

1-27

From a free-body diagram of pin A

$$\rightarrow \Sigma F_x = 0: \quad T_{AF} \cos 45^\circ - T_{AB} \cos 45^\circ = 0$$

$$\uparrow \Sigma F_y = 0: \quad 20 - T_{AB} \sin 45^\circ - T_{AF} \sin 45^\circ = 0$$

$$T_{AB} = T_{AF} = 14.14214 \text{ lb} \cong 14.14 \text{ lb} \quad \text{Ans.}$$

Finally from a free-body diagram of BCD

$$\rightarrow \Sigma F_x = 0: \quad T_{AB} \cos 45^\circ + C_x + D_x = 0$$

$$\uparrow \Sigma F_y = 0: \quad T_{AB} \sin 45^\circ + C_y - D_y = 0$$

$$\circlearrowleft \Sigma M_C = 0: \quad 2D_x - 1.5(10) - 2(T_{AB} \cos 45^\circ) - 1(T_{AB} \sin 45^\circ) = 0$$

where by symmetry (or from overall equilibrium)

$$D_y = 20/2 = 10 \text{ lb} \downarrow$$

and then

$$C_x = -32.500 \text{ lb} \cong 32.5 \text{ lb} \leftarrow \quad C_y = 0 \text{ lb}$$

$$D_x = 22.500 \text{ lb} \cong 22.5 \text{ lb} \rightarrow$$

$$\mathbf{C} = 32.5 \text{ lb} \leftarrow \quad \text{Ans.}$$

$$\mathbf{D} = 24.6 \text{ lb} \searrow 24.0^\circ \quad \text{Ans.}$$

