

System of Particles and Rotational Motion

Question 1.

A particle performing uniform circular motion has angular momentum L . If its angular frequency is doubled and its kinetic energy halved, then the new angular momentum is

- (a) $L/2$
- (b) $L/4$
- (c) $2L$
- (d) $4L$

▼ Answer

Answer: (b) $L/4$

Question 2.

A car is moving with a speed of 108 km/hr on a circular path of radius 500 m. Its speed is increasing at the rate of 2 m/s. What is the acceleration of the car?

- (a) 9.8 m/s^2
- (b) 2.7 m/s^2
- (c) 3.6 m/s^2
- (d) 1.8 m/s^2

▼ Answer

Answer: (b) 2.7 m/s^2

Question 3.

The moment of inertia of uniform circular disc about an axis passing its centre is 6 kg m^2 . its M.I. about an axis perpendicular to its plane and just touching the rim will be

- (a) 18 kg m^2
- (b) 30 kg m^2
- (c) 15 kg m^2
- (d) 3 kg m^2

▼ Answer

Answer: (a) 18 kg m^2

Question 4.

A particle undergoes uniform circular motion. About which point on the plane of the circle will the angular momentum of the particle remain conserved?

- (a) centre of the circle
- (b) on the circumference of the circle
- (c) inside the circle
- (d) outside the circle

▼ Answer

Answer: (a) centre of the circle

Question 5.

Two particles A and B, initially at rest, move towards each other under a mutual force of attraction. At the instant when the speed of A is u and the speed of B is $2u$, the speed of centre of mass is,

- (a) Zero

- (b) u
- (c) $1.5 u$
- (d) $3 u$

▼ Answer

Answer: (a) Zero

Question 6.

The moment of inertia of a body about a given axis is 1.2 kg metre^2 . Initially, the body is at rest. In order to produce a rotating kinetic energy of 1500 joules, an angular acceleration of 25 radian/sec^2 must be applied about that axis for a duration of

- (a) 4 sec
- (b) 2 sec
- (c) 8 sec
- (d) 10 sec

▼ Answer

Answer: (b) 2 sec

Question 7.

Two discs has same mass rotates about the same axes. r_1 and r_2 are densities of two bodies ($r_1 > r_2$) then what is the relation between I_1 and

- (a) I_2 .
 - (b) $I_1 > I_2$
 - (c) $I_1 < I_2$
 - (d) $I_1 = I_2$
- None of these

▼ Answer

Answer: (b) $I_1 > I_2$

Question 8.

The kinetic energy of a body is 4 joule and its moment of inertia is 2 kg m^2 then angular momentum is

- (a) $4 \text{ kg m}^2/\text{sec}$
- (b) $5 \text{ kg m}^2/\text{sec}$
- (c) $6 \text{ kg m}^2/\text{sec}$
- (d) $7 \text{ kg m}^2/\text{sec}$

▼ Answer

Answer: (a) $4 \text{ kg m}^2/\text{sec}$

Question 9.

A mass is revolving in a circle which is in the plane of the paper. The direction of angular acceleration is

- (a) Upward to the radius
- (b) Towards the radius
- (c) Tangential
- (d) At right angle to angular velocity

▼ Answer

Answer: (c) Tangential

Question 10.

By keeping moment of inertia of a body constant, if we double the time period, then angular momentum of body

- (a) Remains constant
- (b) Becomes half
- (c) Doubles
- (d) Quadruples

▼ [Answer](#)

Answer: (b) Becomes half

Question 11.

If a horizontal cylindrical tube, partly filled with water is rapidly rotated about a vertical axis passing through its centre, the moment of inertia of the water about its axis will

- (a) Decrease
- (b) Increase
- (c) Not change
- (d) Increase or decrease depending upon clock wise or anticlockwise sense of rotation

▼ [Answer](#)

Answer: (b) Increase

Question 12.

The moment of inertia of a copper disc, rotating about an axis passing through its centre and perpendicular to its plane

- (a) Increases if its temperature is increased
- (b) Changes if its axis of rotation is changed
- (c) Increases if its angular velocity is increased
- (d) Both (a) and (b) are correct

▼ [Answer](#)

Answer: (d) Both (a) and (b) are correct

Question 13.

The kinetic energy of a body is 4 joule and its moment of inertia is 2 kg m^2 then angular momentum is

- (a) $4 \text{ kg m}^2/\text{sec}$
- (b) $5 \text{ kg m}^2/\text{sec}$
- (c) $6 \text{ kg m}^2/\text{sec}$
- (d) $7 \text{ kg m}^2/\text{sec}$

▼ [Answer](#)

Answer: (a) $4 \text{ kg m}^2/\text{sec}$

Question 14.

The total energy of rolling ring of mass m and radius R

- (a) $\frac{3}{2} mv^2$
- (b) $\frac{1}{2} mv^2$
- (c) mv^2
- (d) $\frac{5}{2} mv^2$

▼ [Answer](#)

Answer: (c) mv^2

Question 15.

Two blocks of masses 10 kg and 4 kg are connected by a spring of negligible mass and placed on a frictionless horizontal surface. An impulse gives a velocity of 14 m/s to the heavier block in the direction of the lighter block. The velocity of the centre of mass is

- (a) 30 m/s
- (b) 20 m/s
- (c) 10 m/s
- (d) 5 m/s

▼ Answer

Answer: (c) 10 m/s

Question 16.

A child is standing with folded hands at the centre of a platform rotating about its central axis. The kinetic energy of the system is K . The child now stretches his arms so that the moment of inertia of the system doubles. The kinetic energy of the system now is

- (a) $2K$
- (b) $K/2$
- (c) $K/4$
- (d) $4K$

▼ Answer

Answer: (b) $K/2$

Question 17.

Angular momentum is

- (a) A scalar
- (b) A polar vector
- (c) A scalar as well as vector
- (d) An axial vector

▼ Answer

Answer: (d) An axial vector

Question 18.

A particle of mass m is moving with a constant velocity along a line parallel to the +ve direction of the X-axis. The magnitude of its angular momentum w.r.t the origin

- (a) Is zero
- (b) Goes on increasing as x is increased
- (c) Goes on decreasing as x is increased
- (d) Remains constant for all positions of the particle

▼ Answer

Answer: (d) Remains constant for all positions of the particle

Question 19.

A solid sphere is rotating in free space. If the radius of the sphere is increased keeping mass same, which one of the following will not be affected?

- (a) Moment of inertia
- (b) Angular momentum

- (c) Angular velocity
- (d) Rotational kinetic energy

▼ Answer

Answer: (b) Angular momentum

Question 20.

Two circular discs A and B have equal masses and uniform thickness but have densities ρ_1 and ρ_2 such that $\rho_1 > \rho_2$. their moment of inertia is

- (a) $I_1 > I_2$
- (b) $I_1 \gg I_2$
- (c) $I_1 < I_2$
- (d) $I_1 = I_2$

▼ Answer

Answer: (c) $I_1 < I_2$
