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Sec # "B"

Subject: Structural Analysis.

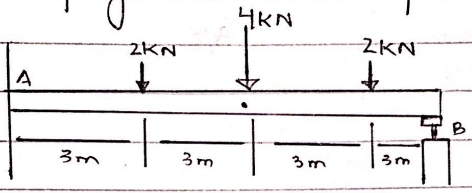
Submmitted To:- Sir Amjid Islam.

Date:* 13 July, 2020.

Musa Khan

Que:no2

Determine slope at A and displacement at C of the beam in the figure $E = 200\ GPa$, $I = 6(10^6)\ mm^4$.



$$\theta_{B/C} = \frac{1}{2}\left[\frac{Pa}{EI}\right]a + \left[\frac{Pa}{EI}\right]a + \frac{1}{2}\left[\frac{Pa}{EI}\right]a.$$

$$\theta_{B/C} = \frac{7Pa^2}{4EI} = \frac{7(4)(3)^2}{4 \times 1200} \quad \therefore EI = 1200.$$

$$\theta_{B/C} = 0.052 \text{ radian.}$$

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

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

$$t_{B/C} = \frac{9Pa^3}{4EI}$$

$$= \frac{9 \times 4 (3)^3}{4 \times 1200} \quad \therefore EI = 1200.$$

$$= \frac{36 \times 27}{4800} = \frac{972}{4800}.$$

$$= 0.202m.$$

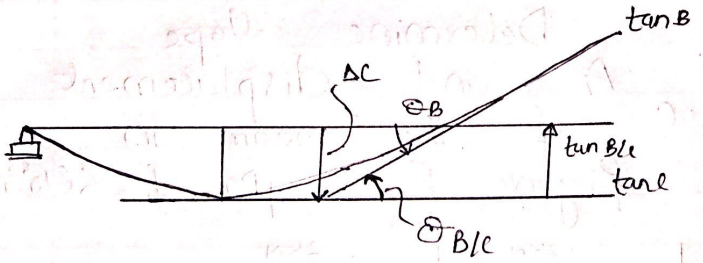
Then;

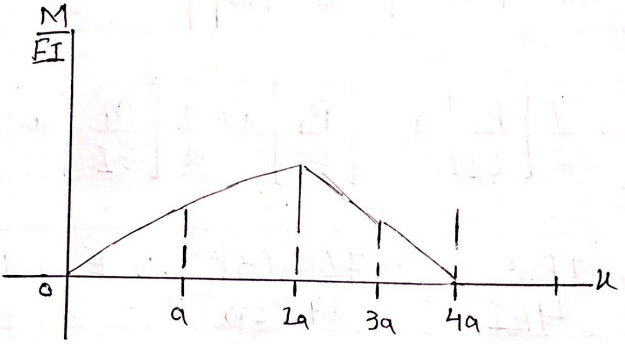
$$\theta_B = \theta_{B/C} = \frac{7Pa^2}{4EI}$$ ↗ ANS

$$A_C = t_{B/C} = \frac{9Pa^3}{4EI}$$ ↓ AM.

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

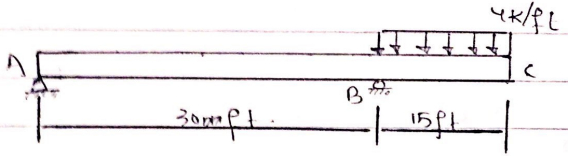
$$\Delta C = 202mm.$$


tan B
ΔC
θB
tan B/c
tan c
θB/C


M
EI
0
a
2a
3a
4a
x

Qu1:no1

Determine the slope and displacement at C [I constant. Use Moment Area Theorem.



Slope (θ_C) = ?

Displacement, ΔC = ?

Draw M/EI Diagram.

$+\circlearrowright \sum M_A = 0$

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

$$V_B = 75k$$

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

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

$$V_A = -15k.$$

$$\rightarrow \quad \Delta C = -\frac{1946062.5}{2} - \left(\frac{67503}{EI}\right)\frac{3}{2}$$

$$\Delta c = \frac{2953125}{EI} = k - ft^3$$

Slope at "B"

$$\theta_B = \frac{\Delta C}{15} = \left(\frac{7953125}{EI}\right)/15$$

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

For displacement.

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

By proportionality.

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

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

→ eqn (1).

$$\Delta C = t_{C/A} - \frac{3}{2} t_{B/A}$$