Worksheet: System of Particles and Rotational Motion

ISC · Class 11 · Physics · 9 questions · 27 marks

Name: _____ Date: _____ Score: _____ / 27

Q1. Masses 2 kg and 3 kg are at (1,0) and (4,0) m. Find the centre of mass. *[2 marks]*

Q2. Three point masses 1 kg, 2 kg and 3 kg are placed at (0,0), (2,0) and (0,3) m respectively. Find the coordinates of the centre of mass. *[2 marks]*

Q3. A solid cylinder of mass 20 kg and radius 0.25 m rotates about its own axis. Find its moment of inertia and its radius of gyration. *[3 marks]*

Q4. A torque of 10 N m acts on a body with I = 5 kg m^2 for 4 s from rest. Find the angular velocity attained. *[3 marks]*

Q5. A uniform rod of length 2 m and weight 20 N rests horizontally on two supports, one at each end. A 30 N weight hangs 0.5 m from the left end. Find the reaction force at each support. *[3 marks]*

Q6. Two point masses of 2 kg each are fixed at the ends of a light rod of length 1 m. Find the moment of inertia of the system about an axis through the centre of the rod, perpendicular to it. *[3 marks]*

Q7. A diver with I = 15 kg m^2 spins at 3 rad/s tucked, then straightens to I = 25 kg m^2. Find the new angular velocity. *[3 marks]*

Q8. A solid sphere rolls down a 10 m high incline. Find its speed at the bottom (g = 10 m/s^2). *[5 marks]*

Q9. A man stands at the centre of a rotating platform holding a 5 kg mass in each hand, 0.8 m from the axis. The platform-plus-man system (excluding the masses) has I = 2 kg m^2 and spins at 2 rad/s. He pulls both masses in to 0.2 m from the axis. Find the new angular speed. *[3 marks]*