St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1st

Solution of Work Sheet – 26

Class – XI | Subject – Physics | Date – 25.07.20

Chapter – Dynamics of rigid body | Topic – Moment of inertia

Choose the correct option for the following questions. $1 \times 15 = 15$

1. A person stands on a rotating platform has his hands lowered. He suddenly outstretches his arms. The angular velocity –
   a. Becomes zero
   b. Decreases
   c. Increases
   d. Remains same
2. The ratio of the rotational and translational kinetic energies of a sphere is –
   a. 2/9
   b. 2/7
   c. 2/5
   d. 2/3
3. A constant torque of 31.4N-m is exerted on a pivoted wheel. If the angular acceleration is 4π rad/s^2, then the moment of inertia of it is –
   a. 3.5 kg m^2
   b. 2.5 kg m^2
   c. 4.5 kg m^2
   d. 5.5 kg m^2
4. A wheel of moment of inertia $5 \times 10^{-3} kg\ m^2$ is making 20 revolution per sec. it is stopped in 20 sec. the angular retardation is –
   a. 2π rad/s^2
   b. 8π rad/s^2
   c. 4π rad/s^2
   d. π rad/s^2
5. Moment of inertia of a thin circular disc of mass M and radius R about any diameter is –
   a. $\frac{MR^2}{4}$
   b. $\frac{MR^2}{2}$
   c. MR^2
   d. $2\,MR^2$
6. A disc is rotating with angular speed w. if a child sits on it, which of the following is conserved?
   a. Angular momentum
   b. Kinetic energy
   c. Potential energy
   d. Linear momentum

7. The moment of inertia of a body about a given axis is 1.2 kg-m^2. To produce a rotational kinetic energy of 1500J, an angular acceleration of 25 rad/s^2 must be applied about that axis for the duration of
   a. 4sec
   b. 8sec
   c. 10se
   d. 2sec
8. The moment of inertia of a solid cylinder of mass m and radius r about a line parallel to the axis of the cylinder but lying on the surface of the cylinder is –
   a. $\frac{2}{5}mr^2$
   b. $\frac{3}{5}mr^2$
   c. $\frac{3}{2}mr^2$
   d. $\frac{5}{2}mr^2$
9. A solid spherical ball rolls on a table, ratio of rotational kinetic energy to the total kinetic energy is –
   a. 7/10
   b. 2/7
   c. ½
   d. 1/6
10. The moment of inertia of a regular circular disc of mass 0.4kg and radius 1m about an axis perpendicular to the plane of the disc and passing through its centre is –
   a. 0.2 kg m^2
   b. 0.02 kg m^2
   c. 2 kg m^2
   d. 0.002 kg m^2
11. One quarter sector is cut from a uniform circular disc of radius r. the mass of this portion is m. what is the moment of inertia of this portion about the axis passing through the centre and perpendicular to the plane of it is
   a. $\frac{1}{2}mr^2$
   b. $\frac{1}{4}mr^2$
   c. $\frac{1}{8}mr^2$
   d. $\sqrt{2}mr^2$
12. The least coefficient of friction for an inclined plane of inclination θ needed such that a solid cylinder will roll down with out slipping is –
   a. $\frac{2}{3}\tan\theta$
   b. $\frac{2}{7}\tan\theta$
   c. $\frac{1}{3}\tan\theta$
   d. $\frac{5}{7}\tan\theta$
13. For a hollow cylinder and solid cylinder of same mass and same radius, rolling without slipping on an inclined plane, which one reaches ground earlier?
   a. Hollow cylinder
   b. Solid cylinder
   c. Both simultaneously
   d. can not be predicted

14. A ring and a disc have the same mass and radius. The ratio of their moments of inertia about the axes passing through their centre of mass will be –
    a. 1:1
    b. 2:1
    c. 4:1
    d. 1:2
15. A solid sphere, a hollow sphere and a solid cylinder, all of the same radius and mass, roll down one inclined plane with out slipping from same height. Which of them takes least time to reach ground?
    a. Hollow sphere
    b. Solid sphere
    c. Solid cylinder
    d. All reach simultaneously

Name of the teacher – Soumitra Maity