I.M PRACTICE PAPER [CLASS 11th]
Rotational Motion & Work Power Energy

Q1. State & prove theorem of parallel axes? 3

Q2. If earth shrinks to half of its present radius, the time period of rotation increase or decrease?   1

Q3. Define radius of gyration? Find radius of gyration "K" of solid sphere about any diameter?2

Q4. A ring, disc and a sphere all of the same radius and same mass rolls down an inclined plane from the same height h, which of them reaches the bottom (i) Earliest ? 1

Q5. A solid cylinder of mass 20 kg rotates about its axis with angular speed 100 s-1.The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder? What is the magnitude of the angular momentum of the cylinder about its axis?(Ans:62.5 joules)

Q6: A fly wheel rotating at a speed of 600 rpm about its axis is brought to rest by applying a constant torque for 10 seconds. Find the angular deceleration and angular velocity 5 second after the application of the torque?

Q7. In HCl molecule the separation between the nuclei of two atoms is 1.27 Å. Find the approximation location of center of mass. Given that chlorine atom is about 35.5 times massive as hydrogen atom and nearly all the mass are concentrated at the centre in its nucleus? 2

Q8. Given $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}$ and .Find magnitude of $\vec{A}$ in direction of $\vec{B}$? 2

Q9. Find the relation between angular momentum and moment of inertia? 2

Q10. Find the relation for moment of inertia of disc about perpendicular axis passing its centre   Also Find.(i) Moment of inertia about any diameter (ii) about tangent parallel to diameter.(iii) about tangent parallel to an axes passing through its center and perpendicular to its plane? 4

Q11. Define collision? Find r/l for elastic collision in one dimension? Also find relation for velocities when two bodies of equal mass collide with each other but coming from opposite direction?3

Q12. State and explain work energy theorem? 3

Q13.Show that gravitational forces are conservative forces? 2

Q14. A lighter and heavy body has same momentum which one has large K.E.? 2

Q15. If the momentum of a body is increased by 50% what is its % change in K.E.? 3

Q16.A trolley of mass 300 kg carrying a sandbag of 25 kg is moving uniformly with a speed of 27 km/h on a frictionless track. After a while, sand starts leaking out of a hole on the floor of the trolley at the rate of 0.05 kg s-1. What is the speed of the trolley after the entire sand bags empty ?

Q17. A molecule in a gas container hits a horizontal wall with speed 200 m s^{-1} and angle 30^0 with the normal, and rebounds with the same speed. Is momentum conserved in the collison ? Is the collision elastic or inelastic ?