

Assignment # 4

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Section A

Subject Structure Analysis 2

### Question ①

#### Solution

Member BC

$$\{ F_x = 0 \quad B_x = 0$$

$$\left\{ \begin{array}{l} R.W \\ L = 30 \\ h = 10 \end{array} \right.$$

Member AB  $\rightarrow +$

$$\sum F_x = 0 \quad A_x = 0$$

Moment at A

$$\sum M_A = 0 \quad F_{11}(10) - 18y(30) + (45)(7 \times 5) = 0 \rightarrow ①$$

FAD,

$$\sum M'_A = 0 - F_{11}(10) - B_y(30) + 45(7 \times 5) = 0 \rightarrow ②$$

$$F_{11} = 15.4$$

$$w_e = 2R(h)h = \frac{2(15.4)(10)}{30^2} = \frac{308}{900}$$

$$w_e = 3.4$$

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

$$= 3.4(30) \sqrt{1 + \left(\frac{30}{2 \cdot 10}\right)^2} = F_{max} = 15.4$$

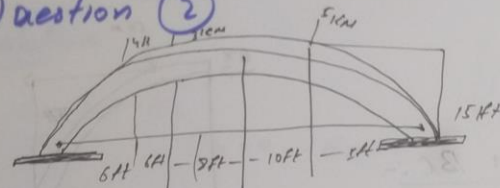
Each hanger carries

5ft of  $w_e$

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

$$T = 17k$$

Question 2



Solution

Entire Arch

$$\sum \text{Moments} = 0;$$

$$-4(8) - 3(12) - 5(30) + C_y(40) = 0$$

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

$$\sum F_y = 0$$

$$A_y + 5.5 - 4 - 3 - 5 = 0$$

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

$$\sum F_x = 0; A_x = 0$$

Section BC :-

$$\sum M_B = 0;$$

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

$$T = 3.67k$$

