

ASSIGNMENT :- 04

CABLE AND ARCHES

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AD :- 7965

SECTION :- "B"

SUBJECT :- STRUCTURAL ANALYSIS

SUBMITTED TO :- SIR AMTAD ISLAM

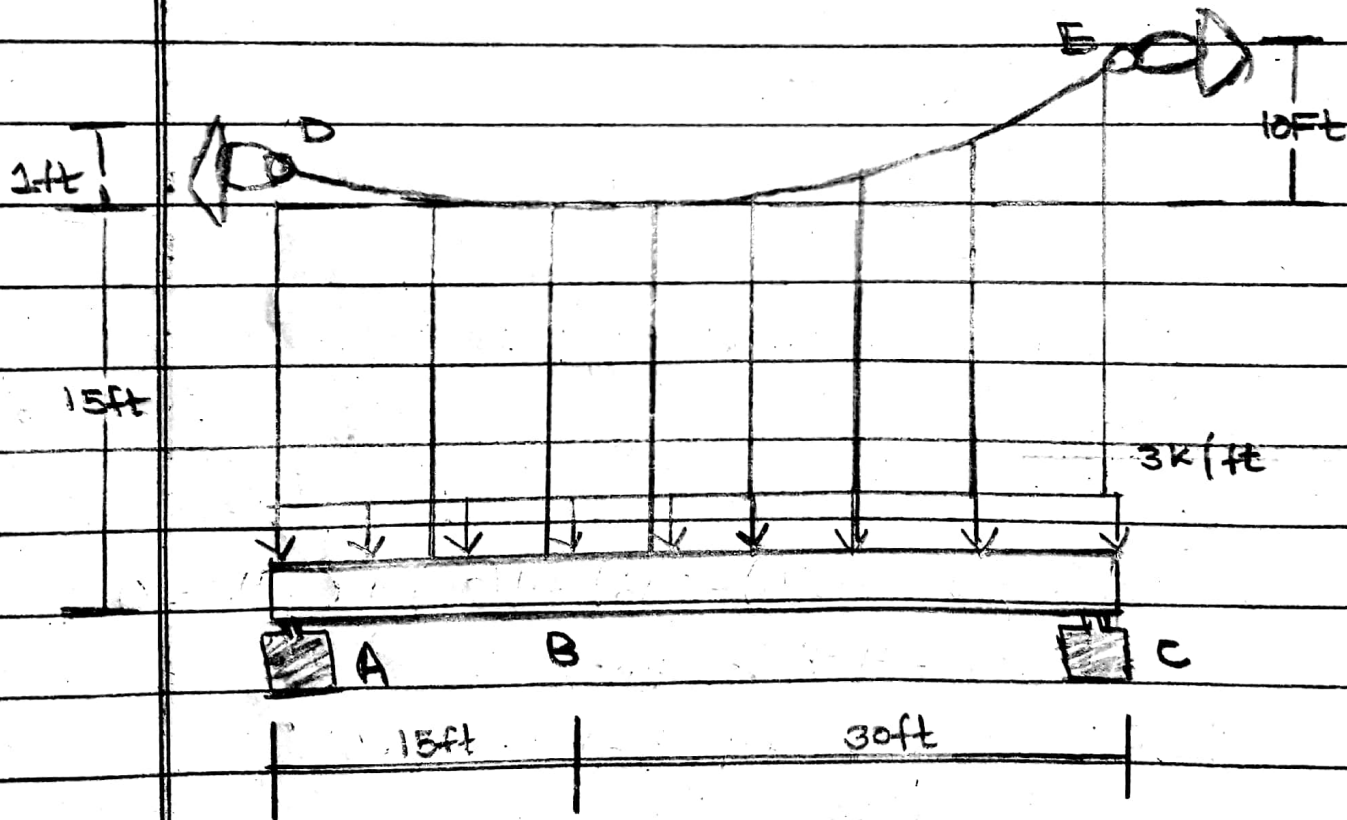
DEPARTMENT :- BE (CIVIL)

DATE :- 13-JULY 2020

①

QUESTION No :- 1

Determine the Maximum and Minimum Tension in the parabolic cable & the forces in each of the hangers ... and is pin connected at B.



②

Member BC :-

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

Member AB :-

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

FBD I :

$$\hookrightarrow + \sum M_A = 0; F_H(1) - B_y(15) - 20(5) = 0$$

FBD II :

$$-F_H(10) - B_y(30) + 90(15) = 0$$

Solving :-

$$B_y = 0$$

$$F_H = F_{min} = 135 \text{ k Ans}$$

Max Cable force occurs at E
where slope is the maximum

As

$$w_0 = \frac{2F_H h}{L^2}$$

③

$$w_0 = \frac{2(135)(10)}{(30)^2}$$

$$w_0 = 3 \text{ k/ft}$$

$$\text{And } f_{\max} = w_0 L \sqrt{1 + \left(\frac{L}{2h}\right)^2}$$

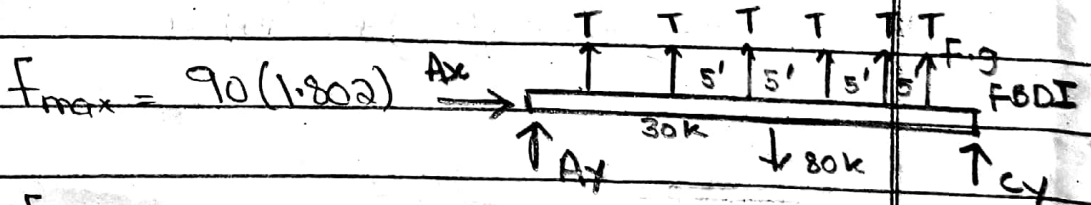
$$f_{\max} = 3 \times 30 \sqrt{1 + \left(\frac{30}{2 \times 10}\right)^2}$$

$$f_{\max} = 90 \sqrt{1 + \frac{900}{400}}$$

$$f_{\max} = 90 \sqrt{\frac{400 + 900}{400}}$$

$$f_{\max} = 90 \sqrt{\frac{1300}{400}}$$

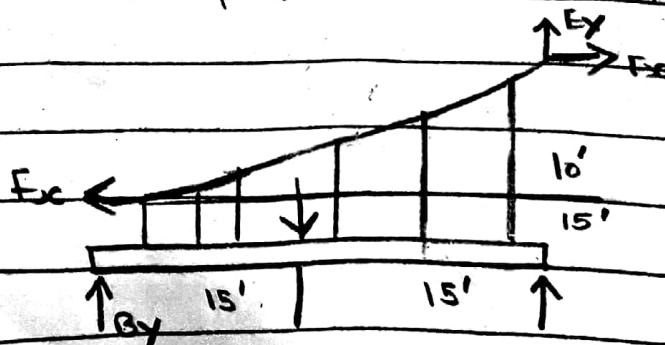
$$f_{\max} = 90 \sqrt{3.25}$$



$$f_{\max} = 162 \text{ k Ans}$$

Each Hanger Carries 5 ft of

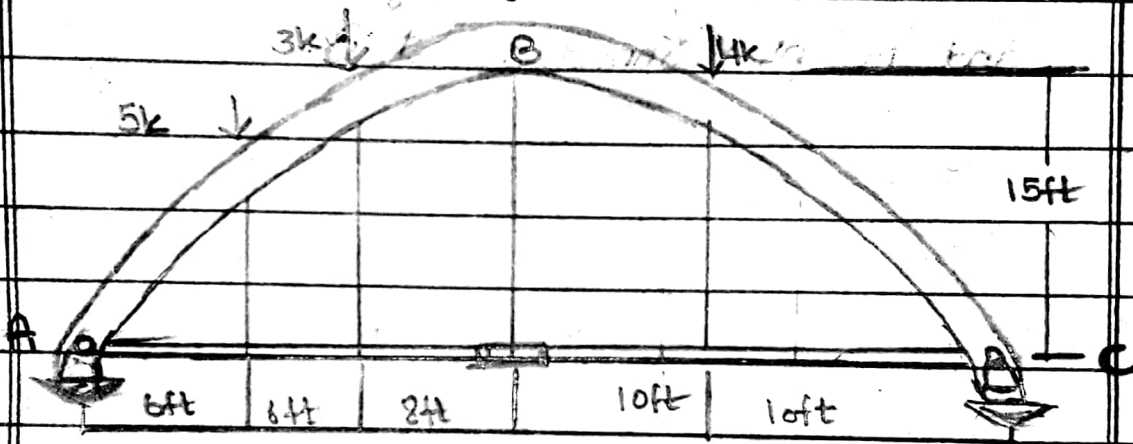
$$T = (3 \text{ k/ft})(5 \text{ ft}) = 15 \text{ k Ans}$$



(4)

QUESTION NO :- 2

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



Entire Arch :-

$$\hookrightarrow +\sum M_A = 0 ; -5(6) - 3(12) - 4(30) + C_y(40) = 0$$

$$C_y = 4.65 \text{ k Ans}$$

$$\uparrow \sum F_y = 0 ; A_y + 4.65 - 5 - 3 - 4 = 0$$

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

$$A_y = 7.35 \text{ k Ans}$$

$$\rightarrow \sum F_x = 0 ; A_x = 0 \text{ Ans}$$

SECTION BC :-

$$\hookrightarrow +\sum M_B = 0 ; -4(10) - T(15) + 4.65(20) = 0$$

$$T = 3.53 \text{ k Ans}$$

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FOR SECTION :- B

