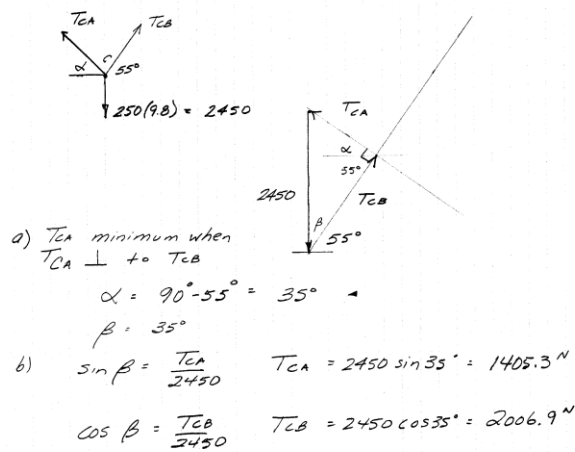
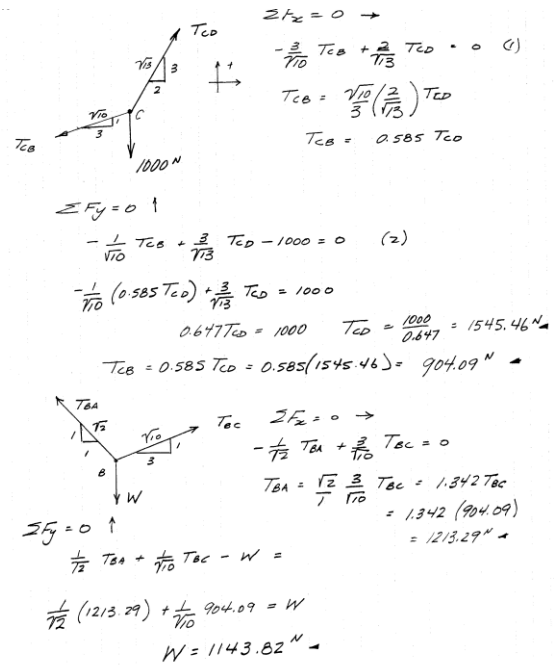


Assignment #3 Solution

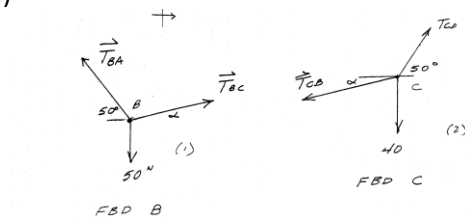
1)



2)



3)



From (1)

$$\sum F_x = 0 \rightarrow -T_{BA} \cos 50^\circ + T_{BC} \cos \alpha = 0 \quad (1)$$

$$\sum F_y = 0 \uparrow T_{BA} \sin 50^\circ + T_{BC} \sin \alpha - 50 = 0 \quad (2)$$

From (2)

$$\sum F_x = 0 \rightarrow -T_{CB} \cos \alpha + T_{CD} \cos 50^\circ = 0 \quad (3)$$

$$\sum F_y = 0 \uparrow -T_{CB} \sin \alpha + T_{CD} \sin 50^\circ - 40 = 0 \quad (4)$$

(1) + (3)

$$-T_{BA} \cos 50^\circ + T_{CD} \cos 50^\circ = 0$$

(2) + (4)

$$T_{BA} \sin 50^\circ + T_{CD} \sin 50^\circ = 90$$

But $T_{BA} = T_{CD}$ $\therefore 2 T_{BA} \sin 50^\circ = 90$

$T_{BA} = 58.743 \text{ N} \quad T_{CD} = 58.743 \text{ N}$

3) Cont'd

$$-T_{CB} \cos \alpha + 58.743 \cos 50^\circ = 0$$

$$-T_{CB} \sin \alpha + 58.743 \sin 50^\circ - 40 = 0$$

$$-T_{CB} \cos \alpha + 37.759 = 0$$

$$-T_{CB} \sin \alpha + 5 = 0$$

$$T_{CB} \cos \alpha = 37.759$$

$$T_{CB} \sin \alpha = 5$$

$$\frac{T_{CB} \sin \alpha}{T_{CB} \cos \alpha} = \frac{5}{37.759} \quad \tan \alpha = 0.1324$$

$$\alpha = 7.543^\circ$$

$$T_{CB} = \frac{5}{\sin 7.543} \quad T_{CB} = 38.09 \text{ N}$$

Bonus: (Ans: $T_{AB}=12.73\text{N}$, $T_{BC}=9.06\text{N}$, $T_{CD}=12.73\text{N}$, $\alpha = 6.34^\circ$)