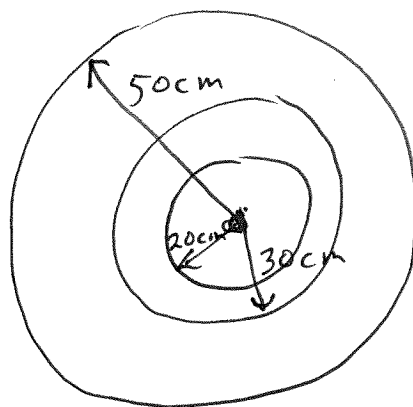


Chapter 10Problem 63

Disk  $m_d = 2.0 \text{ kg}$   
 $r_d = 50 \text{ cm}$

Annular  
 Cylinder  $m_c = 1.0 \text{ kg}$   
 $r_i = 20 \text{ cm}$   
 $r_o = 30 \text{ cm}$



a) What is the moment of inertia?

For the disk  $I_d = \frac{1}{2} m_d r_d^2 = \frac{1}{2} (2.0 \text{ kg}) (0.50 \text{ m})^2$   
 $= 0.25 \text{ kg} \cdot \text{m}^2$

For the annular cylinder  $I_c = \frac{1}{2} m_c (r_i^2 + r_o^2)$   
 $= \frac{1}{2} (1.0 \text{ kg}) [(0.20 \text{ m})^2 + (0.30 \text{ m})^2]$   
 $= 0.065 \text{ kg} \cdot \text{m}^2$

The total moment of inertia is

$$I_{\text{total}} = 0.25 + 0.065 = 0.315 \text{ kg} \cdot \text{m}^2$$

b) What is the rotational kinetic energy?

$$\omega = 10 \frac{\text{rev}}{\text{s}} \left( \frac{2\pi \text{ rad}}{1 \text{ rev}} \right) = 62.8 \frac{\text{rad}}{\text{s}}$$

$$K = \frac{1}{2} I \omega^2 = \frac{1}{2} (0.315 \text{ kg} \cdot \text{m}^2) \left( 62.8 \frac{\text{rad}}{\text{s}} \right)^2$$

$$K = 621 \text{ J}$$