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Section : A

Assignment : 03

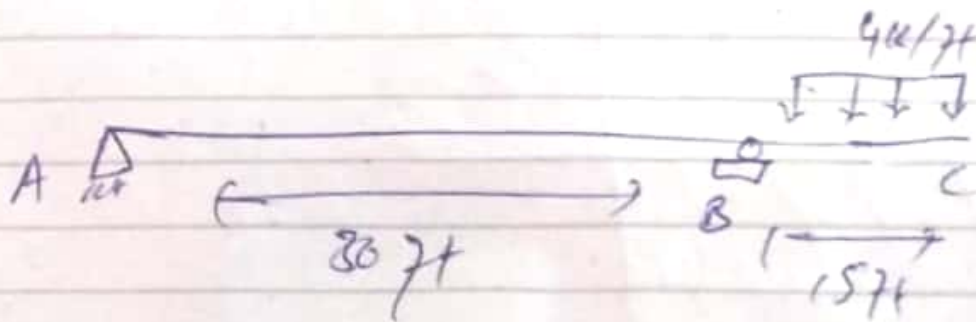
Subject: Strucher Analysis

Date : 13/7/20

Q1

Determine The slope  
and displacement at C.

EC IS CONST use the  
moment area theorms.



Solu:

$$\sum M_A = 0$$

$$-V_B \times 30 + (4 \times 15) \times 3.75 = 0$$

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

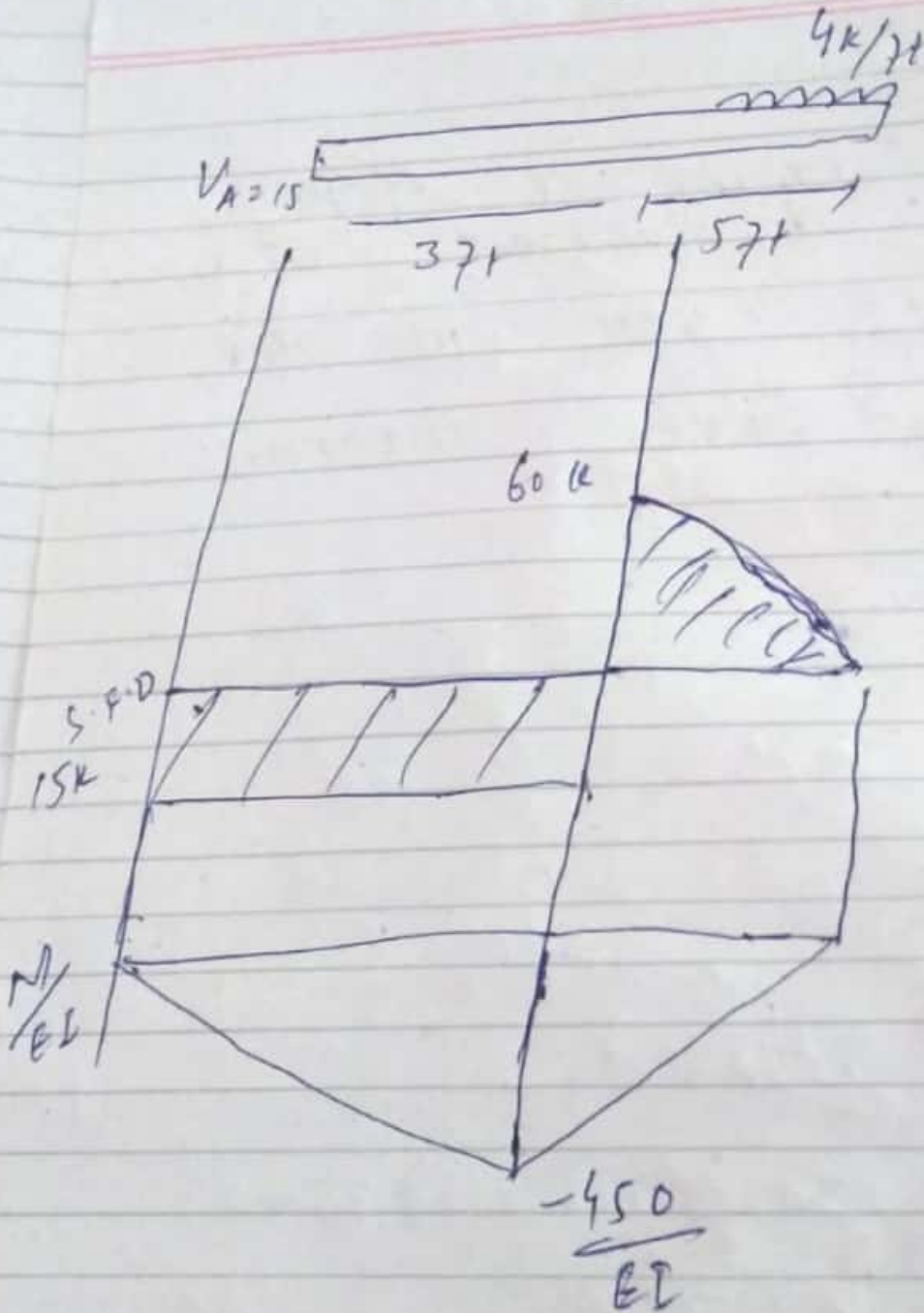
$$V_B = 75 \text{ k}$$

$$\sum B = 0$$

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

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

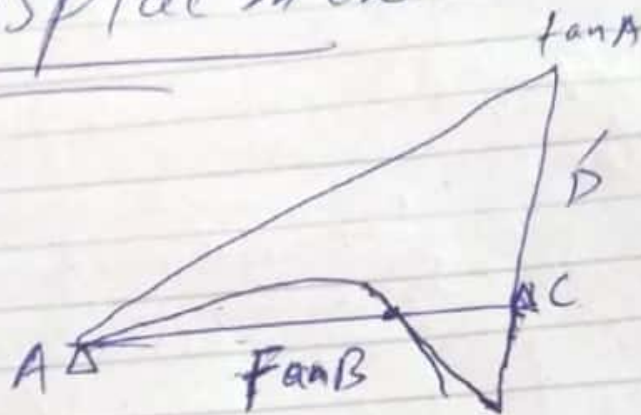
(2)



Thus  $M/EI$  consist of triangle and possible segment.

(3)

For Displacement



$$t_A = \Delta C + \Delta'$$

$$\Delta C = l - \Delta' \quad \text{--- (1)}$$

$$\frac{\Delta'}{45} = \frac{l - \Delta'}{A}$$

$$\Delta' = \frac{3}{3} \frac{l - \Delta'}{A}$$

eg (1)

$$\Delta C = \frac{l}{A} - \frac{3}{2} \frac{l - \Delta'}{A}$$



(4)

$$t_{C/A} =$$

$$t_{C/A} = \left[ \frac{-450 + 30 \times \frac{1}{2}}{EI} \right] \times \left( 15 + \frac{1}{3} \times 30 \right)$$

$$+ \left[ \frac{3}{4} \times 15 \right] \times \left[ \frac{1}{3} \times \frac{450}{EI} \times 15 \right]$$

$$\frac{t_C}{a} = \frac{168750}{EI} - \frac{25312.5}{EI}$$

$$\frac{t_C}{a} = \frac{-194062.5}{EI}$$

~~11~~

For  $t_{B/A}$

$$t_{B/A} = \left[ \frac{-450 \times \frac{30}{2}}{EI} \right] \times \left[ \frac{1}{3} \times 30 \right]$$

$$= \frac{-67500}{EI}$$

(5)

$$D_C = \frac{-19406.5}{2} - \left( \frac{67500}{EI} \right) \times \frac{3}{2}$$

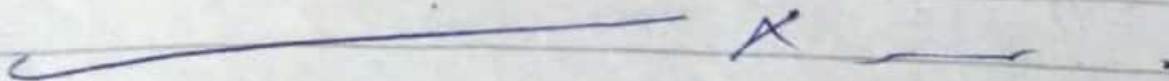
$$D_C = \frac{-295312.5}{EI} \text{ k}\cdot\text{ft}^3$$

For Slope at B

$$\theta_B = \frac{D_C}{15} = \frac{295312.5}{EI} / 15$$

$$\theta_B = \frac{19687.5}{EI} \text{ k}\cdot\text{ft}$$

Slope of the free end at C is nearly equal to zero.

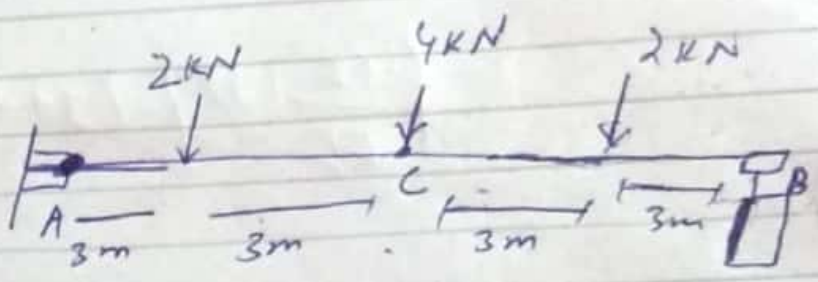


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# Question # 02

Determine The Slope at A and Displacement at C of the beam in the figure  
 moment Area Theorem take  
 $E = 200 \text{ GPa}$  ,  $I = 6(10^6) \text{ mm}^4$

Solu:-

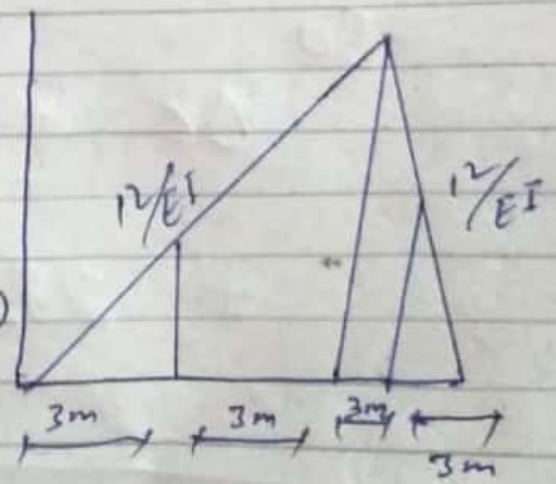


Solu =

$$Q_{A/C} = \frac{1}{2}$$

$$\Rightarrow \frac{1}{2} \left( \frac{12}{EI} \right) (3) + \left( \frac{12}{EI} \right) (3) + \frac{1}{2} \left( \frac{6}{EI} \right) (3)$$

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





$$Q_{A/C} = \frac{63}{EI} \Rightarrow \frac{63}{(200 \times 10^6)(6 \times 10^6)(1000)^{-4}}$$

$$Q_{A/C} = 0.0525 \text{ rad}$$

$$Q_{A/ce} = 0.0525 \text{ rad h.}$$

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

$$\left[ \frac{12(3)}{EI} \right] \left( 3 + \frac{1}{2}(3) \right) + \left[ \frac{1}{2} \left( \frac{6}{EI} \right) (3) \right] \left( 3 + \frac{2}{3}(3) \right)$$

$$= 0.202 \text{ m}$$

So

$$DC = \frac{t_A}{t_C} = 0.202 \text{ m}$$

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