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Section - A

Semester 4<sup>th</sup> (BECC)

Subject: Structure Analysis-I

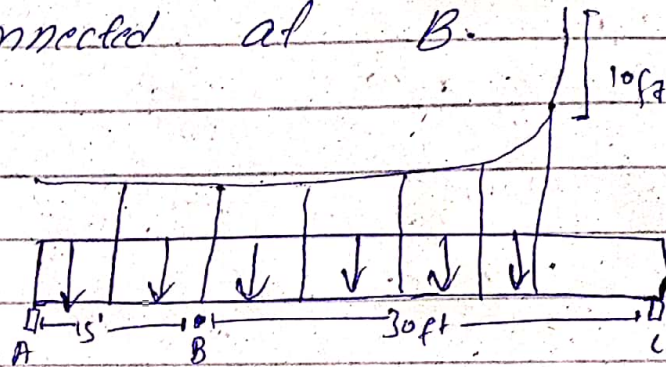
Assignment No. 04

Date: 13/07/2020



(2)

Question No. 01: Determine the maximum and minimum tension in the parabolic cable and the force in each of the hangers. The girder is subjected to uniform load and is pin connected at B.



Sol: member AB:

$$\sum F_x = 0 \Rightarrow A_x = 0$$

member BC

$$\sum F_x = 0 \Rightarrow B_x = 0$$

moment at A:

$$\sum M_A = 0, F_H(10) - B_y(15) - 45(7.5) = 0 \rightarrow \text{A}$$

$$\sum M_C = 0, -F_H(10) - B_y(30) + 45(30) = 0$$

$$F_H = 153.4, B_y = 0$$

$$w_0 = \frac{2F_H h}{L^2} = \frac{2(153.4)(10)}{30^2} = 3.40$$

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



(3)

$$F_{max} = W_0 L \sqrt{1 + \left(\frac{L}{24}\right)^2}$$

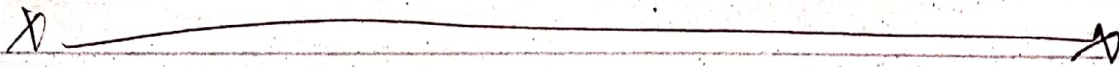
$$= 3.4(30) \sqrt{1 + \left(\frac{30}{24(10)}\right)^2}$$

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

Each hanger carries 5ft of  $W_0$

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

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

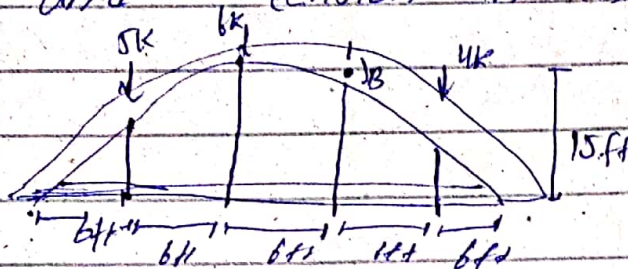




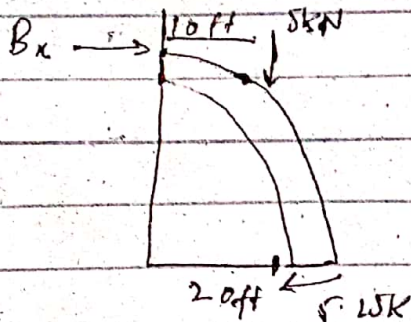
(4)

Question No. 09:-

The fixed three-hinged arch is subjected to loading shown. Determine the components of reaction at 'A' and 'C' and tension in the rod.



Sol:-



Entire Arch:-

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

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

$$4y = 5.25 \times$$

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

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

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

$$\rightarrow \sum F_x = 0$$

$$A_x = 0$$





(5)

Section B.C.:-

$$\sum M_B = 0 \quad (\rightarrow)$$

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

$$T = 3.67L$$

X

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