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class - VIIIth - Mathematics

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Topic - Matrices

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Q. No - ② Find A^{-1} if $A = \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix}$

Solution: We write $A = IA$

$$\Rightarrow \begin{bmatrix} 2 & -6 \\ 1 & -2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} A$$

$\Rightarrow$ Applying $R_1 - R_2$, we get

$$\begin{bmatrix} 2-1 & -6-(-2) \\ 1 & -2 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 1 & 0 \end{bmatrix} A$$

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

Applying $R_2 - R_1$, we get

$$\begin{bmatrix} 1 & -4 \\ 1-1 & -2-(-4) \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 0 & 1 & 1-(-1) \end{bmatrix} A$$

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

Applying $R_1 + 2R_2$, we get

$$\begin{bmatrix} 1+2 \times 0 & -4+2 \times 2 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1+2(-1) & -1+2 \times 2 \\ -1 & 2 \end{bmatrix} A$$

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

Applying $R_2 \rightarrow \frac{1}{2}R_2$, we get

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 3 \\ -\frac{1}{2} & \frac{1}{2} \end{bmatrix} A \Rightarrow A^{-1} = \begin{bmatrix} -1 & 3 \\ -\frac{1}{2} & \frac{1}{2} \end{bmatrix} \text{ Ans}$$

Q. (4) Find A' if $A = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$

Solution: Given that

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

We write $A = AI$

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

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

Applying $R_1 \rightarrow R_1 - 2R_2$ we get

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

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

$\therefore$ each element of C_1 on L.H.S. are equal to zero.

$\therefore A'$ does not exist.

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