

Assignment #4

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Sec:- B

Subject:- Structural Analysis I

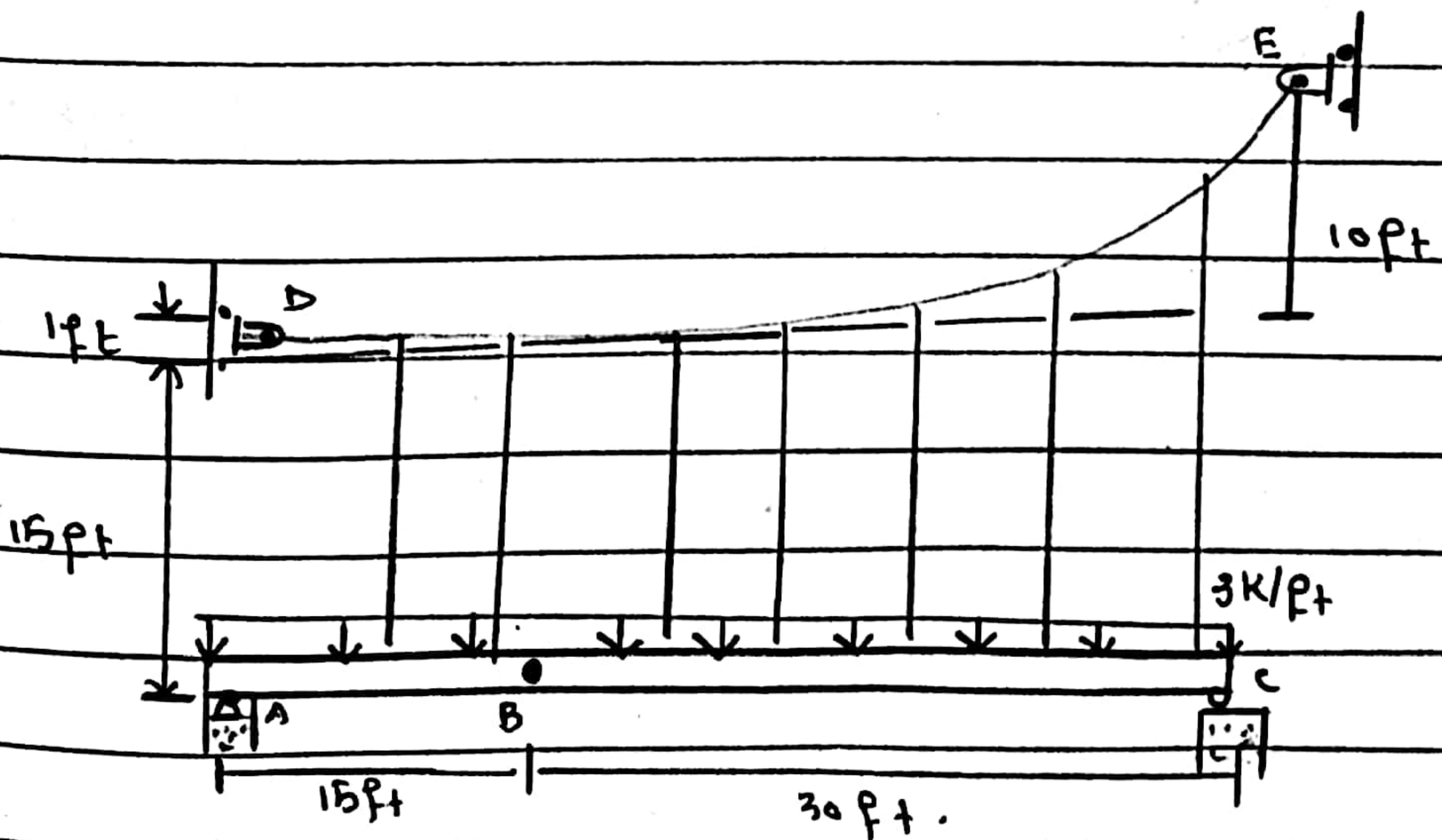
Submitted to # Sir Amjad Islam

Assignment: no #4

: Cables And Arches :

Que: 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.



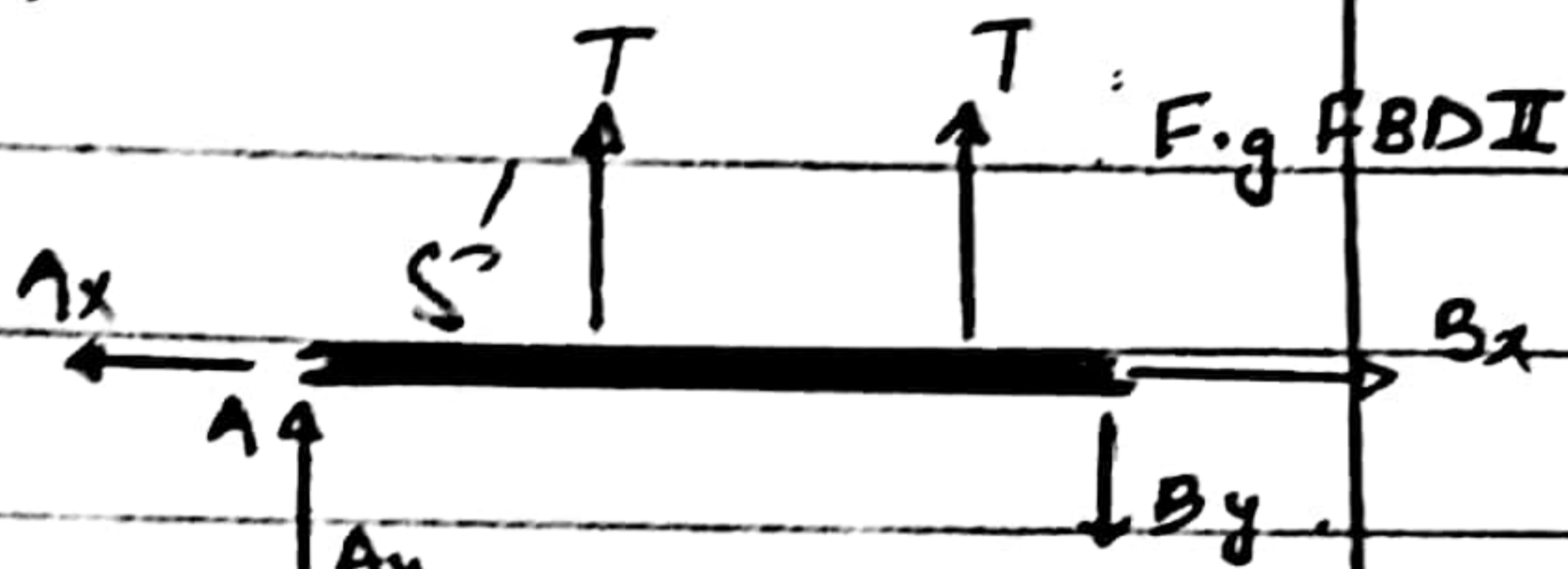
Member BC:

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

Member AB:

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

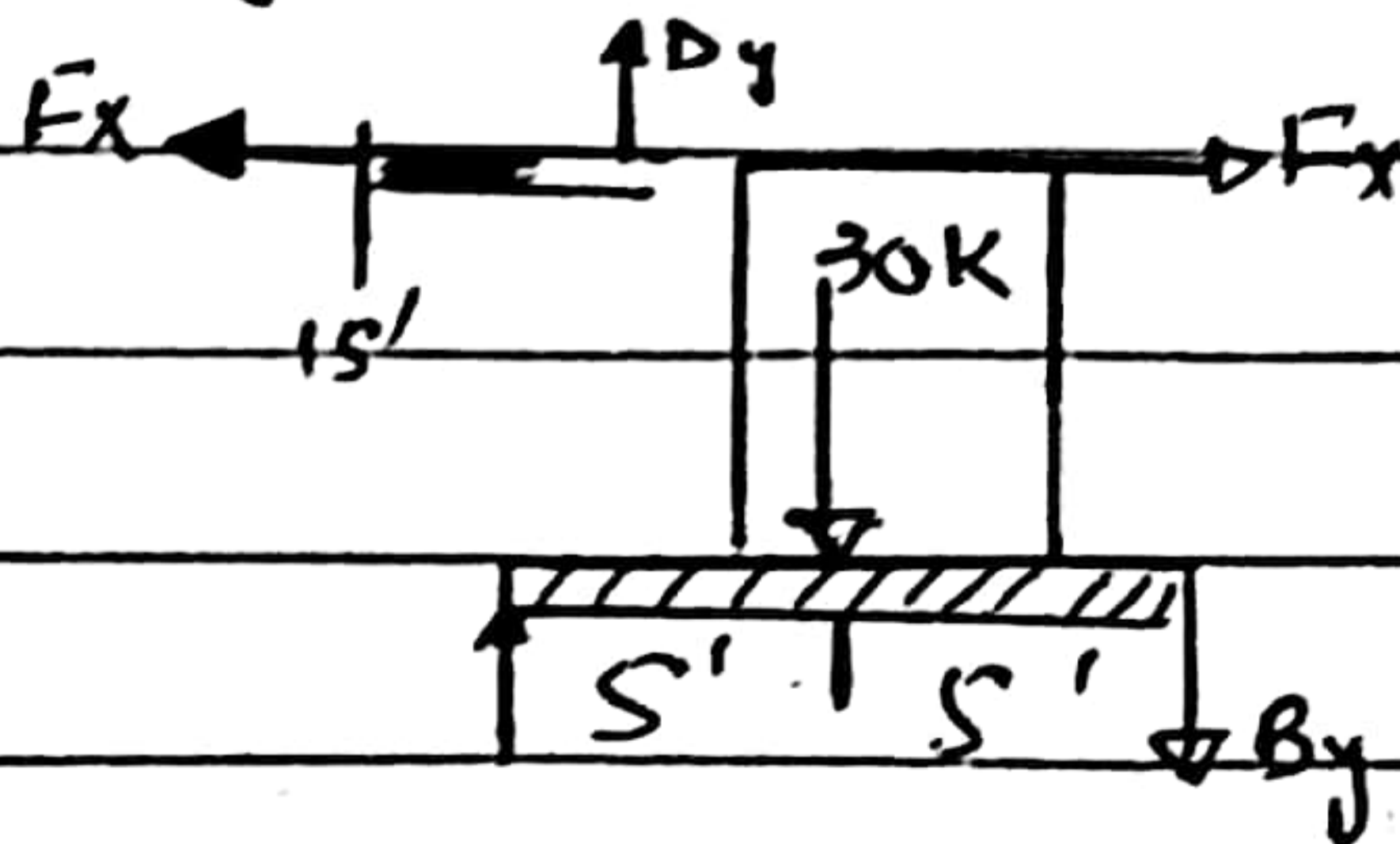
FBD I:



$$\curvearrowright \sum M_A = 0; \quad F_H(12) - B_y(15) - 20(5) = 0.$$

FBD II:

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



Solving :-

$$B_y = 0$$

$$F_H = F_{min} = 135K \quad \text{Ans.}$$

Max Cable force occurs at E

where slope is the maximum

-As.

$$W_0 = \frac{2F_h h}{L^2}$$

$$W_0 = \frac{2(135)(10)}{30^2}$$

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

-As.

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

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

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

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

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

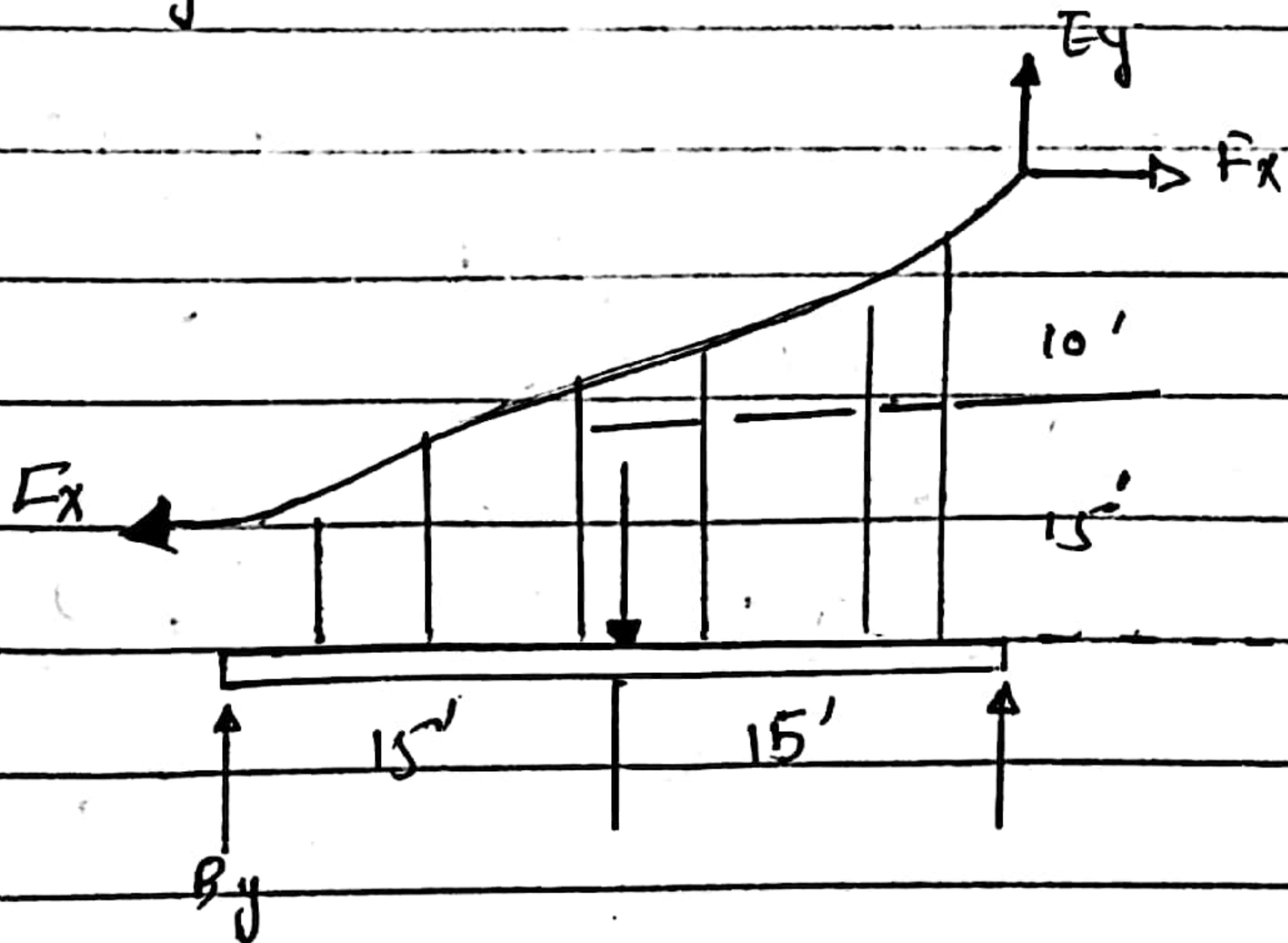
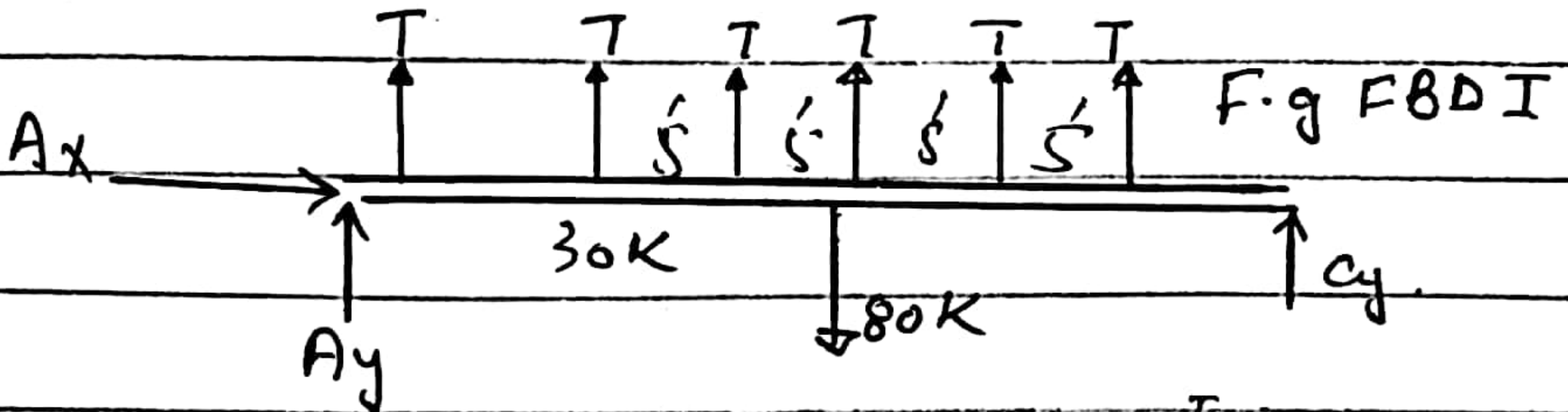
$$= 90 \sqrt{3.25}$$

$$= 90 (1.802)$$

$F_{max} = 162 \text{ K}$ Ans.

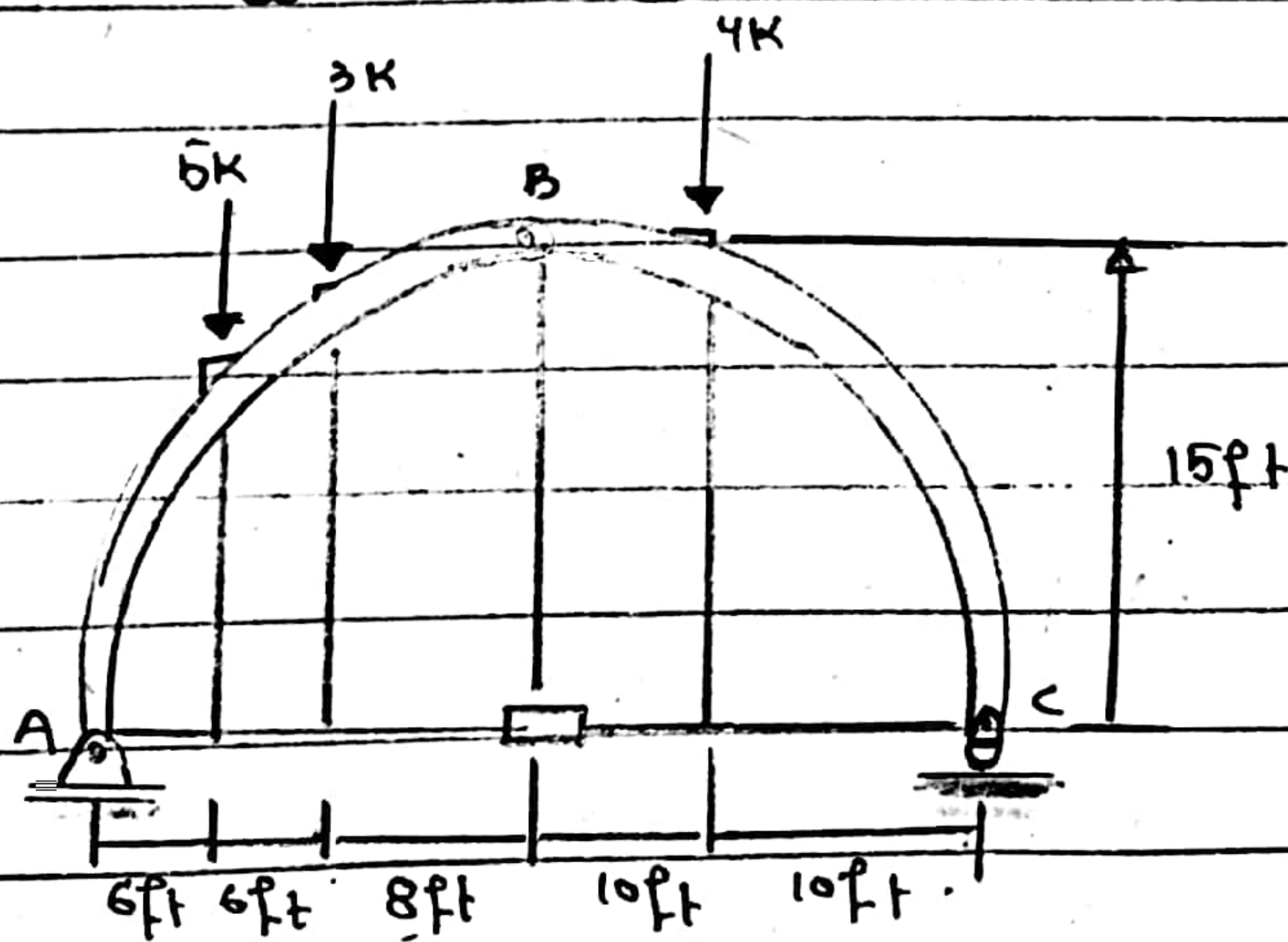
Each Flange Carries 5 ft of

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



Que: 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:

$$\rightarrow + \sum M_A = 0, \quad - 5(6) - 3(12) - 4(20) + C_y(40) = 0$$

$$C_y = 4.65K \text{ Ans.}$$

$$+\uparrow \sum F_y = 0; \quad A_y + 4 \cdot 65 - 5 - 3 - 4 = 0$$

$$A_y = 5 + 3 + 4 - 4 \cdot 65$$

$$A_y = 7.35 \text{ K} \quad \text{Ans}$$

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

Section BC:

$$\curvearrowright + \sum M_B = 0; \quad -4(10) - T(15) + 4 \cdot 65(20) = 0$$

$$T = 3.53 \text{ K} \quad \text{Ans.}$$

