PAPER :- ENGINEERING MECHANICS

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SEMESTER :- 2nd

SECTION :- A

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DEPT :- CIVIL ENGINEERING

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Part A

* **Given Data :-**

$m = 400$ lbs

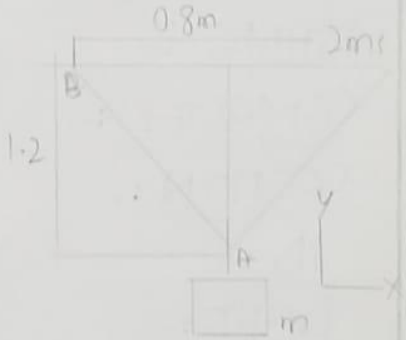
increase of volume $\Rightarrow \Delta AB = 15\%$

increase of volume $\Rightarrow \Delta AC = 35\%$

* **Required :-**

$AB = ?$

$BC = ?$



* **Solution :-**

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

$\phi = 56.3^\circ$

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

$\beta = 31.6$

We know that

$m = 400$ lbs $\Rightarrow 400/2.204 = 181.48$ kg

$T_{AB} = T_{AB}\Delta_{AB} = 0.15 \times (181.48)(9.81)[-(0356 - 3i + \sin 563i)$

$= 267.047\{-0.55i + 0.831i)$

$(T_{AB} = -146.87i + 221iN)$

$TAC = TAC\ DAC = 0.35(181.48) + (9.81)\{0331i + \sin 3i\}$

$TAC = (623.11)\{\ 0.357i + 0.5751\}$

$TAC = -534i + 320iN$

$TAC\ \ -146i + 221iN$

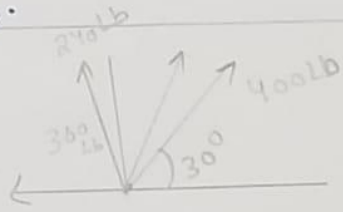
$TAC = -534i + 320iN$

Question 2 (Part B)

If the water tank increase their weight to their stabily is not double.

Given Data:-

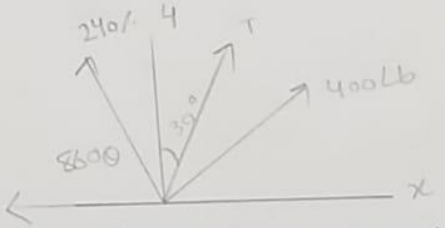
Sfect of bold = 600Lb



Required:-

$T = ?$

$Q = ?$



Solution:-

$\{Fu = 0 = -360 - 240 \sin 0 + T \sin 30 + 400(0.330 = 0)$

$\{Fy = 0.240 \cos 0 + T \cos 30^{\circ} + 400 \sin 30 = 600$

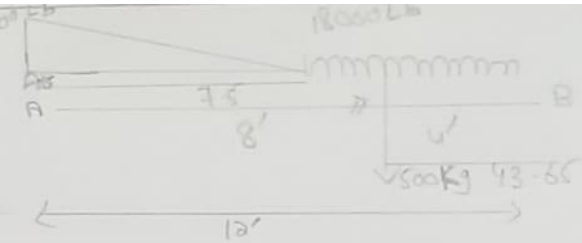
Numerical solution of equation 1 & 2

$Q = 21.7^{\circ}$ $T = 204$ Lb Ans.

Note:-

We could eliminate T between equation 1 & 2 the resulting equation Transcendental.

Question 3 Part (3)



Given Data:-

Required:- · Ay = ?
· By = ?

Solution:- ⇒ UDL = Convert to point load

⇒ 300 x 4 = 1200 Lb at point = 1/2 x 4 = 2' from B

⇒ UVL = 1/2 x 400 x 8 = 1600 Lb

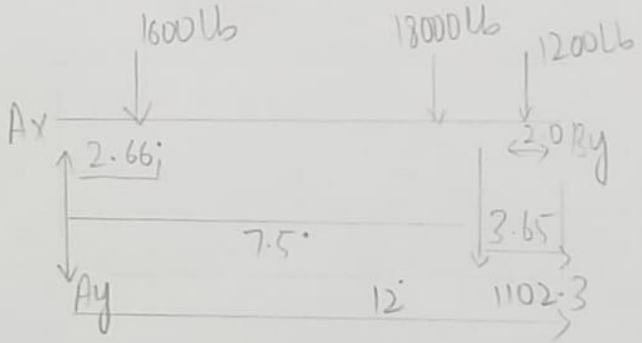
at distance = 1/3 x 8 = 2.66' from A

⇒ One load in kg

Convert to lb

= 500 x 2.204 = 1102.31 Lb

Now:-



$\sum Ax = 0$

$Ax = 0$

$\sum mA = -1600 \times 2.66 - 18000 \times 7.5 - 1200 \times 10 - 1102.31 \times 8.35 + 1 + 12$

$= -4256 - 135000 - 12000 - 9204.28 + By \times 12$

$A_y = \{$ Total load $- B_y$

$A_y = 1200 + 1102.31 + 18000 + 1600 - 13371.69$

$A_y = 8530.31$ lb

$\boxed{A_y = 8530.31, \; B_y = 13371.69}$ Ans