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SECTION: A

SEMESTER: 4th

SUBJECT: Structure Anal: I

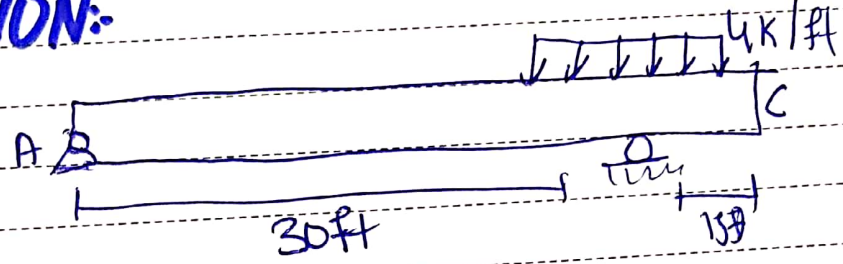
ASSIGNMENT: 3rd

SUBMITTED TO: Sir Amjad Tsaim

DATE: 13th July 2020

QUESTION # 1

SOLUTION:-



$\downarrow \Sigma M_A = 0$

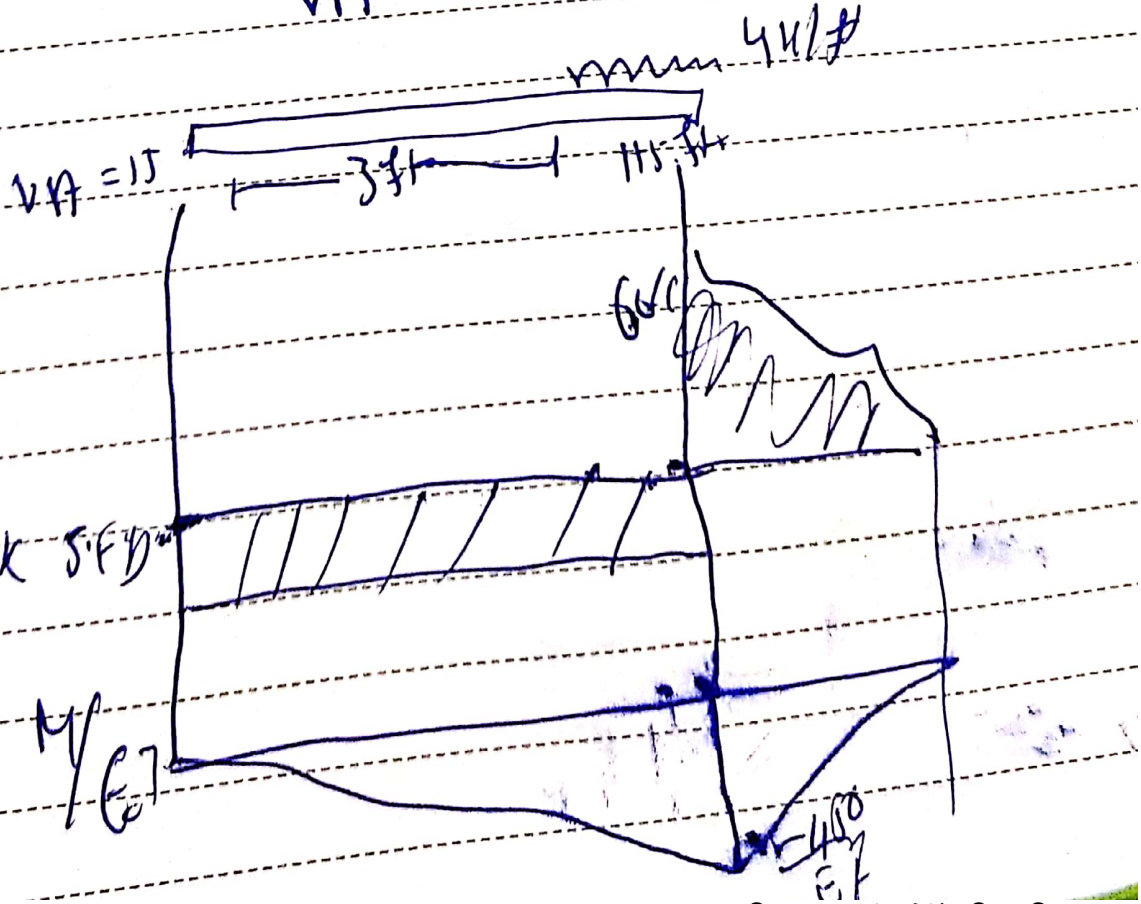
$-V_B \times 30 + (4 \times 15) \times 3.75 = 0$

$V_B = 75K$

$\uparrow \Sigma M_B = 0$

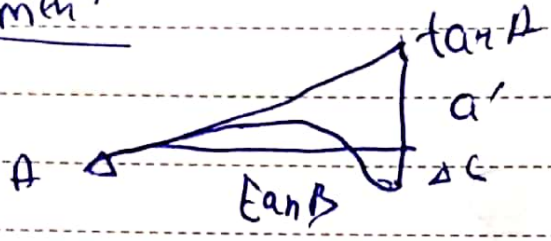
$V_A \times 30 + (4 \times 15) \times 7.5 = 0$

$V_A = -15K$



Thus M/EI consist of triangle and parabol segment

For displacement



$$+ \quad t_{C/A} = DC + D'$$

$$DC = t_{C/A} - D' \rightarrow (1)$$

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

$$D' = \frac{3}{5} t_{B/A}$$

eqn (1)

$$DC = t_{C/A} - \frac{3}{5} t_{B/A}$$

$$t_{C/A} = \left[\frac{-450}{EI} \times 30 \times \frac{1}{2}\right] \times \left[15 + \frac{1}{3} \times 30\right] + \left[\frac{3}{4} \times 15\right] \times \left[\frac{1}{3} \times \frac{450}{EI} \times 15\right]$$

$$t_{C/A} = \frac{16875}{EI} - \frac{25312.5}{EI}$$

$$t_{C/A} = \frac{-194062.5}{EI}$$

$$t_{C/A} = \frac{-194062.5}{EI}$$

for $t_{B/A}$

$$t_{B/A} = \left[\frac{-450}{EI} \times \frac{36}{2}\right] \times \left[\frac{1}{3} \times 36\right]$$

$$t_{B/A} = \frac{-67500}{EI}$$

$$DC = \frac{-194062.5}{2} - \left(\frac{67500}{EI}\right) \times \frac{3}{2}$$

$$DC = \frac{-295312.5}{EI} \quad k \cdot ft^3$$

For slope at B

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

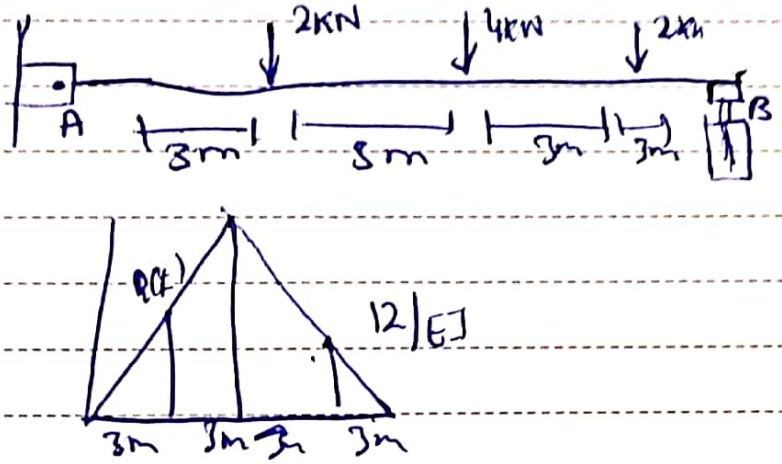
$$= \frac{\left(\frac{295312.5}{EI}\right)}{15}$$

$$\theta_B = \frac{19687}{EI} \; kft^3$$

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

QUESTION # 02

SOLUTION:



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

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

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

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

$$\theta_A = 0.0525 \text{ rad}$$

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

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

$$\left(3 + \frac{2}{3}(3)\right)$$

$$= 0.202\ m$$

So,

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

$$= 202\ mm \quad Ans$$

*

END