

Date: _____

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ASSIGNMENT:

STRUCTURAL ANALYSIS
CABLE AND ARCHES
NO : 4

NAME:

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7968

SECTION: B

SUBMITTED TO:

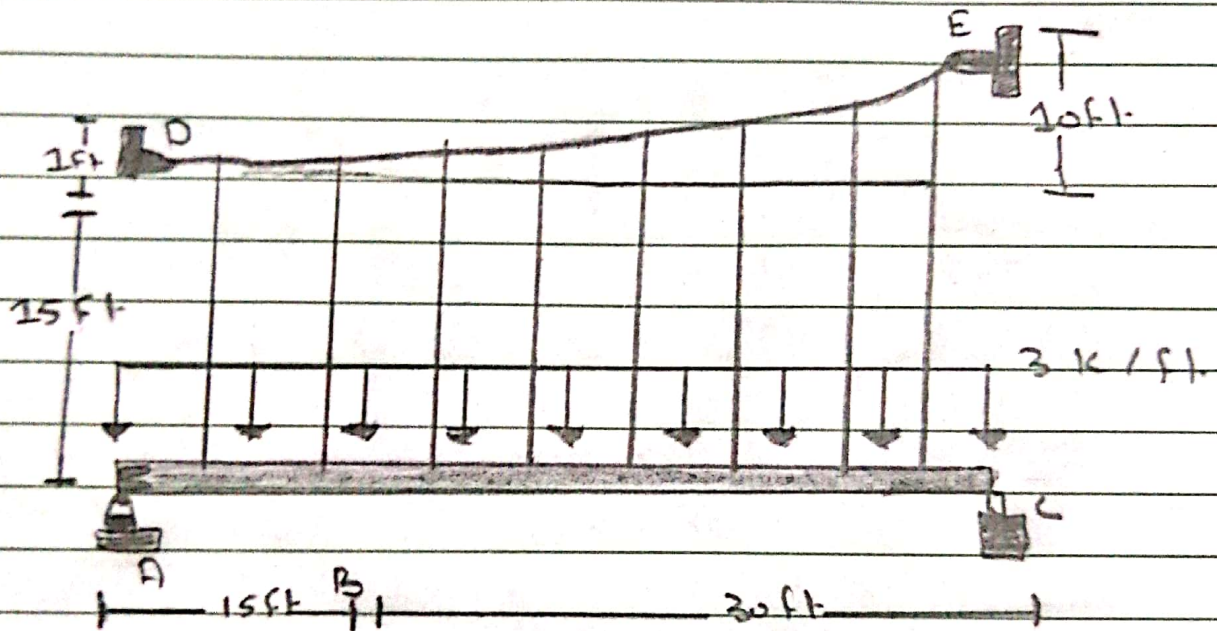
SIR
AMJAD
ISLAM.

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Ans of Qno 1:

DIAGRAM:



MEMBER BC :

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

MEMBER AB:

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

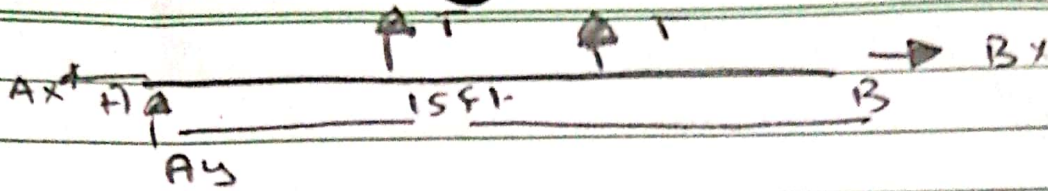
FBD 1 : (MEMBER AB) :

$$\sum M_A = 0$$

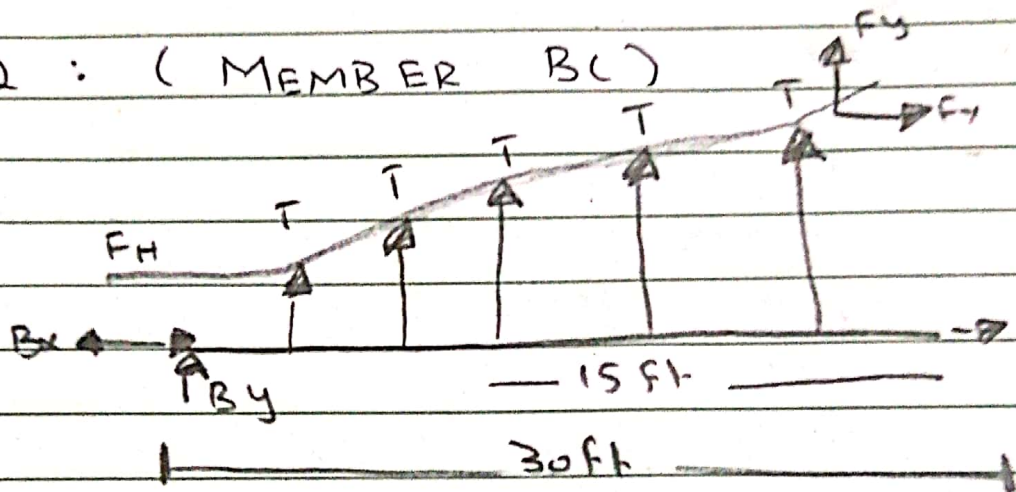
$$F_H \times 1 - B_y \times 15 - 45 \times (7.5) = 0$$

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FBD 2 : (MEMBER BC)



$$\downarrow + M_C = 0$$

$$-B_y \times 30 - F_H \times 10 + 90 \times 15 = 0$$

$$1350 - 10F_H - 30B_y = 0 \rightarrow (2)$$

Now by multiplying it with
(2) and then subtracting from
(1)

$$1350 - 10F_H - 30B_y = 0$$

$$-6750 + 2F_H + 30B_y = 0$$

$$2025 - 12F_H = 0$$

$$F_H = 168.75 \text{ K}$$

$$F_H = F_{\text{min}} = 168.75 \text{ K}$$

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Because w_D determine the force at θ slope is max.

Now

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

$$= \frac{2 \times 168.75 \times 10}{(30)^2}$$

$$w_D = 3.75 \text{ k/ft}$$

As we know that

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

$$F_{\max} = 3.75 \times 30 \times \sqrt{1 + \left(\frac{3}{2 \times 10}\right)^2}$$

$$F_{\max} = 202.81 \text{ N}$$

Load on each hanger in member BC.

Each hanger carries 5 ft. of w_D

$$T = 3.75 \times 5 = 18.75 \text{ k.}$$

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$$\bar{T} = 18.75 \text{ K.}$$

w_0 load member AB

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

$$w_0 = \frac{2 \times 168.75 \times 1}{(5)^2}$$

$$w_0 = 1.05 \text{ K/ft}$$

HP & in member AB each
hinges carries 7.5 ft of w_0 .

$$\bar{T} = 7.5 \times 7.5$$

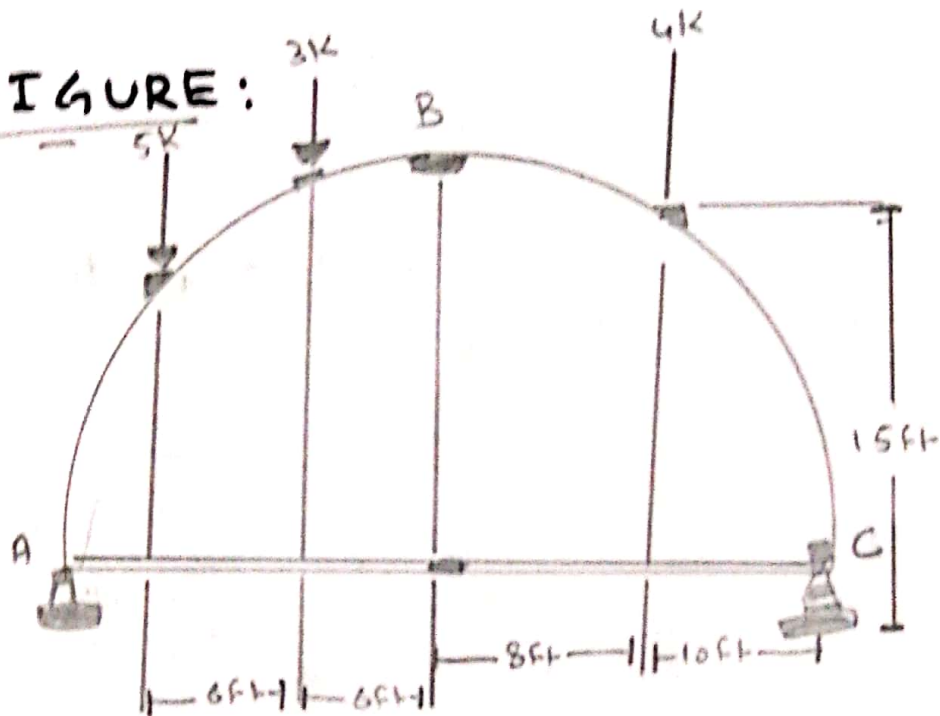
$$\bar{T} = 11.25 \text{ K.}$$



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Ans of Qno 2:

FIGURE:



SOLUTION:

Entire Arch

$$\sum F_x = 0$$

$$C_y \times 40 - 4 \times 30 - 3 \times 12 - 5 \times 60 = 0$$

$$40C_y = 186$$

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

$$\sum M_C = 0$$

$$-A_y \times 40 + 5 \times 3 + 3 \times 28 + 4 \times 10 = 0$$

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

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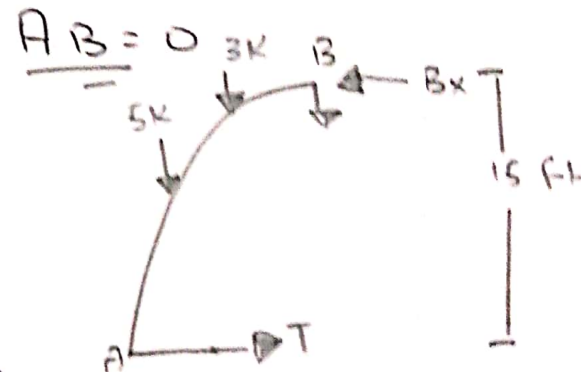
$$A_y = 7.35 \text{ K}$$

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

$$7.35 + 4.65 = 5 + 3 + 4$$

$$12 = 15$$

MEMBER AB = 0



$$\curvearrow + \sum M_B = 0$$

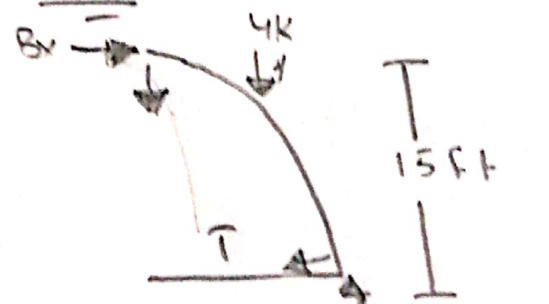
$$-7.35 \times 20 + T \times 15 + 5 \times 14 + 3 \times 8 = 0$$

$$15 T = 53$$

$$T = 3.53 \text{ K}$$

MEMBER CB :

$$\curvearrow + \sum M_B = 0$$



$$-T \times 15 + 4.65 \times 20 - 4 \times 10 = 0$$

$$15 T = 53$$

$$T = 3.53 \text{ K}$$

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RESULT:

