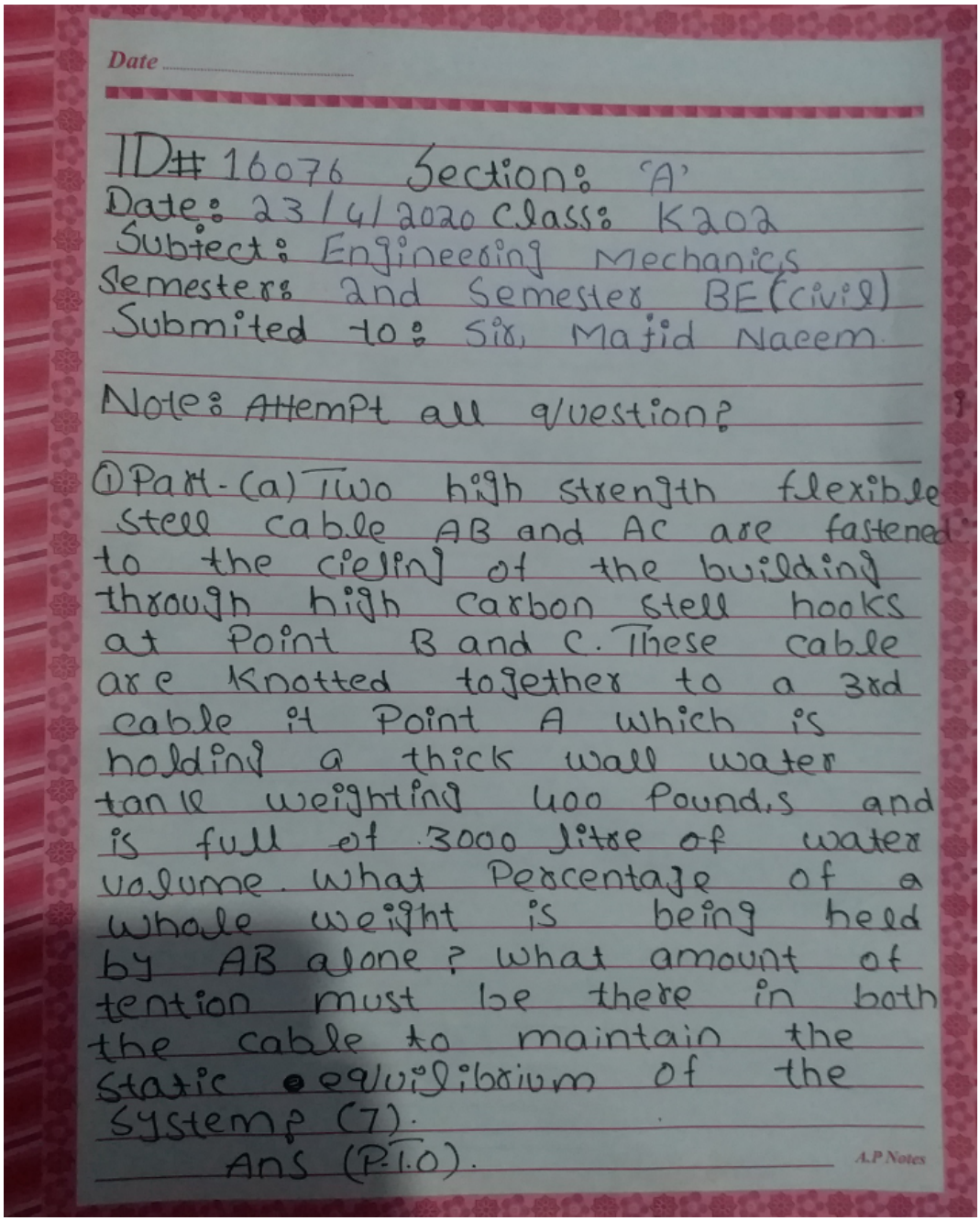
Image



Date .....

ID# 16076 Section: 'A'
Date: 23/4/2020 Class: K202
Subject: Engineering Mechanics
Semester: 2nd Semester BE(civil)
Submited to: Sir, Majid Naeem.

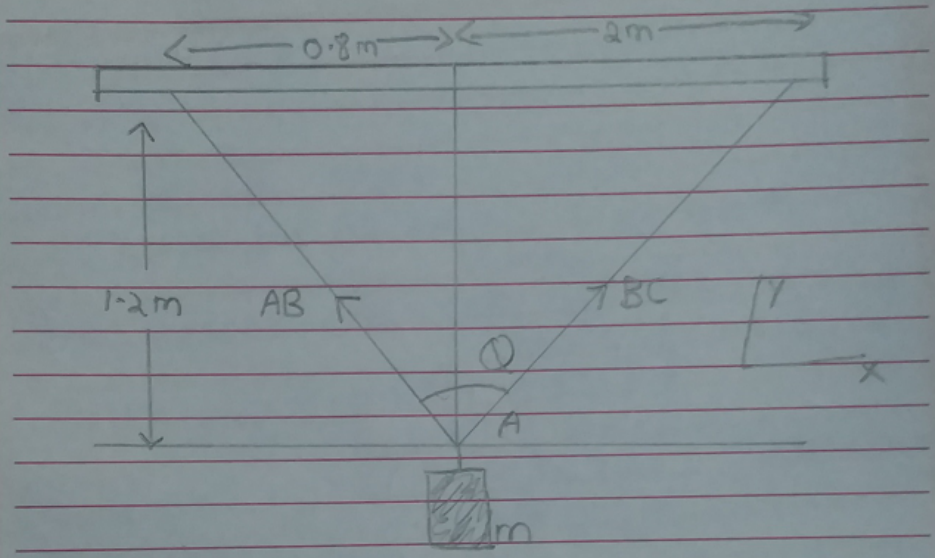
Note: Attempt all questions.

① Part-(a) Two high strength flexible stell cable AB and AC are fastened to the cieling of the building through high carbon stell hooks at Point B and C. These cable are Knotted together to a 3rd cable it Point A which is holding a thick wall water tank weighting 400 Pounds and is full of 3000 litre of water volume. what Percentage of a whole weight is being held by AB alone? what amount of tention must be there in both the cable to maintain the static equilibrium of the system? (7).

Ans (P.T.O).

A.P Notes

Date .....



Sol: PART 'A':

Given Data

$m = 400$ lbs

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

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

Required:

$AB = ?$

$BC = ?$

Solution:

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

$\theta = 56.3^\circ$

(P.T.O)

A.P Notes

Date

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

$B = 31.0°$

We know that

$m = 400 \text{ lbs} \Rightarrow 400/2204 = 181.48 \text{ kg}$

$T_{AB} = T_{AB}\lambda_{AB} = 0.15 \times (181.48)(9.81) \left[-\cos 56.3 i + \sin 56.3 j\right]$

$= 267.047 \{-0.55 i + 0.831 j\}$

$T_{AB} = -146.87 i + 221 j \text{ N}$

$T_{AC} = T_{AC}\lambda_{AC} = 0.35(181.48) \times 9.81) [\cos 31 i + \sin 3$

$T_{AC} = (623.11)[-0.857 i + 0.515 j]$

$T_{AC} = -534 i + 320 j \text{ N}$

$T_{AB} = -146 j + 221 j \text{ N}$

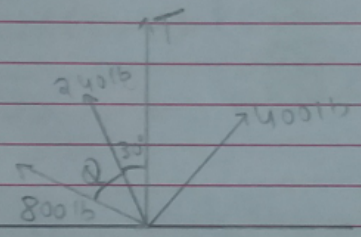
$T_{AC} = -534 i + 320 j \text{ N}$

Part B: If the water tank increase thier weight is % thier Stability is no durable.

Date

Q no 2:- Four forces are exerted on the eye bolt is shown the net effect in a bolt is a direct Pull of 600 lb in the "Y" direction Determin the necessery of T and Q.

Sol:-



Required T=? Q=?

$\Sigma F_X = 0 = -360 - 240\sin Q + T\sin 30 + 400\cos 30 = 0$ ...(i)

$\Sigma F_Y = 0 = 240\cos Q + T\cos 30° + 400\sin 30 = 600$ ...(ii)

numerical solution of equation 1 and 2

$Q = 21.7°$

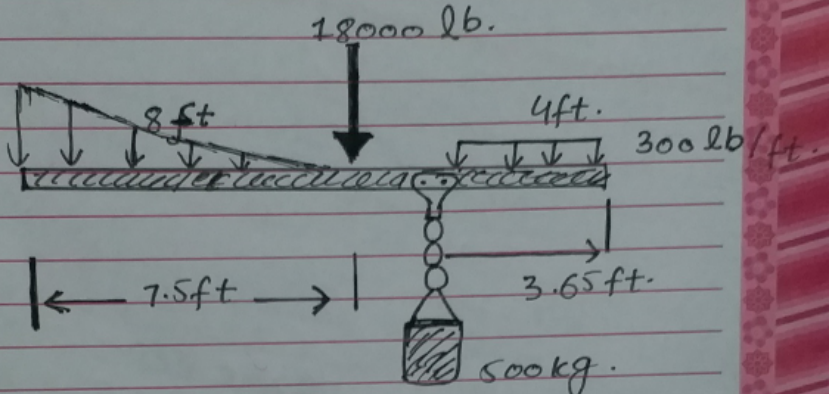
$T = 204\,lb$ Ans.

Note: we could eliminate T b/w equation 1 and 2 the resulting equation trascendental.

Date .....

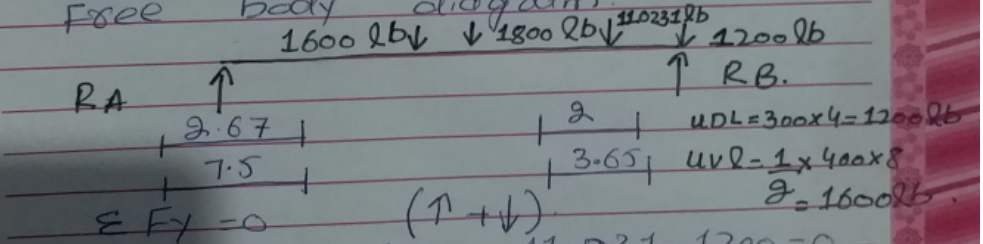
(3)°

Ans 3:



solution :-

Free body diagram.



$\Sigma F_y = 0 \quad (\uparrow + \downarrow)$

$R_A + R_B - 1600 - 1800 - 110231 - 1200 = 0$

$R_A + R_B - 5702.31 = 0$

$R_A + R_B = 5702.31 \quad \text{---(i)}$

$R_A + R_B = 0 \quad (\circlearrowleft^{+} \; \circlearrowright_{(-)})$

$R_A(0) + 1600(2.67) + 1800(7.5) + 110231 \times (8.35) + 1200(10) - R_B \times 12 = 0$

Date

$12R_B = 38976.2885$

$\frac{12R_B}{12} = \frac{38976.2885}{12}$

$R_B = 3248.024\ lb$

Using the value of R_B in eqn

$R_A + 3248.024 = 5702.31$

$R_A = 5702.31 - 3248.024$

$R_A = 2454.286\ lb$

$R_B = 3248.024\ lb$

Last modified: 7:54 pm