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Sec ~ A

Sub ~ Structure - I

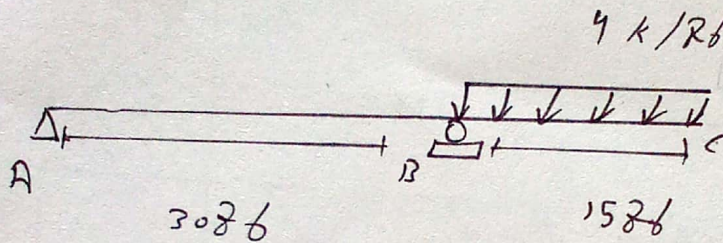
Assignment ~ 03

Eng ~ Amjid Islam

Date ~ 13 July 2020

Assignment No # 3

Determine the slope and displacement at c. EI is constant use the moment area theorem.



Solution:

$$\uparrow \sum M_A = 0$$

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

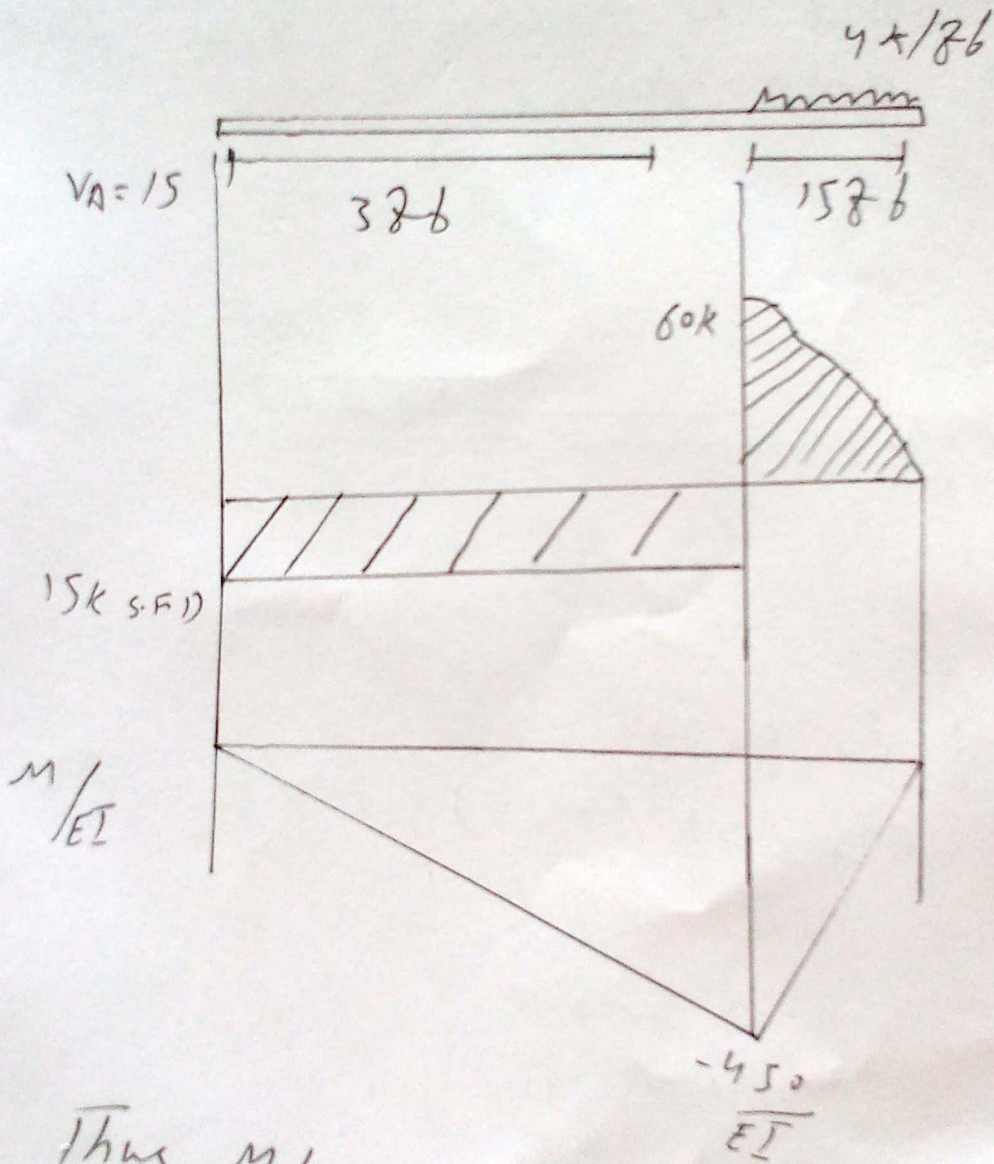
$$V_B = 75 \text{ k}$$

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$$\downarrow \sum M_B = 0$$

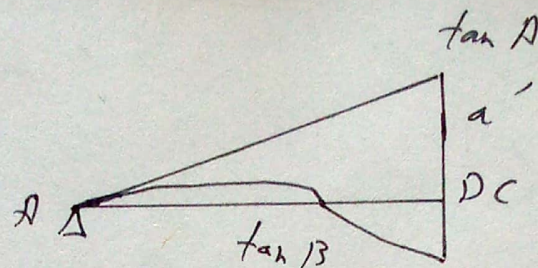
$$V_A \times 30 + (4 \times 15) \times 7.5 = 0$$

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



Thus M/EI consist of Triangle and parabol segment

For displacement



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

$$DC = t_{C/A} - D' \rightarrow (2)$$

$$\frac{0'}{45} = \frac{t_{C/A}}{30}$$

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

Eq (2)

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

$t_{C/A}$

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

$$+ \left[\frac{3}{5} \times 15 \right] \times \left[\frac{1}{3} \times \frac{450}{EI} \times 15 \right]$$

$$t_{C/A} = \frac{16}{EI} - \frac{25312.5}{EI}$$

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

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For $t_{B/A}$:

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

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

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

$$D_C = -\frac{295312.5}{EI} \quad \text{K. 86}$$

For slope at B

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

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

$$QB = \frac{19687.5}{EI} \quad \text{K/ft}^3$$

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

