

Date: _____

Name :- Muhammad Adil
Rehman

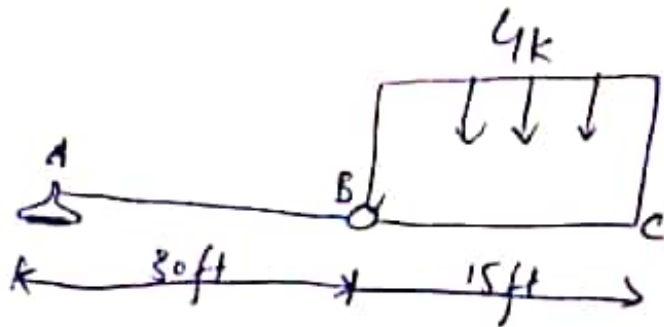
ID :- 7939

Section:- B

Subject:- structural analysis

Assignment: 3

⇒ Q:1



Slop (θ_c) = ?

Displacement (Δ_c) = ?

First we have to draw M/EI diagram
So,

$$\begin{aligned} +\curvearrowright \sum M_A &= 0 \\ -V_B \times 30 + (4 \times 15) \times 37.5 &= 0 \\ \boxed{V_B = 75 \text{ K}} \end{aligned}$$

$$\begin{aligned} +\curvearrowright \sum M_B &= 0 \\ V_A \times 30 + (4 \times 15) \times 7.5 &= 0 \\ \Rightarrow V_A &= -15 \text{ K} \end{aligned}$$

By Proportionality of triangles

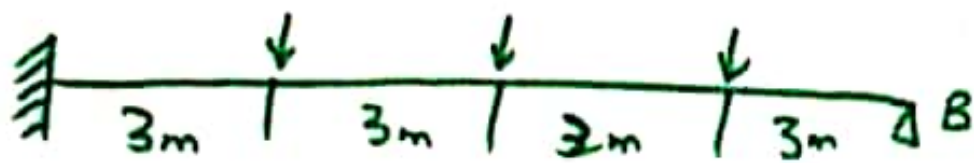
$$\frac{\Delta'}{45} = \frac{t_{B/A}}{30}$$

$$\boxed{\Delta' = \frac{3}{2} t_{B/A}}$$

eq (1) ⇒

$$\boxed{\Delta_c = \frac{t_{C/A}}{A} - \frac{3}{2} \frac{t_{B/A}}{A} \rightarrow (1)}$$

Q. 2



$$E = 200 \text{ GPa}$$

$$I = 6(10^6) \text{ mm}^4$$

$$\Delta_{AK} = \frac{1}{2} \left(\frac{12}{EI} \times 3 \right) + \left(\frac{12}{EI} \times 3 \right) + \frac{1}{2} \left(\frac{6}{EI} \times 3 \right)$$

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

$$= \frac{63}{EI}$$

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

$$\Delta_A = 0.0525$$

$$\epsilon_{A/C} = \frac{1}{2} \left(\frac{12}{EI} \times 3 \right) \left(\frac{2}{3} \times 3 \right) + \left(\frac{12}{EI} \times 3 \right) \left(7 + \frac{1}{2} \times 3 \right) + \frac{1}{2} \left(\frac{6}{EI} \times 3 \right) \left(3 + \frac{2}{3} + 3 \right)$$

$$\epsilon_{A/C} = 0.202 \text{ m}$$

$$\Delta_C = \epsilon_{A/C} = 0.202 \text{ m}$$

$$\Delta_C = 202 \text{ mm}$$

①

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

$$\Delta_c = \frac{-295312.5 \text{ k} - 7 \text{ ft}^3}{EI}$$

→ Slope at Point B :-

$$\begin{aligned} \theta_B &= \frac{\Delta_c}{15} \\ &= \frac{795312.5}{EI} / 15 \end{aligned}$$

$$\theta_B = \frac{19687.5 \text{ k} - \text{ft}^2}{EI}$$

→ For displacement :-

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

$$\Delta_c = t_{c/A} - \Delta'$$

