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Sec:

B

Assignment:

"4"

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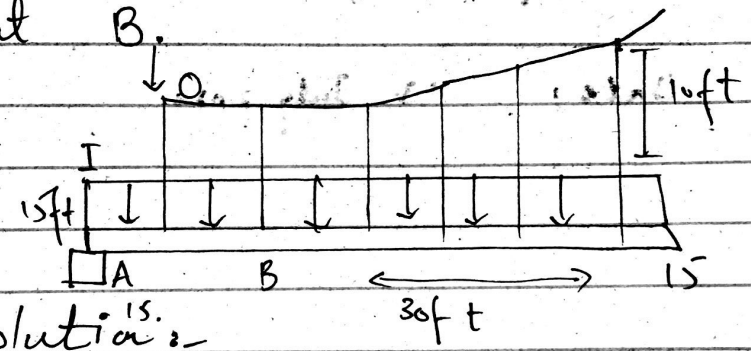
Assignment No 4

Cables and Arches

Question # 01

Determine the maximum and minimum tension in the parabolic cable and the force in each of the hangers

--- pin connected at B.



Solution:-

Member BC

$$\sum F_x = 0$$

$$B_x = 0$$

Member AB

$$\sum F_x = 0$$

$$A_x = 0$$

moment At A

3

$$\downarrow \sum M_n = 0 \quad F_H (1) = B_y (15) - 45 (7.5)$$

$$= 0 \rightarrow \textcircled{1}$$

FBD

$$\downarrow \sum M_c = 0 \quad - F_H (10) - B_y (30) + (45)(30) = 0$$

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

$$w_0 = \frac{2 F_H h}{L^2} = \frac{2 (153.4)(10)}{30^2}$$

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

$$\boxed{w_0 = 3.40 \text{ k/ft}}$$

$$F_{max} = w_0 L \sqrt{1 + \left(\frac{L}{24}\right)^2}$$

$$= 3.4(30) \sqrt{1 + \left(\frac{30}{2(10)}\right)^2}$$

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

Each hanger carries sft of

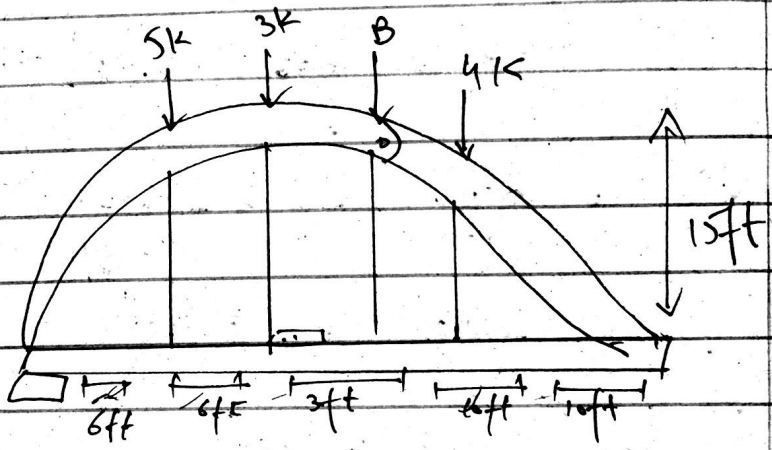
$$T = (5 \text{ft}) (3.4) \text{ k (ft)}$$

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

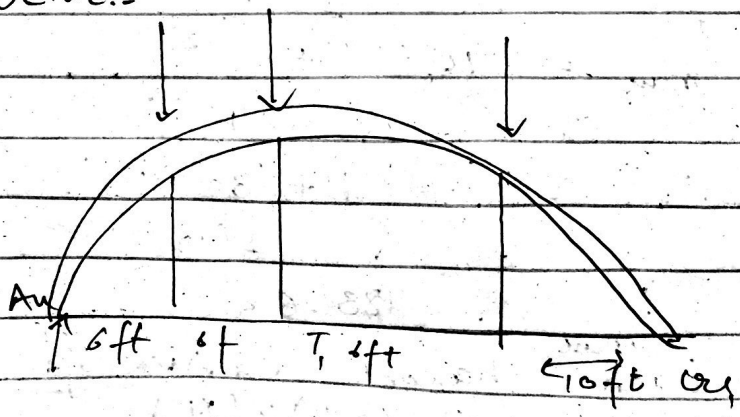
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Question 02

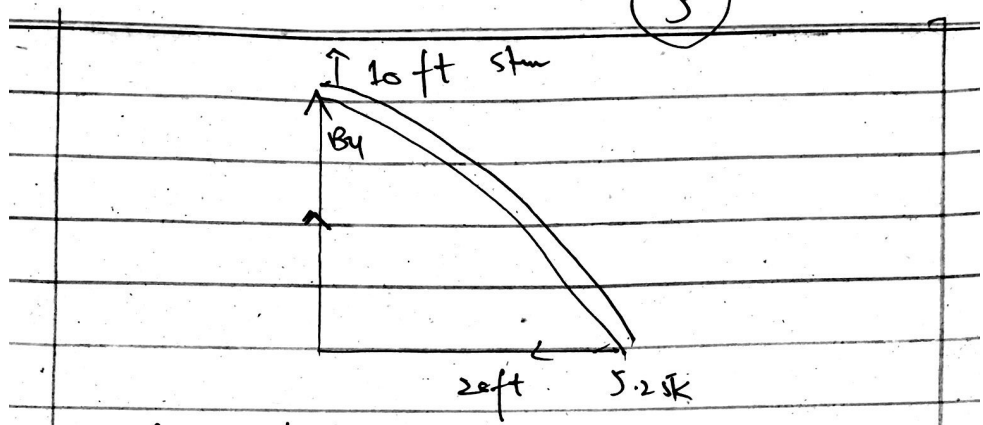
The fixed three-hinged arch is subjected to the loading shown. Determine the component the tension in the rod



* Solution:-



5



Enter Ache

$$\hookrightarrow + \sum M_A = 0 ; -4(6) - 3(2) - 5(30) + y(40) = 0 \quad cy = 5.25k$$

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

$$Ay - 5.25 - 4 - 3 - 5 = 0$$

$$Ay = 6.75k$$

$$\rightarrow \sum F_x = 0 \quad Ax = 0$$

Solution BC =:

$$\hookrightarrow + \sum M_B = 0$$

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

$$T = 3.67L$$