Name = khalid khan

ID = 7936

Section = B

Subject = Structural Analysis

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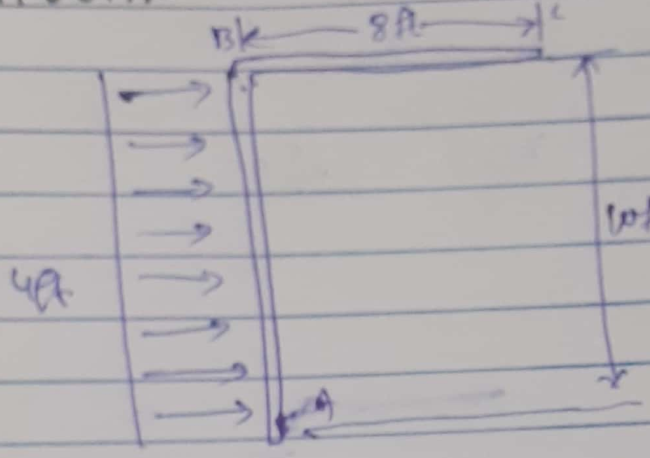
Question = 1:-

Given:-



Uniform load = 4k/ft.

$E = 29 \times 10^3$ ksi

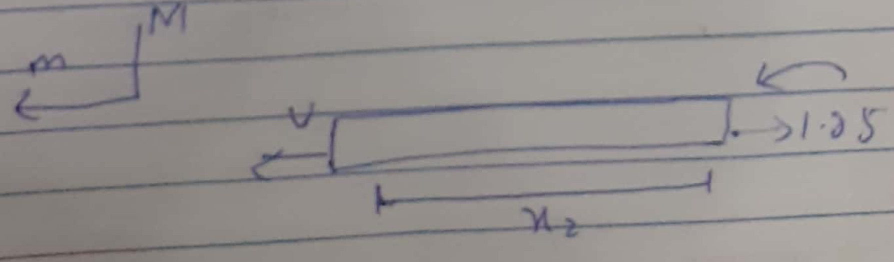
$I = 600 in^4$

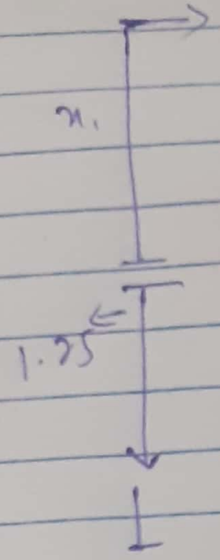
Required:-

Vertical Displacment.

Solution:-

Now vertical moment.

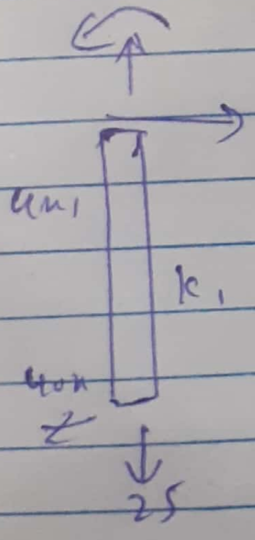


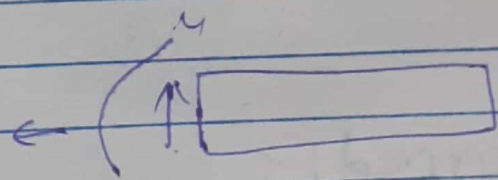


$m_2 = x_1$

$m_2 = 1.25x$

Real moment





$m_1 = 12.5x_2$

$\boxed{m_2 = 25}$

$$m = \frac{40x_1 - \frac{1}{2} Y_1 (x_2)}{40x_1 - 2x_1^2}$$

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Now by virtical work equation

$$\Delta DC = \int_0^L \frac{m M dx}{E}$$

$$\Delta L = \int_0^{10} (1x_1) \left(\frac{40x_2 - 2x^2}{E} \right) dx +$$

$$\int_0^8 \frac{(1.25x_2)(25x_2)\, dx}{EI}$$

$$\Delta L = \frac{1}{EI} \left| \frac{42x^3}{3} - \frac{2x^3}{4} \right|_0^{10} +$$

$$\left| \frac{31.25x_2^3}{3} \right|_0^8$$

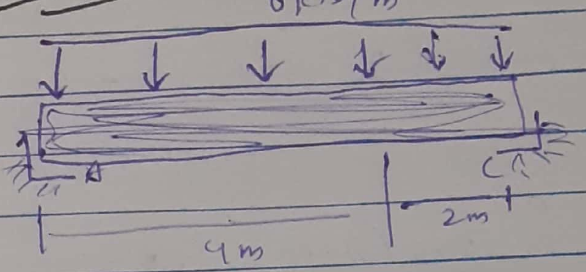
$$\boxed{\Delta L = 10649.6018}$$

Babar Paper Product

Checked By:........ Parents:........ Excellent ☐ Good ☐ Need Improvement

Question = 2:.

Given data:-

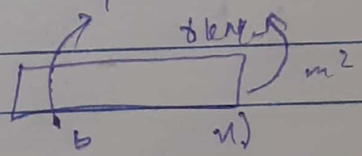


$E = 200\,GPa$

$I = 60 \times 10^6\,mm^4$

Required:-

Slope and displacment = ?



$$m' = m' + \frac{6x_2 + x_r^2}{2}$$

$$m = m' + 3x^2 + x_1^2/2$$

Taking potial derivation with respect to m

$$\frac{\partial m_2}{\partial P} = -x$$

$$DB = \int_0^2 \frac{m\,(\partial m)}{\partial p}\,\frac{dx}{E}$$

$$= \int_0^6 \frac{-3x^2(-x)\,dx}{EI} + \int_0^4 \frac{-3x^3(-x)\,dx}{EI}$$

$$\Delta B = \frac{-3x^2}{4EI}\Big|_0^6 + \frac{-3x^4}{4EI}\Big|_0^4$$

put the value of EI & I -

$$= \frac{-3x^2}{2(200)(60\times10^6)}\Big|_0^6 + \frac{-3x^4}{4000(60\times10^6)}\Big|_0^4$$

$$= \frac{-\partial 16\,kN\,\cancel{ft}^3}{4.8\,Nb^0} + \frac{-614.4\,kN\,ft^2}{4.8\times10^{10}}$$

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$= -4.5 \times 10^{-9} + (-1.28 \times 10^{-8})$

$\boxed{\Delta B = 5.76 \times 10^{-10} \text{ inch.}}$

Displacement

Slope :-

$m + \frac{1}{2} + (6x_1) = 0$

$m = -\frac{1}{2} x (6x_1) = 3x^2$

So;

$\frac{\partial m_1}{\partial m_1} = 0$

$m_1' - m_2 \frac{1}{2} (x_2)(6 + x_2)$

$m = -m' + 6x_2 + x_2^2$

$m = -m' + 3x^2 + x^2/2$

$\frac{\partial m_2}{\partial m_1} = -1.$

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$$= \int_0^{10} \frac{-3x^2(4x}{E \cdot I} + \int_0^{10} \left(-2 + 6x^2 + \frac{x^2}{2}\right)$$

$$= 0 + \left(-x + \frac{6x^3}{3} + \frac{x^3}{6}\right) \int_0^{10} \left(\frac{1}{EI}\right)$$

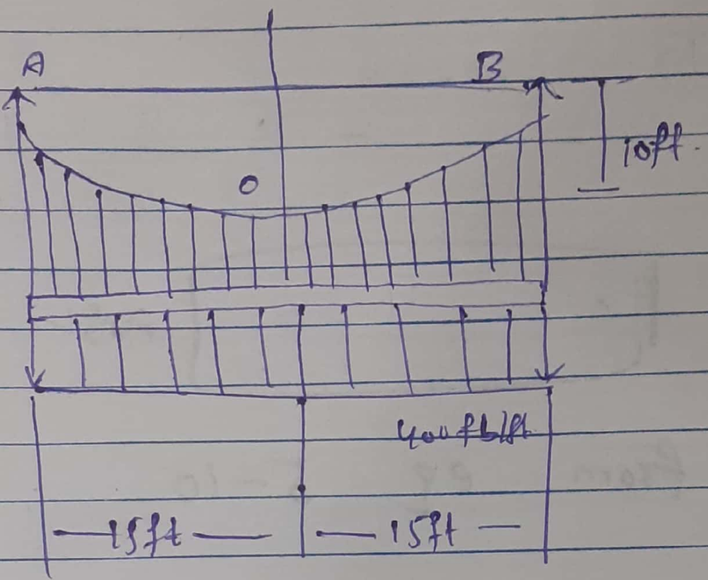
$$= \frac{1}{200 \times (60 \times 10^6)} \left(-x + \frac{6x^3}{3} + \frac{x^3}{6}\right) \Big|_0^{10}$$

$$\Rightarrow \boxed{\theta = 4.125 \times 10^{-7} \text{ inch.}}$$

Ans.

Q No = 3:-

Given:-



Solution:-

from eq 5-9

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

$$= \frac{10}{5} x^2$$

$$\boxed{y = 0.044x^2}$$ Ans.

from eq 5-8

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

$T_o = 4500 lb$

$\div$ ing by 1000

$\boxed{T_o = 4.5k}$ Ans

from eq 5-10

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

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

$= \cancel{\sqrt{20250000 + 9000000}}$

$= \cancel{\sqrt{29250000}}$

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

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$= 7500\ lb$ ÷ing by 1000

$T_B = T_{max} = \boxed{7.5k}$ Ans

Also Eq 5-11.

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

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

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

$'' = 6000 (1.25)$

$= 7500\ lb$ ÷ by 1000

$T_B = T_{max} = \boxed{7.5k}$ Ans

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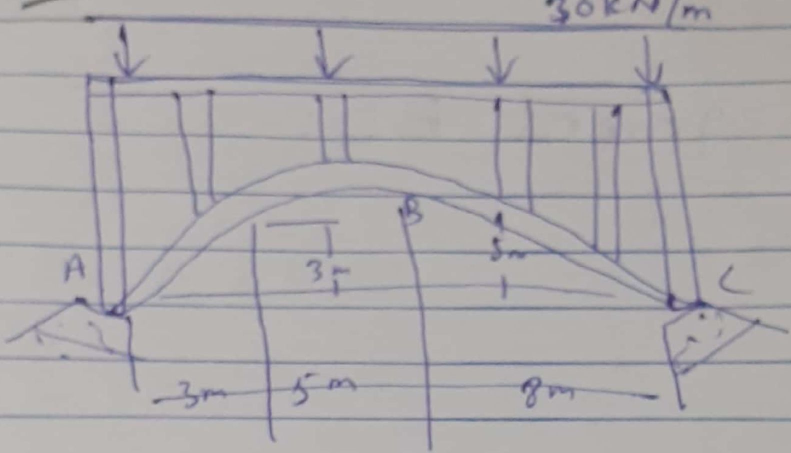
Question = 4:-

Given:-



Member AB;

$\circlearrowright + \sum M_A = 0$

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

Member BC;

$\circlearrowright + \sum M_C = 0$

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

Sloving:

$B_x = 192 \text{ kN}, \; B_y = 0$

Segment BD:-

$\circlearrowright + \Sigma M_D = 0;$

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

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