

UNIT- 5 – MOTION OF SYSTEM OF PARTICLES AND RIGID BODIES

I. Answer the Following (2/3 marks)

1. Define centre of mass.
2. Find out the centre of mass for the given geometrical structures:
a) Equilateral triangle b) Cylinder c) Square
3. Define torque of motion its unit.
4. What are the conditions in which force cannot produce torque?
5. Give any two examples of torque in daily life.
6. Define couple.
7. What is equilibrium?
8. Distinguish between stable and unstable equilibrium.
9. State principle of moments.
10. Define centre of Gravity.
11. Mention any two-physical significance of moment of inertia.
12. What is radius of gyration?
13. State conservation of angular momentum.
14. What are the rotational equivalents for the physical quantities, (i) mass and (ii) force?
15. What is the condition for pure rolling?
16. What is the difference between sliding and slipping?

II. Answer the Following (5 marks)

1. Derive the relation between torque of angular acceleration.
2. Derive the relation between angular momentum of angular velocity.
3. Explain the method to find the centre of gravity of a irregularly shaped lamina.
4. Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity.
5. Derive the expression for moment of inertia of a rod about its centre and perpendicular to the rod.
6. Derive the expression for moment of inertia of a uniform disc about an axis passing through the centre and perpendicular to the plane.
7. Discuss conservation of angular momentum with example.
8. State and prove parallel axis theorem.
9. State and prove perpendicular axis theorem.
10. Arrive at the expression for Kinetic Energy in rotation.
11. Discuss rolling on inclined plane and arrive at the expression for the acceleration.