Modal Answers of II Test — MM 15

Maths (104)

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Q. 1. यदि $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ हो तो सिद्ध करो $A^2 = I$

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

To Prove $A^2 = I$

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

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

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

Q2 यदि $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ व $B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$ हो तो $3A-B$ का मान निकालो ।

Ans →

$$A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$$

$$B = \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$$

$$3A - B = ?$$

$$\Rightarrow 3A - B = 3\begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix} - \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$$

$$3A-B = \begin{bmatrix} 0 & 6 & 9 \\ 6 & 3 & 12 \end{bmatrix} - \begin{bmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{bmatrix}$$

$$3A-B = \begin{bmatrix} -7 & 0 & 6 \\ 5 & -1 & 7 \end{bmatrix}$$ Ans

Q-3 x, y, z, t का मान ज्ञात करो यदि

$$\begin{bmatrix} x+3 & 2y+x \\ z-1 & 4t-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 2t \end{bmatrix}$$

Ans => $$\begin{bmatrix} x+3 & 2y+x \\ z-1 & 4t-6 \end{bmatrix} = \begin{bmatrix} 0 & -7 \\ 3 & 2t \end{bmatrix}$$

$x+3 = 0$ —— (1)

$2y+x = -7$ —— (2)

$z-1 = 3$ —— (3)

$4t-6 = 2t$ —— (4)

= (4) से —

$4t-6 = 2t$

$4t-2t = 6$

$2t = 6$

$t = \frac{6}{2}$

$\boxed{t = 3}$

(3) से —

$z-1 = 3$

$z = 3+1$

$\boxed{z = 4}$

(1) से

$x+3=0$

$\boxed{x=-3}$

x का मान दो में रखने पर

$2y+x=-7$

$2y-3=-7$

$2y=-7+3$

$2y=-4$

$y=-2$

तब

$\boxed{x=-3}$

$\boxed{y=-2}$

$\boxed{z=4}$

$\boxed{t=3}$

Q-4 ⇒ यदि $A=\begin{bmatrix}1&2&2\\2&1&2\\2&2&1\end{bmatrix}$ हो तो सिद्ध करो की $A^2-4A+5I_3=0$

Ans ⇒ $A=\begin{bmatrix}1&2&2\\2&1&2\\2&2&1\end{bmatrix}$

To Prove — $A^2-4A+5I_3=0$ —— (1)

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

$$A^2=\begin{bmatrix}1+4+4&2+2+4&2+4+2\\2+2+4&4+1+4&4+2+2\\2+4+2&4+2+2&4+4+1\end{bmatrix}$$

$$A^2=\begin{bmatrix}9&8&8\\8&9&8\\8&8&9\end{bmatrix}$$

① हल, $A^2-4A+5I_3=0$

$$=\begin{bmatrix}9&8&8\\8&9&8\\8&8&9\end{bmatrix}-4\begin{bmatrix}1&2&2\\2&1&2\\2&2&1\end{bmatrix}+5\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}=0$$

$$\begin{bmatrix}9&8&8\\8&9&8\\8&8&9\end{bmatrix}-\begin{bmatrix}4&8&8\\8&4&8\\8&8&4\end{bmatrix}-\begin{bmatrix}5&0&0\\0&5&0\\0&0&5\end{bmatrix}=0$$

$$\begin{bmatrix}9-4-5&8-8-0&8-8-0\\8-8-0&9-4-5&8-8-0\\8-8-0&8-8-0&9-4-5\end{bmatrix}=0$$

$$\begin{bmatrix}0&0&0\\0&0&0\\0&0&0\end{bmatrix}=0$$ L.H.S = R.H.S Hence proved

Q-5 सिद्ध करो कि $D=\begin{bmatrix}1&x&yz\\1&y&zx\\1&z&xy\end{bmatrix}=(x-y)(y-z)(z-x)$

Ans. $D=\begin{vmatrix}1&x&yz\\1&y&zx\\1&z&xy\end{vmatrix}$

L.H.S लेने पर -

$$=\begin{vmatrix}1&x&yz\\1&y&zx\\1&z&xy\end{vmatrix}$$

$$\begin{vmatrix}1&1&yz\\1&1&zx\\1&1&xy\end{vmatrix}x^2y^2z^2$$

$=(x-y)(y-z)(z-x)=$ R.H.S

Hence proved