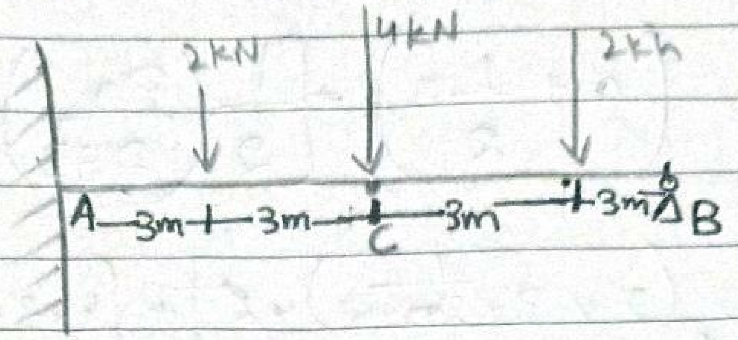
Determine the slope at A and displacement at C of the beam in figure



By Moment Area Theorm ⇒

Take $E = 200\ GPa$

$I = 6(10^6)mm^4$

Solution :-

Slop (A) ⇒ ?   displacment (C) = ?

A_B

$\frac{1}{2}(Pa/_{CI})$

$$\theta_{BC} = \frac{1}{2}\left(\frac{4\times 3}{200\times 10^9 \times 6\times 10^{-5}}\right)^3 + \left(\frac{4\times 3}{200\times 10^9\times 6\times 10^3}\right)\times 3$$

$$+\frac{1}{2}\left(\frac{2\times 3}{2\times 200\times 10^9 \times 6\times 10^3}\right)$$

$$\theta_{AC} = \frac{1}{200\times 10^3}\left[\left(\frac{3}{2}(4\times 3)\right) + (12\times 3) + \frac{3}{2}\left(\frac{6}{2}\right)\times 3\right]$$

$$\boxed{\theta_{AC} = 0.00008925}$$

$$t_{BC} = \left[\frac{1}{2}\left(\frac{Pa}{EI}\right)a\right]\left(\frac{2}{3}a\right) + \left[\frac{Pa}{EI}(a)\right]$$

$$\left(a + \frac{1}{2}a\right) + \left[\frac{1}{2}\left(\frac{Pa}{2EI}\right)a\right]\left[a + \frac{2}{3}a\right]$$

$$t_{BC} = \left[\frac{3}{\cancel{2}}\left(2 \times 3 \times \frac{1}{200 \times 10^4}\right) \times \cancel{2}\right] + \left[4 \times 3 \times 3 \times \frac{1}{200 \times 10^4}\right.$$

$$\left. * \left(3 + \frac{3}{2}\right)\right] + \frac{3}{2}\left(\frac{2 \times 3}{2} \times \frac{1}{200 \times 10^4}\right) \times (3+2)$$

$$t_{BC} = 9 \times 10^{-6} + 8.1 \times 10^{-5} + 1.125 \times 10^{-5}$$

$$t_{BC} = 1.0125 \times 10^{-4}$$

OR

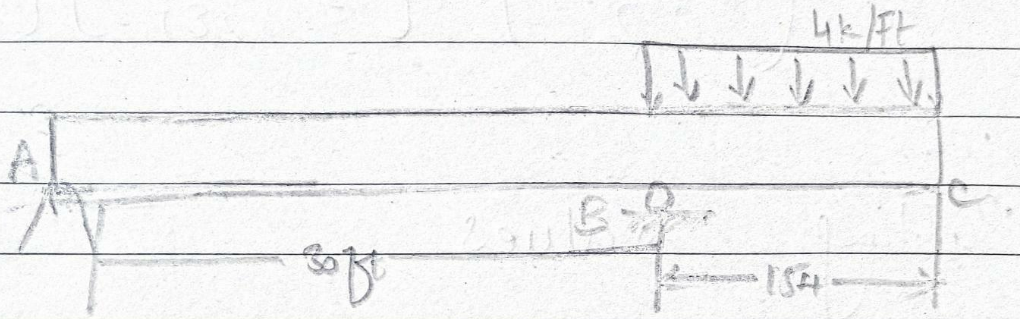
$$\boxed{t_{BC} = 0.00010125}$$

Date:

Day: M T W T F S S

Question 1:-

Determine the slope and displacment at C. EI is constant. Use the moment area theorm.



Solution:-

Slop and displacement at C = ?

As

A $\frac{1}{2}$ (Pa/CI)

$$\theta_{AC} = \frac{1}{2}\left(\frac{4\times 30}{200\times10^{0}\times 6\times10^{-5}}\right)^{3} + \left(\frac{4\times 30}{200\times10^{9}\times6\times10^{3}}\right)\times 3$$

$$\frac{1}{2} = \left[\frac{2\times 30}{2\times200\times10^{9}\times6\times10^{3}}\right]$$

$$\theta_{AC} = \frac{1}{200\times10^{3}}\left[\frac{30}{2}(4\times30)\right] + (12\times3) + \frac{30}{2}\left(\frac{6}{2}\right)\times 3$$

$$\theta_{AC} = \boxed{0.0001285}$$

$$t_{BC} = \left[\frac{1}{2}\left(\frac{Pa}{EI}\right)a\right]\left(\frac{2}{3}\right) + \left[\frac{Pa}{EI}(a)\right]$$

$$\left(a + \frac{1}{2}a\right) + \left[\frac{1}{2}\frac{Pa}{2EI}a\right]\left[a + \frac{2}{3}\right]$$

Putting values

$$t_{BC} = \left[\frac{4}{15}\left(2\times 3'\times\frac{1}{200\times 10^4}\right)\times 15\right]\left[4\times 15\times 3\frac{1}{200\times 10^4}\right]$$

$$\times\left(3 + \frac{4}{15}\right) + \frac{4}{15}\left(\frac{15\times 3}{4}\times\frac{1}{200\times 10^4}\right)(4\times 15)$$

$$\boxed{t_{BC} = 0.000143}$$