

# Structure Analysis



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Section :- A.

Assignment No :- 04

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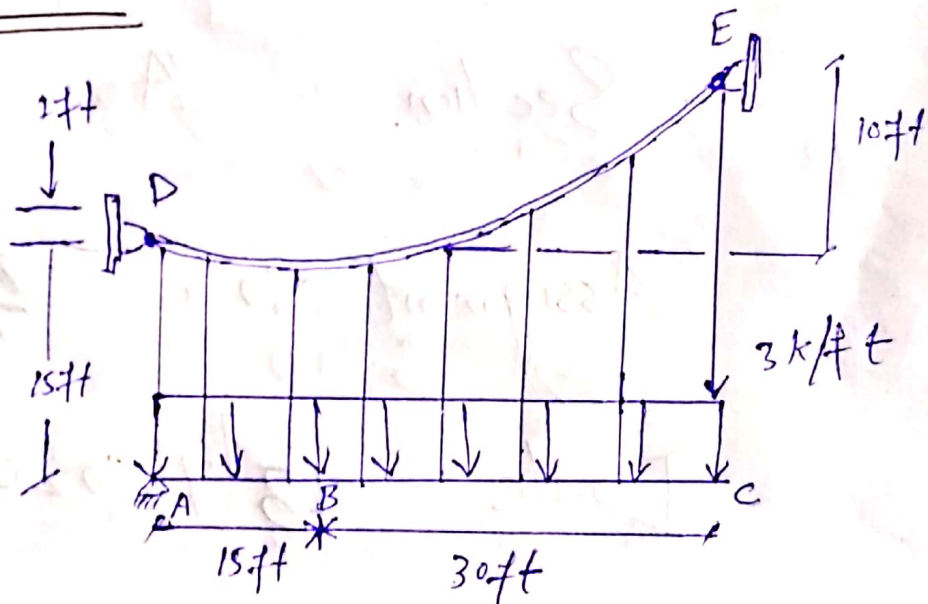
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QNO 1

(1)

Determine the maximum tension in the parabolic cable and the force in each of the hangers. The girder is subjected to the uniform load (UDL) and is pin connected at B.

Given



Solution :- Member BC

$$\sum F_x = 0$$

$$B_x = 0$$

Member AB

$$\sum F_x = 0$$

$$A_x = 0$$

⇒ Moment at A

$$\left( \sum M_A^+ = 0 \right)$$

$$F_H(2) - B_y(15) - 45(7.5) = 0 \quad \text{--- (1)}$$

FBD.

$$\left( \sum M_C^+ = 0 \right)$$

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

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

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

$$\Rightarrow \boxed{3.40}$$

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

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

$$= 3.40 \times 300 \sqrt{1 + \left(\frac{30}{24}\right)^2}$$

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

⇒ Each hanger carries 5 ft of  $w_0$   
 $T = (5 \text{ ft})(3.4 \text{ k/ft})$

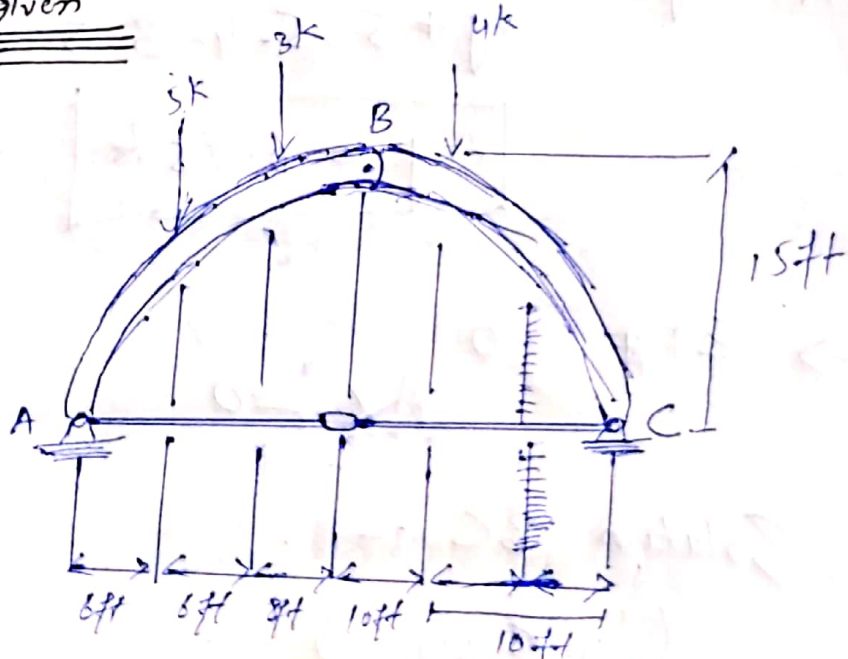
$$\boxed{T = 17 \text{ k}}$$

No 2

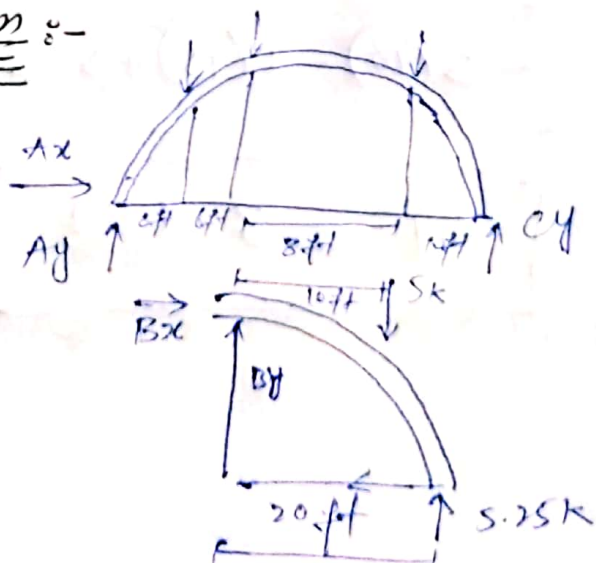
3

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

Given



Solution :-





Entire arch

4)

$$\sum M_A = 0$$

$$\Rightarrow -4(1) - 3(2) - 5(30) + C_y(40) = 0$$

$$C_y = 5.25 \text{ k}$$

$$\sum F_y = 0$$

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

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

$$\sum F_x = 0$$

$$A_x = 0$$

Solution BC :-

$$\sum M_B = 0$$

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

$$T = 3.672$$