

NAME

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ID

7741

SECTION

C

SUBJECT

STRUCTURE ANALYSIS - I

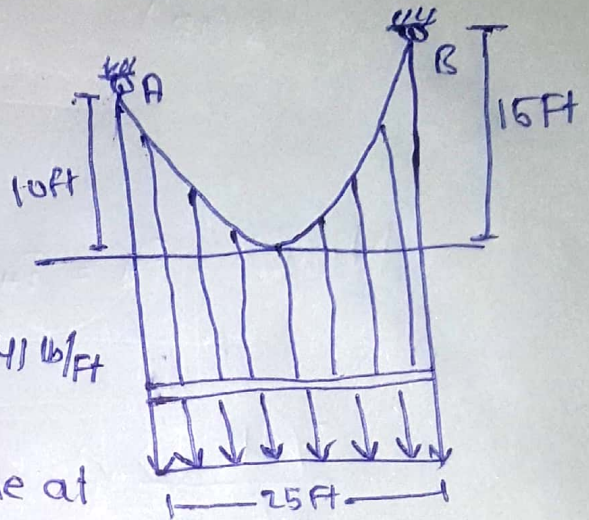
SUBMITTED TO

ENGR M. SAQIB SAIB

Question No # 02 ANSWER

(1)

$10 = 7741$



→ cable support uniform load = 741 lb/ft

→ Determine the tension in cable at

Support A = ?

Support B = ?

Solution :-

$$y = \frac{w_0}{2FH} x^2$$

By putting values

$$15 = \frac{741}{2FH} x^2 \rightarrow (1)$$

$$10 = \frac{741}{2FH} (25-x)^2 \rightarrow (2)$$

By solving both equations

$$F_H = \frac{741}{2(15)} x^2,$$

$$F_H = \frac{741}{2(10)} (25-x)^2$$

Now $F_H = F_H$

$$\frac{741}{2(15)} x^2 = \frac{741}{2(10)} (25-x)^2$$

$$24.7 x^2 = 37.05 (625 - 50x + x^2)$$

$$x^2 = \frac{37.05}{24.7} (625 - 50x + x^2)$$

$$x^2 = 1.5 (625 - 50x + x^2)$$

$$0.5x^2 - 75x + 937.50 = 0 \rightarrow (1)$$

Now choose root < 25 ft

By solving eq (1)

$$x = 13.76 \text{ ft}$$

Now $25 - 13.76 = \boxed{11.25 \text{ ft}}$

(3)

As

(3)

$$F_H = \frac{741}{2(15)} v^2 = \frac{741}{30} (13.76)^2$$

$$F_H = 4676.451 \text{ lb} \rightarrow \textcircled{A}$$

$$F_H = \frac{741}{2(10)} (15-v)^2 = \frac{741}{20} (11.25)^2$$

$$F_H = 4689.14 \text{ lb} \rightarrow \textcircled{B}$$

Support B

$$y = \frac{W_c}{2F_H} v^2 = \frac{741}{2(4689)} \frac{741}{2(4676)} v^2$$

$$\frac{dy}{dv} = \tan \phi_B = 0.079(v^2)$$

$$= 0.079(13.76)$$

$$= 1.089$$

we have

$$\tan \phi_B = 1.089$$

$$\phi_B = \tan^{-1}(1.089)$$

P.T.O \rightarrow

We have

(4)

$$\tan \theta_B = 1.089$$

$$\tan \theta_B = 1.089$$

$$\theta_B = \tan^{-1}(1.089)$$

$$\theta_B = 47.439^\circ$$

Tension at B

$$T_B = \frac{F_H}{\cos \theta_B} = \frac{4676.45}{\cos(47.439)} = 6953.24 \text{ lb}$$

$$T_B = 6.95 \text{ Kips}$$

Support A

$$y = \frac{W_0 x^2}{2F_H} = \frac{741}{2(4776)} = (11.25)^2$$

$$y = 10.027$$

$$\frac{dy}{dx} = \tan \theta_A = 10.027$$

$$\theta_A = \tan^{-1}(10.027)$$

$$\theta_A = 84.304^\circ$$

Now

$$T_A = \frac{F_H}{\cos \theta_A} = \frac{4776.45}{\cos(84.304)} = 47435.63 \text{ lb}$$

X-----X-----X-----X

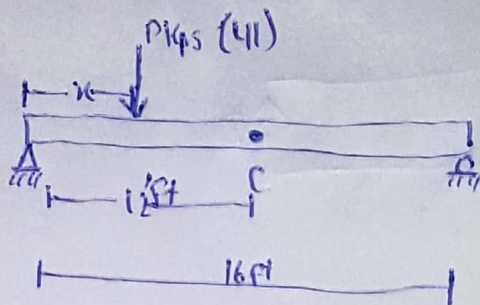
Question No # 03 Answer

5

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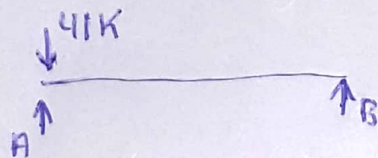
Solution:

Diagram



For $x = 0$

$R_A = ?$



$$\sum M_B = 0$$

$$(41 \times 16) - R_A (16) = 0$$

$$224 - R_A 16 = 0$$

$$~~R_A 16 = 224~~$$

$$224 = R_A 16$$

$$\frac{224}{16} = R_A$$

$$R_A = 14$$

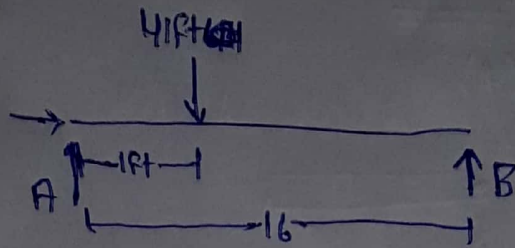
P.T.O \rightarrow

(6)

Fov

$$x = 11 \text{ ft}$$

$$R_A = ?$$



$$\sum M_B = 0$$

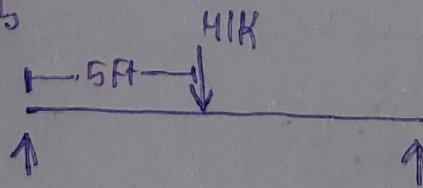
$$(41 \times 15) - R_A(16) = 0$$

$$615 - R_A 16 = 0$$

$$R_A = \frac{615}{16}$$

$$R_A = 38.4375 \text{ k}$$

Fov $x = 5$

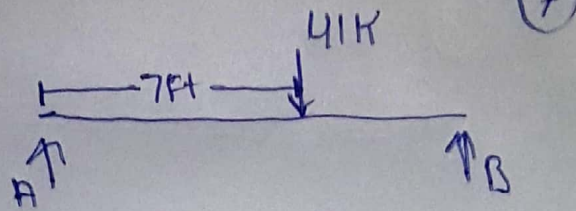


$$\sum M_B = 0$$

$$(41 \times 5) - R_A(16) = 0$$

$$R_A = \frac{205}{16}$$

$$R_A = 12.8125 \text{ k}$$

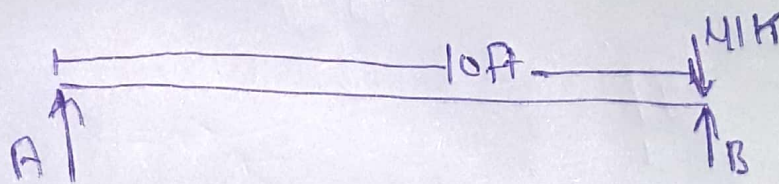


$$\sum M_B = 0$$

$$(41 \times 7) - R_A(16) = 0$$

$$R_A = \frac{287}{16}$$

$$R_A = 17.9375$$



$$-R_A(16) + 41(0) = 0$$

$$-R_A(16) + 0 = 0$$

$$R_A = 0$$

