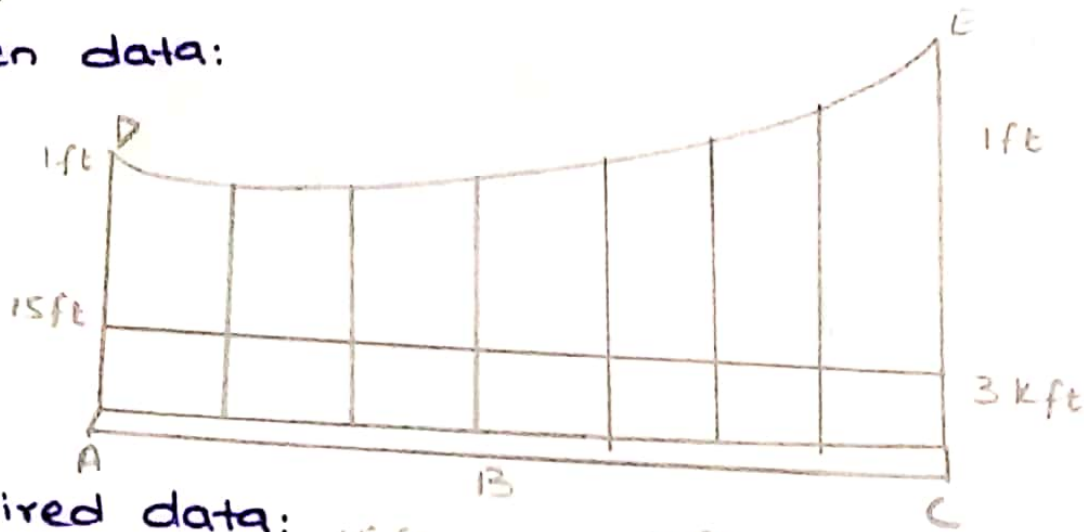


Hassan	Zaib Khattak
ID	7958
Section	B
Deptt	BE(L)
Semester	4
Assignment	Cable and arch
Subject	Structure Analysis
Submission	

Question NO. 1

Determine the maximum and minimum tension in cable is pin connected at B.

Given data:



Required data:

15 ft 30 ft

Determine the minimum & maximum tension.

Solution:

Member BC

$$+\rightarrow \sum F_x = 0$$

$$B_x = 0$$

Member AB

$$+\rightarrow \sum F_x = 0$$

$$A_x = 0$$

FBD 1:

$$\hookrightarrow \sum M_A = 0$$

$$F_H(1) - B_y(10) - 30(5) = 0$$

FBD 2:

$$\hookrightarrow \sum M_C = 0$$

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

$$B_y = 0$$

So

$$F_H - F_{min} = 135k$$

Max cable force occurs at C where slope is maximum.

So

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

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

$$= 3k/ft$$

Now

$$F_{max} = w_0 L \sqrt{1 + \left(\frac{4h}{2L}\right)^2}$$

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

$$\Rightarrow \boxed{F_{max} = 162.24k}$$

Each hangers carries 5ft of w_0

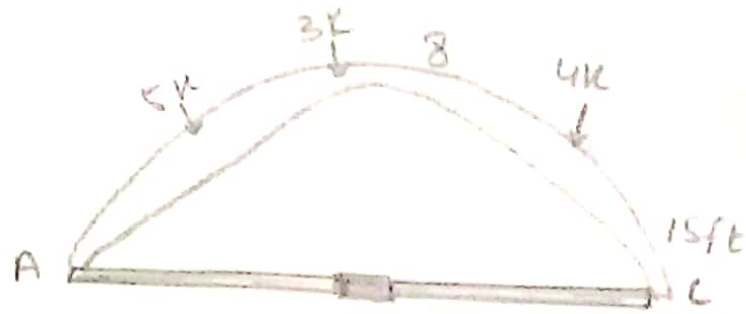
$$\boxed{T = (3k/ft)(5) = 15k}$$

Question NO. 2

The tied three-hinged arch is ----- ϵ_f the tension in the steel.

Given data:

(3)



Required data:

We have to find the reactions and tension in the rod.

Solution:

$$\sum M_A = 0 \quad \curvearrowright$$

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

$$\Rightarrow C_y = 4.65k$$

Now

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

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

$$\Rightarrow A_y = 7.35k$$

$$A_x = 0$$

Sect BC

$$\sum M_B = 0$$

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

$$\Rightarrow T = 3.5333k$$

