

# ASSIGNMENT 1

CS21BTECH11020

**PROBLEM 6b (2018) :** If  $A = \begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix}$ ,  
 $B = \begin{pmatrix} 0 & 4 \\ -1 & 7 \end{pmatrix}$  and  $C = \begin{pmatrix} 1 & 0 \\ -1 & 4 \end{pmatrix}$ ,

and,

$$10C = (10I)C = \begin{pmatrix} 10 & 0 \\ 0 & 10 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ -1 & 4 \end{pmatrix} \quad (12)$$

$$= \begin{pmatrix} 10+0 & 0+0 \\ 0-10 & 0+40 \end{pmatrix} \quad (13)$$

$$10C = \begin{pmatrix} 10 & 0 \\ -10 & 40 \end{pmatrix} \quad (14)$$

Find  $AC + B^2 - 10C$ .

**SOLUTION:** We have,

$$A = \begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix}$$

$$B = \begin{pmatrix} 0 & 4 \\ -1 & 7 \end{pmatrix}$$

$$C = \begin{pmatrix} 1 & 0 \\ -1 & 4 \end{pmatrix}$$

(1) Using Identity (5) and values from (8), (11) and (14),  
 We have  $AC + B^2 - 10C =$

$$(2) \quad \begin{pmatrix} -1 & 12 \\ -2 & 28 \end{pmatrix} + \begin{pmatrix} -4 & 28 \\ -7 & 45 \end{pmatrix} - \begin{pmatrix} 10 & 0 \\ -10 & 40 \end{pmatrix} \quad (15)$$

(3)

$$\boxed{AC + B^2 - 10C = \begin{pmatrix} -15 & 40 \\ 1 & 33 \end{pmatrix}} \quad (16)$$

Since we know the identities,

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} aw + by & ax + bz \\ cw + dy & cx + dz \end{pmatrix} \quad (4)$$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \pm \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} a \pm w & b \pm x \\ c \pm y & d \pm z \end{pmatrix} \quad (5)$$

Using Identity (4), we have

$$AC = \begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ -1 & 4 \end{pmatrix} \quad (6)$$

$$= \begin{pmatrix} 2-3 & 0+12 \\ 5-7 & 0+28 \end{pmatrix} \quad (7)$$

$$AC = \begin{pmatrix} -1 & 12 \\ -2 & 28 \end{pmatrix} \quad (8)$$

$$B^2 = BB = \begin{pmatrix} 0 & 4 \\ -1 & 7 \end{pmatrix} \begin{pmatrix} 0 & 4 \\ -1 & 7 \end{pmatrix} \quad (9)$$

$$= \begin{pmatrix} 0-4 & 0+28 \\ 0-7 & -4+49 \end{pmatrix} \quad (10)$$

$$B^2 = \begin{pmatrix} -4 & 28 \\ -7 & 45 \end{pmatrix} \quad (11)$$