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Section= A

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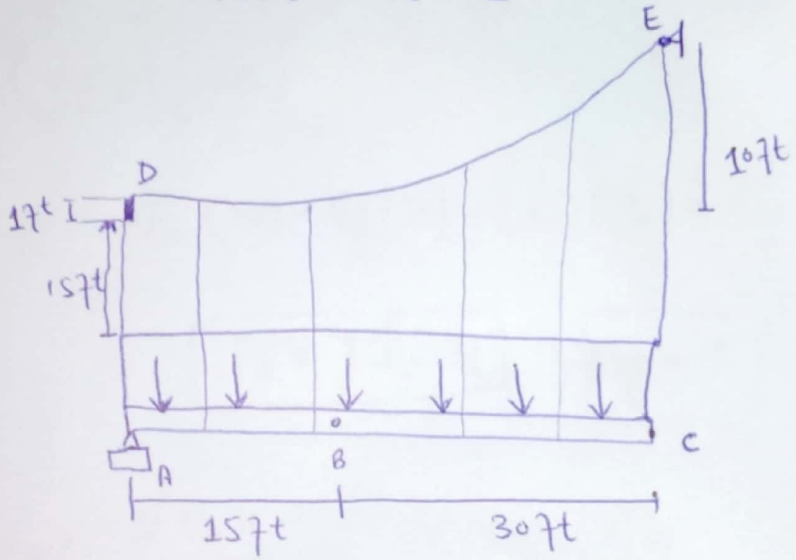
Dept= B.S Civil Engineering

Assignment # 04

Q#1:-

Determine the maximum and minimum tension in the Parabolic cable and the force in each of the hangers. The girder is subjected to the uniform load and is Pin Connected at B.



Solution:-

Member BC:-

$\xrightarrow{+} \sum F_x = 0;$ $\quad B_x = 0$

Member AB:-

$\xrightarrow{+} \sum F_x = 0$ $\quad A_x = 0$

moment At A

$$\left(+\circlearrowright\right) \sum M_A = 0 ;$$

$$F_H(1) - B_y(15) - 45(75) = 0 \rightarrow (1)$$

FBD

$$\left(+\circlearrowright\right) \Sigma M_c = 0 ;$$

$$-F_H(10) - B_y(30) + (45)(30) = 0$$

$$\boxed{F_H = 153.4} \quad , \quad \boxed{B_y = 0}$$

$$W_o = \frac{2 F_H h}{L^2} \Rightarrow \frac{2(153.4)(10)}{(30)^2}$$

$$= \frac{3068}{900} = \boxed{3.40}$$

$$\boxed{w_o = 3.40 \text{ k/ft}}$$

$$F_{max} = W_o L \sqrt{1 + \left(\frac{L}{24}\right)^2}$$

$$= (3.4)(30)\sqrt{1 + \left(\frac{30}{24}\right)^2}$$

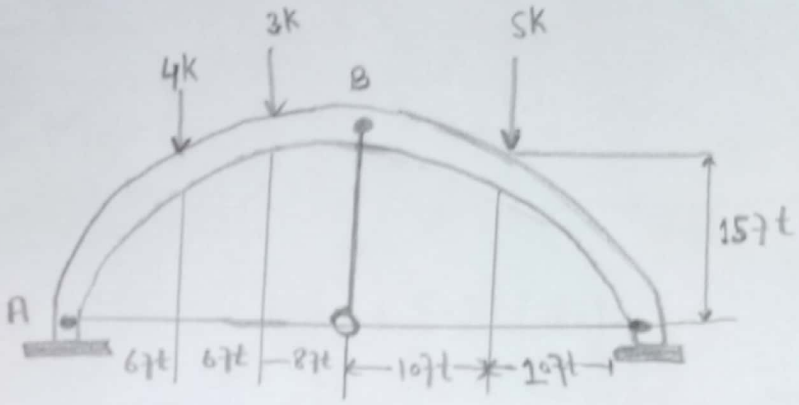
$$\boxed{F_{max} = 183.6\ k}$$

Each Hanger Carries 5ft of W_o

$$T = (5ft)(3.4\ k/ft)$$

$$\boxed{T = 17\ k}$$

Q#2:-

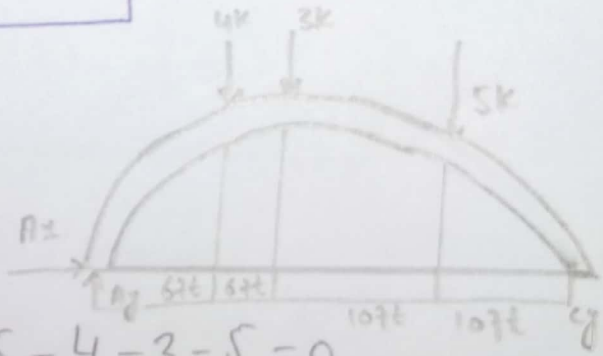


Entire Arch:-

$$\circlearrowright + \sum M_A = 0;$$

$$-4(6) - 3(12) - 5(30) + C_y(40) = 0$$

$$\boxed{C_y = 5.5\ k}$$

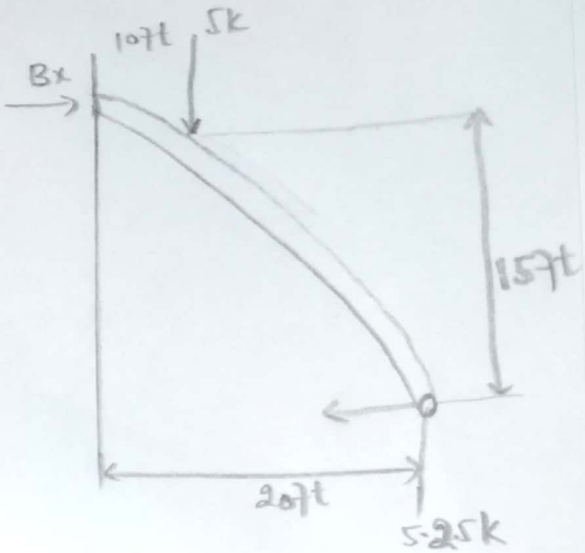


$$+\uparrow \sum F_y = 0;$$

$$A_y + 5.25 - 4 - 3 - 5 = 0$$

$$\boxed{A_y = 6.75\ k}$$

$\xrightarrow{+} \sum F_x = 0; \quad A_x = 0$



Section BC :-

$\circlearrowleft + \sum M_B = 0;$

$-5(10) - T(15) + 5.25(20) = 0$

$T = 3.67k$

The End
