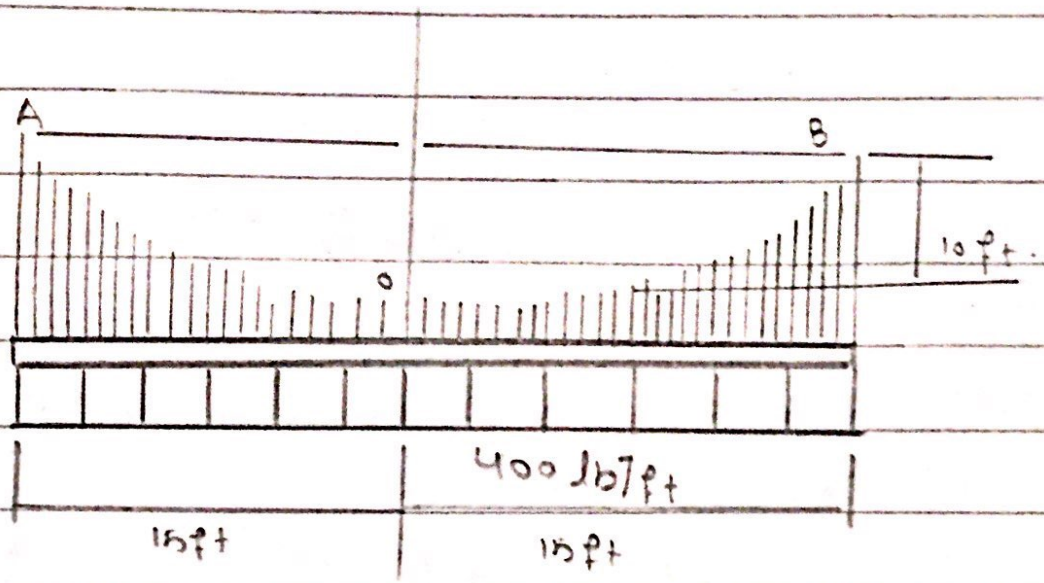
Que:no:3



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

$$T_o = F_4 = \frac{w_o L^2}{2h} = \frac{400\,(15^2)}{2(10)}$$

$T_o = 4500\ lb$ ÷ing by 1000

$T_o = 4.5K$

From Eq 5-10 :.

$$T_B = T_{max} = \sqrt{F_4^2 + (w_o L)^2}$$

$$= \sqrt{(4500)^2 + (400)^2(15)^2}$$

$$= \sqrt{20250000 + 9000}$$

$$= \sqrt{20259000}$$

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

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

$T_B = T_{max} = 7.5K.$

Also From Eq 5-11

$$T_6 = T_{max} = w_0 L \sqrt{1 + \left(\frac{L}{2h}\right)^2}$$

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

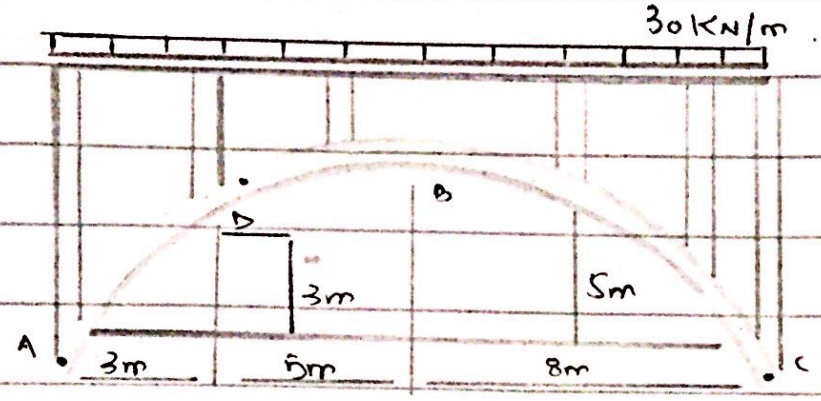
$$= 6000\sqrt{1 + \frac{225}{400}}$$

$$= 6000\,(1.25)$$

$$= 7500\,lb \div ing\ by\ 1000$$

$T_6 = T_{max} = 7.5K.$ Ans.

Que: no4



Solution: *

Memba AB,

$$\curvearrowright + \sum M_A = 0$$

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

Memba BC:

$$\curvearrowright + \sum M_C = 0$$

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

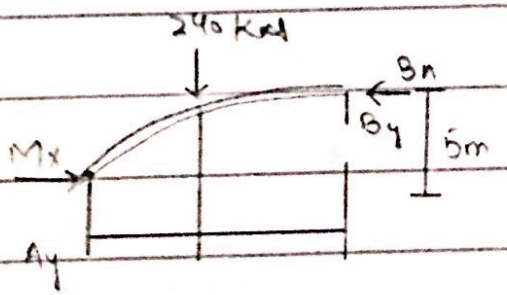
$$\longrightarrow B_x = 192\,KN, \quad B_y = 0.$$

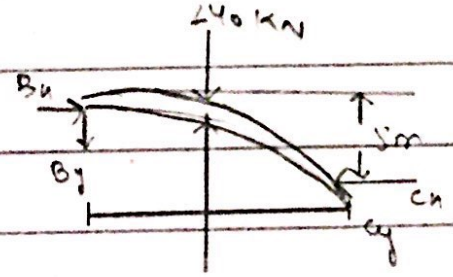
Segment BD:

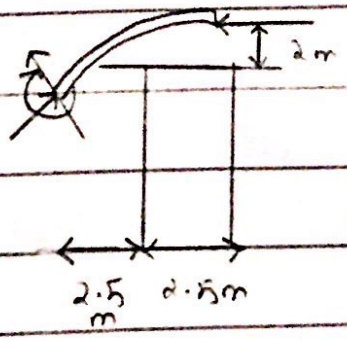
$$\curvearrowright + \Sigma M_D = 0$$

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

$$M_D = 9\,kN\cdot m.$$

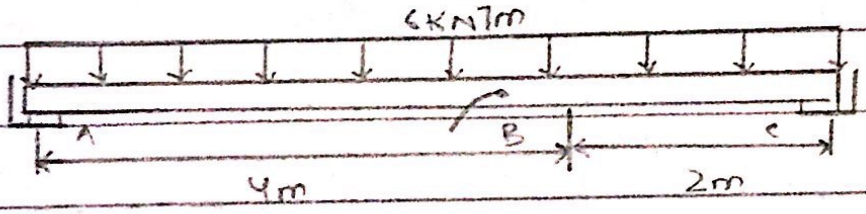




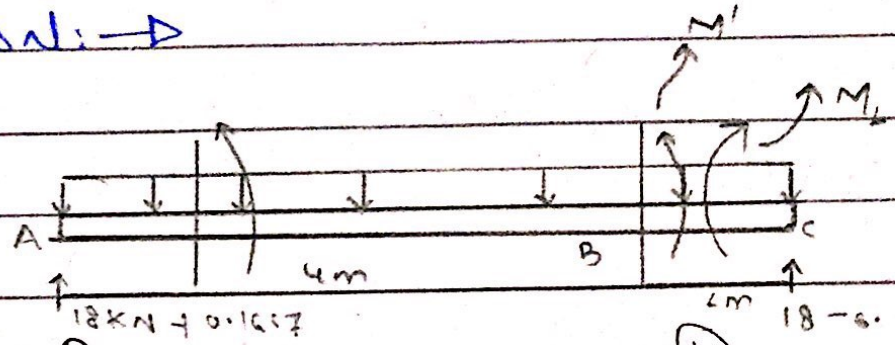


Que:no2

Determine the slope and displacement at point B.



Solution:→



$R_1 + R_2 = 0$ ——— (1)

$\Sigma M_A = 0 \; \circlearrowright +$

$1 + R_2(6) = 0$

-0.16667 put in eq (1)

$R_1 + (-0.1667) = 0$

$R_1 = 0.1667\ KN.$

$$\rightarrow R_1 + R_2 = 1$$

$$\circlearrowleft + \Sigma M_A = 0$$

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

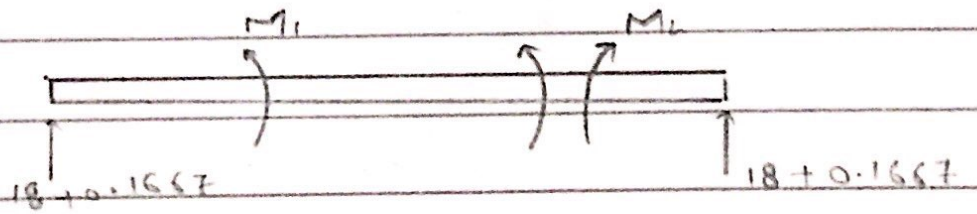
$$R_1 = 0.667\,kN$$

$$R_2 = 1 - 0.6667\,kN$$

$$R_2 = 0.333\,kN$$

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

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



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

$$M_2 = (0.667p + 18)x_2 - 2x_1^2$$

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

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

Set $M' = 0$ then.

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

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

$$\longrightarrow \quad M_2 = (18x_2 - 2x_2^2)$$

$$\phi B = \int_0^2 M \left(\frac{2M}{2M_1}\right) \frac{dx}{EI} = \int_0^4 \frac{(18x_1 - 2x_1^2)(0.1667x_1)\,dx_1}{EI}$$

$$+ \int_0^2 \frac{(18x_2 - 2x_2^2)(0.1667x_2)\,dx_2}{EI}$$

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

$$\varphi_B = \frac{49.31}{EI}$$

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

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

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

also set $p = 0$.

then $M_1 = (18x_1 - 2x_1^2)\ KN-m$

$M_2 = (18x_2 - 2x_2^2)\ KN \cdot m$

Thus:

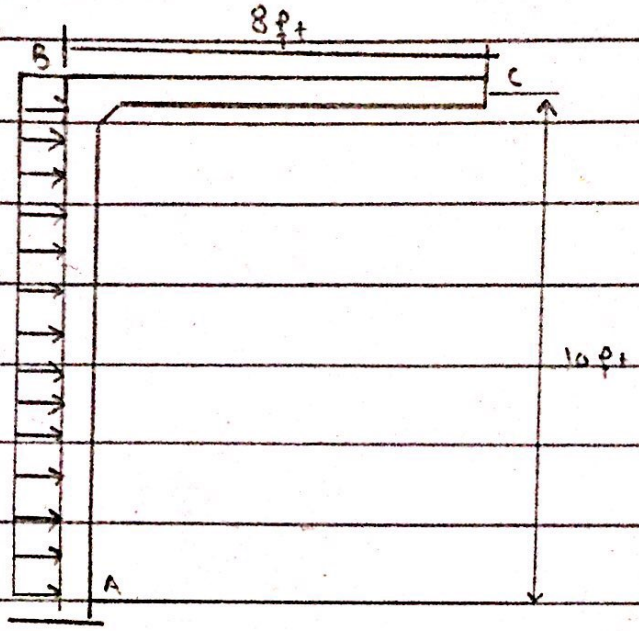
$$\Delta_B = \int_6^L M \left(\frac{\partial M}{\partial p}\right) \frac{dx}{EI}$$

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

$$\Delta_B = \frac{218.5}{EI} \Rightarrow \frac{218.5}{(200 \times 10^6)(0.00006} = 0.018m$$

$$\Delta_B = 18mm \downarrow$$

Qu: no 1



Solution:

Finding Reaction

$$\circlearrowleft^{+} \quad \Sigma M_A = 0$$

$$-4(10)(5) + C_y(8) = 0$$

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

$$\Sigma F_y = 0 \uparrow^{+}$$

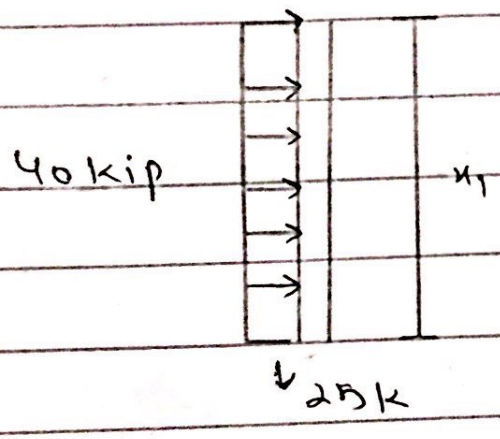
$$25 + A_y = 0$$

$$A_y = -25 \text{ kips}.$$

$\Sigma F_x = 0 \longrightarrow +$

$40 - A_x = 0 \Rightarrow A_x = 40k$

Taking Section.

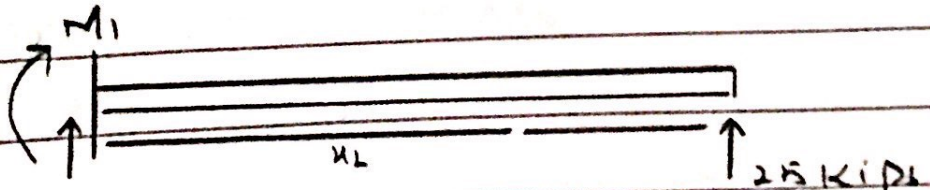


Real Moment:

$\curvearrowright + \Sigma M_1 = 0$

$-40(x_1) + 40x_1\left(\frac{x_1}{2}\right) + C_{x1} = 0$

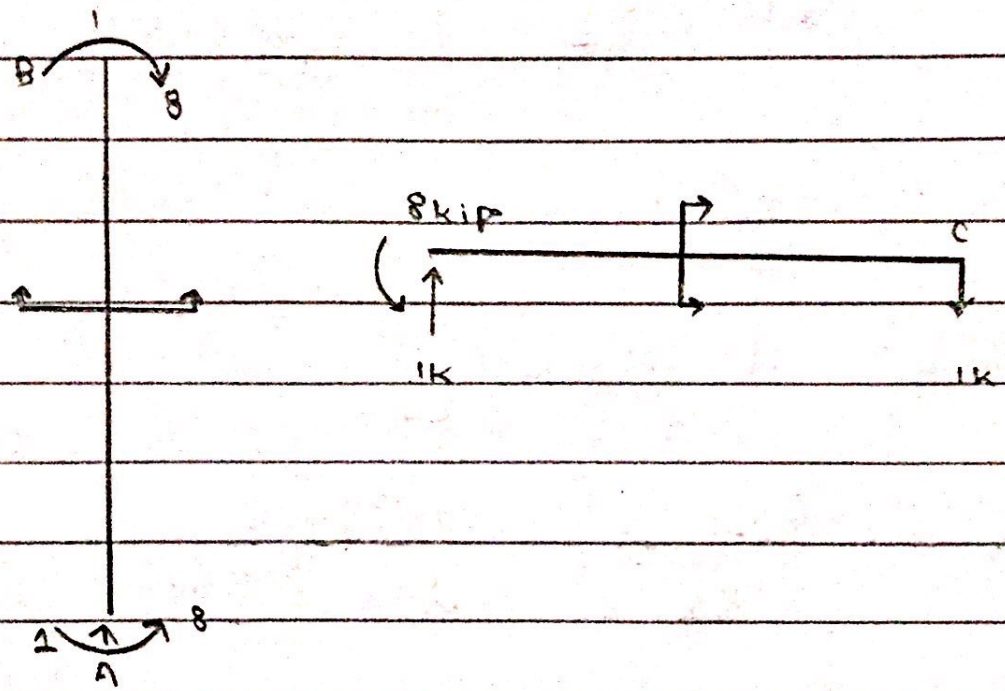
$M_1 = 40x_1 - 20x_1$



$-25(x_2) + M_2 = 0$

$M_2 = 25x_2$ kips.

Now



Mem	BA	CB
Origin	B	C
limit	0-10	0-8
M	$2x^2$	0
M	8	x

By Vertual work Method:.

$$1 \cdot \Delta_1 = \int_0^{10} \frac{2x^2(8)\,dx}{EI} + \int_0^{8} \frac{(0)(x)}{EI}$$

$$4 = \frac{16x^3}{3}\Big|_0^{10} + 0$$

$$4 = \frac{16 \times 1000}{3} / EI$$

$$4 = \frac{6333.33}{EI} = \frac{5333.33}{29 \times 10^3 \times 600}$$

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