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) 2 L
(d) 4 L

▼ 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 6kgm^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 particl 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 corcle
(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, moves 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 2 u, 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 metre². Initially, the body is at rest. In order to produce a rotating kinetic energy of 1500 joules, an angular acceleration of 25 radian/sec² 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. r1 and r2 are densities of two bodies (r1 > r2) then what is the relation between I1 and
(a) I2.
(b) I1 > I2
(c) I1 < I2
(d) I1 = I2
None of these

▼ Answer

Answer: (b) I1 > I2

Question 8.
The kinetic energy of a body is 4 joule and its moment of inertia is 2 kg m² then angular momentum is
(a) 4 kg m²/sec
(b) 5 kg m²/sec
(c) 6 kg m²/sec
(d) 7 kg m²/sec

▼ Answer

Answer: (a) 4 kg m²/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 f 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 kg m^2/sec
(b) 5 kg m^2/sec
(c) 6 kg m^2/sec
(d) 7 kg m^2/sec

▼ Answer

Answer: (a) 4 kg m^2/sec

Question 14.
The total energy of rolling ring of mass m and radius R
(a) 3/2 mv^2
(b) 1/2 mv^2
(c) mv^2
(d) 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 frictionalless 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) 2 K
(b) K/2
(c) K/4
(d) 4 K

▼ 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 r1 and r2 such that r1 > r2. their moment of inertia is
(a) I1 > I2
(b) I1 >> I2
(c) I1 < I2
(d) I1 = I2

▼ Answer

Answer: (c) I1 < I2
