

$$8.5 \ b) \quad \theta = 90^\circ$$

$$\sum M_A = 0$$

$$\Rightarrow \vec{r}_{C/A} \times \vec{F} + \vec{r}_{B/A} \times \vec{D}_y = 0$$

$$D_y \cdot (r_{AB}) \cos \theta + (F)(r_{AC}) \cos \theta = 0$$

$$\Rightarrow D_y \cdot (300 \text{ mm}) \cos(30^\circ)$$

$$+ (-20 \text{ kN})(300 + 150) \text{ mm} \cos(30^\circ) = 0 \text{ kN}\cdot\text{mm}$$

$$\Rightarrow D_y = 30 \text{ kN}$$

$$D_y' = D_y = 30 \text{ kN}, \quad W = 30 \text{ mm} = 30 \times 10^{-3} \text{ m}$$

$$t = 12 \text{ mm} = 12 \times 10^{-3} \text{ m}$$

$$\sigma_{BD} = \frac{D_y'}{A_{BD}}$$

$$= \frac{30 \text{ kN}}{(30 \times 10^{-3} \text{ m})(12 \times 10^{-3} \text{ m})} \cdot \left( \frac{1 \text{ kPa}}{1 \text{ kN/m}^2} \right)$$

$$= 83333 \text{ kPa}$$

$$= 83.3 \text{ MPa}$$

