Name:: AFAQ AHMAD

ID:: 16669 Section:: B

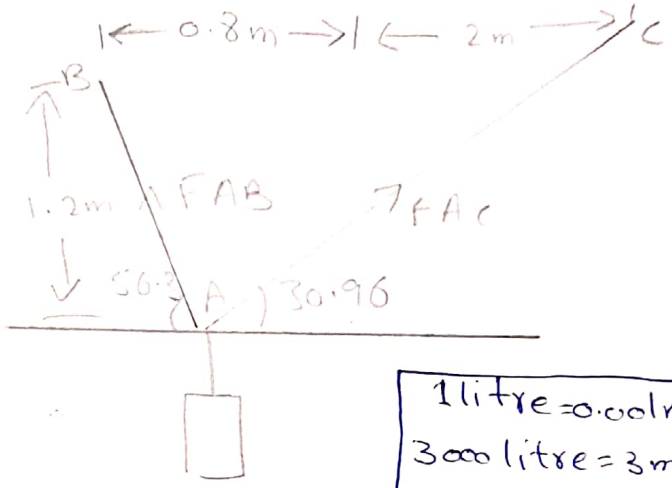
BE (civil)

Submitted To:: Majid Naeem

Subject:: Engineering Mechanics

Q No 1(a)

Ans:-



1 litre = 0.001 m^3

3000 litre = 3 m^3

* weight of tank = 400 pounds

weight of water = γ x volume.

$= 62.41 lb/ft^3 \times 105.86 ft^3$

$= 6605.66 lb$

Total weight = 7005.66 lb

1m = 3.28ft

$3m^3 = 3 \times (3.28)^3$

$= 105.86 ft^3$

* $\Sigma F_x = 0, \rightarrow +$

$FA \cos 30.96 - FAB \cos 56.3 = 0$

$FAC = 0.647 FAB \rightarrow (1)$

* $\Sigma F_y = 0 \quad \uparrow +$

$FAB \sin 56.3 + FAC \sin 30.96 - 7005.66 = 0$

$FA \sin 56.3 + (0.647 FAB) \sin 30.96 = 7005.66$

$1.165 FAB = 7005.66 \rightarrow (2)$

$\frac{6013.4}{7005.66} \times 100$ $\boxed{F_{AB} = 6013.41b}$

$= 85.8\%$ of the total weight is being help by cable AB.

Put F_{AB} in eq (1)

$(F_{AC} = 389.71b)$

(Q No 1 b) Ans New weight of tank = 460 lb

New weight of water = 8917.6 lb

Tatal weight = 9377.6 lb

eq (2) $\rightarrow$ $1.165\, F_{AB} = 9377.6$

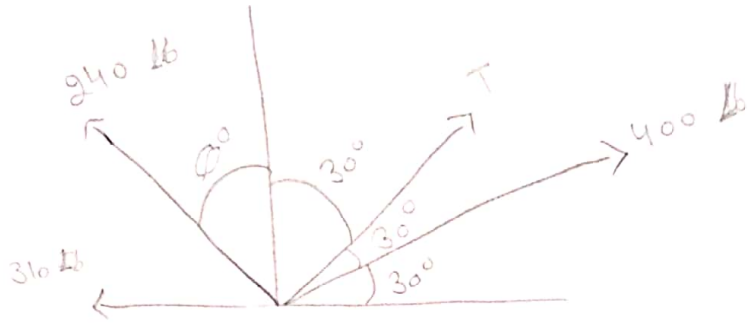
$(F_{AB} = 8049.5\, lb)$

eq (1) $\rightarrow$ $(F_{AC} = 520 lb)$

Tenision in Cablees in increases if water tank weight & Volume increases.

Q No 2

Ans



$F_1 = 400 lb$

$F_2 = 240 lb$

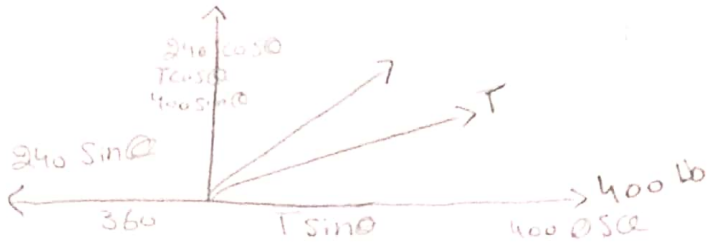
$F_3 = 360$

So According to given all resultant is directed to wards Y- axis So

$R_x = 0$

$R_y = 600 lb-$

After by Resoloving all forces



So we can write it now

$$\Sigma F_y = 240\cos\theta + T\cos(30) + 400\cos\theta = 600$$

$$\Sigma F_x = -360 - 240\sin\theta + T\sin(30) + 400\cos\theta$$

Now

$$-T\cos(30) = 240\cos\theta + 400\cos 80 - 600$$

$$-T\sin(30) = -360 - 240\sin\theta + 400\cos(30) \quad (1)$$

$$-T\cos(30) = 240\cos\theta + 36.4 - 600$$

$$-T\sin(30) = 360 - 240\sin\theta + 364.4$$

$$-T\sin(30) = 240\sin\theta - 253.6$$

$$-T\sin(30) = 4.4 - 240\sin\theta$$

$$\frac{-T\sin(30)}{-T\cos(30)} = \frac{4.4 - 240\sin\theta}{253.6 + 240\cos\theta}$$

$$\tan(30) = \frac{4.4 - 240 \sin\theta}{253.6 + 240 \cos\theta}$$

$$0.57 = \frac{4.4 - 240 \sin\theta}{253.6 + 240 \cos\theta}$$

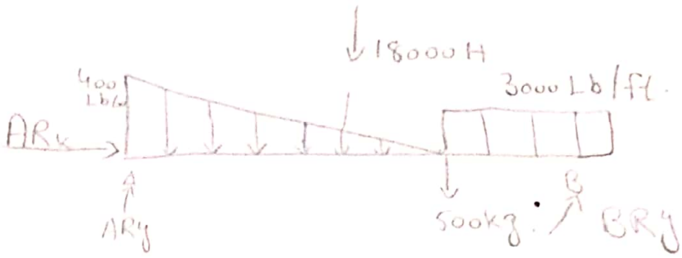
→ II).

⇒ ② So By further edlastio
So putt "ie" in ead.

So = 240 Cos(21.4) + T Cos30) + 400 (30) cos
204 lb.

(Q No 3)

Ans:-



Now. This is determined.

(i)

R = 0 →

There is no Reaction along x-axis)

$\Sigma F_y = 0$

ΣF_y (300x4) − (1102) − 18000 −

= RBy − 1200 − 162 − 18000

− 1600 + Ray = 0

RBy + Ray − (1200 + 1102 + 18000 + 1600) = 0

RBy + RAy = 21902 → (i)

$\Sigma M = 0$

$\Sigma M_{A} = 0$

+ BRy × 12 − 1102 × 8.25 − 18000 × 2.5

BRy 12 − 9201.7 − 135.000 − 4200

FBRy = 10,327.916

Now

FARy + FBRy = 21902

FARy + 10327.9 = 21902

FARy = 21902 − 10327.9

FARy = 1157.17