

ASSIGNMENT- PHYSICS

CLASS XI

SYSTEM OF PARTICLES AND ROTATIONAL MOTION

1. Why an ice skater or a ballet dancer does sometimes stretches their hands and sometimes brings them closer to the body while performing their routines?
2. If angular momentum is conserved in a system whose moment of inertia is decreased, will its rotational kinetic energy be also conserved?
3. Two circular discs A and B of the same mass and same thickness are made of two different metals whose densities are d_A and d_B ($d_A > d_B$). Their moments of inertia about the axes passing through their centres of gravity and perpendicular to their planes are I_A and I_B . Which is greater; I_A or I_B ?
4. Torques of equal magnitude is applied to hollow cylinder and a solid sphere, both having the same mass and radius. The cylinder is free to rotate about its standard axis of symmetry and the sphere is free to rotate about an axis passing through its centre. What is the ratio of their angular acceleration?
5. A ring, a disc and a sphere all of the same radius and mass roll down an inclined plane from the same height h . Which of the three reaches the bottom (i) earliest (ii) latest?
6. A ring, a disc and a sphere all of the same radius and mass roll down an inclined plane from the same height h without slipping. They start from rest. Which of the three reaches the bottom with maximum velocity?
7. A solid sphere rolls down two different inclined planes of same heights but different angles of inclination.
 - (i) Will it reach the ground with the same speed in each case?
 - (ii) Will it take longer to roll down one plane than another? If so, which one and why?
8. What is the moment of inertia of a uniform circular disc and circular ring of radius R and mass M about
 - (i) Diameter of the disc and ring
 - (ii) An axis passing through a point on its edge and normal to the disc?
 - (iii) A tangent in the plane of the disc and ring. M.I. about an axis passing through its centre and perpendicular to it is $\frac{1}{2} MR^2$ and MR^2 .
9. Two particles of mass 2kg and 1kg are moving along the same straight line with speeds of 2m/s and 5m/s respectively. What is the speed of the centre of mass of the system if both the particles are moving (i) in same direction and (ii) in opposite direction? [3m/s, 1/3 m/s]
10. What will be the duration of the day, if earth suddenly shrinks to $1/64$ th of its original volume? [1.5 hr]
11. Energy of 484 J is spent in increasing the speed of a flywheel from 60 to 360 rpm. Calculate MI of Flywheel. [0.7kgm²]
12. A disc of mass 5 kg and radius 50 cm rolls on the ground at the rate of 10m/s. Calculate the K.E. of the disc. (Given $I = \frac{1}{2} MR^2$). [375 J]
13. A particle starts rotating from rest according to the formula $\theta = 3t^3/20 - t^2/3$. Calculate the angular Velocity and angular acceleration after 5 seconds. [7.92 rad/s, 3.83 rad/s²]
14. A spherical ball rolls on a table without slipping. Determine the percentage of its K.E. which is Rotational. M.I. of sphere = $\frac{2}{5} MR^2$. [28.57%]