Physicsaholics

Module

Rotation

(Physicsaholics)

Exercise-3

(Miscellaneous Type)

Q 1. If radius of earth is reduced to half without changing its mass:

	Table-1		Table-2
(A)	Angular momentum of earth	(P)	will become four times
(B)	Time period of rotation of earth	(Q)	will remain constant
(C)	Rotational kinetic energy of earth	(R)	will become 1/4 times

Q 2. A 1f on ground without slipping. Velocity of centre of mass is v. There is a point P on circumference of disc at angle θ. Suppose v, is the speed of this point. Then, match the following table:
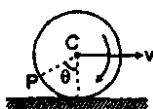

	Table-1		Table-2
(A)	If $\theta = 60°$	(P)	$v_P = \sqrt{2}\, v$
(B)	If $\theta = 90°$	(Q)	$v_P = v$
(C)	If $\theta = 120°$	(R)	$v_P = 2v$
(D)	If $\theta = 180°$	(S)	$v_P = \sqrt{3}\, v$

Directions for Assertion & Reason questions

These questions consist of two statements each, printed as Assertion and Reason. While answering these Questions you are required to choose any one of the following four responses.

(A) If both Assertion & Reason are True & the Reason is a correct explanation of the Assertion.

(B) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.

(C) If Assertion is True but the Reason is False.

(D) If both Assertion & Reason are false.

Q 3. **Assertion:** If earth were to shrink, length of the day would increase.

Reason: Smaller objects would take more time to complete one rotation around its axis.

(1) A   (2) B   (3) C   (4) D

Q 4. **Assertion:** Only rotating bodies can have angular momentum:

Reason : The perpendicular axis theorem only applicable for the axis passing through the centre of mass of the body.

(1) A   (2) B   (3) C   (4) D

Q 5. **Assertion :** A couple does not exert a net force on an object even though it exerts a torque.

Reason : Couple is a pair of two forces with equal magnitude but opposite directions acting simultaneously on a body in different lines of action.

(1) A   (2) B   (3) C   (4) D

Q 6. **Assertion:** The total distance moved by any point on the periphery of a wheel of radius R along the surface in one revolution is 2πR.

Reason: In rolling motion of a wheel, every point on its periphery comes in contact with the surface with zero velocity once in one revolution.

(1) A   (2) B   (3) C   (4) D

Q 7. **Assertion:** To unscrew a rusted nut, we need a pipe wrench with longer arm.

Reason : Wrench with longer arm reduces the force applied on the arm.

(1) A   (2) B   (3) C   (4) D

Q 8. **Assertion:** The condition of equilibrium for a rigid body is-

Translational equilibrium : $\sum \vec{F} = 0$, (i.e. sum of all external forces equal to zero.)

Rotational equilibrium : $\sum \vec{\tau} = 0$, (i.e. sum of all external forces equal to zero.)

Reason : A rigid body must be in equilibrium under the action of two equal and opposite forces.

(1) A   (2) B   (3) C   (4) D

Q 9. **Assertion :** For the purpose of calculation of moment of inertia, body's mass can be assumed to be concentrated at its centre of mass.

Reason : Moment of inertia of rigid body about an axis passing through its centre of mass is zero.

(1) A   (2) B   (3) C   (4) D

Q 10. **Assertion :** Many great rivers flows toward the equator. The small particle that they carry increases the time of rotation of the earth about its own axis.

Reason : The angular momentum of the earth about its rotation axis is conserved.

(1) A   (2) B   (3) C   (4) D

Q 11 . **Assertion :** The spokes near the top of a rolling bicycle wheel are more blurred than those near the bottom of the wheel.

Reason : The spokes near the top of wheel are moving faster than those near the bottom of the wheel.

(1) A   (2) B   (3) C   (4) D

Q 12. **Assertion :** A wheel moving down a perfectly frictionless inclined plane will undergo slipping (not rolling).

Reason : For pure rolling, work done against frictional force is zero.

(1) A   (2) B   (3) C   (4) D

Q 13. **Assertion :** Angular momentum about a point may not necessarily be parallel to angular velocity vector.

Reason : The body may not be symmetrical about its axis of rotation.

(1) A   (2) B   (3) C   (4) D

Q 14. **Assertion :** As star collapse its angular velocity increases.

Reason : The mass of star decreases

(1) A   (2) B   (3) C   (4) D

Answer Key

Q.3) 4	Q.4) 4	Q.5) 1	Q.6) 1	Q.7) 1
Q.8) 3	Q.9) 4	Q.10) 1	Q.11) 1	Q.12) 2
Q.13) 1	Q.14) 3			

Q.1) A→Q, B→R, C→P

Q.2) A→Q, B→P, C→S, D→R