y \end{bmatrix}\begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$, then $x.y$ is equal to:

(A) -5 (B) 5

(C) 4 (D) 6

Q17 If a matrix has 5 elements, then the possible order is

(A) 5×1 (B) 5×0

(C) 2×3 (D) None of these

Q18 If n≥2 be an integer $A = \begin{bmatrix} \cos(2\pi/n) & \sin(2\pi/n) & 0 \\ -\sin(2\pi/n) & \cos(2\pi/n) & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and I is the identity matrix of order 3. Then

(A) $A^n = I$ and $A^{n-1} \neq I$

(B) $A^m \neq I$ for any positive integer m

(C) A is not invertible

(D) $A^m = 0$ for a positive integer m

Q19 Simplify : $\cos\theta\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta\begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$

(A) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (B) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Q20 The simplified form of $\tan\theta\begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & -\sec\theta \end{bmatrix} + \sec\theta\begin{bmatrix} -\tan\theta & -\sec\theta \\ -\sec\theta & \tan\theta \end{bmatrix}$

(A) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (B) $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$ (D) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

Q21 Let $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}, C = \begin{bmatrix} -2 & 5 \\ 3 & 4 \end{bmatrix}$. Find $2A - B - 3C$

(A) $\begin{bmatrix} 9 & 1 \\ 0 & 9 \end{bmatrix}$

(B) $\begin{bmatrix} -9 & 10 \\ 1 & 13 \end{bmatrix}$

(C) $\begin{bmatrix} 9 & -10 \\ -1 & -13 \end{bmatrix}$

(D) $\begin{bmatrix} 9 & 1 \\ 10 & 13 \end{bmatrix}$

Q22 If $A = \begin{bmatrix} 4 & x+2 \\ 2x-3 & x-1 \end{bmatrix}$ is symmetric then x is

(A) 3 (B) 5

(C) 2 (D) 4

Q23 If $A^2 = A$, then $(A + I)^3 - 7A$ =

(A) A (B) A - I

(C) I (D) A + I

Q24 If $A = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$, then A^{2017} is equal to

(A) $2^{2015}A$ (B) $2^{2016}A$

(C) $2^{2014}A$ (D) $2^{2017}A$

Q25 If $\begin{bmatrix} 4 & 9 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} x & y^2 \\ 3 & 0 \end{bmatrix}$ then $(x, y) =$

(A) (4, ±3) (B) (2, 4)

(C) (-2, -4) (D) (0, 0)

Q26 Construct a 3 × 2 matrix whose elements in the i^{th} row and j^{th} column are given by $a_{ij} = \frac{(2i-j)}{2}$

(A) $\begin{bmatrix} 1/2 & 0 \\ 3/2 & 1 \\ 5/2 & 2 \end{bmatrix}$ (B) $\begin{bmatrix} 1/2 & 0 \\ 1 & 3/2 \\ 5/2 & 2 \end{bmatrix}$

(C) $\begin{bmatrix} 1/2 & 3/2 & 5/2 \\ 0 & 1 & 2 \end{bmatrix}$ (D) None of these

Q27 For a 2×3 matrix, A = [a_{ij}], whose elements are given by $a_{ij} = \frac{(i+2j)^2}{4}$, write the value of $a_{13} \times a_{23}$.

(A) 16 (B) 49

(C) 196 (D) 784

Q28 If $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$, then A^2 = B for

(A) a = 4 (B) a = -1

(C) a = 1 (D) no a

Q29 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$, then A^3 - 37A =

(A) A + I (B) A - I

(C) 3I (D) 6I

Q30 If $\begin{bmatrix} x - y & 2x + z \\ 2x - y & 3z + w \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 0 & 13 \end{bmatrix}$, then $x + y + z + w =$

(A) 20 (B) 15

(C) 10 (D) 5

Answer Key

Q1	D
Q2	A
Q3	C
Q4	A
Q5	D
Q6	D
Q7	A
Q8	A
Q9	D
Q10	A
Q11	B
Q12	B
Q13	B
Q14	A
Q15	B
Q16	A
Q17	A
Q18	A
Q19	A
Q20	B
Q21	C
Q22	B
Q23	C
Q24	B
Q25	A
Q26	A
Q27	C
Q28	D
Q29	D
Q30	C

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

AB is exist,

then order of matrix A is 4x3

Video Solution:

Q2 Text Solution:

By matrix multiplication we get

$$\begin{bmatrix} 3x+8-6 & - & - \\ 15+4y+4 & - & - \\ 3-4+2z & - & - \end{bmatrix}$$

$$=\begin{bmatrix} 5 & 3 & 3 \\ 19 & -5 & 16 \\ 1 & -3 & 6 \end{bmatrix}$$

Other elements need not have to be computed.

$3x+2=5 \Rightarrow x=1,\ 4y+19=19 \Rightarrow y=0$ and

$-1+2z=1 \Rightarrow z=1$

Video Solution:

Q3 Text Solution:

If the product of two matrices is a zero matrix, then both the matricesneed not be zero matrices

Let: $A=\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ & $B=\begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$

Clearly $A \neq 0$ *and* $B \neq 0$

But $AB=O$

Video Solution:

Q4 Text Solution:

Given : $AB = B$ and $BA = A$

Now, $A^2 + B^2 = AA + BB = A(BA) + B(AB)$

$= (AB)A + (BA)B$

$= BA + AB$

$= A + B$

Video Solution:

Q5 Text Solution:

$$A=\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$$

$$A^2=\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}\begin{bmatrix} 0 & i \\ -i & 0 \end{bmatrix}$$

$$A^2=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}=I$$

$$A^{40}=\left(A^2\right)^{20}=I^{20}=I$$

Video Solution:

Q6 Text Solution:

$$A = \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}, A^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$$

We know that $AA^{-1} = I$

$$\Rightarrow \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}\begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 2x & 0 \\ 0 & 2x \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

On comparing, we get $2x = 1 \Rightarrow x = \frac{1}{2}$

Video Solution:

Q7 Text Solution:

$$\text{Given, } \begin{bmatrix} a+b & 2 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 6 & 5 \\ 2 & 2 \end{bmatrix}'$$

$$\Rightarrow \begin{bmatrix} a+b & 2 \\ 5 & b \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 2 \end{bmatrix}$$

$\Rightarrow a + b = 6, b = 2 \Rightarrow a = 4, b = 2.$

Video Solution:

Q8 Text Solution:

$A_x A_y$

$$= \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}\begin{bmatrix} \cos y & -\sin y \\ \sin y & \cos y \end{bmatrix}$$

$$= \begin{bmatrix} \cos x \cos y - \sin x \sin y & -\sin y \cos x - \cos y \sin x \\ \sin x \cos y + \cos x \sin y & -\sin x \sin y + \cos x \cos y \end{bmatrix}$$

$$= \begin{bmatrix} \cos(x+y) & -\sin(x+y) \\ \sin(x+y) & \cos(x+y) \end{bmatrix} = A_{x+y}$$

Video Solution:

Q9 Text Solution:

Given, (A - 3I) (A - 5I) = 0

\ A^2 - 8A + 15I = O

Post multiplying by A^{-1} on both sides, we have

$$A \Rightarrow AA^{-1} - 8A \Rightarrow A^{-1} + 15I \Rightarrow A^{-1} = O$$

$$\Rightarrow A - 8I + 15A^{-1} = O \Rightarrow A + 15A^{-1} = 8I$$

$$\Rightarrow \frac{1}{2}A + \frac{15}{2}A^{-1} = 4I$$

Comparing (i) with $\alpha A + \beta A^{-1} = 4I$, we get

$\alpha = \frac{1}{2}$ and $\beta = \frac{15}{2} \quad \therefore \alpha + \beta = \frac{1}{2} + \frac{15}{2} = 8$

Video Solution:

Q10 Text Solution:

$\therefore A' = -A$

$$\Rightarrow \begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}' = -\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 0 & 2 & c \\ a & b & 1 \\ 3 & -1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & -a & -3 \\ -2 & -b & 1 \\ -c & -1 & 0 \end{bmatrix}$$

On equating the corresponding elements, we get a = -2 and b = -b 2b = 0 b = 0 and c = -3

a+b+2c=-8

Video Solution:

Q11 Text Solution:

There are in total 9 entries and each entry can be selected in exactly 2 ways. Hence, the total number of all possible matrices of the given type is $2^9 = 512$.

Video Solution:

Q12 Text Solution:

Here

$$f(\alpha)\cdot f(\beta)\cdot f(\gamma)$$

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

$$=\begin{bmatrix} \cos\pi & \sin\pi \\ -\sin\pi & \cos\pi \end{bmatrix}=\begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}=-I_2$$

Video Solution:

Q13 Text Solution:

On comparing the corresponding elements

$$3a = a+4,\ 3b = b+a+b$$

$$3a = -1+c+d,\ 3d = 2d+3$$

On solving we get

$$a=2,\ b=2,\ c=1,\ d=3$$

$$\Rightarrow\ a+b+c+d=8$$

Video Solution:

Q14 Text Solution:

$$A=\begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix},\ B=\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

$|A| = 4 + 6 = 10 \neq 0$ and $|B| = 0 + 1 = 1 \neq 0$

A^{-1}, B^{-1} exists.

$$\left(B^{-1}A^{-1}\right)^{-1} = \left(A^{-1}\right)^{-1}\left(B^{-1}\right)^{-1} = AB$$

$$=\begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$$

$$=\begin{bmatrix} 0+2 & -2+0 \\ 0+2 & 3+0 \end{bmatrix}=\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$$

Video Solution:

Q15 Text Solution:

Given, $A=\begin{pmatrix} 1 & 1 \\ 0 & i \end{pmatrix}$

$$\Rightarrow\ A^2=\begin{bmatrix} 1 & 1+i \\ 0 & -1 \end{bmatrix}$$

$$\Rightarrow\ A^3=\begin{bmatrix} 1 & i \\ 0 & -i \end{bmatrix}\ \Rightarrow A^4=\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Also, $A^{2018} = A^{4\times 504/2} = A^2 = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

Using (i), we get $a + d = 1 + (-1) = 0$

Video Solution:

Q16 Text Solution:

We have, $\begin{bmatrix} x+y & y \\ 2x & x-y \end{bmatrix}\begin{bmatrix} 2 \\ -1 \end{bmatrix}=\begin{bmatrix} 3 \\ 2 \end{bmatrix}$.

$$\Rightarrow\begin{bmatrix} 2x+2y-y \\ 4x-x+y \end{bmatrix}=\begin{bmatrix} 3 \\ 2 \end{bmatrix}\Rightarrow\begin{bmatrix} 2x+y \\ 3x+y \end{bmatrix}=\begin{bmatrix} 3 \\ 2 \end{bmatrix}$$

∵If two matrices are equal, their corresponding elements are also equal.

\ $2x + y = 3$.....(i) and $3x + y = 2$ ....(ii)

From (i) and (ii) we get $x = -1$ and $y = 5$

\ $xy = -1 \times 5 = -5$

Video Solution:

Q17 Text Solution:

All possible orders of 5 elements are 1 × 5 or 5 × 1 .

Video Solution:

Q18 Text Solution:

Let $\frac{2\pi}{n} = \theta.$

$$\Rightarrow A = \begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix} \Rightarrow A^2$$

$$= \begin{bmatrix} \cos 2\theta & \sin 2\theta & 0 \\ -\sin 2\theta & \cos 2\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\therefore A^n = \begin{bmatrix} \cos n\theta & \sin n\theta & 0 \\ -\sin\theta & \cos n & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} \cos 2\pi & \sin 2\pi & 0 \\ -\sin 2\pi & \cos 2\pi & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I \quad \text{Also } A^{n-1} \neq I.$$

Video Solution:

Q19 Text Solution:

$$\text{We have, } \cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$$

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

$$= \begin{bmatrix} \cos^2\theta & \sin\theta\cos\theta \\ -\sin\theta\cos\theta & \cos^2\theta \end{bmatrix}$$

$$= \begin{bmatrix} \cos^2\theta + \sin^2\theta & -\sin\theta\cos\theta \\ \sin\theta\cos\theta & \sin^2\theta \end{bmatrix}$$

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

Video Solution:

Q20 Text Solution:

$$\tan\theta \begin{bmatrix} \sec\theta & \tan\theta \\ \tan\theta & -\sec\theta \end{bmatrix}$$

$$+\sec\theta \begin{bmatrix} -\tan\theta & -\sec\theta \\ -\sec\theta & \tan\theta \end{bmatrix}$$

$$= \begin{bmatrix} \tan\theta\sec\theta & \tan^2\theta \\ \tan^2\theta & -\tan\theta\sec\theta \end{bmatrix}$$

$$+ \begin{bmatrix} -\tan\theta\sec\theta & -\sec^2\theta \\ -\sec^2\theta & \tan\theta\sec\theta \end{bmatrix}$$

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

Video Solution:

Q21 Text Solution:

$$2A - B - 3C = (2A - B) - 3C$$

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

$$= \left(\begin{bmatrix} 4 & 8 \\ 6 & 4 \end{bmatrix} - \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}\right) - \begin{bmatrix} -6 & 15 \\ 9 & 12 \end{bmatrix}$$

$$= \begin{bmatrix} 4-1 & 8-3 \\ 6+2 & 4-5 \end{bmatrix} - \begin{bmatrix} -6 & 15 \\ 9 & 12 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ 8 & -1 \end{bmatrix} - \begin{bmatrix} -6 & 15 \\ 9 & 12 \end{bmatrix}$$

$$= \begin{bmatrix} 3+6 & 5-15 \\ 8-9 & -1-12 \end{bmatrix} = \begin{bmatrix} 9 & -10 \\ -1 & 13 \end{bmatrix}$$

Video Solution:

Q22 Text Solution:

Since given matrix is symmetric $A = A^T$

Video Solution:

Q23 Text Solution:

$$(A+I)^2 = A^2 + 2A + I = 3A + I$$

$$\Rightarrow (A+I)^3 = (3A+I)(A+I) = 3A^2 + 4A + I = 7A + I$$

$$\therefore (A+I)^3 - 7A = I$$

Video Solution:

Q24 Text Solution:

$$A^2 = A \cdot A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$$

$$= 2A$$

$A^2 = 2A$

$A^2 = 2^2A$

$$\therefore A^{2017} = 2^{2016}A$$

Video Solution:

Q25 Text Solution:

$$\begin{bmatrix} 4 & 9 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} x & y^2 \\ 3 & 0 \end{bmatrix}$$

$$x = 4 \quad y^2 = 9$$

$$y = \pm 3$$

$$(x, y) = (4, \pm 3)$$

Video Solution:

Q26 Text Solution:

Let 3 x 2 matrix is $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix}$ whose elements are given by $a_{ij} = \frac{(2i-j)}{2}$

$$a_{11} = \frac{2(1)-1}{2} = \frac{1}{2}, \quad a_{12} = \frac{2(1)-2}{2} = 0$$

$$a_{21} = \frac{2(2)-1}{2} = \frac{3}{2}, \quad a_{22} = \frac{2(2)-2}{2} = 1$$

$$a_{31} = \frac{2(3)-1}{2} = \frac{5}{2}, \quad a_{32} = \frac{2(3)-2}{2} = 2$$

So, matrix will be $\begin{bmatrix} 1/2 & 0 \\ 3/2 & 1 \\ 5/2 & 2 \end{bmatrix}$

Video Solution:

Q27 Text Solution:

We have, $a_{ij} = \frac{(i+2j)^2}{4}$

$\therefore a_{23} = \frac{[2+3(3)]^2}{4} = \frac{(8)^2}{4} = \frac{64}{4} = 16$

$a_{13} = \frac{[1+2(3)]^2}{4} = \frac{(7)^2}{4} = \frac{49}{4}$

$\therefore\ a_{23} \times a_{13} = 16 \times \frac{49}{4} = 196$

Video Solution:

Q28 Text Solution:

$$A^2 = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} \alpha^2 & 0 \\ \alpha+1 & 1 \end{bmatrix},$$

$$A^2 = B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$$

$\Rightarrow\ \alpha^2 = 1,\ \alpha + 1 = 5\ \Rightarrow \alpha = \pm 1\ \Rightarrow \alpha + 1 \neq 5$

$\therefore A^2 = B$ for no α

Video Solution:

Q29 Text Solution:

We have,

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}, A^2 = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 7 & 12 \\ 18 & 31 \end{bmatrix}$$

$$A^3 = \begin{bmatrix} 7 & 12 \\ 18 & 31 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix} = \begin{bmatrix} 43 & 74 \\ 111 & 191 \end{bmatrix}$$

$$\text{Now, } A^3 - 37A = \begin{bmatrix} 43 & 74 \\ 111 & 191 \end{bmatrix}$$

$$-\begin{bmatrix} 37 & 74 \\ 111 & 185 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix} = 6I$$

Video Solution:

Q30 Text Solution:

x - y = –1 ...(i) 2x – y = 0 –(ii)

(i) - (ii)

–x = –1

x = 1

∴1 – y = –1

y = 2

2x + z = 5 ...(iii) 3z + w = 13 ...(iv)

2 + z = 5 9 + w = 13

z = 3 w = 4

∴ x + y + z + w = 10

Video Solution: