

18/SCI01/038

$$1) \quad A = \begin{bmatrix} 1 & 4 & 8 \\ -3 & 0 & 5 \\ 6 & 2 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 & 0 \\ 1 & -2 & 3 \\ 2 & 1 & -4 \end{bmatrix} \quad C = \begin{bmatrix} 4 & -7 \\ 3 & 1 & 2 \end{bmatrix}$$

i) $|A| = 1(0-10) - 4(-3-30) + 8(-6-0)$
 $= 74 \neq 0$, hence rank = 3 ii)

$$B^T = \begin{bmatrix} 1 & 1 & 2 \\ 1 & -2 & 1 \\ 0 & 3 & -4 \end{bmatrix}$$

$$|B^T| = 1(8-3) - 1(-4-0) + 2(3-0)$$

$$= 15 \neq 0$$
, hence rank = 3 iii) $A+C$

$$(A+C)^T = \begin{bmatrix} 1 & 1 & 9 \\ 1 & -7 & 2 \\ 9 & 2 & 3 \end{bmatrix}$$

$$|(A+C)^T| = 1(-21-6) - 1(30-27) + 9(20+63)$$

$$= 717 \neq 0$$
, hence rank = 3 iv)

$$B+C = \begin{bmatrix} 1 & 7 & 1 \\ 5 & -9 & 0 \\ 5 & 2 & -2 \end{bmatrix}$$

$$|B+C| = 1(18-0) - 7(-10-0) + 1(10+45)$$

$$= 143 \neq 0$$
, hence rank = 3

$$v) \quad A+B+C = \begin{bmatrix} 2 & 11 & 9 \\ 2 & -9 & 5 \\ 11 & 4 & -1 \end{bmatrix}$$

$$\begin{aligned} |A+B+C| &= 2(9-20) - 11(-2-55) + 9(8+99) \\ &= 1568 \neq 0, \text{ hence rank} = 3 \end{aligned}$$