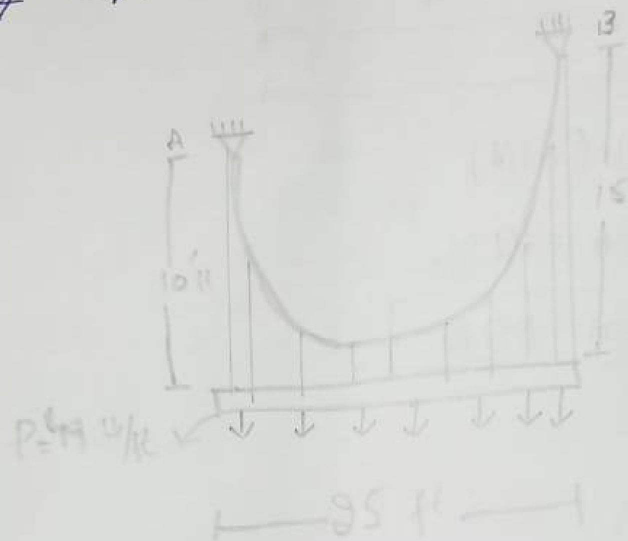
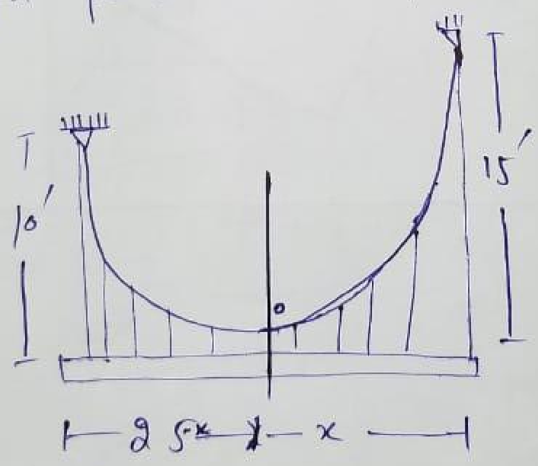

V(16)

Q No # 02




Solution:-

let suppose we take a point "o" in the cable which is the largest point, where slope is zero.

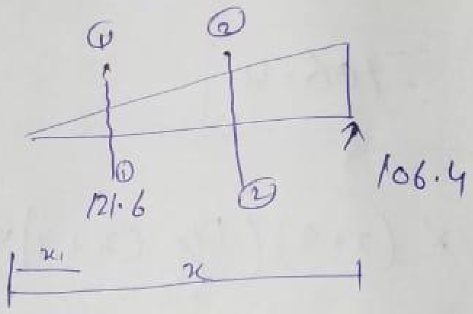



using formula,

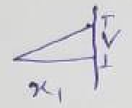
$$y = \frac{w_0}{2T_0} x^2 = \frac{819}{2T_0} x^2$$

$$\boxed{y = \frac{409.5}{T_0} x^2}$$

Find Shear force equation




Section 1-1



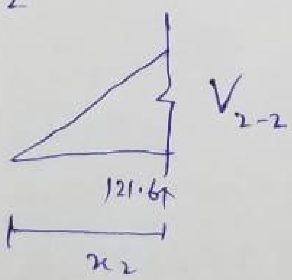

$V_{1-1} = \frac{1}{2} \times x_1 \times \frac{19}{24} x_1 = \frac{19}{48} x_1^2 \quad \therefore x = 0-9$

$V_{1-1}\big|_{x=0} = \frac{19}{48} \times (0)^2 = 0$

$V_{1-1}\big|_{x=9} = \frac{19}{48} \times (9)^2 = 32.06$ lb

$\boxed{V_C = 32.09}$

Section 2-2




$\Sigma F_y = 0$

$-V + 121.6 - \frac{1}{2} \times \frac{19}{24} x_2 \times x_2 = 0$

$V_{2-2}\big|_{x=9} = 121.6 - \frac{19}{48}(9)^2 = 89.53$ lb

Name " Mazhar - hayat

ID " 7819

Section " "A"

Subject " Structural Analysis -1

Submitted to " Engr: Mohammad Saqib

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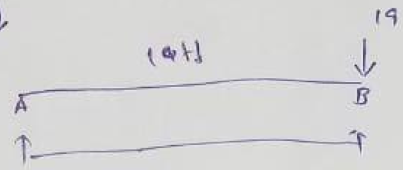
→ For $x \to 10$

$\Sigma M_B = 0$ ↻

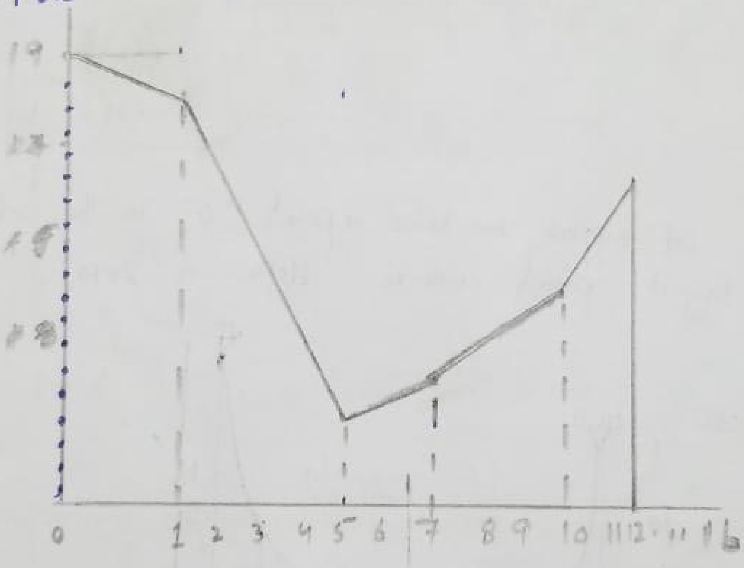



$-19(10) + R_A(16)$

$16 R_A = 190/16$

$\boxed{R_A = 11.875}$

For $x = 12$
$R_A = 14.25$




$R_{A_1} = 19$

$R_{A_2} = 17.812$

$R_{A_3} = 5.9375$

$R_{A_4} = 8.312$

$R_{A_5} = 11.87$

$R_{A_6} = 14.25$

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$$V_{2-2}\Big|_{x=24} = 121.6 - \frac{19}{48}(24)^2 = -106.4$$

$$\boxed{V_C = -106.4}$$

$$M + \frac{1}{2} \times (x+9)\left(\frac{19}{24}(x+9)\right) \times \frac{1}{3} \times (x+9) - 620 = 0$$

$$M = 620 - \frac{8x}{} \frac{19(x+9)^3}{144}$$

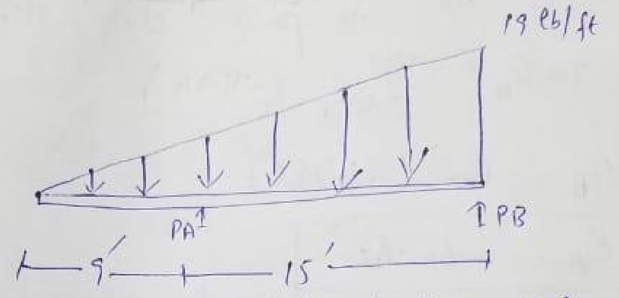
at $x = 0$

$$M = -457.1125$$

(1)

QNo# 01

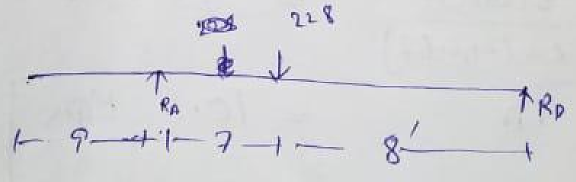
Solution:




Converting UVL into point load = $\frac{1}{2}(19 \times 24) = 228$ lb/ft

This point load act on $\frac{2}{3}$ of beam length =

$$\frac{2}{3} \times 24 = 16 \text{ ft}$$




$\Sigma M_A = 0$ ↻+

$$-15 R_B + 228 \times 7 = 0$$

$$R_B = \frac{228 \times 7}{15} = \boxed{106.4 \text{ lb}}$$

$\Sigma F_y = 0$ ↑+

$$R_A - 228 + 106.4 = 0$$

$$R_A - 121.6 = 0$$

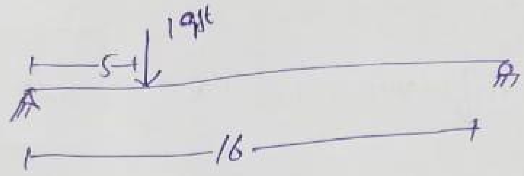
$$\boxed{R_A = 121.6 \text{ lb}}$$

$-285 + 16R_A = 0$

$16R_A = 285 \Rightarrow R_A = 285/16$

$\boxed{R_A = 17.812}$

→ For $x = 5$




$\Sigma M_B = 0$ +

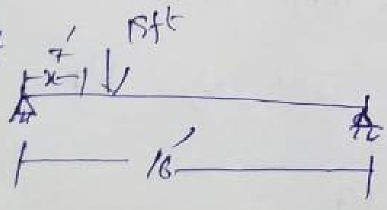
$-(19 \times 5) + 16 R_A = 0$

$-95 + 16R_A = 0$

$R_A = \frac{95}{16} =$

$\boxed{R_A = 5.9375}$

→ For $x = 7$




$\Sigma M_B = 0$ +

$-(19 \times 7) + 16 R_A = 0$

$-133 + 16 R_A = 0$

$R_A = 133/16 \Rightarrow 8.312$

$\boxed{R_A = 8.312}$

$dy/dx = d/dx \left( \frac{409.5}{T_0} \cdot x^2 \right)$

$= \frac{409}{T_0} \cdot 2x \Rightarrow dy/dx = \frac{819}{T_0} x \rightarrow (a)$

Also $dy/dx = \tan\theta \rightarrow (b)$

So $\tan\theta = \frac{819}{T_0} x$ As point O is $-11.24$ away from "O"

So $\tan\theta_A = \frac{819}{5168.91}(-11.24)$

$\theta_A = \tan^{-1}(-1.780)$

$$\boxed{\theta_A = -60.67^\circ}$$

Now, Tension at point A is

$T_A = \frac{T_0}{\cos\theta_A}$ $\therefore \cos\theta = T_0/T_A$

$= \frac{5168.91}{\cos(-60.67)} = 10552.26$ lbs

$$\boxed{T_A = 10.5 \text{ Kips}}$$

→ Now point "B" where $x = 13.76$ ft

$\tan\theta_B = \frac{819}{T_0}(13.76)$

$= \frac{819}{5168.91}(13.76 \Rightarrow \theta_B = \tan^{-1}(2.18)$

$$\boxed{\theta_B = 65.3^\circ}$$

Now Tension

$T_C = \frac{T_0}{\cos\theta_B} = \frac{5168.91}{\cos(65.3)} =$

$T_C = 12369.74$ lbs

$$\boxed{T_C = 12.4 \text{ kips}}$$

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$$9375 - 75x + 1.5x^2 - x^2 = 0$$

$$0.5x^2 - 75x + 937.5 = 0$$

by Solving

using Quadratic Equation

$a = 0.5 \qquad b = -75 \qquad c = 937.50$

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

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

$$x = \frac{75 \pm \sqrt{5625 - 1875}}{1}$$

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

we get

$$\boxed{x = 13.76\ ft} \rightarrow 4$$

Now put eq (4) in (2)

$$To = 27.3(13.76)^2$$

$$\boxed{To = 5168.91\ Lbs}$$

Now we have to find the tension at given point By using formula

$$y = \frac{w_o}{2T_o}x^2 \Rightarrow \frac{409.5}{To}x^2$$

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

Now assume point c is located at x distance from point "o"

So from Point "zero" to right, for distance 'x', $y = 15$

$$\Rightarrow y = \frac{409.5}{T_o} x^2$$

$$\boxed{15 = \frac{409.5}{T_o} x^2} \rightarrow (1)$$

$$T_o = \frac{409.5}{15} x^2 \Rightarrow \boxed{T_o = 27.3 x^2} \rightarrow 2$$

⇒ Again

from poin 'O' to left

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

$$\Rightarrow y = \frac{409.5}{T_o} x^2$$

$$10 = \frac{409.5}{T_o} x^2 \Rightarrow 10 = \frac{409.5}{T_o}[-(25-x)]^2 \rightarrow (3)$$

comparing eq (1) and (3)

$$\frac{409.5}{T_o} x^2 = \frac{409.5}{T_o}[-(25-x)]^2$$

Interchanging

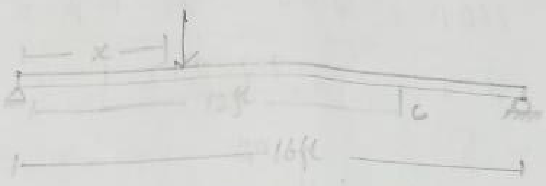
$$\frac{409.5}{409.5} x^2 = 15/10\,(625 - 50x + x^2)$$

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

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

(9)

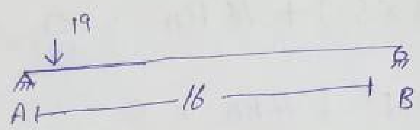
QNo # 03




Infulance at "C" and "A"

P= 19

for $x = 0$ $R_A = ?$




$\Sigma M_B = 0$ +

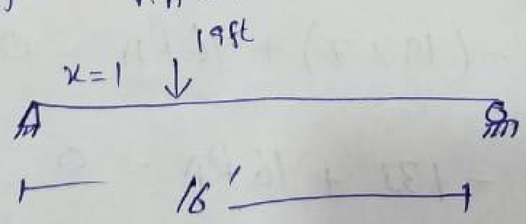
$-(19 \times 16) + R_A(16) = 0$

$-304 + 16R_A = 0$

$16 R_A = 304 \Rightarrow R_A = 304/16$

$R_A = 19$

for $x = 1ft$ $R_A = ?$




$\Sigma M_B = 0$ +

$-(19 \times 15) + R_A(16) = 0$