Problem Session: Chapter 11

Q1.

A 2.0 kg stone is tied to a 0.50 m string and swung around a circle at a constant angular velocity of 12 rad/s. The net torque on the stone about the center of the circle is:

A1 0 N\*m

A2 6.0 N\*m

A3 12 N\*m

A4 72 N\*m

A5 140 N\*m

Q2.

A stone in the form of a uniform circular disk of radius 0.20 m and mass 14 kg can rotate about its axis. Starting from rest, it reaches an angular velocity of 44 rad/s in 10 s under the action of a constant torque. What is the instantaneous power at the end of this time interval?

A1 54 W

A2 110 W

A3 75 W

A4 3 W

A5 0 W

Q3.

A disk has a rotational inertia of 6.0 kg\*m\*\*2 and a constant angular acceleration of 2.0 rad/s\*\*2. If it starts from rest the work done during the first 5.0 s by the net torque acting on it is:

A1 300 J

A2 30 J

A3 120 J

A4 0 J

A5 600 J

Q0

Q4.

A uniform wheel of radius 0.5 m rolls without slipping on a horizontal surface. Starting from rest, the wheel moves with constant angular acceleration 6.0 rad/s\*\*2. The distance traveled by the center of mass of the wheel from t = 0 to t = 3 s is:

A1 13.5 m

A2 27 m

A3 zero m

A4 18 m

A5 none of other answers

Q5.

Fig 6 shows a pulley (R=3.0 cm and Io= 0.0045 kg\*m\*\*2 (suspended from the ceiling. A rope passes over it with a 2.0 kg block attached to one end and a 4.0 kg block attached to the other. When the speed of the heavier block is 2.0 m/s the total kinetic energy of the pulley and blocks is :



A1 22 J

A2 10 J

A3 2 J

A4 16 J

A5 38 J

Q0

Q6.

A 3.0 kg wheel, rolling smoothly on a horizontal surface, has a rotational inertia about its axis= M\*R\*\*2/2, where M is its mass and R is its radius. A horizontal force is applied to the axle so that the center of mass has an acceleration of 2.0 m/s\*\*2. The magnitude of the frictional force of the surface is :

A1 3.0 N

A2 6.0 N

A3 9.0 N

A4 12 N

A5 0 N

Q7.

Fig 7 shows two disks mounted on bearings on a common axis. The first disk has rotational inertia I and is spinning with angular velocity w. The second disk has rotational inertia 2I and is spinning in the same direction as the first disk with angular velocity 2w. The two disks are slowly forced toward each other along the axis until they stick and have a final common angular velocity of:



A1 5\*w/3

A2 w\*sqrt(3)

A3 w

A4 3\*w

A5 2\*w

Q8.

A hoop has a mass of 200 grams and a radius of 25 cm. It rolls without slipping along a level ground at 500 cm/s. Its total kinetic energy is :

A1 5 J

A2 25 J

A3 10 J

A4 2 J

A5 0 J

Q9.

A wheel of radius 0.10 m has a 2.5 m cord wrapped around its outside edge. Starting from rest, the wheel is given a constant angular acceleration of 2.0 rad/s\*\*2. The cord will unwind in:

A1 5.0 s

A2 2.0 s

A3 8.0 s

A4 0.82 s

A5 130 s

Q10.

A thin rod of mass 0.50 kg and length 2.0 m is pivoted at one end and can rotate in a vertical plane about this horizontal frictionless pivot (axis). It is released from rest when the rod makes an angle of 45° above the horizontal (Fig. 7). Find the angular speed of the rod as it passes through the horizontal position.



A) 3.2 rad/s

B) 6.9 rad/s

C) 1.2 rad/s

D) 4.8 rad/s

Q11.

The average power needed to spin ( rotate about its axis) a uniform, solid disk of mass 5.0 kg and radius 0.50 m from rest to a final angular velocity ωf in 3.0 s is 2.6 W. The final angular speed is:

A) 5.0 rad/s

B) 7.0 rad/s

C) 3.0 rad/s

D) 9.0 rad/s

E) 2.0 rad/s

Q12

A sphere of mass 1.40 x102 kg rolls on a horizontal floor so that its center of mass has a speed of 0.150 m/s. How much work must be done on the sphere to stop it?

A) – 2.21 J

B) + 2.21 J

C) – 5.35 J