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Section # B

Deptt # BE Civil Engg.

Subject # Structural Analysis(I)

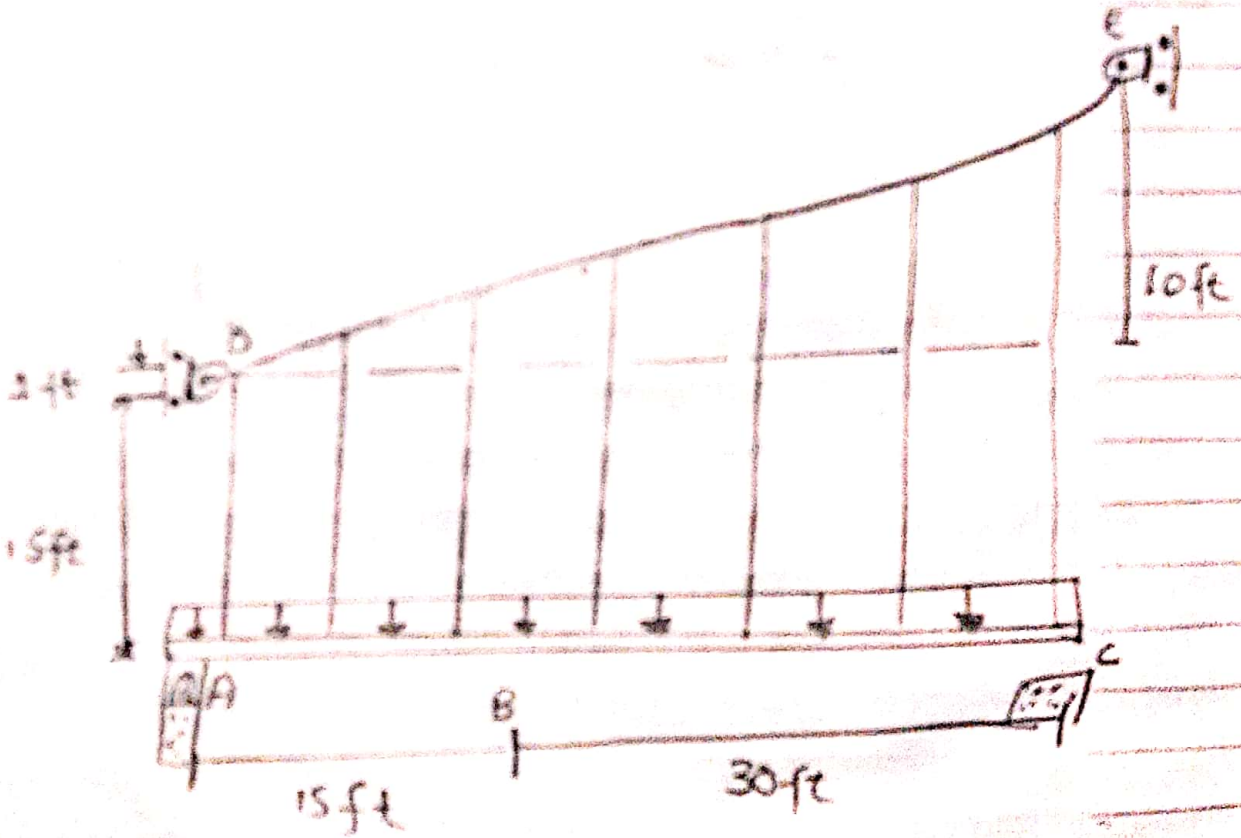
Assignment # 04

Assigment: no#4

Cables And Arches:

Question no.1:

Determine the maximum and minimum tension in the parabolic cable and the forces in each of the hangers... and is pin connected at B.



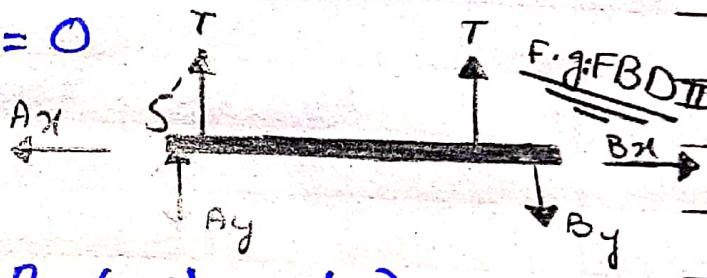
Member BC:

$$\pm \sum F_x = 0, \quad B_x = 0$$

Member: AB:

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

FBDI:

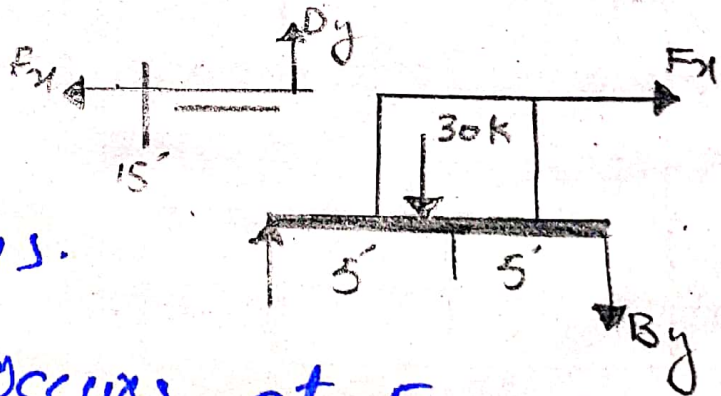


$$\curvearrowleft + \sum M_A = 0; \quad F_H(1) - B_y(15) - 20(5) = 0$$

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

Solving:

$$B_y = 0$$



$F_H = F_{min} = 35\,K$ Ans.

Max cable force occurs at E where slope is the maximum.

- As

$$w_o = \frac{2FHh}{L^2}$$

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

$$w_o = 3\,K/ft$$

- As.

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

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

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

$$// = 90\sqrt{\frac{400+900}{400}}$$

$$// = 90\sqrt{\frac{1300}{400}}$$

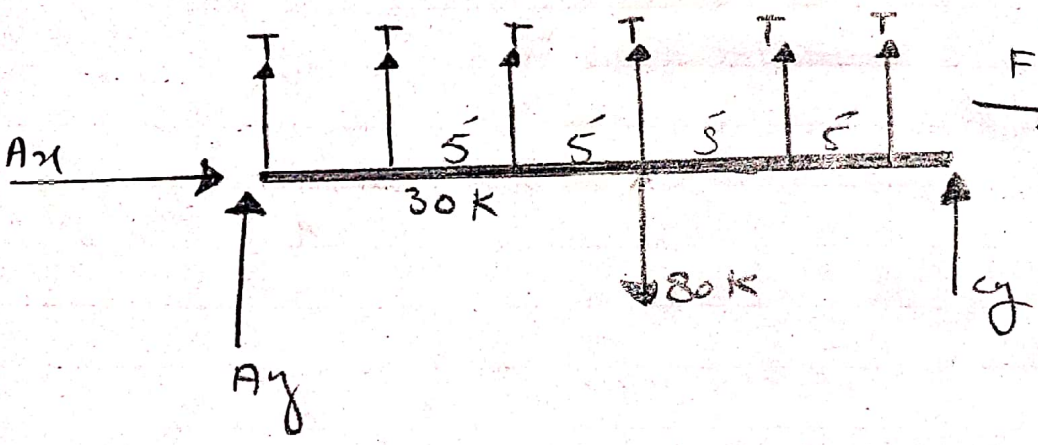
$$// = 90\sqrt{3.25}$$

$$// = 90\,(1.802).$$

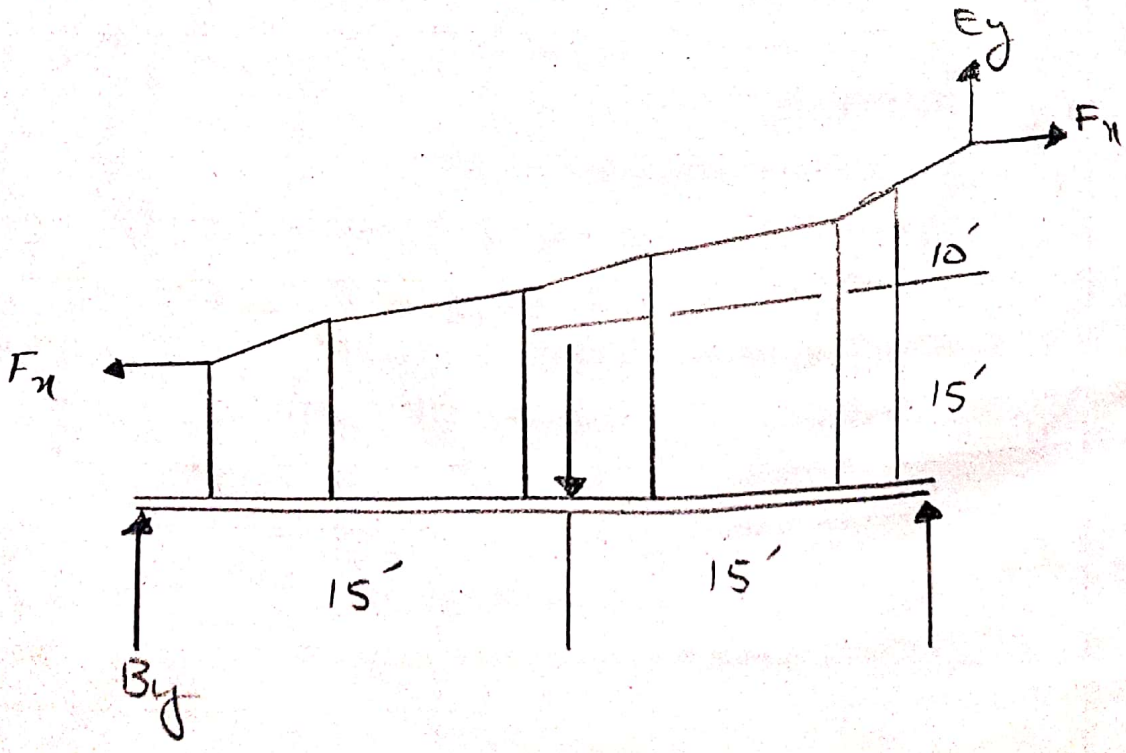
$\Rightarrow F_{max} = 162\ K$ Ans

Each hanger caries 5ft of

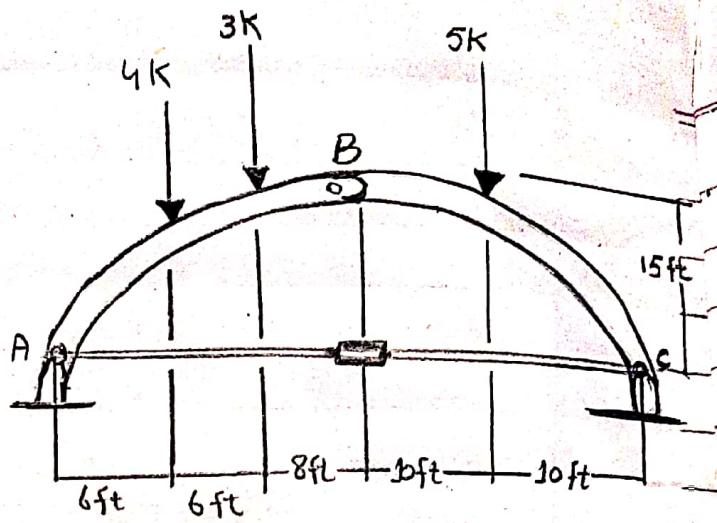
$T = (3K/ft)(5ft) = 15\ K$ Ans.



F.g: FBDI



Q#02



Entire arch:

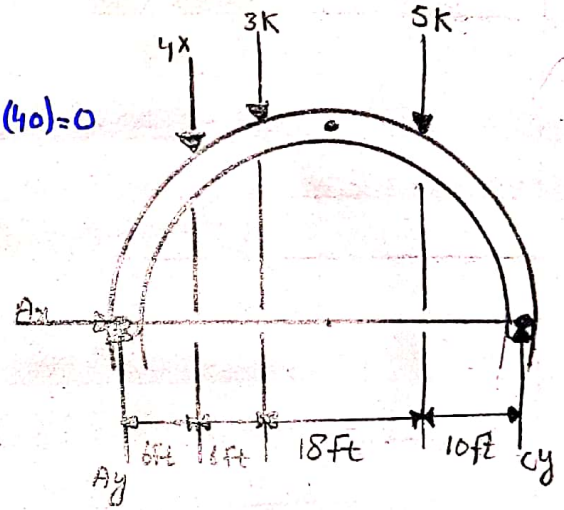
$\circlearrowleft + \Sigma M_A = 0;\quad -4(6)-3(12)-5(30)+C_y(40)=0$

$C_y = 5.25\,K$

$+\uparrow \Sigma F_y = 0;\quad A_y + 5.25 - 4 - 3 - 5 = 0$

$A_y = 6.75\,K$

$\pm \Sigma F_x = 0;\quad A_x = 0$



Section BC:

$\circlearrowleft \Sigma M_B = 0;\quad -5(10) - T(15) + 5.25(20) = 0$

$T = 3.67\,K$