ARSALAN KHAN

I.D NO 7614

SECTION A

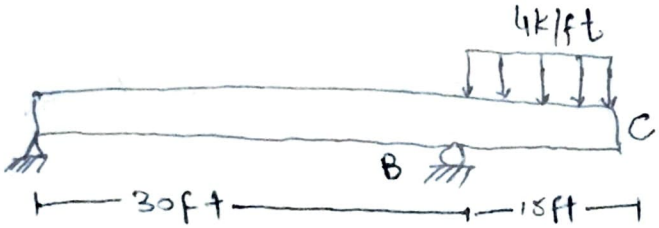
SUBMITTED TO ENGR. AMJAD ISLAM

ASSIGNMENT # 03

Date 23- July -2020

QUESTION #01:

Determine the slope and displacement at C. EI is constant. Use the moment area theorem.



Solution:

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

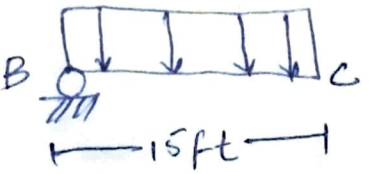
$$T_{CD} = \left(\frac{4}{\sqrt{17}}\right)(4) + T_{CD}\left(\frac{1}{\sqrt{8}}\right)(2) - 6(4) - 4(1)$$

$$\xrightarrow{+} \Sigma F_x = 0$$

$$6.414\left(\frac{1}{\sqrt{17}}\right) - T_{BC}\cos\theta = 0$$

$$\boxed{T_{BC} = 1.571\ KN}$$

$$\Phi = 8.130^{\circ}$$



$\overset{+}{\rightarrow} \Sigma F_y = 0;$

$6.5125 + 6x(30) + 4x(1)$

$$\boxed{\Sigma F_y = 25.1425 \text{ KN}}$$

$T_{AB} = 4.086 \text{KN}$

$\phi = 67.62^\circ$

$$\frac{Y_B}{1} = \tan\phi$$

$Y_B = 1 \tan\phi$

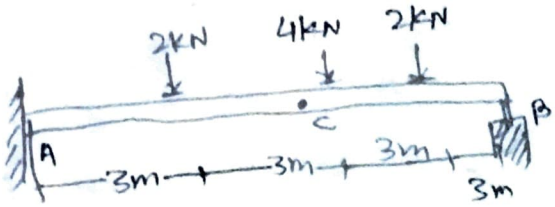
$Y_B = 1 \tan 67.62$

$= 2.429 \text{ m}$

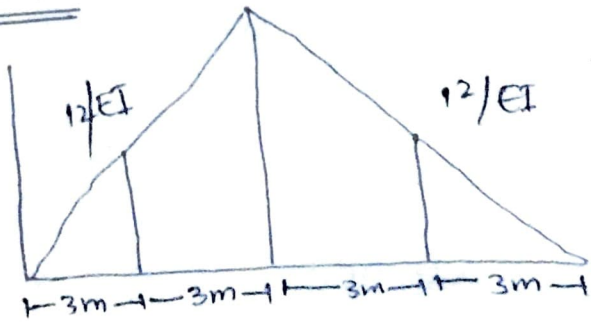
$$\boxed{Y_B = 2.43 \text{ m}}$$

QUESTION #02:

Determine the slope at A and displacement at C of the beam in the Figure by (a) Moment Area theorem. Take $E = 200$ Gpa $I = 60 \times (10^6)\ mm^4$.



Solution:



$$\frac{Q_A}{C} = \frac{1}{2}\left(\frac{12}{EI}\right)(3) + \left(\frac{12}{EI}\right)(3) + \frac{1}{2}\left(\frac{6}{EI}\right)(3)$$

$$Q_{n/c} = \left(\frac{13}{EI}\right) + \left(\frac{36}{EI}\right) + \left(\frac{9}{EI}\right)$$

$$Q_{n/c} = \frac{63}{EI}$$

$$= 63 \Big/ (200\times10^{9})(6\times10^{6})(1066)^{-4}$$

$$\theta_{A/C} = 0.0525 \text{ rad}$$

$$\theta_A = 0.0525 \text{ rad/hr.}$$

$$t_{A/C} = \left[\frac{1}{2}\left(12/EI\right)(3)\right]\left(\frac{2}{3}(3)\right) + \left[12/EI\,(3)\right]\left[3+\frac{1}{2}(3)\right] + \frac{1}{2}\left(6/EI\right)(3)\left(3+\frac{2}{3}(3)\right)$$

$$= 0.202 \text{ m}$$

So;

$$\Delta C = t_{A/Ae} = 0.202 \text{ m}$$

$$\boxed{\Delta e = 202 \text{ mm}}.$$