

34. (a) Eq. 11-27 gives $\alpha = \tau/I$ and Eq. 11-12 leads to $\omega = \alpha t = \tau t/I$. Therefore, the angular momentum at $t = 0.033$ s is

$$I\omega = \tau t = (16 \text{ N} \cdot \text{m})(0.033 \text{ s}) = 0.53 \text{ kg} \cdot \text{m}^2/\text{s}$$

where this is essentially a derivation of the angular version of the impulse-momentum theorem.

- (b) We find

$$\omega = \frac{\tau t}{I} = \frac{(16)(0.033)}{1.2 \times 10^{-3}} = 440 \text{ rad}$$

which we convert as follows: $\omega = (440)(60/2\pi) \approx 4200 \text{ rev/min}$.