

## CHAPTER-6 | Systems of Particles and Rotational Motion

QUIZ  
PART-01

1. A rigid body is defined as:

- A. A body whose shape changes under force
- B. A body in which distance between any two particles remains constant
- C. A body that cannot rotate
- D. A body without mass (B)

**Explanation :** A rigid body maintains constant distance between its particles irrespective of external forces.

2. Which of the following represents rolling motion?

- A. Pure translation
- B. Pure rotation
- C. Translation + Rotation
- D. Oscillation (D)

**Explanation :** Rolling is a combination of translatory and rotational motion, e.g., a wheel rolling on a road.

3. The point where the entire mass of a system of particles is imagined to be concentrated is called:

- A. Centre of gravity
- B. Moment arm
- C. Centre of mass
- D. Axis of rotation (C)

**Explanation :** Centre of mass simplifies analysis of motion by treating distributed mass as if concentrated at a single point.

4. For a system of two particles with masses  $m_1$  and  $m_2$  at positions  $r_1$  and  $r_2$ , the centre of mass lies at:

- A.  $(m_1 + m_2) / (r_1 + r_2)$
- B.  $(m_1 r_1 + m_2 r_2) / (m_1 + m_2)$
- C.  $m_1 r_1 - m_2 r_2$
- D.  $(r_1 + r_2) / 2$  (B)

**Explanation :** The weighted average position formula is used, where heavier mass pulls CM closer to itself.

5. The centre of mass of a uniform thin rod of length  $L$  lies at:

- A. One-fourth of its length from one end
- B. One-third of its length from one end
- C. Midpoint of the rod
- D. End of the rod (C)

**Explanation :** By integration, CM of a uniform rod lies at  $L/2$  from either end.

6. The centre of mass of a uniform circular ring lies:

- A. On the circumference
- B. At the centre of the ring
- C. On any diameter
- D. At infinity (B)

**Explanation :** Due to symmetry, all mass elements are equidistant from the centre, so CM lies at the geometric centre.

7. The intersection of diagonals gives the centre of mass for which shape?

- A. Sphere
- B. Cylinder
- C. Rectangular plane lamina
- D. Circular disc (C)

**Explanation :** Symmetry ensures the diagonals bisect the plane evenly, so CM is at their intersection.

8. The centre of mass of a uniform sphere lies:

- A. At the centre
- B. On its surface
- C. At one-fourth of the radius from surface
- D. Outside the sphere (A)

**Explanation :** Uniform distribution in all directions ensures CM is at the geometric centre.

9. Which motion does a ceiling fan represent?

- A. Translatory
- B. Rotational
- C. Rolling
- D. Random (B)

**Explanation :** The blades rotate about a fixed axis, which is characteristic of pure rotational motion.

10. The combination of translatory and rotational motion of a rigid body is called:

- A. Angular motion
- B. Axis motion
- C. Frictional motion
- D. Rolling motion (D)

**Explanation :** When a body rolls (like a ball on a floor), both translation of the centre and rotation about the axis occur.