System of Particles and Rotational Motion

1. **Assertion (A):** In any kind of collision, kinetic energy cannot be same throughout.
Reason (R): In elastic collision kinetic energy remains constant throughout.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** In a perfectly inelastic collision there is a limit to the loss of kinetic energy of colliding bodies.
Reason (R): In perfectly inelastic collision, linear momentum of system is conserved.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Centre of mass of a body in pure rolling on a horizontal surface always moves in a straight line.
Reason (R): Centre of mass of a body must be inside the body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

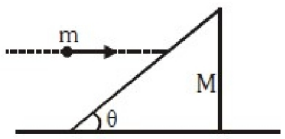
4. **Assertion (A):** In two particle system when viewed from center of mass reference frame, if one particle stops then other one will also stop simultaneously, irrespective of external forces acting on system
Reason (R): Centre of mass of a system is a point about which total momentum of system is always constant and non-zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Two particles undergo rectilinear motion along different straight lines. Then the centre of mass of system of given two particles also always moves along a straight line.
Reason (R): If direction of net momentum of a system of particles (having nonzero net momentum) is fixed, the centre of mass of given system moves along a straight line.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** A half filled bottle is more stable than a fully filled identical bottle when kept in upright position.
Reason (R): A half filled bottle has lesser mass than a fully filled bottle. (The fluid and bottles are identical).
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Two objects are moving towards each other due to mutual attraction. The kinetic energy of the system remains constant.
Reason (R): Total linear momentum of the system consisting both the objects remain constant even in the presence of external forces.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. A particle of mass m strikes a wedge of mass M horizontally as shown in the figure.



Assertion (A): If collision is perfectly inelastic then, it can be concluded that the particle sticks to the wedge.

Reason (R): In perfectly inelastic collision velocity of both bodies is same along common normal just after collision.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. Consider a one-dimensional head on collision of two balls.

Assertion (A): The loss in kinetic energy of the system during the collision does not depend on the velocity of the observer.

Reason (R): Kinetic energy of a body is independent of velocity of observer.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

10. **Assertion (A):** When one object collides with another object, the impulse during deformation and reformation will be in same direction on one particular object.

Reason (R): Due to deformation impulse the objects first deform and due to the same reformation impulse, they again try to regain its original shape.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

11. Assertion and Reason are on a situation of a frog jumping vertically up on a rigid floor.

Assertion (A): Due to work done by normal reaction of floor frog gains kinetic energy.

Reason (R): Normal reaction by ground accelerates centre of mass of frog.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

12. **Assertion (A):** Maximum energy loss occurs when the particles get stuck together as a result of collision.

Reason (R): A point particle of mass m moving with speed v collides with stationary point particle of mass M. Then the maximum energy loss possible is given $\left(\frac{m}{m+M}\right)\left(\frac{1}{2}mv^2\right)$

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

13. **Assertion (A):** In case of bullet fired from a gun, the ratio of kinetic energy of gun and bullet is equal to ratio of masses of bullet and gun.

Reason (R): In firing of bullet, linear momentum of system is conserved.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

14. **Assertion (A):** The centre of mass of a system of two particles is closer to the heavier particle.
Reason (R): Algebraic sum of mass moments about centre of mass is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Value of radius of gyration of a body depends on axis of rotation.
Reason (R): Radius of gyration is rms distance of particles of the body from the axis of rotation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Kinetic energy of a rigid body can be greater than $\frac{1}{2}mv^2$, where m is mass of rigid body & v is speed of centre of mass of body.
Reason (R): Kinetic energy of a particle (point mass) cannot be greater than $\frac{1}{2}mv^2$, where m is mass of particle & v is speed of particle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

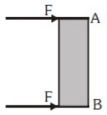
17. **Assertion (A):** A disc rolls without slipping on a fixed rough horizontal surface. Then there is no point on the disc whose velocity is in vertical direction.
Reason (R): Rolling motion can be taken as combination of translation and rotation. Due to the translational part of motion a velocity (translational component) exist in horizontal direction for any point on the disc rolling on a fixed rough horizontal surface.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** By definition, pure rolling of a body occurs when velocity of its point of contact is zero relative to the surface on which it rolls.
Reason (R): A body is purely rolling (rolling without slipping). The velocity of point of contact (of body) must be zero with respect to ground.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Two cylinders, one hollow (metal) and the other solid (wood) with the same mass and identical dimensions are simultaneously allowed to roll without slipping down an inclined plane from the same height. The solid cylinder will reach the bottom of the inclined plane first.
Reason (R): By the principle of conservation of energy, the total kinetic energies of both the cylinders are identical when they reach the bottom of the incline.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** When the body is rolling purely, the velocity of the point of contact should be zero relative to the surface in contact.
Reason (R): Friction is necessary for a body to roll purely on a level horizontal ground.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Net torque about point B is of all real forces is not zero.



Reason (R): Because it will rotate about point B.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** 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 torques equal to zero.)
Reason (R): A rigid body must be in equilibrium under the action of two equal and opposite forces.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

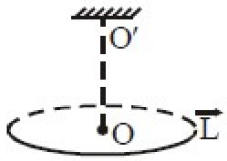
23. **Assertion (A):** A cyclist always bends inwards while negotiating a curve
Reason (R): By bending he lowers his centre of gravity
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** A wheel slides downward on frictionless inclined plane, without rolling.
Reason (R): In pure rolling work done against friction always zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** If a sphere starts pure rolling down a rough incline plane, work done by friction is zero.
Reason (R): Work done by friction for translational motion is negative and work done by friction for rotational motion is positive and equal in magnitude.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** A solid copper and solid aluminium sphere of same masses are spinning about their axes with same angular velocities copper sphere has more angular momentum than aluminium.
Reason (R): Both copper and aluminium sphere have same radius.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** In a conical pendulum angular momentum of bob $\vec{L}$ remains constant with respect to O centre of circle swept by it.



Reason (R): Net torque $(\vec{\tau}_{net})$ about centre O is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Speed of any point on a rigid body in pure rolling can be calculated by expression $v = r\omega$, where r = distance of point from instantaneous centre of rotation.
Reason (R): Pure rolling of rigid body can be considered as a pure rotation about instantaneous centre of rotation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** A sphere rolls down a rough inclined plane without slipping. It gains rotational K.E due to friction.
Reason (R): In this situation, work done by static friction is negative.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** If there is no external torque on a body about its centre of mass, then the velocity of the center of mass remains constant.
Reason (R): The angular momentum of a system always remains constant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** When a sphere is rolls on a horizontal table it slows down and eventually stops.
Reason (R): When the sphere rolls on the table, both the sphere and the surface deform near the contact. As a result, the normal force does not pass through the centre and provide an angular deceleration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** A ladder is more likely to slip when a person is near the top than when he is near the bottom.
Reason (R): The friction between the ladder and floor decreases as he climbs up.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. A sphere is performing pure rolling on a rough horizontal surface with constant angular velocity.
Assertion (A): Frictional force acting on the sphere is zero.
Reason (R): Velocity of contact point is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** Moment of inertia about an axis passing through center of mass is maximum.
Reason (R): Theorem of parallel axis can be applied only for two dimensional body of negligible thickness.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** If earth shrink (without change in mass) to half its present size, length of the day would become 6 hours.
Reason (R): As size of the earth changes its moment of inertia changes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** When the disc rolls without slipping, friction is required because condition of pure rolling is velocity of point of contact is zero.
Reason (R): The force of friction in the case of a disc rolling without slipping down an inclined plane is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

37. **Assertion (A):** It is more difficult to open the door by applying the force near the hinge.
Reason (R): Torque is maximum at hinge.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

38. **Assertion (A):** Angular momentum of a body may remain conserved even when moment of inertia of body changes.
Reason (R): Angular momentum of a body does not depend upon moment of inertia of the body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

39. **Assertion (A):** In case of rolling without sliding, friction force can act in forward and backward direction both.
Reason (R): The angular momentum of a system will be conserved only about that point about which external angular impulse is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

40. **Assertion (A):** A body is rolling without slipping on a surface. There must be frictional force to start such a motion.
Reason (R): In rolling without slipping, work done against the frictional force is zero on rolling body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

41. **Assertion (A):** If the moment of inertia of a non-uniform thin circular ring is same about two different axes parallel to each other and lying in the plane of ring, then both the axis can be at same distance from geometrical centre of the ring.
Reason (R): From parallel axis theorem $I = I_{cm} + md^2$, (where terms have usual meaning). Moment of inertia of a body about two axes parallel to each other and at a same distance from centre of mass of the body is same.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

42. **Assertion (A):** A ballet dancer increases or decreases the angular velocity of spin, about the vertical axis by pulling in or extending out her limbs.
Reason (R): $L = I\omega$ which is constant about rotational axis where symbols have their usual meaning.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

43. **Assertion (A):** It will be much easier to accelerate a merry-go-round full of children if they stand close to its axis then if they all stand at the outer edge.
Reason (R): For larger moment of inertia, the angular acceleration is small for riven torque.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

44. **Assertion (A):** Inertia and moment of inertia are same quantities.
Reason (R): Moment of inertia represents the capacity of a rigid body to oppose its state of translatory motion.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

45. **Assertion (A):** For the purpose of calculation of moment of inertia, body's mass can be assumed to be concentrated at its centre of mass.
Reason (R): Moment of inertia of a rigid about an axis passing through its centre of mass is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

46. **Assertion (A):** A sphere is placed such that is its centre is at origin of coordinate system. If I_x and I_y be the moment of inertia about x-axis and y-axis respectively then moment of inertia about z-axis is $I_x + I_y$
Reason (R): For any body according to perpendicular axis theorem $I_z = I_x + I_y$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

47. A sphere is rotating about a diameter with constant angular acceleration α.
Assertion (A): All the particles on the surface have same linear acceleration.
Reason (R): All the particles on the surface have same linear speed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

48. **Assertion (A):** A disc is rolling on a rough horizontal surface without slipping. The velocity of centre of mass is v. Then all the other points on the disc lying on a circular arc with point of contact as the center and this arc passing through center of mass of disc will have the same speed v.
Reason (R): When a disc is rotating without sliding on a rough horizontal surface the magnitude of velocities of all the points at a distance r from point of contact is same.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

49. **Assertion (A):** Moment of inertia of a rigid body is not unique.
Reason (R): Moment of inertia of a rigid body depends on the distribution of mass about the axis of rotation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

50. **Assertion (A):** A body rolling without slipping has only rotational kinetic energy.
Reason (R): The centre of mass of a rolling body docs not move forward.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

51. **Assertion (A):** Angular velocity of the seconds hand of a watch is $\frac{\pi}{30}$ rad / s.

Reason (R): Angular velocity is equal to $\frac{2\pi}{T}$ where T is the time period.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

52. **Assertion (A):** If two different axes are at same distance from the centre of mass of a rigid body then moment of inertia of the given rigid body about both the axes will always be equal.

Reason (R): According to perpendicular axis theorem $I = I_{cm} + Md^2$ where symbols have their usual meaning.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

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

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

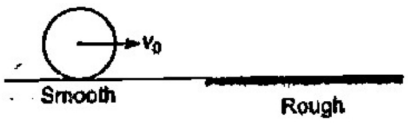
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

54. A sphere moving with a velocity v_0 on a smooth surface suddenly enters on a rough horizontal surface as shown in figure.



Assertion (A): The sphere loses translational kinetic energy and gains rotational kinetic energy.

Reason (R): Friction force acts in forward direction.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

55. **Assertion (A):** If total external torque on a rigid system is zero, its angular momentum remains constant.

Reason (R): The change in angular momentum is equal to the angular impulse of the resultant torque,

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

56. **Assertion (A):** For a system of particles under central force field, the total angular momentum is conserved.

Reason (R): The torque acting on such a system is zero.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	3	1	4	3	4	2	4	4	3	3	4	3	1	1	3	2	4	3	2	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	3	3	2	2	3	4	1	1	3	4	1	3	2	4	2	4	3	3	2	4
Que.	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**				
Ans.	1	1	1	4	4	4	4	1	1	4	1	4	2	3	1	1				