Matrix - type - IV

5. vi) $A = \begin{bmatrix} 1 & 0 & -2 \\ 2 & -1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} -3 & 1 \\ 2 & 4 \\ 1 & -2 \end{bmatrix}$ 2×3 3×2 $= 2\times2$

$(AB)' = B'A'$

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

$= \begin{bmatrix} -3+0-2 & 1+0+4 \\ -6-2+3 & 2-4-6 \end{bmatrix}$

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

$AB' = \begin{bmatrix} -5 & 5 \\ -5 & 8 \end{bmatrix}'$

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

$$A' = \begin{bmatrix} 1 & 0 & -2 \\ 2 & -1 & 3 \end{bmatrix}' = \begin{bmatrix} 1 & 2 \\ 0 & -1 \\ -2 & 3 \end{bmatrix} \quad 3 \times 2$$

$$B' = \begin{bmatrix} -3 & 1 \\ 2 & 4 \\ 1 & -2 \end{bmatrix}' = \begin{bmatrix} -3 & 2 & 1 \\ 1 & 4 & -2 \end{bmatrix} \quad 2 \times 3$$

$$B'A' = \begin{bmatrix} -3 & 2 & 1 \\ 1 & 4 & -2 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 0 & -1 \\ -2 & 3 \end{bmatrix} \quad \begin{matrix} 3 \times 2 \quad 2 \times 3 \\ = 3 \times 3 \end{matrix}$$

$$= \begin{bmatrix} -3+0-2 & -6-2+3 \\ 1+0+4 & 2-4-6 \end{bmatrix}$$

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

$\therefore B'A' = (AB)'$

Showed

I - B

i) $\begin{vmatrix} 10 & -5 & 3 \\ 4 & 20 & 11 \\ -30 & 15 & 14 \end{vmatrix}$

$= 10(20 \times 14 - 11 \times 15) - (-5)\{4 \times 14 - (-30) \times 11\} + 3\{4 \times 15 - (-30) \times 20\}$

$= 10(280 - 165) + 5(56 + 330) + 3(60 + 600)$

$= 10 \times 115 + 5 \times 386 + 3 \times 660$

$= 1150 + 1930 + 1980$

$= 5060$ Ans:

$$\begin{vmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{vmatrix}$$

$$= x_{11}(x_{22}x_{33} - x_{23}x_{32}) - x_{12}(x_{21}x_{33} - x_{23}x_{31}) + x_{13}(x_{21}x_{32} - x_{22}x_{31})$$

$$= x_{11}(x_{22}x_{33} - x_{23}x_{32}) + x_{12}(x_{23}x_{31} - x_{21}x_{33}) + x_{13}(x_{21}x_{32} - x_{22}x_{31})$$

ii) $\begin{vmatrix} x+y & x & y \\ x & x+z & z \\ y & z & y+z \end{vmatrix}$

$= (x+y)\{(x+z)(y+z) - z^2\} - x\{x(y+z) - yz\}$

$+ y\{xz - y(x+z)\}$

$= (x+y)\{xy + xz + yz + z^2 - z^2\} + x\{xy + xz - yz\}$

$+ y(xz - xy - yz)$

$= x^2y + x^2z + xyz + xy^2 + xyz + y^2z + x^2y + x^2z - xyz + xyz - xy^2 - y^2z$

iv) $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2-bc & b^2-ca & c^2-ab \end{vmatrix}$

$= \begin{vmatrix} 0 & 0 & 1 \\ a-b & b-c & c \\ a^2-bc-b^2+ca & b^2-ca-c^2+ab & c^2-ab \end{vmatrix}$ $\left.\begin{matrix} c_1' = c_1 - c_2 \\ c_2' = c_2 - c_3 \end{matrix}\right\}$

$= 1\{(a-b)(b^2-ca-c^2+ab) - (b-c)(a^2-bc-b^2+ca)\}$