quiz 8

Thursday, November 12, 2015 9:26 AM

(1) 1 revolution = 2π rad

$\Rightarrow t = \frac{2\pi}{3} = 2.1\,s$

(2) $|\alpha_{av}| = \left|\frac{\omega_2 - \omega_1}{t_2 - t_1}\right| = \left|\frac{0 - 12(2\pi)}{6}\right| = 4\pi \frac{rad}{s^2}$

(3) $\alpha = \frac{d\omega}{dt} = 0.64 - 5.4t$

$\Rightarrow \alpha(2) = 0.64 - 5.4(2) = -10 \frac{rad}{s^2}$

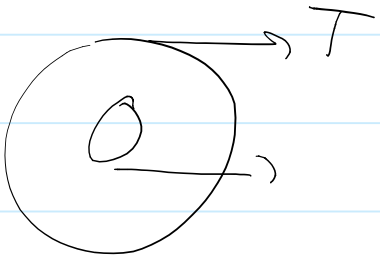
(4) $\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0) = \omega_0^2 + 2\alpha\Delta\theta$

$\Rightarrow \Delta\theta = \frac{\omega^2 - \omega_0^2}{2\alpha} = \frac{0 - (18)^2}{2(-2)} = 81\ rad$

(5) Parallel axis theorem

$I = \bar{I} + MK^2 = \frac{1}{2}MK^2 + MK^2$

$= \frac{3}{2} m R^2$

(6) 

$T = ma$

$\tau = I\alpha = \frac{Ia}{R_2}$

$\Rightarrow FR_1 - TR_2 = Ia/R_2$

$FR_1 - maR_2 = \frac{Ia}{R_2}$

$\Rightarrow a = \frac{FR_1R_2}{I + mR_2^2}$

(7) $W = \frac{1}{2} I\omega_f^2 - \frac{1}{2} I\omega_i^2$

$\omega_i = 0$

$\omega_f = \omega_i + \alpha t = 2.5 = 10 \text{ rad}$

$\Rightarrow W = \frac{1}{2}(6)(10)^2 = 300 \text{ J}$

(8) $W = \tau(\theta_f - \theta_i)$

$= 260(25 \cdot 2\pi) = 4.1 \times 10^4 \text{ J}$