NAME : SHEIKH M RAHMAN

ID : 16197

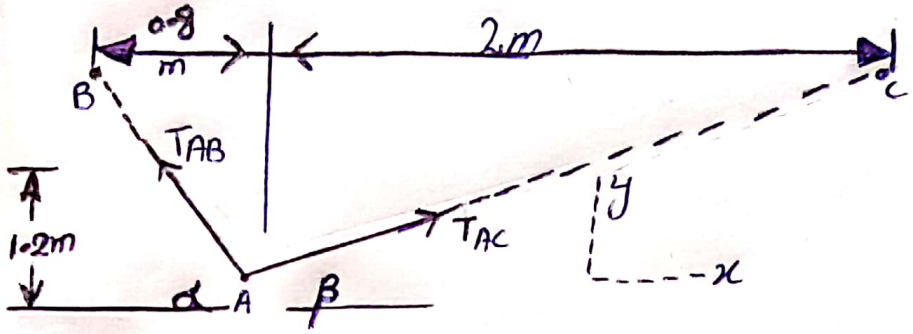
SECCION : B

DEP : BE CIVIL ENG

PAPER : MECHANICS.

DATE : 27/4/20

# QNO: 1




# ANS NO1:-

(i) $\overline{T_{AB}} = \overline{T_{AB}}\, n_{AB}$

$\overline{T_{AB}} = 0.858\,(60)\,(9.81)\,[-\cos\alpha + \sin\alpha]$

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

$\boxed{\alpha = 56.3^\circ}$

$\overline{T_{AB}} = 0.858\,(60)(9.81)[-\cos 56.3^\circ i + \sin 56.3^\circ j]$

$\boxed{\overline{T_{AB}} = -280i + 420j\ N}$

$$\overrightarrow{T_{AC}} = T_{AC}\, n_{AC}$$

$$= 0.555(60)(9.81)[\cos\beta + \sin\beta]$$

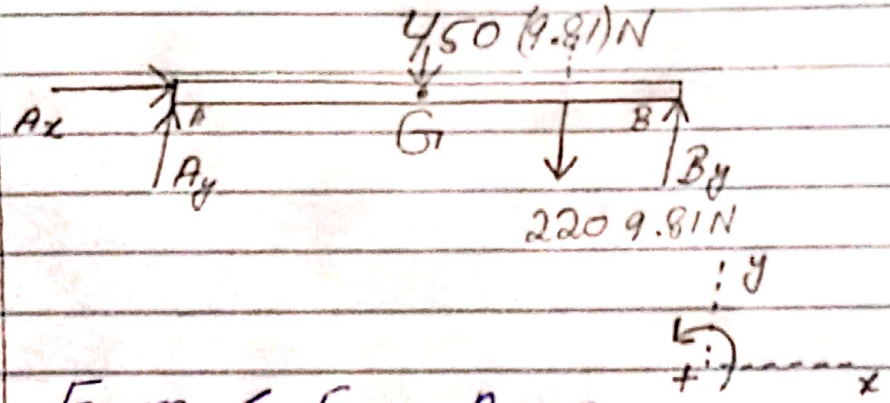
$$\beta = \tan^{-1}(1.2/2)$$

$$\boxed{\beta = 31.0^\circ}$$

$$\overrightarrow{T_{AC}} = 0.555(60)(9.81)[\cos 31.0^\circ i + \sin 31.0^\circ j]$$

$$\boxed{\overrightarrow{T_{AC}} = 280\, i + 168.1\, j\ N}$$

(ii)




From $\Sigma F_x = 0$, $A_x = 0$

$$\Sigma M = 0 \Rightarrow -450(9.81)4 - 220(9.81)(5.6) + B_y(8) = 0$$

$$\Rightarrow -450(9.81)4 - 220(9.81)(5.6) + B_y(8) = 0$$

$$\boxed{B_y = 3720\ N}$$

$$\Sigma F_y = 0$$

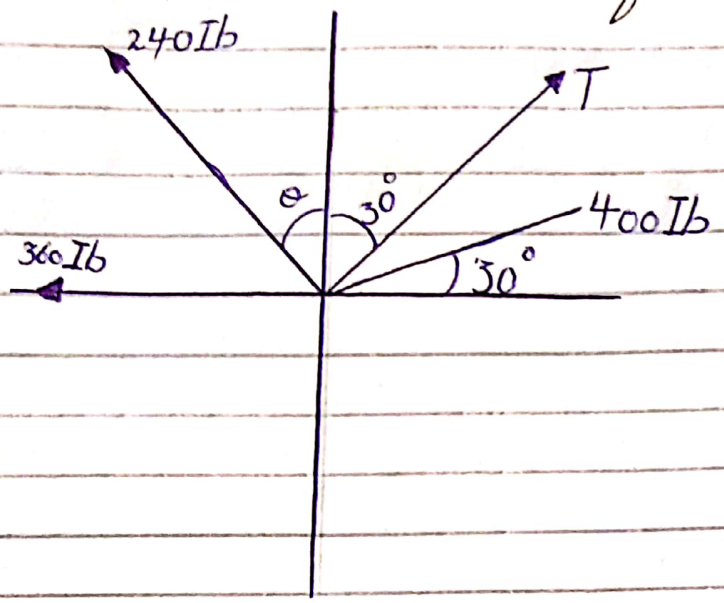
$$\Sigma F_y = 0$$

$$A_y - 450(9.81) - 220(9.81) + 3720 = 0$$

$$\boxed{A_y = 2850\,N}$$

# Q no : 2

Four forces are exerted on the eyebolt as Show below if the net effect on the bolt is directed pull of 600 pounds in the y-direction, determine the value of T & θ.




Solution:

$$\sum F_x = 0$$

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

$$-240\sin\theta + (0.5)T + 346.4 = 360$$

$$-240\sin\theta + 0.5T = 360 - 346.4$$

$$-240\sin\theta + 0.5T = 13.6 \quad \text{—(i)}$$

$$\sum F_y = 600$$

$$240\cos\theta + T\cos 30 + 400\sin 30^\circ = 600$$

$$240\cos\theta + (0.866)T + 400(0.5) = 600$$

$$240\cos\theta + 0.86T + 400(0.5) = 600$$

$$240\cos\theta + 0.86T = 200 = 600$$

$$240\cos\theta + 0.86T = 400 \quad \text{—(ii)}$$

$$-240\sin\theta + 0.5T = 13.6 \quad \text{—(i)}$$

$$240\cos\theta + 0.866T = 400 \quad \text{—(ii)}$$

from the Solution of eq(i) & eq (ii) we get

$\theta = 21.7^\circ$

Put $\theta = 21.7^\circ$ in eq (i) we get

$-240 \sin(21.7) + 0.5T = 13.6$

$-88.7 + 0.5T = 13.6$

$0.5T = 13.6 + 88.7$

$0.5T = 102.3$

$T = \frac{102.3}{0.5}$

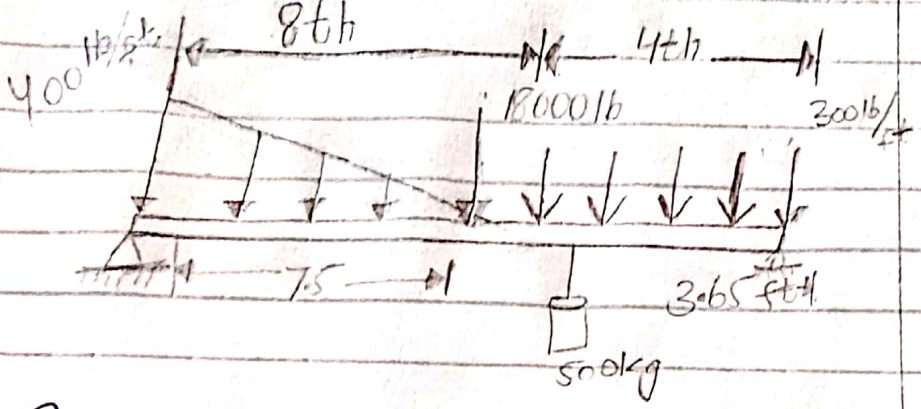
$T = 204.6 \text{ lb}$

So

$\theta = 21.7^\circ$ $T = 204.6 \text{ lb}$ :ANS:

# Q NO3 :-

Calculate the Reaction Supports.

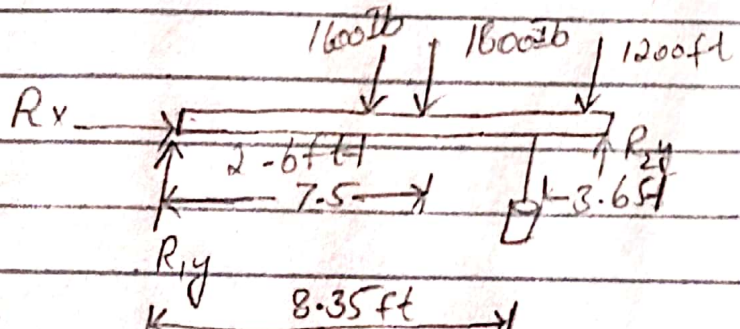



Resultant of UDL = $300\ lb/ft \times 4\ ft$

$= 1200\ lb$

Resultant of UVL = $\frac{400\ lb/ft \times 4\ ft}{2}$

$= 1600\ lb$




$\Sigma F_x = 0$ —(i)

$$\Sigma F_y = 0$$

$$R_{1y} + R_{2y} - 1600 - 18000 - 500 - 1200 = 0 \quad -(ii)$$

$$\Sigma M = 0$$

$$(R_{2y} \times 12ft) - (1600 \times 2.6) - (18000 \times 7.5) - (500 \times 8.3) - (1200 \times 10) = 0$$

$$12R_{2y} - 155310 = 0$$

$$R_{2y} = \frac{155310}{12}$$

$$\boxed{R_{2y} = 13350.62 \text{ lb}}$$

Put the value of $R_{2y}$ in eq (ii) we get

$$R_{1y} + (12942.5) - 1600 - 18000 - 500 - 1200 = 0$$

$$R_{1y} + 12942.5 - 21300 = 0$$

$$\boxed{R_{1y} = 8552.0676 \text{ lb}}$$

$$\Rightarrow \boxed{R_{1x} = 0}$$

$$\Rightarrow \boxed{R_{1y} = 8552.0676 \text{ lb}}$$

$$\Rightarrow \boxed{R_{2y} = 12942.5 \text{ lb}}$$