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SECTION B

DEPARTMENT BE(C)

SUBJECT STRUCTURAL ANALYSIS

SEMESTER 4th

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ASSIGNMENT

QUESTION No ·01

Determine the minimum ———
· —— —— pin oriented at B

SOLUTION :-

Member BC

$\xrightarrow{+} \Sigma F_x = 0$

$B_x = 0$

Member AB

$\xrightarrow{+} \Sigma F_x = 0$

$A_x = 0$

FBD 1 :-

$\circlearrowleft + \Sigma M_A = 0$

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

FBD 2 :-

$\circlearrowleft + \Sigma M_C = 0$

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

$B_y = 0$

So $F_H = F_{min} = 135\,K$

Max Cable force occur at E where slope is the maximum.

So

$$w_o = \frac{2 F_H h}{l^2}$$

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

$$= 3\,K/ft$$

Now

$$F_{max} = w_o L \sqrt{1+(L/2h)^2}$$

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

$$\boxed{F_{max} = 162.24\,K}$$

Each hanger carries 5 ft of w_o

$$T = (3\,K/ft)(5)$$

$$\boxed{T = 15\,K}$$

QUESTION No 2

The tied three hinged arch ---

--- the tension in the rod?

SOLUTION :-

MOMENT :-

$\Sigma M_A = ?$

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

$$\boxed{C_y = 4.65 \text{ K}}$$

FORCES :-

$$\Sigma F_y = 0$$

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

$$\boxed{A_y = 7.35 \text{K}}$$

$$A_x = 0$$

SECTION Bc :

$$\Sigma M_B = 0$$

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

$$\boxed{T = 3.533 \text{ K}}$$