# 11th PHYSICS – ( VOLUME – I ) BOOK BACK ONE MARK

## LESSON - 1

**1.** One of the combinations from the fundamental physical constants is $\frac{hc}{G}$ . Th e unit of this expression is
(a) $kg^2$ (b) $m^3$ (c) $s^{-1}$ (d) m

**2.** If the error in the measurement of radius is 2%, then the error in the determination of volume of the sphere will be
(a) 8% (b) 2% (c) 4% (d) 6%

**3.** If the length and time period of an oscillating pendulum have errors of 1% and 3% respectively then the error in measurement of acceleration due to gravity is
(a) 4% (b) 5% (c) 6% (d) 7%

**4.** The length of a body is measured as 3.51 m, if the accuracy is 0.01 m, then the percentage error in the measurement is
(a) 351% (b) 1% (c) 0.28% (d) 0.035%

**5.** Which of the following has the highest number of significant figures?
(a) 0.007 $m^2$ (b) $2.64 \times 10^{24}$ kg (c) 0.0006032 $m^2$ (d) 6.3200 J

**6.** If π = 3.14, then the value of $\pi^2$ is
(a) 9.8596 (b) 9.860 (c) 9.86 (d) 9.9

**7.** Which of the following pairs of physical quantities have same dimension?
a) force and power b) torque and energy c) torque and power d) force and torque

**8.** The dimensional formula of Planck's constant h is
(a) $[ML^2T^{-1}]$ (b) $[ML^2T^{-3}]$ (c) $[MLT^{-1}]$ (d) $[ML^3T^{-3}]$

**9.** The velocity of a particle *v* at an instant t is given by $v = at + bt^2$. The dimensions of *b* is
(a) [L] (b) $[LT^{-1}]$ (c) $[LT^{-2}]$ (d) $[LT^{-3}]$

**10.** The dimensional formula for gravitational constant *G* is [Related to AIPMT 2004]
(a) $[ML^3T^{-2}]$ (b) $[M^{-1}L^3T^{-2}]$ (c) $[M^{-1}L^{-3}T^{-2}]$ (d) $[ML^{-3}T^2]$

**11.** The density of a material in CGS system of units is 4 g $cm^{-3}$ . In a system of units in which unit of length is 10 cm and unit of mass is 100 g, then the value of density of material will be
(a) 0.04 (b) 0.4 (c) 40 (d) 400

**12.** If the force is proportional to square of velocity, then the dimension of proportionality constant is
(a) $[MLT^0]$ (b) $[MLT^{-1}]$ (c) $[ML^{-2}T]$ (d) $[ML^{-1}T^0]$

**13.** The dimension of $(\mu_0 \varepsilon_0)^{-1/2}$ is
(a) length (b) time (c) velocity (d) force

**14.** Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are taken as three fundamental constants. Which of the following combinations of these has the dimension of length?.
(a) $\frac{\sqrt{hG}}{c^{\frac{3}{2}}}$ (b) $\frac{\sqrt{hG}}{c^{\frac{5}{2}}}$ (c) $\sqrt{\frac{hc}{G}}$ (d) $\sqrt{\frac{Gc}{h^{\frac{3}{2}}}}$

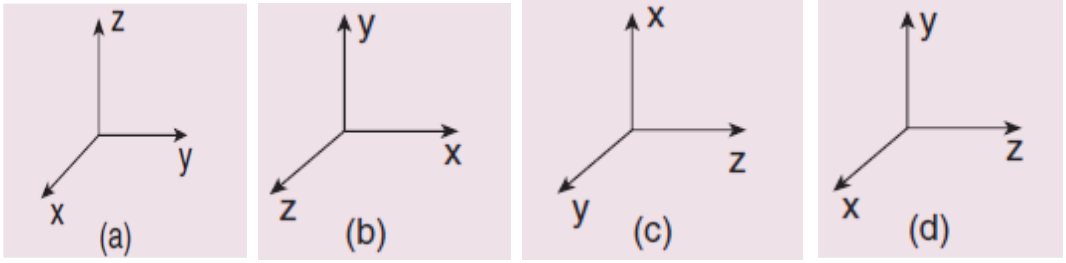
**15.** A length-scale (*l*) depends on the permittivity ( $\varepsilon$ ) of a dielectric material, Boltzmann constant ($k_B$), the absolute temperature (*T*), the number per unit volume (*n*) of certain

charged particles, and the charge ($q$) carried by each of the particles. Which of the following expression for $l$ is dimensionally correct?

(a) $l = \sqrt{\frac{nq^2}{\varepsilon k_B T}}$ (b) $l = \sqrt{\frac{\varepsilon k_B T}{nq^2}}$ (c) $l = \sqrt{\frac{q^2}{\varepsilon n^{\frac{3}{2}} k_B T}}$ (d) $l = \sqrt{\frac{q^2}{\varepsilon n k_B T}}$

## LESSON – 2

**1.** Which one of the following Cartesian coordinate systems is not followed in physics?




**2.** Identify the unit vector in the following.

(a) $\hat{i} + \hat{j}$ (b) $\frac{\hat{i}}{\sqrt{2}}$ (c) $\hat{k} - \frac{\hat{j}}{\sqrt{2}}$ (d) $\frac{\hat{i} + \hat{j}}{\sqrt{2}}$

**3.** Which one of the following physical quantities cannot be represented by a scalar?

(a) Mass (b) length (c) momentum (d) magnitude of acceleration

**4.** Two objects of masses $m_1$ and $m_2$ fall from the heights $h_1$ and $h_2$ respectively. The ratio of the magnitude of their momenta when they hit the ground is (AIPMT 2012)

(a) $\sqrt{\frac{h_1}{h_2}}$ (b) $\sqrt{\frac{m_1 h_1}{m_2 h_2}}$ (c) $\frac{m_1}{m_2}\sqrt{\frac{h_1}{h_2}}$ (d) $\frac{m_1}{m_2}$

**5.** If a particle has negative velocity and negative acceleration, its speed

(a) increases (b) decreases (c) remains same (d) zero

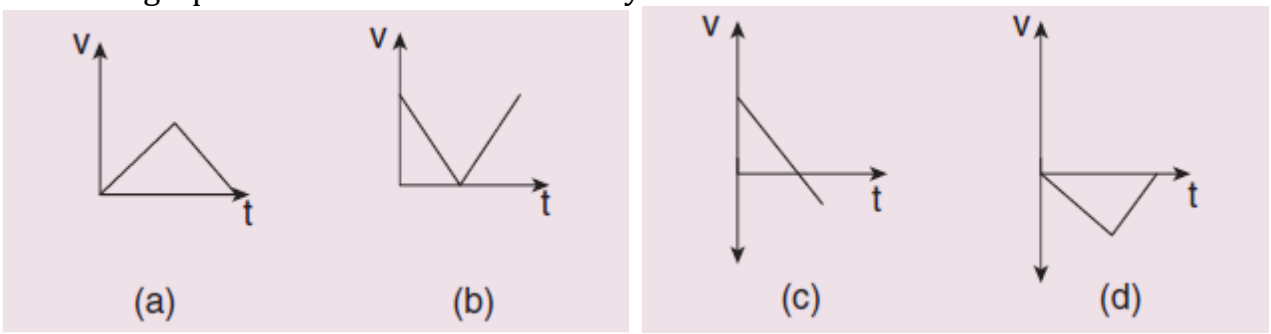
**6.** If the velocity is $\vec{v} = 2\hat{i} + t^2\hat{j} - 9\hat{k}$ , then the magnitude of acceleration at t = 0.5 s is

(a) 1m $s^{-2}$ (b) 2 m $s^{-2}$ (c) zero (d) -1 m $s^{-2}$

**7.** If an object is dropped from the top of a building and it reaches the ground at t = 4 s , then the height of the building is (ignoring air resistance) (g = 9.8 $ms^{-2}$)

(a) 77.3 m (b) 78.4 m (c) 80.5 m (d) 79.2 m

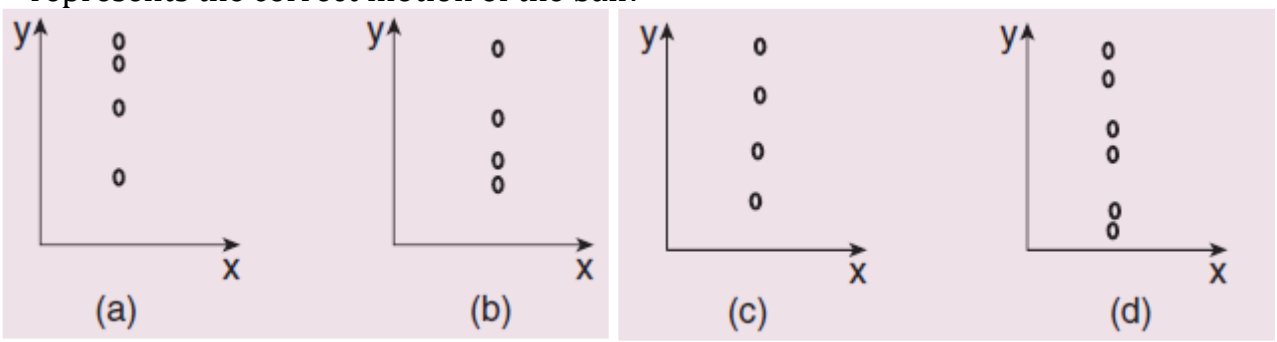
**8.** A ball is projected vertically upwards with a velocity v. It comes back to ground in time t. Which v-t graph shows the motion correctly?




**9.** If one object is dropped vertically downward and another object is thrown horizontally from the same height, then the ratio of vertical distance covered by both objects at any instant t is

(a) 1 (b) 2 (c) 4 (d) 0.5

**10.** A ball is dropped from some height towards the ground. Which one of the following represents the correct motion of the ball?




**11.** If a particle executes uniform circular motion in the xy plane in clock wise direction, then the angular velocity is in

(a) +y direction (b) +z direction (c) -z direction (d) -x direction

**12.** If a particle executes uniform circular motion, choose the correct statement

(a) The velocity and speed are constant.
(b) The acceleration and speed are constant.
(c) The velocity and acceleration are constant.
(d) The speed and magnitude of acceleration are constant.

**13.** If an object is thrown vertically up with the initial speed $u$ from the ground, then the time taken by the object to return back to ground is

(a) $\frac{u^2}{2g}$ (b) $\frac{u^2}{g}$ (c) $\frac{u}{2g}$ (d) $\frac{2u}{g}$



**14.** Two objects are projected at angles 30° and 60° respectively with respect to the horizontal direction. The range of two objects are denoted as $R_{30^0}$ and $R_{60^0}$. Choose the correct relation from the following

(a) $R_{30^0} = R_{60^0}$ (b) $R_{30^0} = 4R_{60^0}$ (c) $R_{30^0} = \frac{R_{60^0}}{2}$ (d) $R_{30^0} = 2R_{60^0}$

**15.** An object is dropped in an unknown planet from height 50 m, it reaches the ground in 2 s . The acceleration due to gravity in this unknown planet is

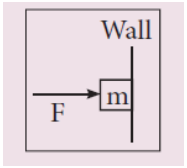
(a) g = 20 m $s^{-2}$ (b) g = 25 m $s^{-2}$ (c) g = 15 m $s^{-2}$ (d) g = 30 m $s^{-2}$

## LESSON – 3

**1.** When a car takes a sudden left turn in the curved road, passengers are pushed towards the right due to

(a) inertia of direction (b) inertia of motion (c) inertia of rest (d) absence of inertia

**2.** An object of mass m held against a vertical wall by applying horizontal force F as shown in the figure. The minimum value of the force F is




(a) Less than mg (b) Equal to mg
(c) Greater than mg (d) Cannot determine

**3.** A vehicle is moving along the positive x direction, if sudden brake is applied, then

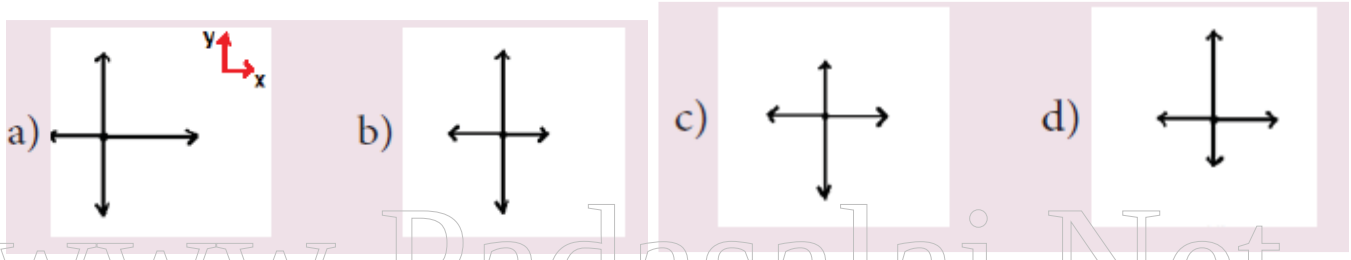
(a) frictional force acting on the vehicle is along negative x direction

(b) frictional force acting on the vehicle is along positive x direction
(c) no frictional force acts on the vehicle
(d) frictional force acts in downward direction

**4.** A book is at rest on the table which exerts a normal force on the book. If this force is considered as reaction force, what is the action force according to Newton's third law?
(a) Gravitational force exerted by Earth on the book
(b) Gravitational force exerted by the book on Earth
(c) Normal force exerted by the book on the table
(d) None of the above

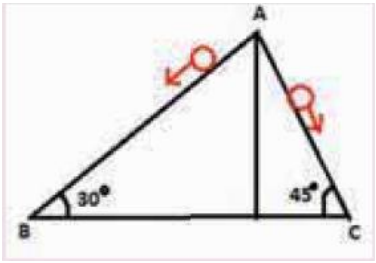
**5.** Two masses $m_1$ and $m_2$ are experiencing the same force where $m_1 < m_2$. The ratio of their acceleration $\frac{a_1}{a_2}$ is
(a) 1 (b) less than 1 (c) greater than 1 (d) all the three cases

**6.** Choose appropriate free body diagram for the particle experiencing net acceleration along negative y direction. (Each arrow mark represents the force acting on the system).

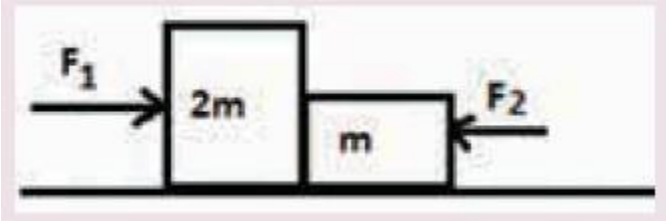





**7.** A particle of mass m sliding on the smooth double inclined plane (shown in figure) will experience F m Wall
(a) greater acceleration along the path AB
(b) greater acceleration along the path AC
(c) same acceleration in both the paths
(d) no acceleration in both the paths.




**8.** Two blocks of masses m and 2m are placed on a smooth horizontal surface as shown. In the first case only a force $F_1$ is applied from the left. Later only a force $F_2$ is applied from the right. If the force acting at the interface of the two blocks in the two cases is same, then $F_1 : F_2$ is
(a) 1:1 (b) 1:2
(c) 2:1 (d) 1:3




**9.** Force acting on the particle moving with constant speed is
(a) always zero (b) need not be zero
(c) always non zero (d) cannot be concluded

**10.** An object of mass m begins to move on the plane inclined at an angle . The coefficient of static friction of inclined surface is $\mu_s$ . The maximum static friction experienced by the mass is

(a) mg (b) $\mu_s$ mg (c) $\mu_s$ mg sin $\theta$ (d) $\mu_s$ mg cos $\theta$

**11.** When the object is moving at constant velocity on the rough surface,
(a) net force on the object is zero
(b) no force acts on the object
(c) only external force acts on the object
(d) only kinetic friction acts on the object

**12.** When an object is at rest on the inclined rough surface,
(a) static and kinetic frictions acting on the object is zero
(b) static friction is zero but kinetic friction is not zero
(c) static friction is not zero and kinetic friction is zero
(d) static and kinetic frictions are not zero

**13.** The centrifugal force appears to exist
(a) only in inertial frames (b) only in rotating frames
(c) in any accelerated frame (d) both in inertial and non-inertial frames

**14.** Choose the correct statement from the following
(a) Centrifugal and centripetal forces are action reaction pairs
(b) Centripetal forces is a natural force
(c) Centrifugal force arises from gravitational force
(d) Centripetal force acts towards the center and centrifugal force appears to act away from the center in a circular motion

**15.** If a person moving from pole to equator, the centrifugal force acting on him
(a) increases (b) decreases
(c) remains the same (d) increases and then decreases



## LESSON – 4

**1.** A uniform force of $(2\hat{i} + \hat{j})$ N acts on a particle of mass 1 kg. Th e particle displaces from position $(3\hat{j} + \hat{k})$ m to $(5\hat{i} + 3\hat{j})$ m. Th e work done by the force on the particle is
(a) 9 J (b) 6 J (c) 10 J (d) 12 J

**2.** A ball of mass 1 kg and another of mass 2 kg are dropped from a tall building whose height is 80 m. Aft er, a fall of 40 m each towards Earth, their respective kinetic energies will be in the ratio of
(a) $\sqrt{2}:1$ (b) $1:\sqrt{2}$ (c) 2 : 1 (d) 1 : 2

**3.** A body of mass 1 kg is thrown upwards with a velocity 20 m $s^{-1}$. It momentarily comes to rest aft er attaining a height of 18 m. How much energy is lost due to air friction?. (Take $g$ = $10 ms^{-2}$)
(a) 20 J (b) 30 J (c) 40 J (d) 10 J

**4.** An engine pumps water continuously through a hose. Water leaves the hose with a velocity v and m is the mass per unit length of the water of the jet. What is the rate at which kinetic energy is imparted to water ?
(a) $\frac{1}{2} m v^2$ (b) $mv^3$ (c) $\frac{3}{2} mv^2$ (d) $\frac{5}{2} m v^2$

**5.** A body of mass 4 m is lying in xy-plane at rest. It suddenly explodes into three pieces. Two pieces each of mass m move perpendicular to each other with equal speed $v$. The total kinetic energy generated due to explosion is

(a) $m\,v^2$ (b) $\frac{3}{2}\,mv^2$ (c) $2mv^2$ (d) $4mv^2$

**6.** The potential energy of a system increases, if work is done
(a) by the system against a conservative force
(b) by the system against a non conservative force
(c) upon the system by a conservative force
(d) upon the system by a non conservative force

**7.** What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?.
(a) $\sqrt{2gR}$ (b) $\sqrt{3gR}$ (c) $\sqrt{5gR}$ (d) $\sqrt{gR}$

**8.** The work done by the conservative force for a closed path is
(a) always negative (b) zero
(c) always positive (d) not defined

**9.** If the linear momentum of the object is increased by 0.1%, then the kinetic energy is increased by
(a) 0.1 % (b) 0.2% (c) 0.4% (d) 0.01%

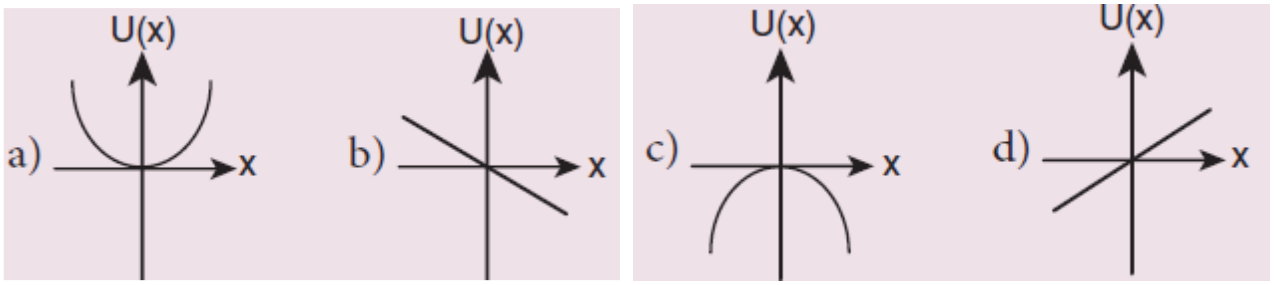
**10.** If the potential energy of the particle is $\alpha - \frac{\beta}{2}x^2$, then force experienced by the particle is
(a) $F = \frac{\beta}{2}x^2$ (b) $F = \beta x$ (c) $F = -\beta x$ (d) $F = -\frac{\beta}{2}x^2$

**11.** A wind-powered generator converts wind energy into electric energy. Assume that the generator converts a fixed fraction of the wind energy intercepted by its blades into electrical energy. For wind speed $v$, the electrical power output will be proportional to
(a) $v$ (b) $v^2$ (c) $v^3$ (d) $v^4$



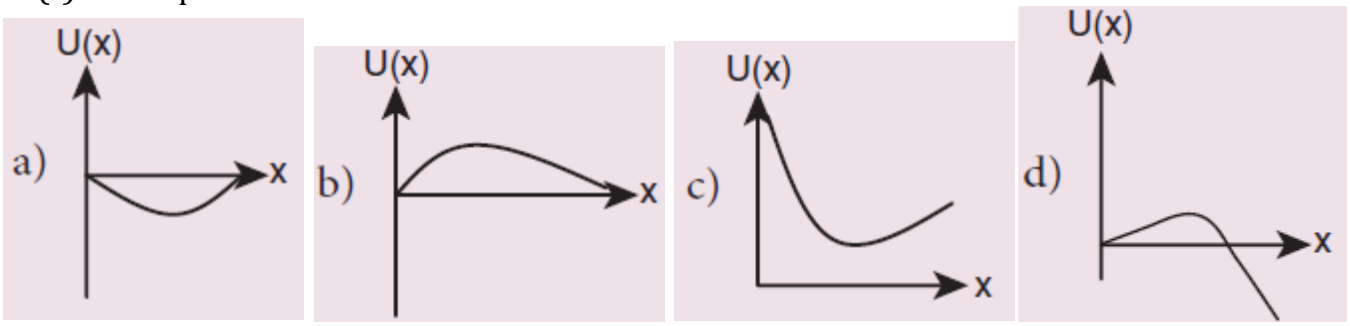
**12.** Two equal masses $m_1$ and $m_2$ are moving along the same straight line with velocities 5 $ms^{-1}$ and - 9 $ms^{-1}$ respectively. If the collision is elastic, then calculate the velocities after the collision of $m_1$ and $m_2$, respectively
(a) - 4 $ms^{-1}$ and 10 $ms^{-1}$
(b) 10 $ms^{-1}$ and 0 $ms^{-1}$
(c) - 9 $ms^{-1}$ and 5 $ms^{-1}$
(d) 5 $ms^{-1}$ and 1 $ms^{-1}$

**13.** A particle is placed at the origin and a force $F = kx$ is acting on it (where $k$ is a positive constant). If $U$ (0)=0, the graph of $U$ (x) versus x will be (where $U$ is the potential energy function)




**14.** A particle which is constrained to move along $x$-axis, is subjected to a force in the same direction which varies with the distance $x$ of the particle from the origin as $F=kx\_kx\ \_\ ax_3$.

Here, $k$ and a are positive constants. For $x \geq 0$, the functional form of the potential energy $U(x)$ of the particle is




**15.** A spring of force constant $k$ is cut into two pieces such that one piece is double the length of the other. Then, the long piece will have a force constant of

(a) $\frac{2}{3}k$ (b) $\frac{3}{2}k$ (c) $3k$ (d) $6k$

## LESSON – 5

**1.** The center of mass of a system of particles does not depend upon,
(a) position of particles (b) relative distance between particles
(c) masses of particles (d) force acting on particle

**2.** A couple produces,
(a) pure rotation (b) pure translation
(c) rotation and translation (d) no motion

**3.** A particle is moving with a constant velocity along a line parallel to positive X-axis. Th e magnitude of its angular momentum with respect to the origin is,
(a) zero (b) increasing with x (c) decreasing with x (d) remaining constant

**4.** A rope is wound around a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force 30 N?
(a) 0.25 rad $s^{-2}$ (b) 25 rad $s^{-2}$ (c) 5 m $s^{-2}$ (d) 25 m $s^{-2}$.

**5.** A closed cylindrical container is partially filled with water. As the container rotates in a horizontal plane about a perpendicular bisector, its moment of inertia,
(a) increases (b) decreases
(c) remains constant (d) depends on direction of rotation.

**6.** A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes,
(a) L (b) L/2 (c) 2L (d) L/ $\sqrt{2}$

**7.** A particle undergoes uniform circular motion. The angular momentum of the particle remain conserved about,
(a) the center point of the circle. (b) the point on the circumference of the circle.
(c) any point inside the circle. (d) any point outside the circle.

**8.** When a mass is rotating in a plane about a fi xed point, its angular momentum is directed along,
(a) a line perpendicular to the plane of rotation
(b) the line making an angle of 45° to the plane of rotation
(c) the radius
(d) tangent to the path

**9.** Two discs of same moment of inertia rotating about their regular axis passing through center and perpendicular to the plane of disc with angular velocities $\omega_1$ and $\omega_2$. They are brought in to contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is,

(a) $\frac{1}{4}I(\omega_1-\omega_2)^2$ (b) $I(\omega_1-\omega_2)^2$ (c) $\frac{1}{8}I(\omega_1-\omega_2)^2$ (d) $\frac{1}{2}I(\omega_1-\omega_2)^2$

**10.** A disc of moment of inertia $I_a$ is rotating in a horizontal plane about its symmetry axis with a constant angular speed ω. Another disc initially at rest of moment of inertia $I_b$ is dropped coaxially on to the rotating disc. Then, both the discs rotate with same constant angular speed. The loss of kinetic energy due to friction in this process is,

(a) $\frac{1}{2}\frac{{I_b}^2}{(I_a+I_b)}\omega^2$ (b) $\frac{{I_b}^2}{(I_a+I_b)}\omega^2$ (c) $\frac{(I_b-I_a)^2}{(I_a+I_b)}\omega^2$ (d) $\frac{1}{2}\frac{I_bI_b}{(I_a+I_b)}\omega^2$

**11.** The ratio of the acceleration for a solid sphere (mass m and radius R) rolling down an incline of angle θ without slipping and slipping down the incline without rolling is,

(a) 5:7 (b)2:3 (c) 2:5 (d) 7:5

**12.** From a disc of radius R a mass M, a circular hole of diameter R, whose rim passes through the center is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis passing through it

(a) $15MR^2/32$ (b) $13MR^2/32$ (c) $11MR^2/32$ (d) $9MR^2/32$

**13.** The speed of a solid sphere after rolling down from rest without sliding on an inclined plane of vertical height h is,

(a) $\sqrt{\frac{4}{3}gh}$ (b) $\sqrt{\frac{10}{7}gh}$ (c) $\sqrt{2gh}$ (d) $\sqrt{\frac{1}{2}gh}$



**14.** The speed of the center of a wheel rolling on a horizontal surface is $v_o$. A point on the rim in level with the center will be moving at a speed of speed of,

(a) zero (b) $v_o$ (c)$\sqrt{2}$ $v_o$ (d) 2 $v_o$

**15.** A round object of mass M and radius R rolls down without slipping along an inclined plane. The fractional force,

(a) dissipates kinetic energy as heat.
(b) decreases the rotational motion.
(c) decreases the rotational and transnational motion
(d) converts transnational energy into rotational energy

**ANSWERS**

**LESSON – 1**

**1) a 2) d 3) d 4) c 5) d 6) c 7) b 8) a 9) d 10) b 11) c 12) d 13) c 14) a 15) b**

**LESSON – 2**

**1) d 2) d 3) c 4) c 5) a 6) a 7) b 8) c 9) a 10) a 11) c 12) d 13) d 14) a 15) b**

**LESSON – 3**

**1) a 2) c 3) a 4) c 5) c 6) c 7) b 8) c 9) b 10) d 11) a 12) c 13) b 14) d 15) a**

**LESSON – 4**

**1) c 2) d 3) a 4) a 5) b 6) a 7) c 8) b 9) b 10) c 11) c 12) c 13) c 14) d 15) b**

**LESSON – 5**

**1) d 2) a 3) d 4) b 5) a 6) d 7) a 8) a 9) a 10) d 11) a 12) b 13) a 14) c 15) d**

**By**

**SRI BHARATHIDASAN MATRIC HIGHER SECONDARY SCHOOL**

**MANNARGUDI**