NAME # SHAHKAR SALEEM

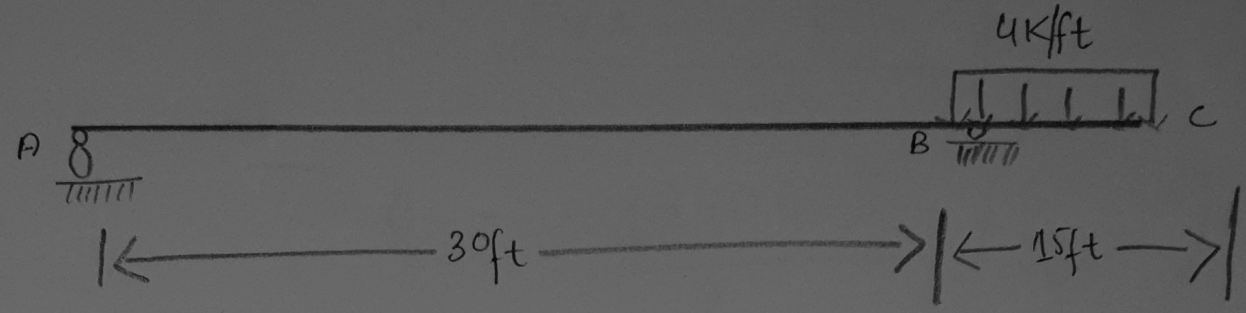
ID # 7943

ASSIGNMENT # 03

SECTION # B

SUBJECT # STRUCTURAL ANALYSIS I

Q1



Slope (θ_C) = ?

Displacement (Δ_C) = ?

First we have to draw M/EI diagram.

Sol

$\circlearrowleft +$ $\quad \Sigma M_A = 0$

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

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

(2)

$+\circlearrowright \quad \sum M_B = 0$

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

$\Rightarrow \boxed{V_A = -15\ K}$

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

$\boxed{\Delta_C = -\frac{295312.5}{EI}\ K - ft^3.}$

Slope at point B :-

$\theta_B = \frac{\Delta_C}{15}$

$= \left(\frac{79531 2.5}{EI}\right) / 15$

$\boxed{\theta_B = \frac{19687.5}{EI}\ K \cdot ft^2.}$

For Displacement

$$t_{C/A} = \Delta_C + \Delta'$$

$$\boxed{\Delta_C = t_{C/A} - \Delta'}$$

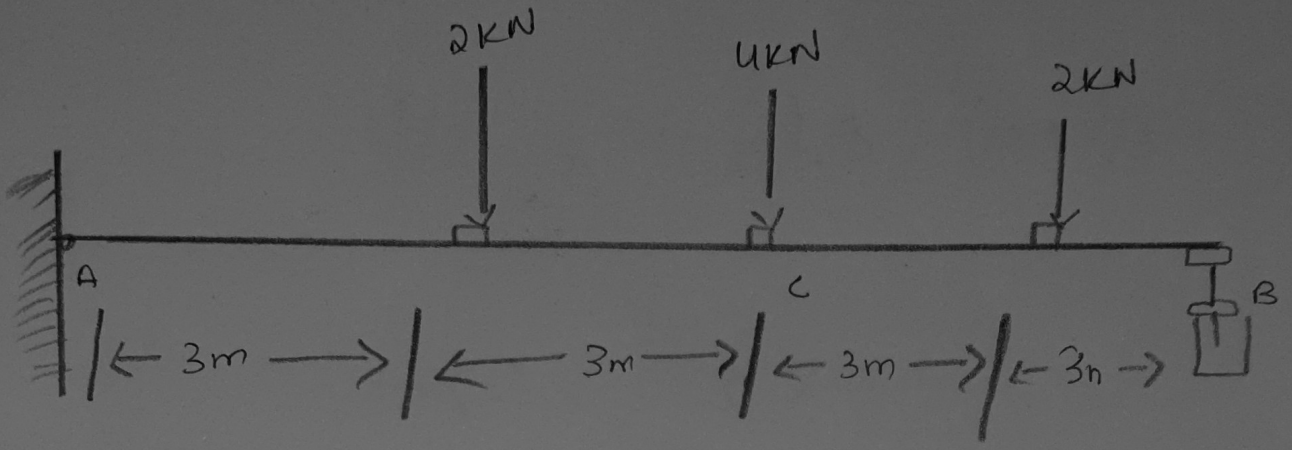
By proportionality of hingles.

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

$$\Delta' = 30/2 \; t_{BA}$$

eq ① $\Rightarrow$

$$\boxed{\Delta_C = t_{C/A} - 3/2 \; t_{B/A}} \quad -②$$



$E = 200\ GPa$

$I = 6(10^6)\ mm^4$

$$\theta_{AK} = \frac{1}{2}\left(\frac{12}{EI} \times 3\right) + \left(\frac{12}{E \cdot I} \times 3\right) \cdot 1\ \frac{1}{2}\left(\frac{6}{EI} \times 3\right)$$

$$= \frac{18}{EI} + \frac{36}{EI} + \frac{9}{EI}$$

$$= 63/EI$$

$$= 63 \Big/ (200 \times 10^6)(6 \times 10^3)\left(\frac{1}{1000}\right)^4$$

$$\theta_A = 0.0525$$

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

$$\left(\frac{12}{EI} \times 3\right)\left(3 + \frac{1}{2} \times 3\right) +$$

$$\frac{1}{2}\left(\frac{6}{EI} \times 3\right)\left(3 \times \frac{2}{3} + 3\right)$$

$$t_{A(C)} = 0.202 \text{ m.}$$

$$\Delta C = t_{A/C} = 0.202 \text{ m}$$

Or

$$\boxed{\Delta C = 202 \text{ mm.}}$$