Answer on Question #41137, Physics, Mechanics | Kinematics | Dynamics

Question:

A solid cylinder of mass 2 kg and radius 20cm is rotating about its axis with a frequency of 10 Hz. What is the rotational kinetic energy of the cylinder?

Answer:

Rotational kinetic energy equals:

$$T = \frac{I\omega^2}{2}$$

where I is moment of inertia, ω is angular speed.

Moment of inertia for cylinder equals:

$$I = mr^2$$

where m is mass, r is radius.

Angular speed equals (one revolution is equal to 2π radians):

$$\omega = 2\pi f$$

where f is frequency.

Therefore:

$$T = \frac{mr^2}{2}(2\pi f)^2 = 158\,J$$

Answer: $158\,J$