6.47 By Fig. a, \( A_1 = b^2 \), \( A_2 = b^2 \).

Then, by Eq. (6.68),

\[
T = 2 \sum_{i=1}^{2} A_i \theta_i = 2 (b^2 \theta_1 + b^2 \theta_2) = 4b^2 \theta
\]

where \( \theta = \theta_1 = \theta_2 \), since cells 1 and 2 are identical. Hence,

\[
\theta = \frac{T}{4b^2}
\]

(a) The shear stresses in the outer walls and the interior web are, respectively,

\[
\tau_{\text{wall}} = \frac{\theta}{t} = \frac{T}{4bt^2}; \quad \tau_{\text{web}} = \frac{\theta}{t} = \frac{\theta}{t} = 0
\]

(b) The unit angle of twist is, by Eq. (6.69),

\[
\Theta = \frac{1}{2AbG} \left[ \frac{1}{t} + \frac{(3t - 9b)}{t^3} \right] \theta = \frac{1}{2AbG} \left[ \frac{3t}{t^3} \right] \theta = \frac{3}{8} \frac{T}{6bt^3}
\]

6.48 By Fig. a, of Problem 6.47, without the web, \( A = 2b^2 \).

Then, by Eq. (6.66),

\[
T = 2Ax = 4b^2 \theta t, \text{ or } \frac{T}{4bt} = \frac{2T}{4bt^2}
\]

By Eq. (6.67), with \( t = \text{constant} \),

\[
\Theta = \frac{T}{4bt} = \frac{1}{2AbG} \left( \frac{T}{4bt} \right) (3b) = \frac{3}{8} \frac{T}{6bt^3}
\]

6.49 By Fig. a, of Problem 6.47, without the web and with a longitudinal slit, Eq. (6.62) yields the torsional constant \( T = \frac{1}{3} (6b) t^2 = 2bt^3 \), assuming that \( 6b/t > 10 \). Then, by Eq. (6.63),

\[
\tau_{\text{max}} = \frac{2T}{J} \text{max} = \frac{2T}{J} \left( \frac{t}{2} \right) = \frac{T}{2bt^2}
\]

and

\[
\Theta = \frac{T}{6J} = \frac{T}{26bt^3}
\]