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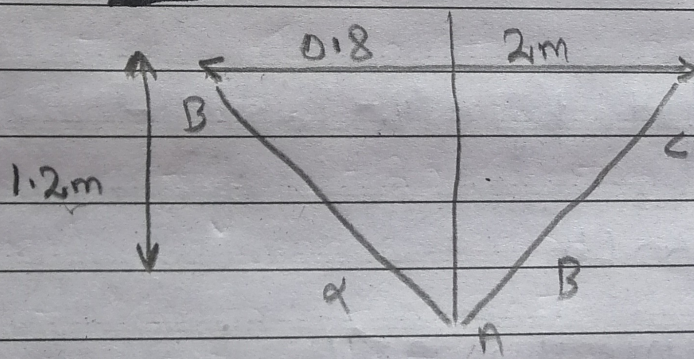
SECTION : (A)

DEPARTMENT: BE (C)

PAPER : ENGINEERING.  
(MECHANICS)

Reg No : 091-19-116075

QUESTION NO (1)

Solution:

$$\alpha = \tan^{-1}\left(\frac{1.2}{0.8}\right)$$

$$= \cancel{56.3} \quad 56.3$$

$$B = \tan^{-1}\left(\frac{1.2}{2}\right)$$

$$B = 31.8$$

$$\text{Total mass} = 400 + 663.9 = 713.9 \text{ kg}$$

$$\text{or } 3181.45 \text{ kg}$$

(2)

the total weight is being held by cable AB is 85.8%.

Part (a)

Tension in AB

$$\begin{aligned} \vec{T}_{AB} &= T_{AB} \Delta_{AB} = 0.858 (3181.45) (9.81) \\ &\quad \{ -\cos 56.32 + \sin 56.32 \} \\ &= 14857 \hat{i} + 22278 \hat{j} \text{ N} \end{aligned}$$

Tension in AC

$$\begin{aligned} \vec{T}_{AC} &= T_{AC} \Delta_{AC} = 0.553 (3181.45) (9.81) \\ &\quad \{ \cos 31 + \sin 31 \} \\ &= 14857 \hat{i} + 8921 \hat{j} \text{ N} \end{aligned}$$

Part (b)

Increase weight by 15%.

$$400 + 60 = 460 \text{ lb}$$

increasing volume by 35%

$$3006 + 1050 = 4056 \text{ i or } 8928.716$$

$$\begin{aligned} \text{Total weight} &= 8928.7 + 460 \Rightarrow 9388.716 \\ &\text{or } 4258.171 \text{ Kg} \end{aligned}$$

Now Find Tension in AB

(3)

M T W T F S

H/W C/W

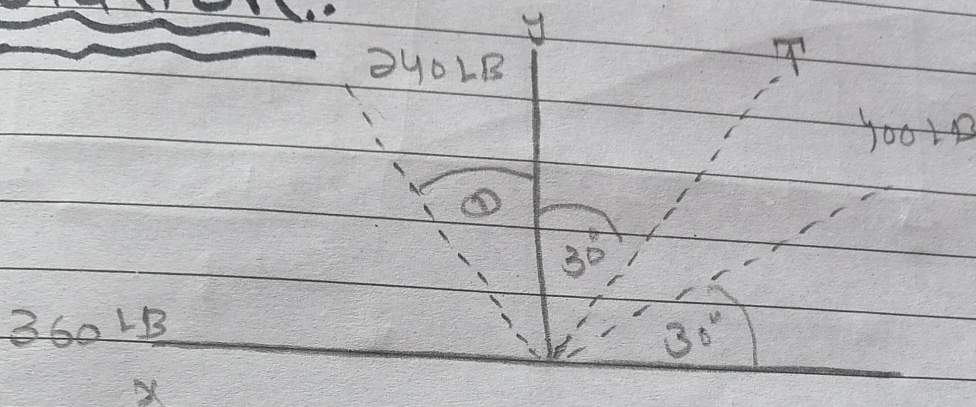
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$$T_{AB} = T_{AB} \sin \alpha_C = 0.8555 (4258.77 (9.8)) \cdot [\cos 3 \sin 10 + \sin 3 \cos 10]$$

$$= 19874i + 11942j \text{ N}$$

Question No (2)

Solution:



As we know that Force on x-axis is

$$\sum F_x = 0$$

$$T \sin 30^\circ + 400 \cos 30^\circ - 360 - 240 \sin \theta = 0 \rightarrow (1)$$

$$\sum F_y = 600$$

$$T \cos 30^\circ + 400 \sin 30^\circ + 240 \cos \theta = 600 \rightarrow (2)$$

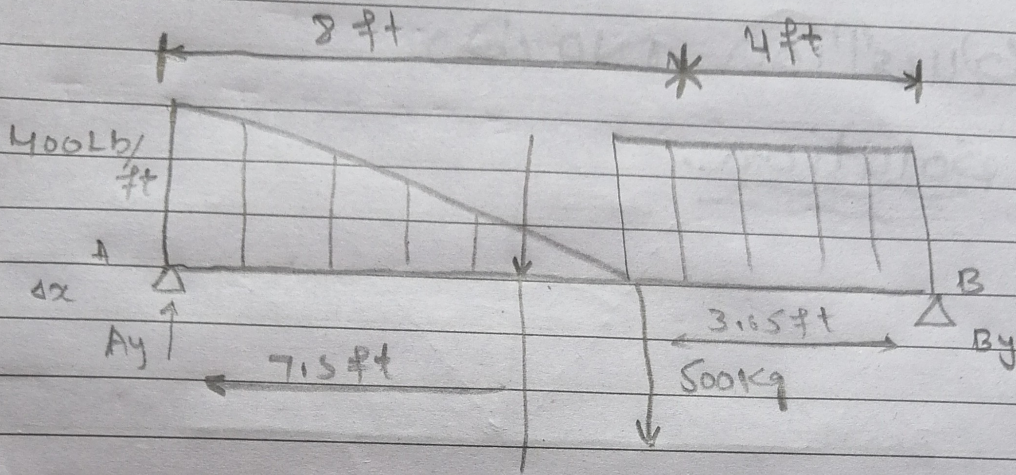
Numerical solution of eq (1) and (2)

$$\theta = 21.7^\circ, T = 204 \text{ lb.}$$

(4)

Question No (3)

Solution:



$$400 \text{ lb/ft} \times 8 \text{ ft} = 3200 \text{ lb}, 300 \text{ lb/ft} \times 4 \text{ ft} = 1200 \text{ lb}$$

$$500 \text{ kg} = 1102.31 \text{ lb}$$

$$\text{From } \sum F_x = 0 \quad A_x = 0$$

$$\sum M_A = 0$$

$$3200 - 1800(7.5) - 1200 \text{ lb} - 1102.31(3.65)$$

$$+ B_y(12) = 0$$

$$B_y = \frac{14342.7143}{12}$$

$$B_y = 1195.2$$

$$\sum F_y = 0$$

$$A_y - 3200 - 1800 - 1200 - 1102.31 + 1195.2 = 0$$

$$A_y = 11550.31$$

$$B_y = 1195.2 + A_y = 11550.31$$