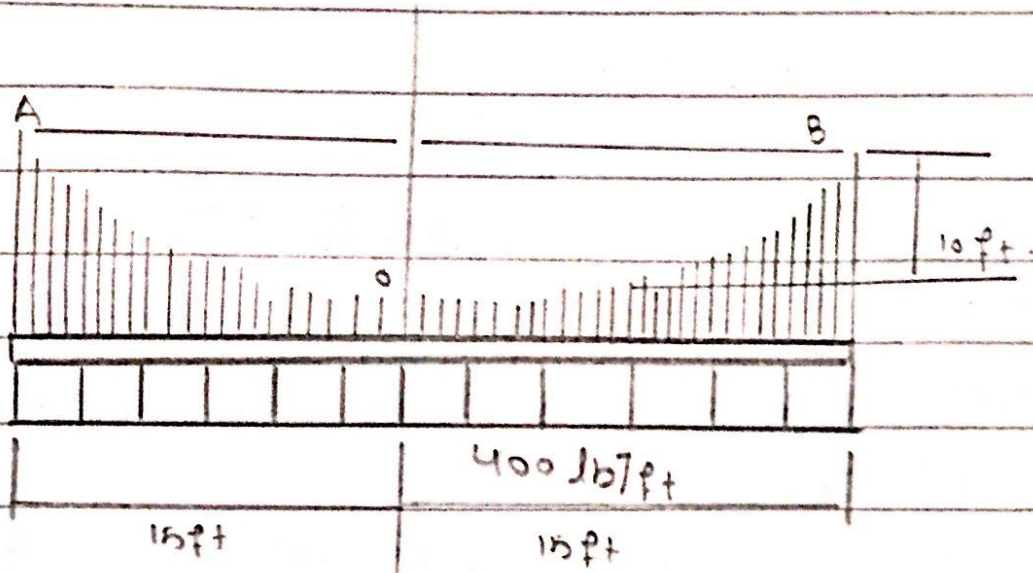


Que: no: 3



Solution: *

From Eq: 5-9

$$y = \frac{h}{L^2} x^2 = \frac{10}{15^2} x^2$$

$$y = 0.0444 x^2$$

From Eq 5-8

$$T_0 = F_u = \frac{w_0 L^2}{2h} = \frac{400 (15^2)}{2(10)}$$

$$T_0 = 4500 \text{ lb} \quad \div \text{ing by } 1000$$

$$T_0 = 4.5 \text{ K}$$

From Eq 5-10 :

$$T_B = T_{\max} = \sqrt{F_u^2 + (w_0 L)^2}$$
$$= \sqrt{(4500)^2 + (400)(15)^2}$$

~~$$= \sqrt{20250000 + 90000}$$~~

~~$$= \sqrt{20340000}$$~~

$$= \sqrt{20250000 + (400 \times 15)^2}$$

$$= 7500 \text{ lb} \quad \div \text{ing by } 1000$$

$$T_B = T_{\max} = 7.5 \text{ K}$$

Also From Eq 5-11

$$T_b = T_{max} = w_0 L \sqrt{1 + \left(\frac{L}{2h}\right)^2}$$

$$= 400 (15) \sqrt{1 + \left(\frac{15}{20}\right)^2}$$

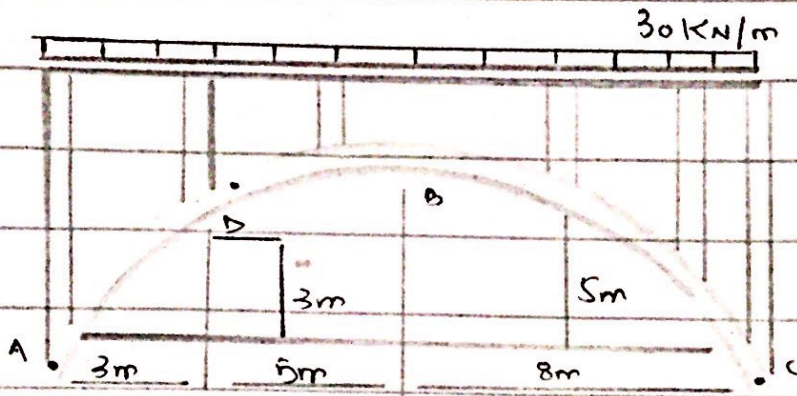
$$= 6000 \sqrt{1 + \frac{225}{400}}$$

$$= 6000 (1.25)$$

$$= 7500 \text{ lb} \div \text{ing by } 1000$$

$$T_b = T_{max} = 7.5 \text{ K. Ans.}$$

Que: no 4



Solution: *

Member AB,

$$\downarrow + \sum M_A = 0$$

$$B_x(5) + B_y(8) - 240(4) = 0$$

Member BC:

$$\downarrow + \sum M_C = 0$$

$$- B_x(5) + B_y(8) + 240(4) = 0$$

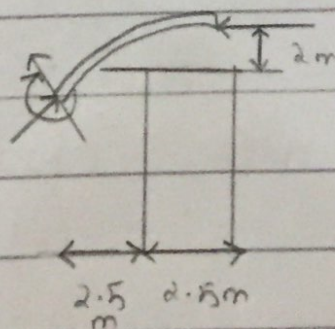
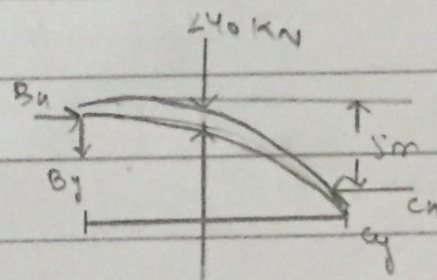
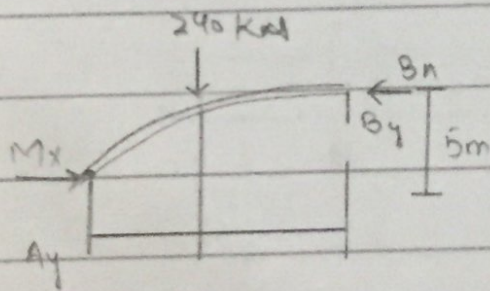
$$\rightarrow B_x = 192 \text{ kN}, \quad B_y = 0.$$

Segment BD:

$$\hookrightarrow + \sum M_D = 0$$

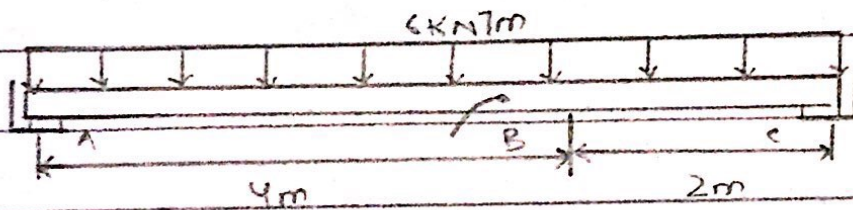
$$= 192(2) - 150(2.5) - M_D = 0$$

$$M_D = 9 \text{ kN}\cdot\text{m}$$

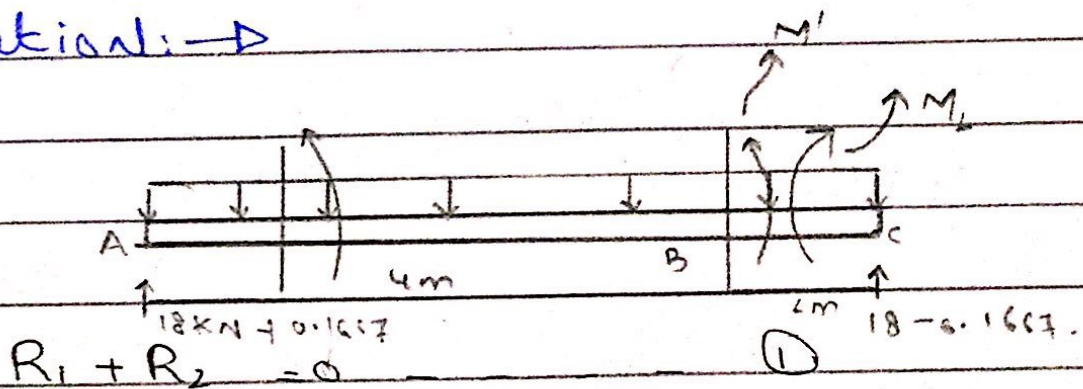


Ques:rod

Determine the slope and displacement at point B.



Solution: \rightarrow



$$\sum M_A = 0 \quad (+)$$

$$1 + R_2 (6) = 0$$

$$-0.16667 \quad \text{put in eq ①}$$

$$R_1 + (-0.1667) = 0$$

$$R_1 = 0.1667 \text{ kN}$$

$$\rightarrow R_1 + R_2 = 1$$

$$\hookrightarrow + \sum M_A = 0$$

$$- (1)(4) + R_2 (6) = 0$$

$$R_1 = 0.667 \text{ kN}$$

$$R_2 = 1 - 0.667 \text{ kN}$$

$$R_2 = 0.333 \text{ kN}$$

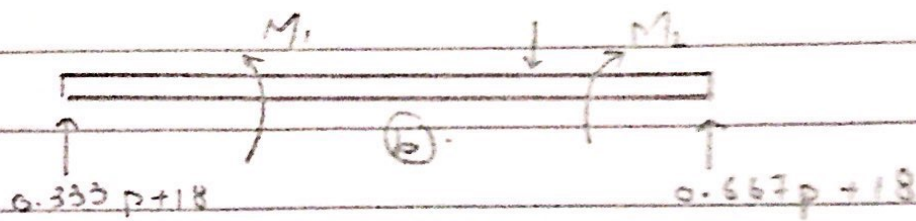
$$\rightarrow M_1 = (18 + 0.1667M')x_1 - 2x_1^2$$

$$M_2 = (18 - 0.1667M')x_2 - 2x_2^2$$



$$M_1 = (0.333p + 18)x_1 - 2x_1^2$$

$$M_2 = (0.667p + 18)x_2 - 2x_2^2$$



The displacement function shown in the figure (a) above.

$$\frac{\partial M_1}{\partial M_2} = 0.1667 x_1 \quad \text{and} \quad \frac{\partial M_2}{\partial M_2} = 0.1667 x_2$$

Set $M_2 = 0$ then

$$M_1 = (18 + 0.1667(0)) x_1 - 2 x_1^2$$

$$M_1 = (18 x_1 - 2 x_1^2)$$

$$\rightarrow M_2 = (18 x_2 - 2 x_2^2)$$

$$\phi_B = \int_0^2 M \left(\frac{\partial M}{\partial M_2} \right) dx_1 = \int_0^2 \frac{(18 x_1 - 2 x_1^2)(0.1667 x_1)}{Ei} dx_1$$

$$+ \int_0^2 \frac{(18 x_2 - 2 x_2^2)(0.16667 x_2)}{Ei} dx_2$$

$$\phi_B = \frac{42.65}{Ei} + \frac{6.66}{Ei}$$

$$\phi_B = \frac{49.31}{E_i}$$

$$\phi_B = \frac{49.31}{(200 \times 10^6 \text{ kPa})(0.00006)}$$

→ For the displacement function are shown in figure "b"

$$\frac{\partial M_1}{\partial p} = 0.333x_1 \quad \text{and} \quad \frac{\partial M_2}{\partial p} = 0.6667x_2$$

also set $p = 0$.

$$\text{then } M_1 = (18x_1 - 2x_1^2) \text{ kN}\cdot\text{m}$$

$$M_2 = (18x_2 - 2x_2^2) \text{ kN}\cdot\text{m}$$

Thus:

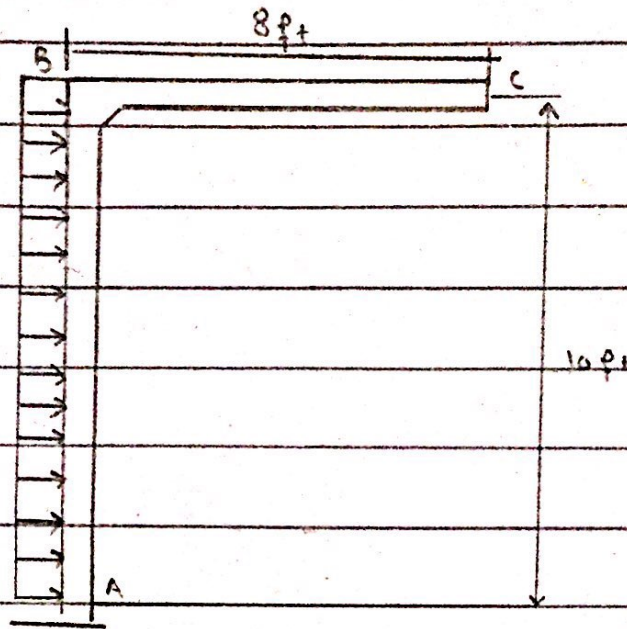
$$\Delta_B = \int_0^L M \left(\frac{\partial M}{\partial p} \right) \frac{dx}{E_i}$$

$$\Delta_B = \int_0^4 \frac{(30x_1 - 2x_1^2)(0.333x_1) dx}{E_i}$$

$$\Delta_B = \frac{218.5}{E_i} \rightarrow \frac{218.5}{(200 \times 10^6)(0.00006)} = 0.018 \text{ m}$$

$$\Delta_B = 18 \text{ mm} \downarrow$$

Q no: 1



Solution:

Finding Reaction

$$\begin{aligned} \sum M_A &= 0 \\ -4(10)(5) + C_y(8) &= 0 \end{aligned}$$

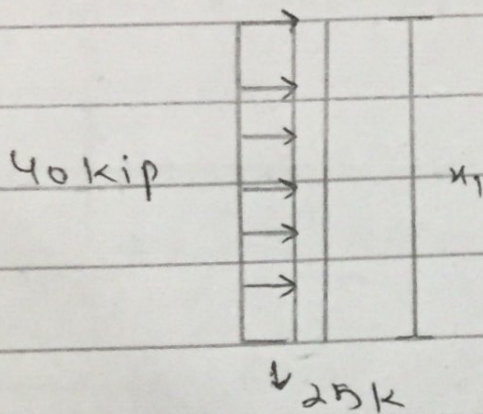
$$C_y = 25 \text{ Kip}$$

$$\begin{aligned} \sum F_y &= 0 \uparrow \\ 25 + A_y &= 0 \\ A_y &= -25 \text{ Kips} \end{aligned}$$

$$\sum F_x = 0 \rightarrow +$$

$$40 - A_H = 0 \Rightarrow A_H = 40 \text{ K}$$

Taking Section.

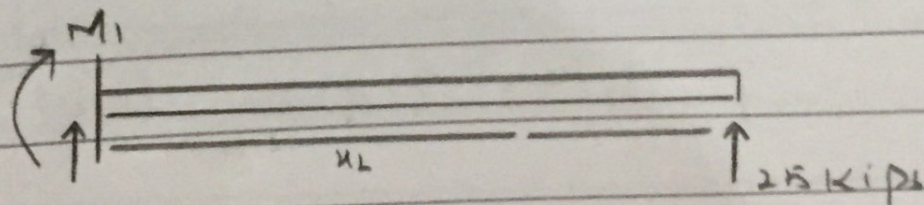


Real Moment:

$$\sum M_1 = 0$$

$$-40(x_1) + 4x_1 \left(\frac{x_1}{2} \right) + C_{H1} = 0$$

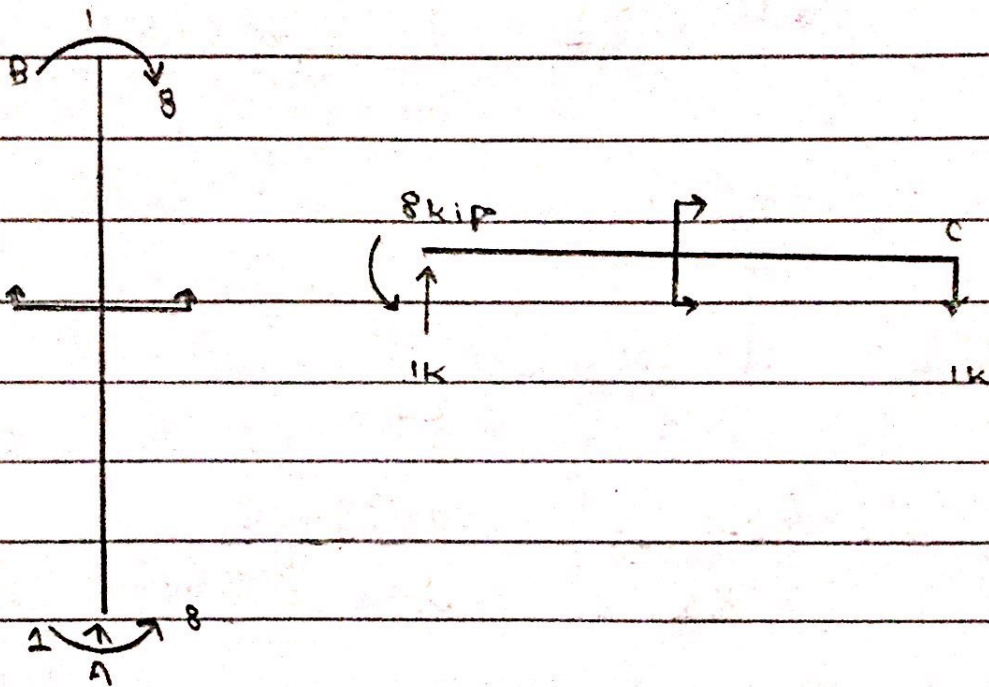
$$M_1 = 40x_1 - 2x_1$$



$$-25(x_2) + M_2 = 0$$

$$M_2 = 25x_2 \text{ Kips}$$

Now



Mem	BA	CB
Origin	B	C
limit	0-10	0-8
M	$2kL$	0
M	8	4

By Virtual work Method:

$$1. \Delta_1 = \int_0^{10} \frac{2u^2(8)}{EI} du + \int_0^8 \frac{(0)(cu)}{EI}$$

$$= \frac{16u^3}{3} \Big|_0^{10} + 0$$

$$= \frac{16 \times 1000}{3} / EI$$

$$= \frac{6333.33}{EI} = \frac{5333.33}{29 \times 10^3 \times 600}$$

$$1. \Delta_1 = 3.06 \times 10^{-4} \text{ in.}$$