Questions 10-12

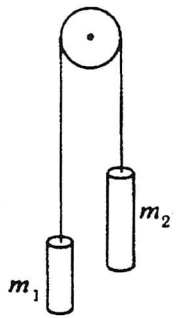
A cylinder rotates with constant angular acceleration about a fixed axis. The cylinder's moment of inertia about the axis is 4 kg m^2. At time $t = 0$ the cylinder is at rest. At time $t = 2$ seconds its angular velocity is 1 radian per second.

10. What is the angular acceleration of the cylinder between $t = 0$ and $t = 2$ seconds?
    (A) 0.5 radian $\cdot$ s^{-2}
    (B) 1 radian $\cdot$ s^{-2}
    (C) 2 radians $\cdot$ s^{-2}
    (D) 4 radians $\cdot$ s^{-2}
    (E) 5 radians $\cdot$ s^{-2}

11. What is the angular momentum of the cylinder at time $t = 2$ seconds?
    (A) 1 kg $\cdot$ m^2 $\cdot$ s^{-1}
    (B) 2 kg $\cdot$ m^2 $\cdot$ s^{-1}
    (C) 3 kg $\cdot$ m^2 $\cdot$ s^{-1}
    (D) 4 kg $\cdot$ m^2 $\cdot$ s^{-1}
    (E) It cannot be determined without knowing the radius of the cylinder.

12. What is the kinetic energy of the cylinder at time $t = 2$ seconds?
    (A) 1 J
    (B) 2 J
    (C) 3 J
    (D) 4 J
    (E) It cannot be determined without knowing the radius of the cylinder.

Questions 13-14



A system consists of two objects having masses m_1 and m_2 ($m_1 < m_2$). The objects are connected by a massless string, hung over a pulley as shown above, and then released.

13. When the speed of each object is v, the magnitude of the total linear momentum of the system is
    (A) $(m_1 + m_2)\, v$
    (B) $(m_2 - m_1)\, v$
    (C) $\dfrac{(m_1 + m_2)}{2}\, v$
    (D) $\dfrac{(m_2 - m_1)}{2}\, v^2$
    (E) $m_2 v$

14. When the object of mass m_2 has descended a distance h, the potential energy of the system has decreased by
    (A) $(m_2 - m_1)\, gh$
    (B) $m_2 gh$
    (C) $(m_1 + m_2)\, gh$
    (D) $\frac{1}{2}(m_1 + m_2)\, gh$
    (E) 0