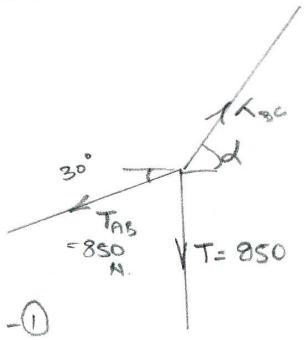
ASSIGNMENT NO. 4

(1)



$T_{BA}\cos 30 = T_{BC}\cos\alpha$

$850\cos 30 = T_{BC}\cos\alpha$ — (1)

$T_{BC}\sin\alpha = 850\sin 30 + 850$

$T_{BC}\sin\alpha = 1275$ — (2)

Dividing (1) by (2),

$\tan\alpha = 1.732$

$\alpha = 60°$

(2)

$\Sigma F_x = 500\cos 30 + 300\cos 60 + 300\cos 20$

$= 865$ N.

$\Sigma F_y = -800\sin 30 + 800\sin 60 + 300\sin 20$

$= 112.41$

$R = 872.3$

$\alpha = \tan^{-1}\frac{112.41}{865}$

$= 7.40°$

For R to be directed along hz. axis,

$\Sigma F_x = 0$

$R = 500\cos 30 + 300\cos(40+\alpha) + 300\cos\alpha$

$\Sigma F_y = 0$

$500\sin 30 = 300\sin(40+\alpha) + 300\sin\alpha$

$500\sin 30 = 300(\sin(40+\alpha) + \sin\alpha)$

$$= 300\left[2\sin\frac{40+2\alpha}{2}\cos\frac{40}{2}\right]$$

$$500\sin 30 = 600\sin\frac{40+2\alpha}{2}\cos 20$$

$$\sin\frac{40+2\alpha}{2} = 0.443$$

$$\alpha = 6.32^\circ$$

(3)

$$\Sigma F_y = 700 + 600 + 650 = 1950\,N \qquad \Sigma F_x = 300N$$

$$M_o = 300\times 3 + 650\times 0.2 + 600\times 1.3 - 700\times 1.8$$

$$= 550\,N\text{-}m$$