IQRA NATIONAL UNIVERSITY

MID TERM ASSIGNMENT PAPER

SUBJECT: ENGINEERING MECHANICS

SEMESTER: SPRING FALL 2020

MODULE: 2ND SEMESTER

ID: 16083

INSTRUCTOR: MAJID NAEEM

NOTE: Attempt all questions.

Q1: Part (a): Two high strength flexible ....of the system?

ANS:
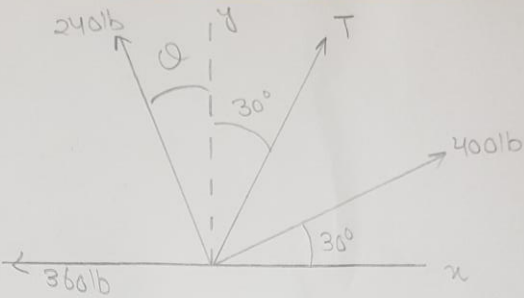
Part (b): If the water weight and volume .... results of part (a).

ANS: If the water tank weight and volume of water are increased 15% and 35% respectively then both the tensions in the cable AB and AC will also increase according to the percentage of the weight.

Q2: Four forces are exerted on the eye bolt as shown in figure. If the net effect on the bolt is a direct pull of 600 pounds in the y direction. Determine the values of T and Q.

ANS:

for u-component

$\Sigma f_u = 0$

$0 = -360 - 240 \sin Q + T\cos 30° + 400 \cos 30°$

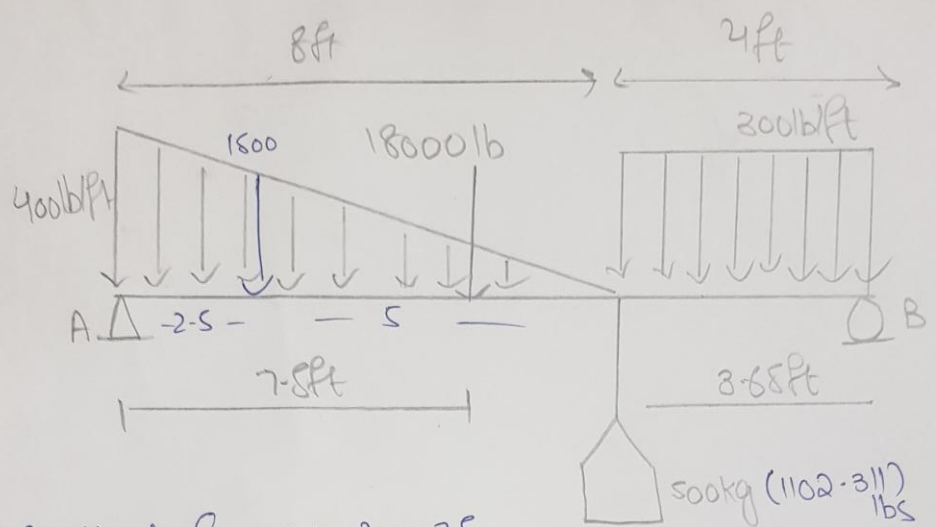$360/7$ (Q is $\underline{30°}$) because of corresponding angles.

$360 = -240 \sin 30° + 0.87T + 348$

$360 = -120 + 0.87T + 348$

$\dfrac{0.87T}{.87} = \dfrac{132}{.87}$

$T = 151.7 - ①$

Now y-component

$\Sigma f_y = 0$

$600 = 240 \cos 30 + T \sin 30 + 400 \sin 30$

$600 = 206.4 + 0.5T + 200$

$0.5T = 400 - 206.4$

$\dfrac{0.5T}{0.5} = \dfrac{193.6}{0.5}$

$T = 387.2 - ②$

solve ① & ② by substracting

$\boxed{T = 235.5}$ $\boxed{Q = 30°}$

Q3: Calculate the reactions at supports.

ANS:

P_2 Resultant for UVL $= \dfrac{400 \times 7.5}{2} = 1500\,lb/ft$

P_2 Resultant for UDL $= \cancel{162.31 \times 8}\ 300 \times 3.65 = 1095\,lb/ft$

$R_{1x} = 0 \qquad \Sigma f_x = 0$

$R_{1y} + R_{2y} - 1500 - 18000 - 1095 = 0 \text{-} ① \qquad \Sigma f_y = 0$

$(R_{2y} \times 12) - (1500 \times 2.5) - (18000 \times 7.5) - (1095 \times 9.825) = 0$

$\dfrac{12R_{2y}}{12} = \dfrac{158326.85}{12}$

$\boxed{R_{2y} = 13193.9\,lb}$ put in ①

$R_{1y} + 13194 - 1500 - 18000 - 1095 = 0$

$\boxed{R_{1y} = 8503.311\,lb}$