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Section # B

Submitted To

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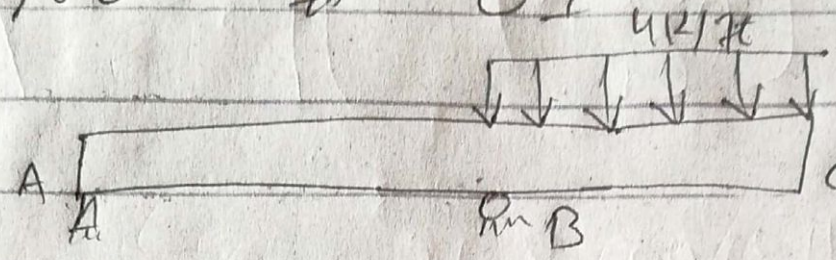
Engr Amjad Islam

Assignment # 03

Q No # 01



Required Slope

Solution:-

As we know that

$$\sum M_A = 0 + \circlearrowleft$$

$$= (F_B \times 30) - (60 \times 37.5) + 0$$

$$\boxed{F_B = 75k}$$

Now $\sum F_y = 0 + \uparrow$

$$F_A + 75k - 60k = 0$$

$$\boxed{F_A = -15k}$$

Now $\theta_{C/A} = \frac{1}{2}\left(\frac{-750k \cdot ft}{EI}\right)(45ft) = \frac{33750k \cdot ft^2}{2EI}$

$$= \frac{16875\ k \cdot ft^2}{EI}$$

$$B/A = \left[\frac{1}{2}\left(\frac{750\ k\cdot ft}{EI}\right)30ft\right]\left[\frac{1}{3}(30ft)\right]$$

$$= \frac{112500\ k\cdot ft^3}{EI}$$

$$C/A = \left[\frac{1}{2}\left(\frac{750\ k\cdot ft}{EI}\right)30ft\right]\left[15ft + \frac{1}{3}(30ft)\right] + \left[\frac{1}{2}\frac{750\ k\cdot ft}{EI}\right](15ft)\left(\frac{2}{3}(15ft)\right)$$

$$= \frac{2812500\ k\cdot ft^3}{EI} + \frac{562500\ k\cdot ft^3}{EI}$$

$$= \frac{3375000\ k\cdot ft^3}{EI}$$

Then

$$\Delta' = \frac{4'}{30}(\epsilon B/A)$$

$$= \frac{4'}{30}\left(\frac{112500\ k\cdot ft^3}{EI}\right)$$

$$= \frac{16875}{EI}\ k\cdot ft^3$$

$$\theta_A = \frac{t_{B/A}}{L_{AB}} = \frac{11250/EI}{30ft}$$

$$= \frac{3750}{EI}\ k\cdot ft^2$$

$$+\circlearrowright\ \theta_C = \theta_A + \theta_{C/A}$$

$$\theta_C = -\frac{3750}{EI}\ k\cdot ft^2 + \frac{16875}{EI}\ k\cdot ft^2$$

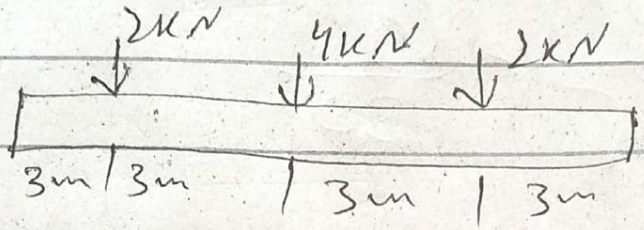
$$\Rightarrow \theta_C = \frac{13125}{EI}\ k\cdot ft^2$$

$$\Delta_C = |t_{C/A}| - 0' = \frac{337500}{EI}\ ft^3 - \frac{16875}{EI}\ k\cdot ft^3$$

$$\boxed{\Delta_C = \frac{16875}{EI}\ k\cdot ft^3}$$

Q No # 02

Given Data :



$E = 200 GPa$

$I = 6 \times 10^6 mm^4$

Solution :

$$\theta A/C = \frac{1}{2}\left(\frac{12}{EI} \times 3\right) + \left(\frac{12}{EI} \times 3\right) + \frac{1}{2}\left(\frac{6}{EI} \times 3\right)$$

$$\theta A/C = \frac{63}{EI}$$

$$\theta A/C = \frac{63}{(200 \times 10^6)(6 \times 10^{-6})\left(\frac{1}{1000}\right)^4}$$

$$\theta A/C = 0.0525 \text{ radian}$$

$$t\, A/C = \frac{1}{2}\left(\frac{12}{EI} \times 3\right)\left(\frac{2 \times 3}{3}\right) + \left(\frac{12}{EI} \times 3\right)$$

$$\left(3+\frac{1}{2}\times 3\right)+\frac{1}{2}\left(\frac{10}{ET}\times 3\right)\left(3+\frac{2}{3}+3\right)$$

$$t_{A/L} = 0.202\,m$$

$$O_L = t_{A/L} = 0.202\,m$$

$$\boxed{O_C = 202\,mm}$$

Result :-

$$O_C = 202\,mm$$