

HARIS IQBAL

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7926 (A)

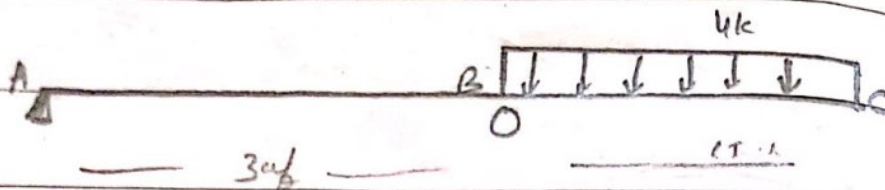
Structure Analysis (1)

Assignment (3)

13 July, 20

Date:

Question # 2



Required:

$$\text{Slope } (\theta_c) = ?$$

$$\text{Displacement } (\Delta_c) = ?$$

Now draw M/EI diagram -

\sum_0

$$\uparrow \sum M_A = 0$$

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

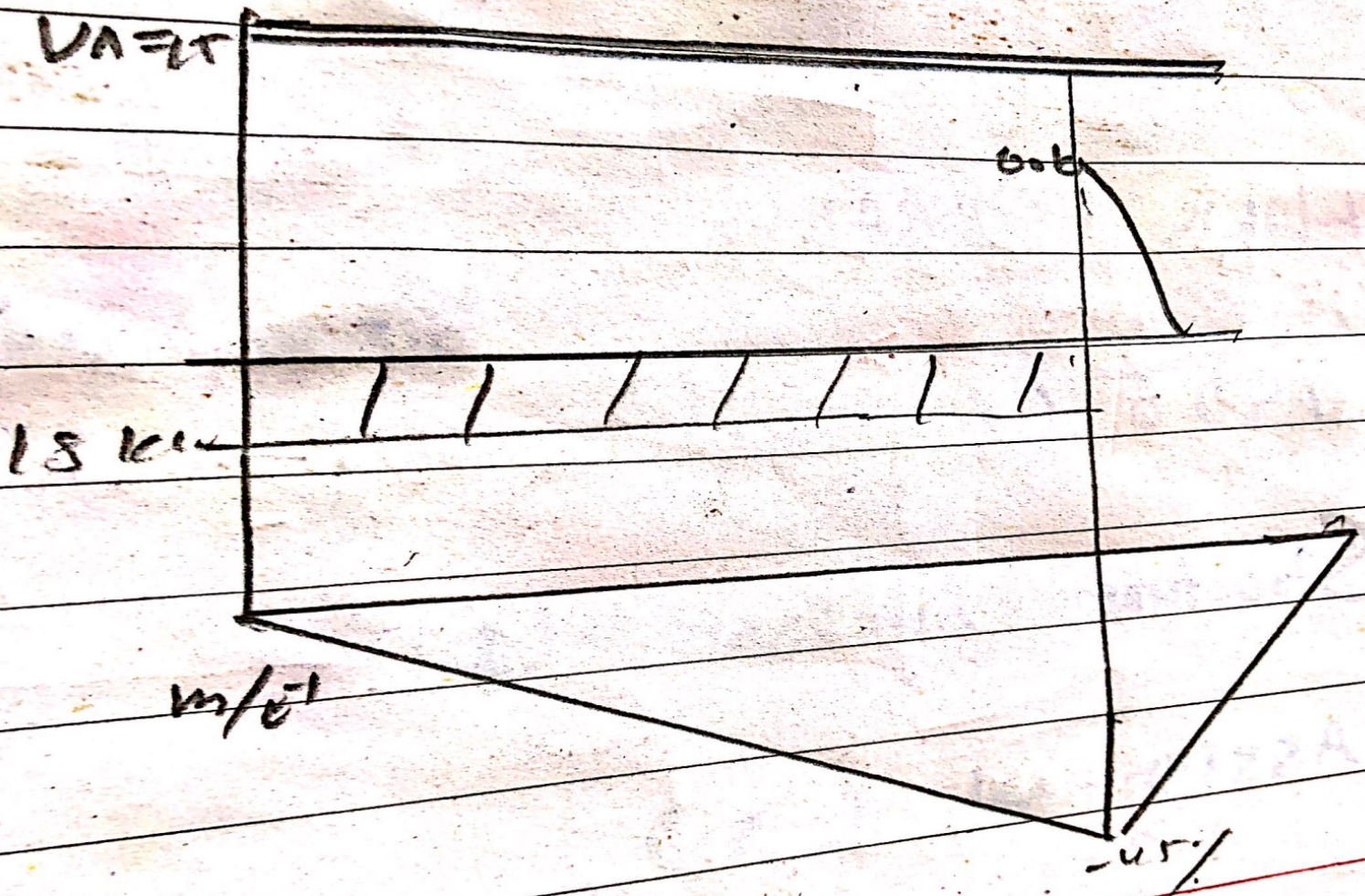
$$\boxed{V_B = 75 \text{ k}}$$

$$\uparrow \sum M_B = 0$$

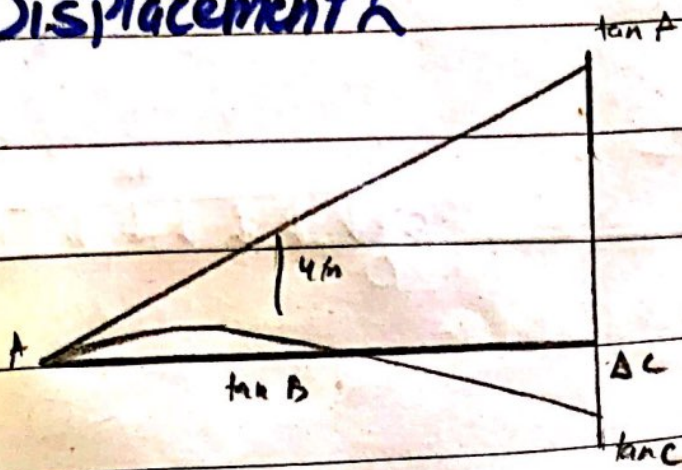
$$V_A \times 30 + (4 \times 15) \times 7.5 = 0$$

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

Fig # ①



For Displacement Δ



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

$$\Delta C = t_{C/A} - \Delta' \quad - (i)$$

By Proportionality of triangles

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

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

eq (i)

$$\Delta C = t_{C/A} - \frac{3}{2} t_{B/A} \quad - (ii)$$

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

$$\Delta C = \frac{-295312.5}{EI} \quad k - 7t^2$$

⇒ For slope at point B

$$\theta_B = \frac{\Delta C}{15}$$

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

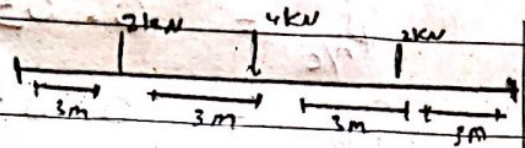
$$\theta_B = \frac{19687.5}{EI} \quad k - 7t^2$$

⇒ Slope of the Free end i.e. point C
near equal to zero.

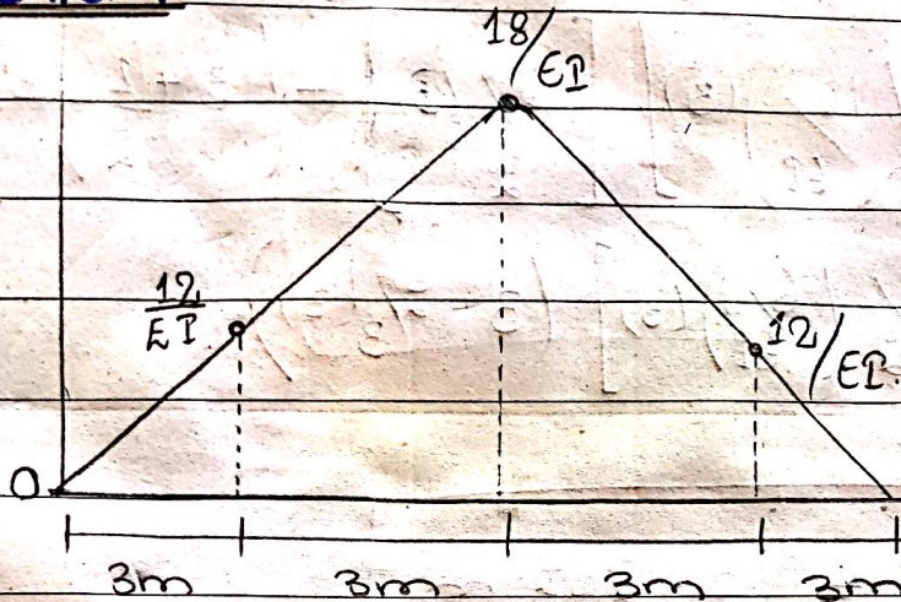
Question # 2

Date: _____

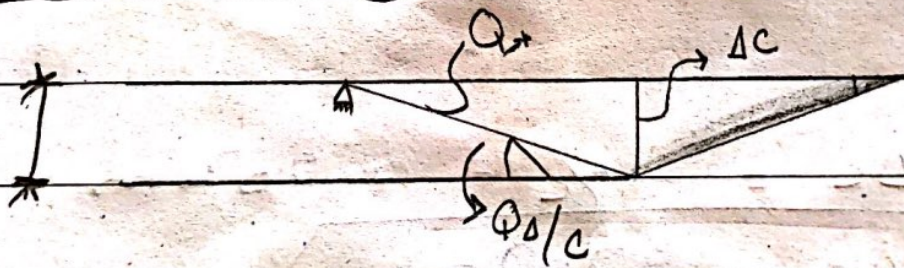
FIG # 1



→ Solution:-



Elastic Curve



$$Q_{A/C} = \frac{1}{2} \left(\frac{12}{EI} \right) (3) + \left(\frac{18}{EI} \right) (3) + \frac{1}{2} \left(\frac{12}{EI} \right) (3)$$

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

$$Q_{A/C} = 63 \Rightarrow 63$$

$$EI (200 \times 10^6) (6 + 10^6) (1000)^{-4}$$

Date: _____

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

$$Q_{B/C} = 0.0525 \text{ rad.}$$

$$\begin{aligned} t_{A/C} &= \left[\frac{1}{2} \left(\frac{12}{EI} \right) (3) \right] \left[\frac{2}{2} (3) \right] + \left(3 + \frac{1}{2} (3) \right) + \\ &\left[\frac{1}{2} \left(\frac{6}{EI} \right) (3) \right] \left(3 + \frac{2}{3} (3) \right) \end{aligned}$$

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

So

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

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

Answer: