ABLES® KOTA

Matrix

Equality of Matrix :- two matrix A & B are equal

i) order of both matrix are same. $\rightarrow$ $\boxed{a_{ij} = b_{ij}}$

ii) Corresponding Elements of both matrix are same.

$$A = \begin{bmatrix} 0 & 5 \\ -7 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 5 \\ -7 & 1 \end{bmatrix}, \quad \Bigg| \quad A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 1 \end{bmatrix}$$

$a_{11} = 1 \neq b_{11} = 2$

Ques:- if A & B are equal than find unknown.

$$A = \begin{bmatrix} a & 4 \\ 7 & -b \end{bmatrix}, \quad B = \begin{bmatrix} 0 & -c \\ d & 2 \end{bmatrix}$$

Solⁿ:- $\because$ $\underline{A = B}$ (given) $\therefore$ $a_{ij} = b_{ij}$

So:- $a_{11} = b_{11}$

$\boxed{a = 0}$ Ans

$a_{12} = b_{12}$

$4 = -c$

$\boxed{c = -4}$ Ans

$a_{21} = b_{21}$

$\boxed{7 = d}$ Ans

$a_{22} = b_{22}$

$-b = 2$

$\boxed{b = -2}$ Ans

So: $a = 0$, $b = -2$, $c = -4$, $d = 7$ Ans

Matrix

Equality of Matrix :-

Que: if $A = B$ then find value of a, b & c.

$$A = \begin{bmatrix} 3a+b & 0 \\ -c & 2b \end{bmatrix}, \quad B = \begin{bmatrix} 5 & 0 \\ -7 & 2 \end{bmatrix}$$

Soln :-

$a_{11} = b_{11}$ $a_{21} = b_{21}$ $a_{22} = b_{22}$

$\boxed{3a+b = 5}$ — ① $-c = -7$ $2b = 2$

$\boxed{c = 7}$ ✓ $\boxed{b = 1}$

$\Rightarrow 3a + 1 = 5$

$3a = 4$

$a = 4/3$

Matrix

Ex:- 3.1 Ques:- $3 \times 3 \rightarrow$ each elements $\rightarrow$ 0 or 1.

Q.10

$$\rightarrow A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \rightarrow \begin{array}{l} a_{11} = 0 \text{ or } 1 \rightarrow {}^2C_1 \Rightarrow 2 \\ a_{12} = 0 \text{ or } 1 \rightarrow {}^2C_1 \Rightarrow 2 \\ \vdots \\ a_{33} = 0 \text{ or } 1 \Rightarrow {}^2C_1 = 2 \end{array}$$

no. of elements = 9

$$\Rightarrow \text{Total no. of Matrix} \rightarrow \underbrace{2 \times 2 \times 2 \times \cdots\cdots \times 2}_{9 \text{ times}}$$

$$= 2^9 = 512 \text{ Ans}$$

Matrix

Operations of Matrix :- i) addition of Matrix :-

→ we can add two Matrix if their order are same.

→ if we add both Matrix :- then corresponding Elements of Both Matrix get added.

Ex. $A = \begin{bmatrix} 1 & 3 \\ 7 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 3 \\ -2 & 1 \end{bmatrix}$ ⇒ $\boxed{A+B}$ − ?

$$\Rightarrow A+B = \begin{bmatrix} a_{11}+b_{11} & a_{12}+b_{12} \\ a_{21}+b_{21} & a_{22}+b_{22} \end{bmatrix}$$

$$A+B = \begin{bmatrix} 1+5 & 3+3 \\ 7+(-2) & 0+1 \end{bmatrix} = \begin{bmatrix} 6 & 6 \\ 5 & 1 \end{bmatrix}_{2\times 2} \text{ Ans}$$

if $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix}$, $B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \\ b_{31} & b_{32} \end{bmatrix}$

than $A+B = \begin{bmatrix} a_{11}+b_{11} & a_{12}+b_{12} \\ a_{21}+b_{21} & a_{22}+b_{22} \\ a_{31}+b_{31} & a_{32}+b_{32} \end{bmatrix}$

Matrix

Multiplication of a Matrix By a Scaler.

if K is a scaler no. then we can multiply K by Matrix A.

$$\rightarrow \quad K \times A = K \times \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}_{2\times 3}$$ $\longrightarrow$ K is multiplied with each Element of Matrix A.

$$KA = \begin{bmatrix} Ka_{11} & Ka_{12} & Ka_{13} \\ Ka_{21} & Ka_{22} & Ka_{23} \end{bmatrix}_{2\times 3}$$

ex:-

Ex:- Multiply A with $K=4$ if $A = \begin{bmatrix} 0 & 7 \\ -5 & 1 \end{bmatrix}$

Solⁿ:- Sol:- $KA = 4\begin{bmatrix} 0 & 7 \\ -5 & 1 \end{bmatrix} = \boxed{\begin{bmatrix} 0 & 28 \\ -20 & 4 \end{bmatrix} = 4A}$

Matrix

Ques:- if $A=\begin{bmatrix}1&7&3\\5&9&4\\8&2&-1\end{bmatrix}$, $B=\begin{bmatrix}0&-5&1\\1&3&9\\7&2&4\end{bmatrix}$, $C=\begin{bmatrix}0&5&2\\0&7&-3\\1&0&1\end{bmatrix}$

find:- $\boxed{2A+B-C}$ - ?

Soln:- $2A = 2\begin{bmatrix}1&7&3\\5&9&4\\8&2&-1\end{bmatrix} \Rightarrow 2A=\begin{bmatrix}2&14&6\\10&18&8\\16&4&-2\end{bmatrix}$

$\Rightarrow 2A+B=\begin{bmatrix}2+0&14+(-5)&6+1\\10+1&18+3&8+9\\16+7&4+2&-2+4\end{bmatrix}=\begin{bmatrix}2&9&7\\11&21&17\\23&6&2\end{bmatrix}=2A+B$

$\therefore 2A+B-C=\begin{bmatrix}2-0&9-5&7-2\\11-0&21-7&17-(-3)\\23-1&6-0&2-1\end{bmatrix}=\begin{bmatrix}2&4&5\\11&14&20\\22&6&1\end{bmatrix}=2A+B-C$ Ans