Name ≠ Attaullah khan

ID ≠ 7933

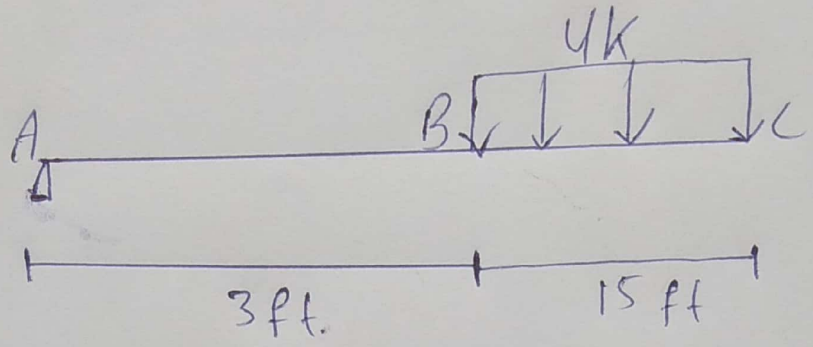
Section ≠ B

Subject ≠ Structure I

Assignment ≠ 03

① Quest No # (01)

Given



Sol:

Slope (θ_C) = ?

Displacement (Δ_C) = ?

First we have to draw M/EI diagram

So

$+\circlearrowright \Sigma M_A = 0$

(2)

$$-V_B \times 30 + (4 \times 15) \times 37.5 = 0$$

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

$$+\circlearrowright \Sigma M_B = 0$$

$$V_A \times 30 + (4 \times 15) \times 7.5 = 0$$

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

$$\Delta_C = \frac{-194062.5}{2} - \left(\frac{67503}{EI}\right) \times 3/2$$

$$\boxed{\Delta_C = \frac{-295312.5}{EI}\ k\text{-}ft^3}$$

Slope at Point (B)

$$\theta_B = \frac{\Delta c}{15}$$

$$= \left(\frac{295312.5}{EI}\right) \Big/ 15$$

$$\theta_B = \frac{19687.5}{EI} \; k \cdot ft^2$$

For displacement

$$t_{c/A} = \Delta c + \Delta'$$

$$\Delta c = \frac{t_o}{A} - \Delta'$$

(4)

By Proportionality of hinger :-

$$\frac{\Delta'}{45} = \frac{t_{B/A}}{30}$$

$$\boxed{\Delta' = 3/2\ t_{BA}}$$

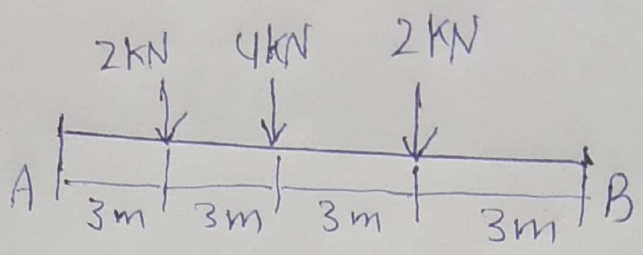
eq (1) $\Longrightarrow$ (1)

$$\boxed{\Delta c = t_{C/A} - 3/2\ t_{B/A}} \Longrightarrow (11)$$

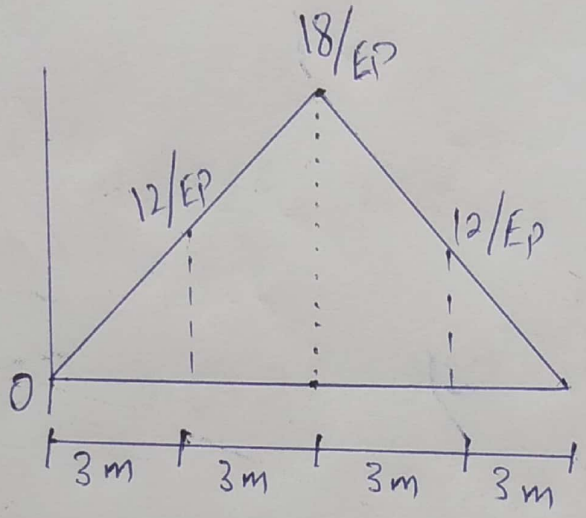
(1)

Question No # 02

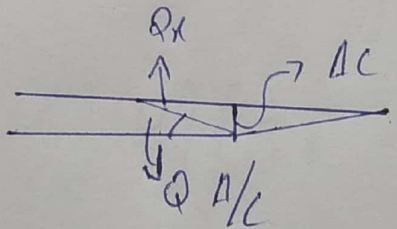
Given



Sol:



Elastic curve:



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

=

(Q)(2)

$$\theta_{A/C} = \left(\frac{18}{EP}\right) + \left(\frac{36}{EP}\right) + \left(\frac{9}{EI}\right)$$

$$\theta_{A/C} = \frac{63}{EI} \Rightarrow \frac{63}{(200\times10^6)(6\times10^6)(1000)^{-4}}$$

$$\theta_{A/C} = 0.0525 \text{ rad.}$$

$$\theta_{A/C} = 0.0525 \text{ rad lies}$$

$$t_{A/C} = \left[\frac{1}{2}\left(\frac{12}{EI}\right)(3)\right]\left[\frac{2}{2}(3)\right] + \left(3+\frac{1}{2}(3)\right)$$

$$+ \left[\frac{1}{2}\left(\frac{6}{EP}\right)(3)\right]\left[3+\frac{2}{3}(3)\right]$$

$$\Rightarrow t_{AC} = 0.202 \text{ m}$$

(3)

So $\Delta L = KA/L = 0.202\,m$

$$\boxed{\Delta L = 202\,mm}$$

Answer.