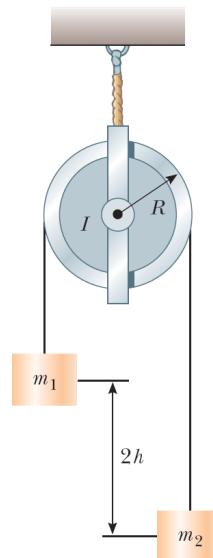


PHYS2325-01 MID TERM EXAM N.3**Question 1**

Consider two objects with $m_1 > m_2$ connected by a light string that passes over a pulley having a moment of inertia of I about its axis of rotation as shown in Figure. The string does not slip on the pulley or stretch. The pulley turns with friction that produces a constant torque τ_f . The two objects are released from rest separated by a vertical distance $2h$. (a) Find the translational speeds of the objects as they pass each other. (b) Find the time when this happens.

The following criteria are used to assess your work:

- (4 pts) Drawing and sketches
- (4 pts) Correct application of kinetic energy theorem
- (4 pts) Correct application of Newtonian method
- (2 pts) Calculation of the speed
- (2 pts) Calculation of the time

**Question 2**

A 1.00-kg glider attached to a spring with a force constant of 25.0 N/m oscillates on a horizontal, frictionless air track. At $t = 0$, the glider is released from rest at $x = 3.00$ cm (that is, the spring is compressed by 3.00 cm) and with speed $v = 2.00$ cm/s. Find (a) the position, velocity, and acceleration as functions of time, (b) the maximum values of its speed and acceleration, (c) the energy of the motion.

Question 3

A string of linear density 30 g/m is pulled by a tension of 50 N and driven at a frequency of 75.00 Hz. The amplitude of the motion is 3.0 mm. Furthermore, the wave is such that $y = 1$ mm at $x = 0$ and $t = 0$. (a) write the expression of this particular wave on the string, (b) calculate the energy on 12λ , (c) find the power carried by the wave.