Physicsaholics

DPP – 4

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Q 1. A fly wheel rotating about a fixed axis has a kinetic energy of 360J. When its angular speed is 30rad/s. The moment of inertia of the wheel about the axis of rotation is
(a) 0.6 kg-m^2 (b) 0.15 kg-m^2
(c) 0.8 kg-m^2 (d) 0.75 kg-m^2

Q 2. A wheel is rotating with an angular speed 20 rad/s. It is stopped to rest by applying constant torque in 4s. If the moment of inertia of the wheel about is axis is 0.20 kg-m^2, then the magnitude of work done by the torque in two seconds will be :
(a) 10 J (b) 20 J
(c) 30 J (d) 40 J

Q 3. Moment of inertia of a ring is 3 kg-m^2. It is rotated for 20 s from its rest position by a torque of 6 N−m. Calculate the work done
(a) 36 J (b) 800 J
(c) 1500 J (d) 2400 J

Q 4. A flywheel is in the form of a uniform circular disc of radius 1 m and mass 2 kg. The work which must be done on it to increase its frequency of rotation from 5 rev/s to 10 rev/s is approximately
(a) 150 J (b) 300 J
(c) 1500 J (d) 3000 J

Q 5. Energy of 1000 J is spent to increase the angular speed of a wheel from 20rad/s to 30rad/s. Calculate the moment of inertia of the wheel.
(a) 4 kg-m^2 (b) 400 kg-m^2
(c) 80 kg-m^2 (d) 300 kg-m^2

Q 6. If the angular momentum of a body increases by 50%, its kinetic energy of rotation increases by
(a) 50 % (b) 25 %
(c) 125 % (d) 100 %

Q 7. A flywheel of moment of inertia 5.0 kg m^2 is rotated at a speed of 60 rad/s. Because of the friction at the axle, it comes to rest in 5.0 minutes. Find the average torque of the friction and the magnitude of angular momentum of the wheel 1 minute before it stops rotating
(a) 1 N-m, 60 (b) 2 N-m, 40
(c) 3 N-m, 20 (d) 4 N-m, 30

Q 8. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes

(a) L (b) L/2

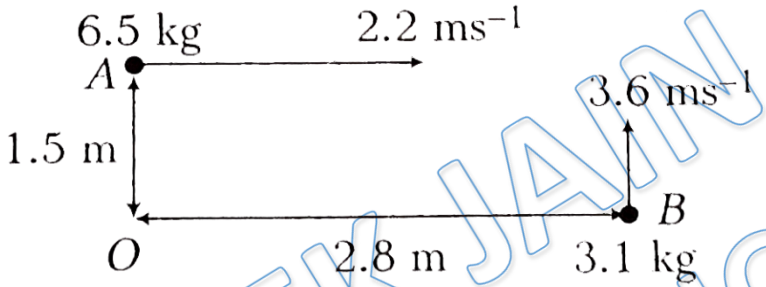
(c) 2L (d) $L/\sqrt{2}$

Q 9. A flywheel of moment of inertia 7.5 kg-m^2 is rotating at 240 revolution per minute; calculate its K.E

(a) 2218 J (b) 2368 J

(c) 1278 J (d) 3288 J

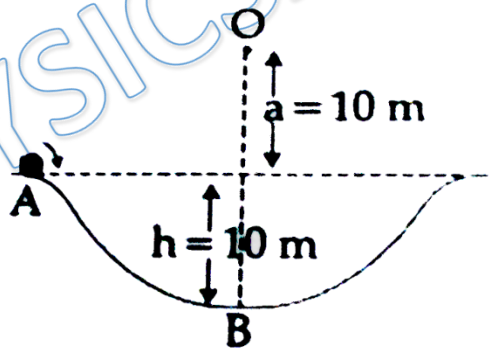
Q 10. Two particle A and B are moving as shown in the figure. Their total angular momentum (in kg-m^2/s) about the point O is



(a) 9.8 (b) zero

(c) 52.7 (d) 37.9

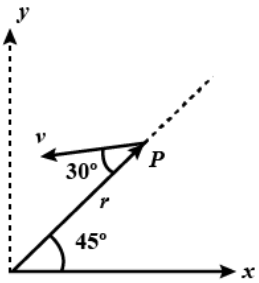
Q 11. A particle of mass 20g is released with an initial velocity 5m/s along the curve from the point A, as shown in the figure. The point A is at height h from point B. The particle slides along the frictionless surface. When the particle reaches point B, its angular momentum about O will be : (Take g=10m/s^2).



(a) 2 kg-m^2/s (b) 8 kg-m^2/s

(c) 6 kg-m^2/s (d) 3 kg-m^2/s

Q 12. A particle P with a mass 2.0 kg has position vector r = 3.0 m and velocity v = 4.0 m/s as shown. It is accelerated by the force = 2.0 N. All these vectors lie in a common plane. The angular momentum vector about origin is



(a) 12 kg-m^2/s out of the plane of the figure
(b) 12 kg-m^2/s into of the plane of the figure
(c) Zero
(d) 24 kg-m^2/s into of the plane of the figure

Q 13. Find angular momentum (in kg-m^2/s) of particle of mass 0.01 kg, position vector $\vec{r}$ =(10$\hat{\imath}$ + 6$\hat{\jmath}$) meter and moving with a velocity 5 $\hat{\imath}$ m/s About the origin

(a) 3 $\hat{\imath}$ (b) $-0.3\ \hat{k}$
(c) $-20\ \hat{k}$ (d) $-3\ \hat{k}$

Answer Key

Q.1 c	**Q.2 c**	**Q.3 d**	**Q.4 c**	**Q.5 a**
Q.6 c	**Q.7 a**	**Q.8 d**	**Q.9 b**	**Q.10 a**
Q.11 c	**Q.12 a**	**Q.13 b**		