ID 7962

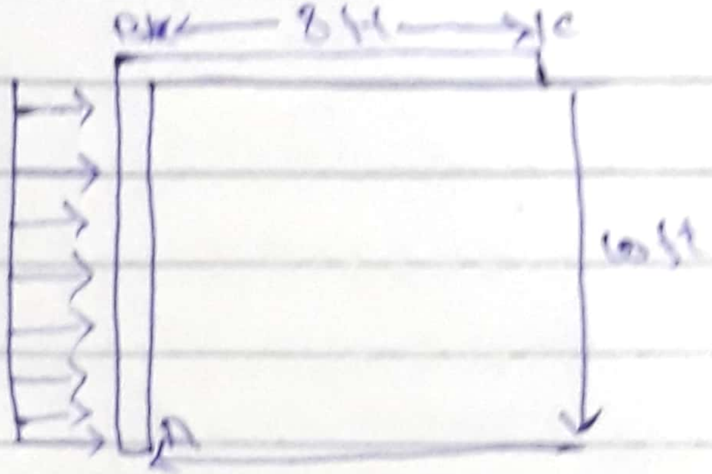
Section B

Dep Be(civil)

Paper structure Analys

Scanned with CamScanner

Given



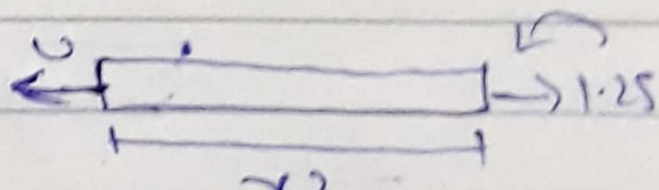
uniform load = 4 k/ft

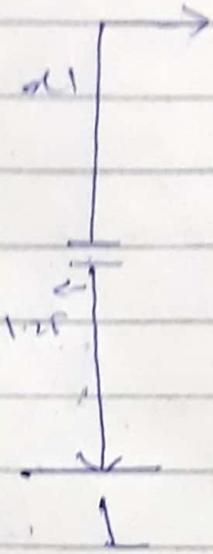
$E = 29 \times 10^3$ ksi

$I = 600 \text{ in}^4$

Required

Now vertical moment

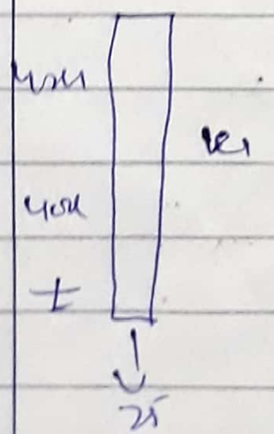


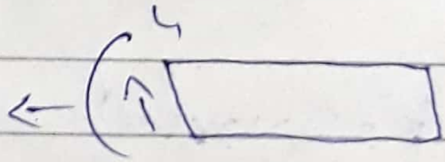


$m_{12} = x_1$

$m_{12} = 1.25x$

Real moment





$m_{11} = 12.5x_2$

$m_{12} = 25$

$m_1 = 40x_1 - \frac{1}{2} v_1 (x_2)$

$40x_1 - 2x_1^2$

Scanned with CamScanner

now by virtical work equation

$$\Delta_{DC} = \int_0^c \frac{m \cdot M dx}{E}$$

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

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

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

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

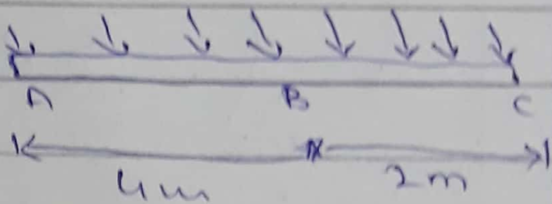
$$\boxed{\Delta L = 10649.6018 \text{ inch}}$$

Scanned with CamScanner

Q No 2

Sol
=

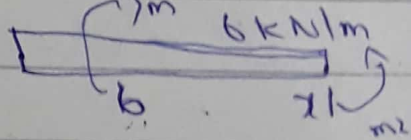
Given that



$E = 200$ Gpa
$I = 60 \times 10^6 \; mm^4$

Required

- Slope and ~~distance~~ displacement = ?



$m_1 - m_2 = \frac{1}{2}(x_2)(6 + x_1)$

$m_1 = m' + \frac{6x_2 + x_1 x_2}{2}$

$m_2 = -m_1 + 3x^2 + x_2^2/2$

taking pertial derivative with respect to m

$$\frac{2m_2}{\partial p} = -x$$

$$\Delta B = \int_0^2 m(2m)\frac{dx}{E}$$

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

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

Put the value of EI and I

$$= \frac{3x^2}{2(280)(60\times10^6)}\Big|_0^6 + \frac{-3x^4}{(4000)(60\times10^6)}\Big|_0^4$$

$$= \frac{216\,kN\,ft^3}{4.8\times10^{10}} + \frac{-614.4\,kN\,ft^3}{4.8\times10^{10}}$$

$$= -4.5\times10^{-9} + (-1.28\times10^{-8})$$

$\Delta B = 5.76\times10^{-}$ inch Displacement

Scanned with CamScanner

Slope

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

$$M = -\frac{1}{2} x ((6x_2) = -3x^2$$

So

$$\frac{2m_1}{2m_1'} = 0$$

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

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

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

$$\frac{2m_2}{2m_1} = -1$$

$$\int_0^5 \frac{-3x^2 dx}{E.I} + \int_0^{10} (-2 + 6x^2 + \frac{x^2}{2}) dx$$

Scanned with CamScanner

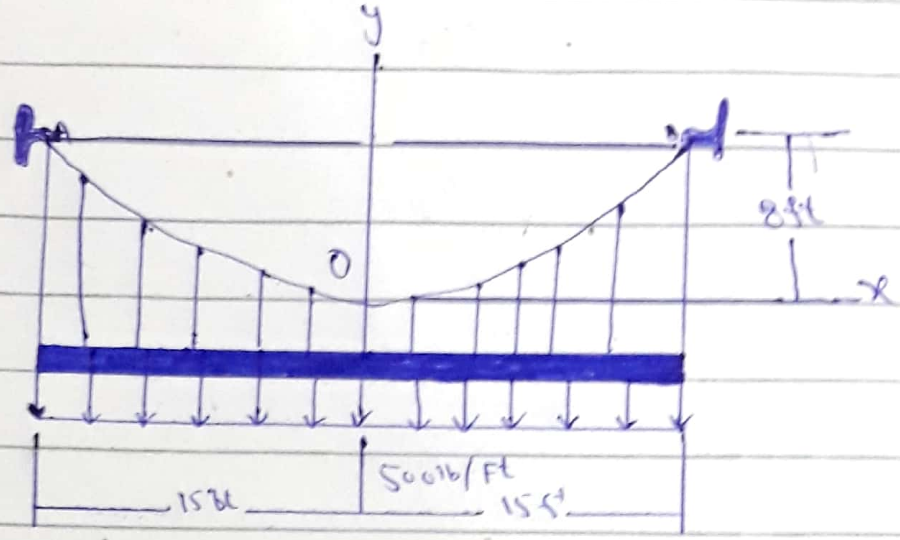
$$0 + \left(-x + \frac{6x^3}{3} + \frac{x^3}{6}\right)\Bigg|_0^{10} \left(\frac{1}{EI}\right)$$

$$= \frac{1}{200 \times (600 \times 10^6)} \left(-x + \frac{6x^3}{3} + \frac{x^3}{6}\right)\Bigg|_0^{10}$$

$$\boxed{\delta = 4.125 \times 10^{-7} \text{ inch}}$$

Scanned with CamScanner

Q no 3



Solution.

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

$$= \frac{10}{(15)^2} x^2$$

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

Now we know that

$$T_O = F_{BO} = \frac{w_o L^2}{2h}$$

Scanned with CamScanner

$$= \frac{(400)(15)^2}{2(10)} = 4500 lb$$

$$= 4.500 k$$

[redacted]

$$T_B = T_{max} = \sqrt{(T_x)^2 + (w_0 L)^2}$$

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

$$= 7500 Lb$$

$$= \boxed{7.50 k \text{ Ans}}$$

Now

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

$$= 400(15) \sqrt{1 + \left(\frac{15}{2(10)}\right)^2}$$

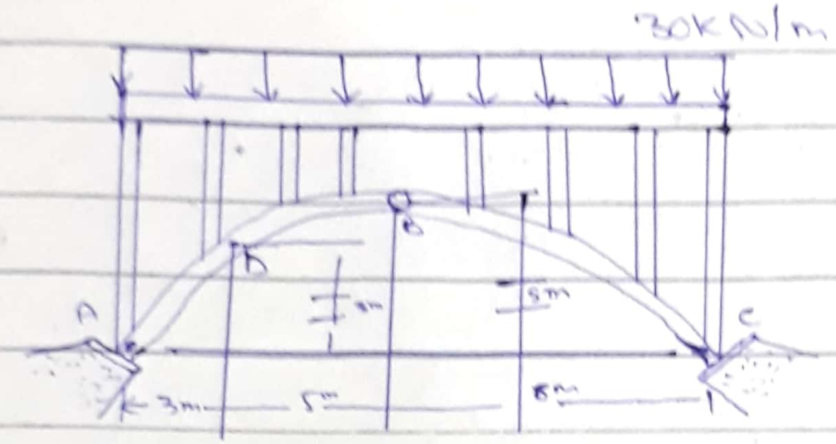
$$= 7500 lb$$

Scanned with CamScanner

7·5ook Aug

Scanned with CamScanner

Q No 4



Member AB

$\circlearrowright + \Sigma M_A = 0$

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

Member BC

$\circlearrowright + \Sigma M_C = 0$

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

Sloving

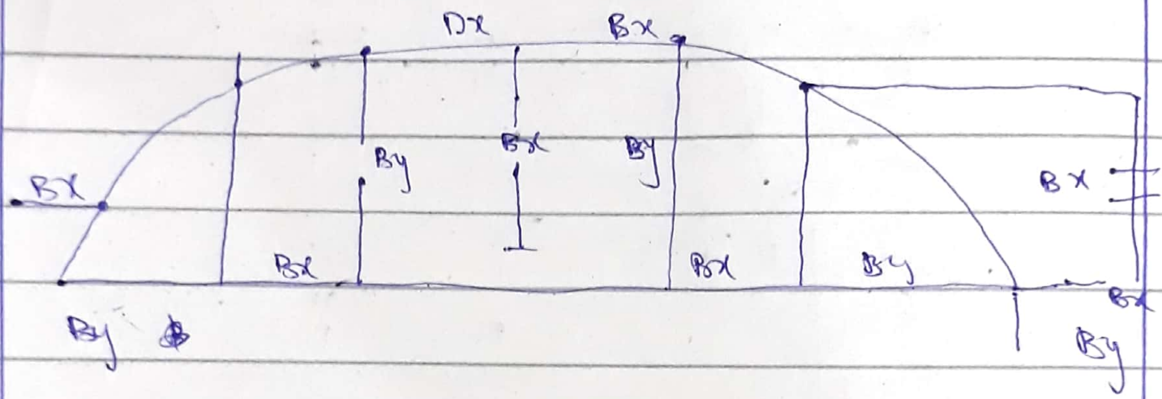
$B_x = 192\ kN \quad B_y = 0$

Segment BD

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

$M_D = 9\ kN.m$

Scanned with CamScanner



Scanned with CamScanner