

PROB. 15-7

$$\omega_1(0) = 0, \quad \omega_2(6^s) = (3300 \frac{\text{REV}}{\text{MIN}}) \left( \frac{\text{MIN}}{60^s} \right) \left( \frac{2\pi}{\text{REV}} \right) = 345.6 \frac{\text{RAD}}{s}$$

$$\omega_3(0) = 345.6 \frac{\text{RAD}}{s}, \quad \omega_4(80^s) = 0$$

UNIFORMLY ACCELERATED MOTION, FIND NUMBER OF REVOLUTIONS DURING START-UP, SHUTDOWN.

$$\omega = \omega_0 + \alpha t; \quad \alpha = \frac{\omega - \omega_0}{t}; \quad \theta = \theta_0 + \omega_0 t + \frac{1}{2} \alpha t^2$$

START-UP:  $\alpha = \frac{(345.6 - 0) \frac{\text{RAD}}{s}}{(6^s)} = 57.60 \frac{\text{RAD}}{s^2}$

$$\theta = 0 + 0 + \frac{1}{2} (57.6 \frac{\text{RAD}}{s^2}) (6^s)^2 \left( \frac{\text{REV}}{2\pi \text{RAD}} \right) = 165 \text{ REV}$$

SHUTDOWN:  $\alpha = \frac{(0 - 345.6) \frac{\text{RAD}}{s}}{(80^s)} = -4.32 \frac{\text{RAD}}{s^2}$

$$\theta = 0 + (345.6 \frac{\text{RAD}}{s}) (80^s) + \frac{1}{2} (-4.32 \frac{\text{RAD}}{s^2}) (80^s)^2 \left( \frac{\text{REV}}{2\pi \text{RAD}} \right)$$

$$\theta = 2200 \text{ REV}$$