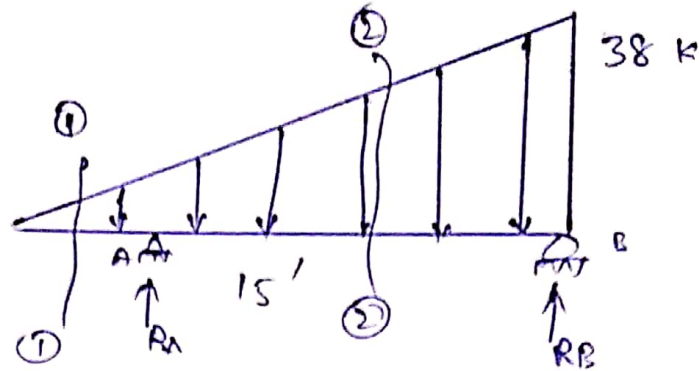


Name - Shahzeb - Khan

QNO: 01



$$\sum M_B = 0 \quad \curvearrowright^+$$

$$\Rightarrow \frac{1}{2} \times 38 \times 24 \times \frac{1}{3} \times 24 = R_A \times 15$$

$$R_A = 243.2 \text{ lb}$$

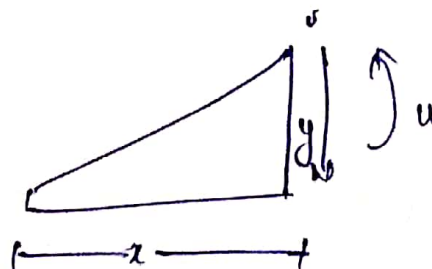
$$\sum F_y = 0 \uparrow$$

$$R_A + R_B = \frac{1}{2} \times 38 \times 24$$

$$R_B = 456 - 243.2$$

$$R_B = 212.8 \text{ lb}$$

Now Section ①—①



$$\frac{y}{x} = \frac{38}{24}$$

$$y = \left(\frac{38}{24}\right)x$$

So  $\sum F_y = 0 \uparrow +$

$$-\frac{1}{2}(2)x \left(\frac{38}{24}\right)x - V_c = 0$$

$$V_c = -\frac{38}{48}x^2$$

at  $x = 0$

$$V_c = 0$$

at  $x = 9$

$$\boxed{V_c = -64.12 \text{ lb}}$$

$$M = -\frac{1}{2} \times x \times \left(\frac{38x}{24}\right) \times \frac{1}{3}x$$

$$\Rightarrow M = \frac{38}{144}x^3$$

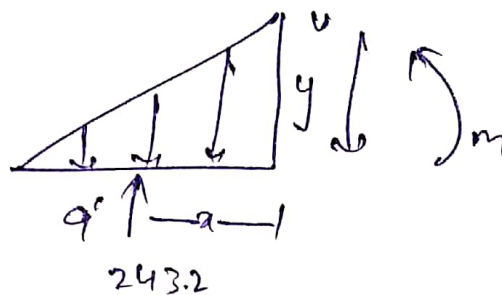
at  $x = 0$

$$M = 0$$

at  $x = 9$

~~$M = -79.2$~~   
 $M = -192.37 \text{ lbs-ft}$

Now of section ② — ②



$$\frac{y}{x+9} = \frac{38}{24}$$

$$y = \frac{38}{24} (x+9)$$

$\sum F_y = 0 \uparrow$

$$243.2 - \frac{1}{2} (x+9) \left( \frac{38}{24} \right) (x+9) - V_c = 0$$

$$V_c = 243.2 - \frac{38x(x+9)^2}{48}$$

at  $x = 0$

$$V_c = 179.07$$

at  $x = 15$

$$V_c = -212.8 \text{ K}$$

$$M + \frac{1}{2} x (x+9) \left( \frac{38}{24} \right) (x+9) \times \frac{1}{3} (x+9) - 243.2x = 0$$

$$M = \frac{243.2x - 38(x+9)^3}{144}$$

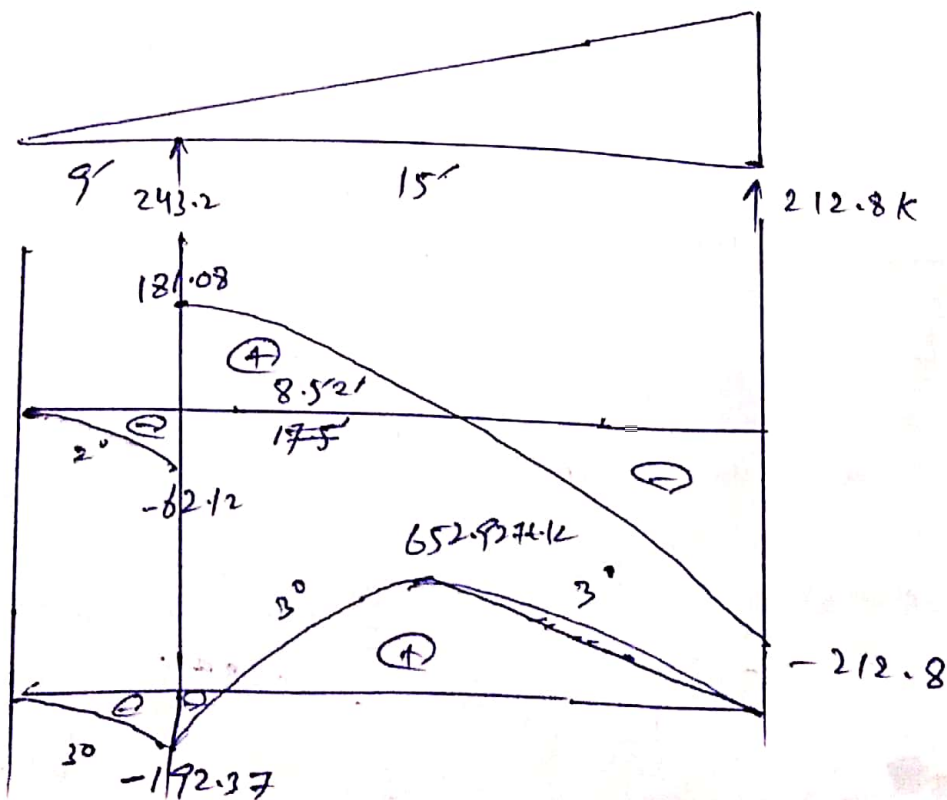
at  $x = 0$

~~$M = 85.50.82$~~

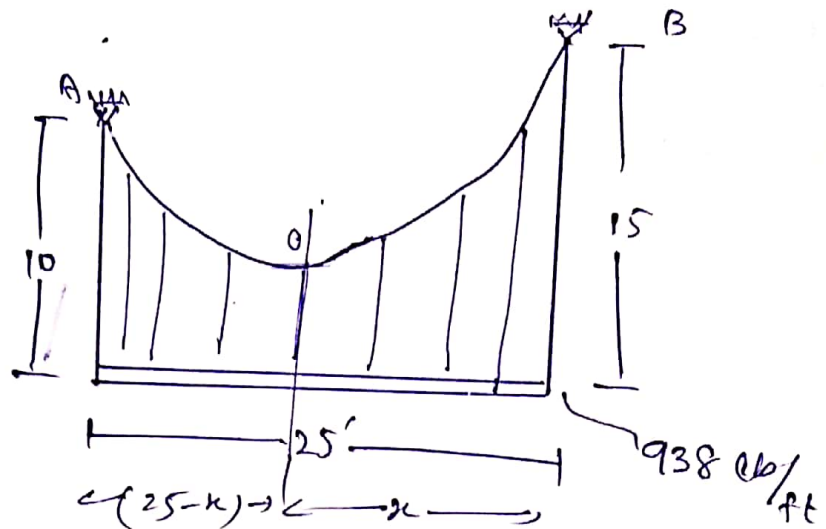
$M = -192.37 \text{ lb-ft}$

at  $x = 15$

$$M = 0$$



Q No. 02



Sol: Let Support we take a point 'O' in the Cable which is lowest point where slope is zero.

using formula:

$$y = \frac{w_0}{2T_0} x^2 = \frac{938}{2T_0} x^2$$

$$y = \frac{469}{T_0} x^2$$

Now; Assume point 'C' is located at  $x$  from point "O" (lowest point)

So

$\Rightarrow$  From point "O" to right  
from distance ' $x$ '  $y = 15'$

$$15 = \frac{469}{T_0} x^2$$

$$T_0 \frac{469}{15} x^2 = 31.26$$

$$T_0 = 31.26 x^2$$

Again

From point 'O' to left

for distance  $-(25-x)$ ,  $y = 10$

$$\Rightarrow y = \frac{469}{T_0} x^2$$

$$\left( 10 = \frac{469}{T_0} (-(25-x))^2 \right) \longrightarrow \textcircled{2}$$

$$10 = \frac{469}{31.26 x^2} (-(25-x))^2$$

$$T_0 = \frac{469}{10} x^2 (-(25-x))^2 \longrightarrow \textcircled{3}$$

Comparing ① & ②

$$\frac{469}{15} x^2 = \frac{469}{10} (-(25-x))^2$$



interchanging

$$\frac{469}{469} x^2 = \frac{15}{10} (625 - 50x + x^2)$$

$$x^2 = 1.5 (625 - 50x + x^2)$$

$$x^2 = 937.50 - 75x + 1.5x^2$$

$$937.50 - 75x + 1.5x^2 - x^2 = 0$$

$$0.5x^2 - 75x + 937.50 = 0$$

By Solving

Using Quadratic Equation

$$a = 0.5, b = -75, c = 937.50$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-75) \pm \sqrt{(-75)^2 - 4(0.5)(937.50)}}{2(0.5)}$$

$$x = 75 \pm \sqrt{3750}$$

We get

$$\boxed{x = 13.86 \text{ t.t.}} \longrightarrow \textcircled{1}$$

Now put eq  $\textcircled{1}$  in eq  $\textcircled{2}$

$$T_0 = 31.26 x^2$$

$$= 26.4$$

$$T_0 = 31.26 (13.76)^2$$

$$T_0 = 5918.69 \text{ lbs}$$

Now we have to find the tension at given points.

$$y = \frac{w_0}{2T_0} x^2$$

$$y = \frac{469}{T_0} x^2$$

Differentiate the above eq. w.r.t "x"

$$\frac{dy}{dx} = \frac{d}{dx} \left( \frac{469}{T_0} x^2 \right)$$

$$= \frac{469}{T_0} \cdot 2(x)$$

$$\frac{dy}{dx} = \frac{938}{T_0} x \quad \text{—————} \textcircled{a}$$

$$\frac{dy}{dx} = \tan \theta \quad \text{—————} \textcircled{b}$$



So

$$\tan \theta = \frac{938}{T_0} x$$

As point (A) is -11.24 away from "O"

So

$$\tan \theta_A = \frac{46 \cdot 938}{5918.69} (-11.24)$$

$$\theta_A = \tan^{-1}(-1.78)$$

$$\theta_A = -60.67^\circ$$

Now, Tension at point A is

$$T_A = \frac{T_0}{\cos \theta_A}$$

$$= \frac{5918.69}{\cos(-60.67)} \quad \begin{array}{l} 12082.92 \text{ lbs} \\ 12.08 \text{ kips} \end{array}$$

$$\therefore \left( \cos \theta = \frac{T_0}{T_A} \right)$$

Now point "B" where  $x = 13.76 \text{ ft}$

$$\tan \theta_B = \frac{938}{5918.69} (13.76) = (2.18)$$

$$\theta_B = \tan^{-1}(2.18)$$

$$\theta_B = 65.36^\circ$$

Now Tension

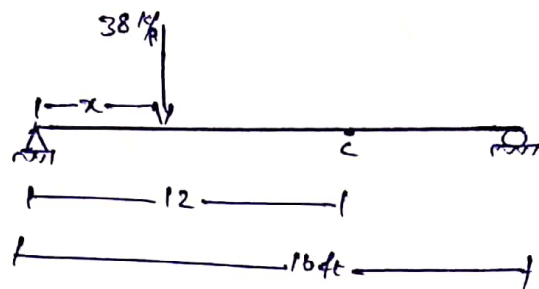
$$T_C = \frac{T_0}{\cos \theta_B}$$

$$T_C = \frac{5918.69}{\cos(65.3)} = 14199.24 \text{ lbs}$$

14.19 kips .



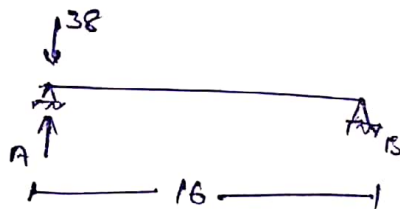
Q NO 03



$$P = 38$$

influence at 'c'  
and a

For  $x = 0$   $R_A$ ?



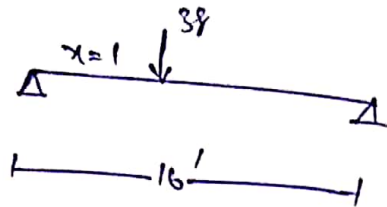
$$\sum M_B = 0 \quad \uparrow$$

$$-(38 \times 16) + R_A(16) = 0$$

$$-608 + 16 R_A = 0$$

$$R_A = \frac{608}{16} = 38$$

for  $x = 1$  ft  $R_A$ ?



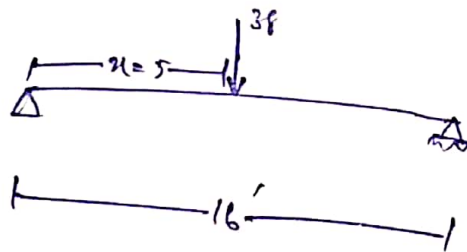
$$\sum M_B = 0 \curvearrowright$$

$$-(38 \times 15) + R_A(16) = 0$$

$$-570 + R_A(16) = 0$$

$$R_A = \frac{570}{16} = 35.62$$

For  $x=5$



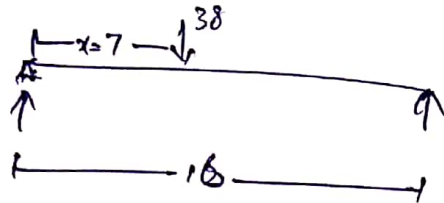
$$\sum M_B = 0 \curvearrowright$$

$$-(38 \times 11) + 16 R_A = 0$$

$$-418 + R_A(16)$$

$$R_A = \frac{418}{16} = 26.12$$

For  $x = 7$   $R_A = ?$

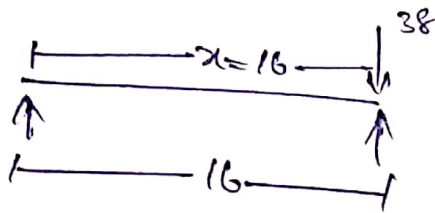


$$-(38 \times 9) + R_A \cdot 16 = 0$$

$$-342 + R_A \cdot 16 = 0$$

$$R_A = \frac{342}{16} = 21.37$$

For  $x = 16$



$$\sum M_B = 0 \quad \uparrow \curvearrowright$$

$$-(38 \times 0) + R_A \cdot 16 = 0$$

$$0 + R_A(16) = 0$$

$$R_A = 0$$

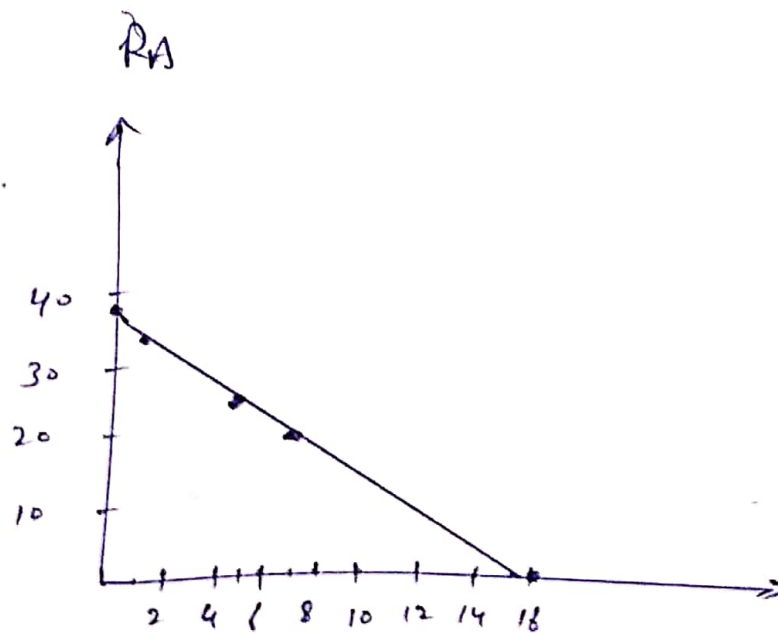
$$RA_0 = 38$$

$$RA_1 = 35.62$$

$$RA_5 = 26.12$$

$$RA_7 = 21.87$$

$$RA_{16} = 0$$



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The END.