

NAME:

FARAN-AI KHAN

ID:

7395

SUBJECT:

STRUCTURAL ANALYSIS
(CABLES & ARCHES)

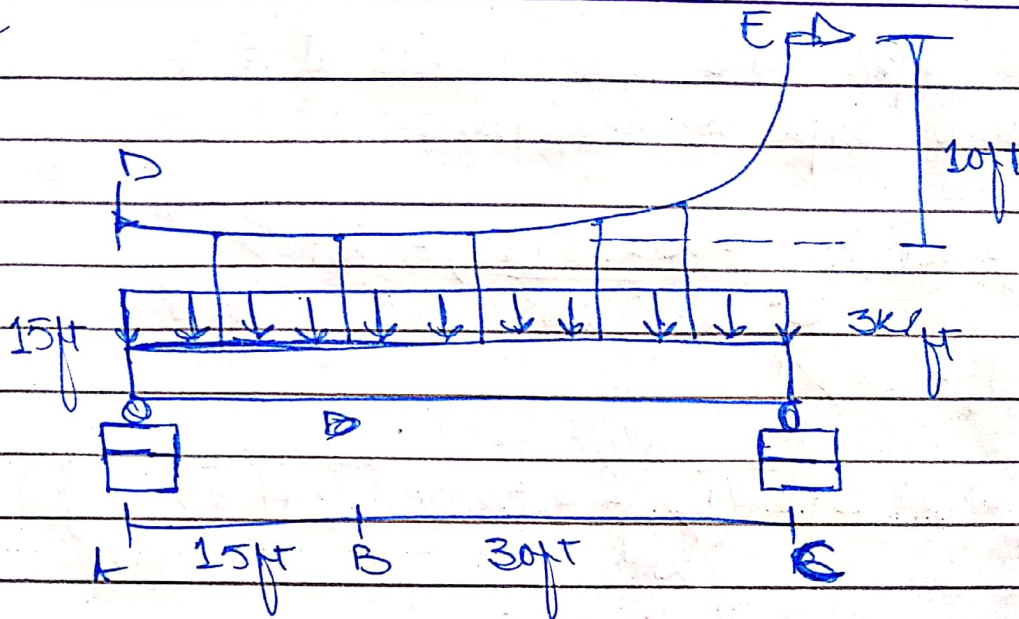
INSTRUCTOR:

SIR AMJAD-ISLAM

DATE:

13th - July - 2020.

Question No 1:



Member BC :-

$$\rightarrow \sum F_x = 0 ; B_x = 0$$

Member AB :-

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

→ FBD 1:

$$\sum M_A = 0$$

$$P_H (1) - B_y (15) - 45 (7.5) = 0$$

→ FBD 2:

$$\sum M_C = 0$$

$$-P_H (20) - B_y (30) + 45 (30) = 0$$

Now

$$B_y = 0 ; P_H = P_{min} = 135k$$

Now Max cable force occurs at E;
where slope is maximum.

$$W_0 = \frac{2F_1 h}{L^2} = \frac{2(135)(10)}{30^2} = \frac{2700}{900}$$

$$W_0 = 3 \text{ k/ft}$$

$$F_{\text{max}} = \frac{W_0 L}{2} \sqrt{1 + \left(\frac{L}{2h}\right)^2} = \frac{3 \times 30}{2} \sqrt{1 + \left(\frac{30}{2(10)}\right)^2}$$

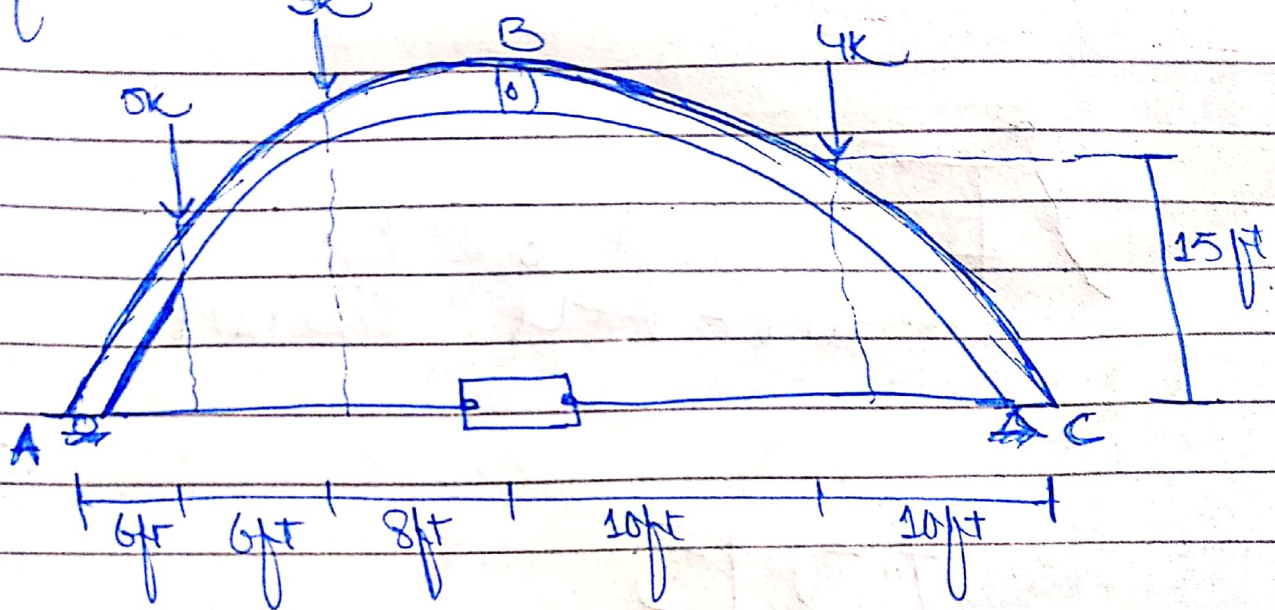
$$F_{\text{max}} = 162.24 \text{ k}$$

Each hanger carries 7.5 ft of W_0

$$T = (3 \text{ k/ft})(7.5 \text{ ft})$$

$$T = 22.5 \text{ k}$$

Question No (2)



$$\sum M_A = 0$$

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

$$C_y = \frac{30 + 36 + 120}{40} = \frac{186}{40} = 4.65 \text{ k}$$

$$\sum F_y = 0$$

$$A_y - 4.65 - 5 - 3 - 4 = 0$$

$$A_y = 12 - 4.65 = 7.35 \text{ k}$$

Section BC: →

$$\sum M_B = 0$$

$$-4(10) - T(15) + 4.65(20) = 0$$

$$T = \frac{53}{15} = 3.534 \text{ k}$$