OLYMPIAD QUESTIONS

KAT
KNOWLEDGE ASSESSMENT TEST

PHYSICS

VI - CLASS

UNITS AND DIMENSIONS

1. The dimensional formula of the product of two physical quantities P and Q is ML2T–2. The dimensional formula of P/Q is ML0T–2. Then what are the units of physical quantities P and Q.
   a) Newton and meter b) kg and meter [ ]
   c) second and meter d) Newton and second

2. The physical quantities having same dimensions [ ]
   a) work b) energy c) torque d) displacement

3. **Statement (A) :** The correctness of an equation is verified using the principle of homogeneity.
   Statement (B) : All unit less quantities are dimensional less. [ ]
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

4. **Assertion (A) :** Dimension of area in length is 2. [ ]
   Reason (R) : Dimensions of physical quantity are the powers to which the fundamental quantities are to be raised to get one unit of physical quantity.
   a) Both A and R are correct and R is the correct explanation of A
   b) Both A and R are correct but R is not the correct explanation of A
   c) A is correct, R is wrong d) Both A and R are wrong

KINEMATICS

1. Two bicycle raiders made a 30 km trip in the same time. Cyclist A travelled non stop at an average speed of 20 km per hour another cyclist B travelled with a lunch break of 20 min. The average speed of B for actual raiding.
   a) 26 kmph b) 36 kmph c) 30 kmph d) 20 kmph

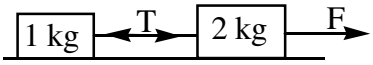
2. Body falls freely from certain height under gravity [ ]
   a) its initial velocity is zero b) its acceleration is constant
   c) its velocity is constant d) its speed is constant

3. The correct statement from the following is [ ]
   Statement (A) : A body having zero velocity will not necessarily have zero acceleration.
   Statement (B) : A body having zero velocity will necessarily have zero acceleration.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

4. **Assertion (A) :** A body may be accelerated even when it is moving at uniform speed. [ ]
   Reason (R) : When direction of motion of the body is changing then body may have acceleration. [ ]
   a) Both A and R are correct and R is the correct explanation of A
   b) Both A and R are correct but R is not the correct explanation of A
   c) A is correct, R is wrong d) Both A and R are wrong

FORCE

1. Two blocks of masses 1 kg and 2 kg rest on a smooth horizontal table. When the 2 kg block is pulled by a certain force F, the tension T in the string is [ ]
a) F/2 N
b) F/3 N
c) F/4 N
d) F/5 N



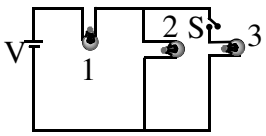
2. A bullet of mass 20 g moving with a speed of 120 ms^{-1} hits a thick muddy wall and penetrates into it. It takes 0.03 s to stop in the wall. Then [ ]
a) the acceleration of the bullet in the wall is 4000 ms^{-2}
b) the force exerted by the wall on the bullet respectively are 80 N
a) the acceleration of the bullet in the wall is $-4000\ ms^{-2}$
b) the force exerted by the wall on the bullet respectively are – 80 N

3. **Assertion (A) :** If action and reaction act on different bodies they do not cancel eath other.
Reason (R) : Action and reactions are the forces which are equal in magnitude but opposite in direction.
a) Both (A) and (R) are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
c) (A) is true but (R) is false d) (A) is false but (R) is true

4. Consider the following two statements : [ ]
Statement (A) : The linear momentum of a particle is independent of the frame of reference
Statement (B) : The kinetic energy of a particle is independent of the frame of reference.
a) Both A and B are true b) Both A and B are false
c) A is true and B is falsed) A is false and B is true

SIMPLE ELECTRIC CIRCUITS

1. An electric circuit is shown in figure. When the switch S is opened, which of the following lamp (s) will switch off [ ]
a) 1 only
b) 3 only
c) 2 and 3 only
d) 1 and 2 only



2. **Statement (A) :** A switch can only break a circuit. [ ]
Statement (B) : A bulb utilises electrical energy in a circuit
a) Both A and B are true b) Both A and B are false
c) A is true and B is falsed) A is false and B is true

3. When the given circuit is opens [ ]
a) electricity doesn't continuously b) bulb doesn't glow
c) electrical wires melt d) bulb will glow

4. **Assertion (A) :** The human beings gets an electric shoke. [ ]
Reason (R) : Human beings can generate electricity.
a) Both (A) and (R) are true and (R) is the correct explanation of (A)
b) Both (A) and (R) are true but (R) is not the correct explanation of (A)
c) (A) is true but (R) is false d) (A) is false but (R) is true

PLAYING WITH MAGNETS

1. When a magnet is placed on a plastic plate with common pins spread on it, then [ ]
   a) Pins sticks all around the magnet b) Pins stick at the middle of the magnet
   c) Pins stick at the end of the magnet d) none

2. **Statement (A) :** A cylindrical magnet has only one pole [ ]
   Statement (B) : Artificial magnets were discovered in greece
   Statement (C) : Bar magnets always point towards north south direction.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is falsed) A is false and B is true

3. If a ferromagnetic substance such as steel wounded by a wire coil then [ ]
   a) It is called electromagnet b) It behaves as a non conductor
   c) If behaves as a magnet as long as we flow current through it.
   d) It behaves as a non - magnet as long as we flow current through it.

4. **Assertion (A) :** Maximum iron fillings do not stick in the middle of, a bar magnet when it is brought near them [ ]
   Reason (R) : The magnetism of a bar magnet is minimum at its two poles and maximum in the middle.
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R are true and R is the not correct explanation of A
   c) A is true, R is false d) A is false, R is true

LIGHT SHADOWS AND IMAGES

1. A camera flash is used infront of a mirror to take a photograph of ther image of an object. The photograph of the image formed is [ ]
   a) clear b) bright c) beautiful d) completely white

2. The source of light is [ ]
   a) A planet b) A star c) A metal strip d) A burning candle

3. **Assertion (A) :** We can't see a burning candle by using a bent pipe. [ ]
   Reason (R) : The light travels in a straight line.
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R are true and R is the not correct explanation of A
   c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** When light rays are blocked an opaque object forms a shadow [ ]
   Statement (B) : The plane mirrors are used as a rare view morrors.
   Statement (C) : The image formed by a pin hole camera is real and inverted.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

VII - CLASS

UNITS AND DIMENSIONS

1. The equation $P = \frac{a - t^2}{bx}$, where P is pressure, x is distance and t is time. The dimensions of $\frac{a}{b}$ is

   a) $[M^2LT^{-3}]$ b) $[MT^{-2}]$ c) $[LT^{-3}]$ d) $[ML^3T^{-1}]$ [ ]

2. A standard unit should be [ ]
   a) consistant b) reprodicible c) inversible d) easily available

3. **Statement A:** ampere is a fundamental unit in SI. [ ]
   Statement B: kelvin is a derived unit in SI.
   a) A is true, B is false b) Both A and B are true
   c) A is false, B is true d) Both A and B are false

4. **Assertion (A) :** For a physical quantity, U_1 , U_2 are units and N_1,N_2 are their numerical values in two different systems. If $N_1 > N_2$, then $U_1 < U_2$ [ ]
   Reason (R) : The numerical value of a physical quantity is inversely proportional to its unit.
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R are true and R is not the correct explanation of A
   c) A is true but R is false d) A is false but R is true

KINEMATICS

1. If the velocity of a car is increased by 20%, then the minimum distance in which it can be stopped increases by [ ]
   a) 44% b) 55% c) 66% d) 88%

2. For an object moving with uniform acceleration and travelling 50 m in 5^{th} sec and 70 m in 7^{th} sec
   a) Its initial velocity is 5 m/sec b) Its acceelration in 20 m/sec^2
   c) Distance travelled in 9^{th} sec is 100 m d) Its average velocity in 9^{th} sec in 90 m/sec.

3. **Assertion (A) :** Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the direction with the same speed. [ ]
   Reason (R) : The maximum height and down ward velocity attained at the point of projection are independent on the mass of ball.
   a) Both (A) and (R) are true and (R) is the correct explanation of (A)
   b) Both (A) and (R) are true and (R) is the not correct explanation of (A)
   c) (A) is true, (R) is false d) (A) is false, (R) is true

4. **Statement (A) :** If the acceleration is zero, the particle is at rest. [ ]
   Statement (B) : A particle with a constant speed may be under acceleration.
   a) Both A and B are true. b) Both A and B are false.
   c) A is true, B is false. d) A is false, B is true.

FORCE

1. The gravitational force between two equal masses at a distance r is F. When one of the masses becomes half, the distance at which it should be kept so that the gravitational force remains same is [ ]

   a) $\sqrt{2}r$ b) $\frac{r}{\sqrt{2}}$ c) $\sqrt{3}r$ d) 2r

2. If a body is placed on an inclined plane, the force acting on the body is [ ]
a) Gravitational b) Electromagnetic c) Nuclear d) Weak

3. **Statement (A) :** The horizontal component of reaction force is frictional force. [ ]
Statement (B) : The vertical component of reaction force is normal reaction.
a) Both A and B are true. b) Both A and B are false.
c) A is true, B is false. d) A is false, B is true.

4. **Assertion (A) :** A person sitting in a chair in a satellite feels weigthless. [ ]
Reason (R) : Whenever there is no normal reaction on a body, its weight appears to be zero.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true but R is not the correct explanation of A
c) A is true and R is false d) A is false and R is true.

WORK POWER ENERGY

1. An elastic string of unstretched length L and force constant K is stretched by a small length x. It is further stretched by another small length y. The work done in the second stretching is [ ]

a) $\frac{1}{2}Ky^2$ b) $\frac{1}{2}K\left(x^2+y^2\right)$ c) $\frac{1}{2}Ky\left(2x+y\right)$ d) $\frac{1}{2}K\left(x+y\right)^2$

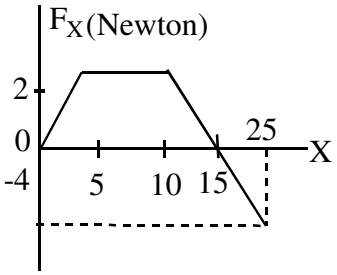
2. In the figure the x-component of F_x of a force that acts on a particle starts from rest from the origin. Then, [ ]

a) The maximum kinetic energy is at x = 15 m

b) Its speed is zero at x = 25 m

c) Its kinetic energy is 5 J at x = 5 m

d) Its kinetic energy is 10 J at x = 10 m



3. **Assertion (A) :** Power of a constant force is also constant [ ]
Reason (R) : Net constant force will always produce a constant acceleration
a) Both A and R are true and R is the correct explanation of A
b) Both A and R true and R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

4. **Statement (A) :** A body at rest can have mechanical energy [ ]
Statement (B) : Mechanical energy of a freely falling body decrease gradually
a) Both A and B are true b) Both A and B are false
c) A is true, B is false d) A is false, B is true

TEMPERATURE AND ITS MEASUREMENTS

1. The absolute zero value in Fahrenheit scale is nearly [ ]
a) zero b) -273^0C c) -460^0 F d) -492^0F

2. Among the following unit of heat is /are [ ]
a) cal b) kcal c) joule d) kelvin

3. **Statement (A) :** When heat is given to a body usually its temperature may increases.
Statement (B) : The temperature of a body may not change when it is heated [ ]
a) Both A and B are true b) Both A and B are false
c) A is true but B is false d) A is false but B is true

4. **Assertion (A) :** When two bodies collide with each other they become hot
Reason (R) : During collision the mechanical energy of the bodies lost and goes in to the internal energies of the bodies. [ ]
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, but R is false d) A is false, but R is true

ELECTRICITY

1. A point charge is brought in to an electric field. The electric field at a near by point [ ]
a) will increase if charge is positive b) will decrease if charge is negative
c) may increase if charge is positive d) may decrease if charge is negative

2. The number of electrons per second that pass through a section of wire carrying a current of 0.7 A is [ ]
a) 3.4×10^{18} b) 4.4×10^{17} c) 4.4×10^{16} d) 4.4×10^{18}

3. **Assertion (A) :** Good conductors of heat are also good conductors of electricity and vice versa.
Reason(R) : Mainly free electrons are responsible for these conductions. [ ]
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** Path of unit negative charge in electric field is called electric line of force
Statement (B) : Electric force acts on unit positive charge is called electric intensity [ ]
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

REFLECTION OF LIGHT

1. A convex mirror has radius of curvature 20cm. Then the position of the image of an object placed at a distance of 12 cm from the mirror is [ ]
a) $\frac{60}{11}cm$ b) $\frac{30}{11}cm$ c) $\frac{11}{60}cm$ d) $\frac{11}{30}cm$

2. For a mirror linear magnification 'm' comes out to be +2. The conclusions can be drawn from this is [ ]
a) mirror is concave b) mirror can be convex (or) concave
c) object lies between pole and focus d) object lies beyond focus

3. **Assertion (A) :** For spherical mirrors, angle of incidence is equal to angle of reflection. [ ]
Reason (R) : Laws of reflection hold good for all surfaces.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** Concave mirrors are used in street lights. [ ]
Statement (B) : Concave mirrors are used as reflectors in head lights.
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

VIII - CALSS

VECTORS

1. If $\vec{X}.\vec{A}=0, \vec{X}.\vec{B}=0$ *and* $\vec{X}.\vec{C}=0$ for same non zero vector $\vec{X}$, then $\left[\vec{A}\vec{B}\vec{C}\right]=0$ [ ]

   a) b) c) d)

2. The following vector(s) is / are perpendicular to $5\hat{k}$ [ ]

   a) $4\hat{i}+3\hat{j}$ b) $6\hat{i}$ c) $7\hat{k}$ d) $3\hat{i}+4\hat{j}$

3. **Statement(A):** The work done $W=\vec{F}.\vec{S}$ when F and S indicate force and displacement respectively

   Statement(B): The instantaneous power $P=\vec{F}.\vec{V}$ where F and V indicate force and instantaneous velocity respectively. [ ]

   a) Both A and B are true b) Both A and B are false
   c) A is true but B is false d) A is false but B is true

4. **Assertion (A) :** Torque is a pseudo vector [ ]
   Reason (R) : The cross prodcut of two polar vectors is a psuedo vector
   a) both A and R are correct and R is the correct explanation of A.
   b) both A and R are correct and R is not the correct explanation of A.
   c) A is true, R is false d) A is false, R is true

KINEMATICS

1. Three particles A, B and C are situated at the vertices of an equilateral triangle ABC of side 'd' at time t = 0. Each of the particles moves with constant speed v . A always has its velocity along AB, B along BC and C along CA.The time will the particles meet each other is [ ]

   a) $\frac{2d}{3v}$ b) $\frac{3d}{2v}$ c) $\frac{2v}{3d}$ d) $\frac{3v}{2d}$

2. A projectile thrown from ground with speed 15 ms^{-1} at an angle 37° with vertical. During motion, (Given g = 10 ms^{-2}) [ ]
   a) minimum speed is 9 ms^{-1}
   b) the magnitude of average velocity during time interval t = 0 to t = time of flight is 9 ms^{-1}
   c) the magnitude of change in velocity from t = 0 to t = half of total time of flight is 12 ms^{-1}
   d) the maximum height attain by the projectile is 7.2 m

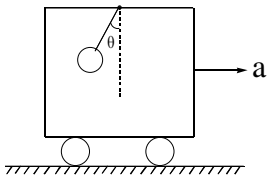
3. **Assertion (A) :** Two projectiles have maximum heights 4H and H repectilvey. The ratio of their horizontal components of velocities should be 1 : 2 for their horizontal ranges to be same[ ]
   Reason (R) : Horizontal range is product of horizontal component of velocity time of flight
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R are true and R is the not correct explanation of A
   c) A is true, R is false d) A is false, R is true

4. **Statment (A) :** A body can have acceleration of its velocity is zero at a given instant. [ ]

   Statment (B) : The direction of velocity and acceleration can be in any way.
   a) Both A and B are true b) Both A and B are false
   c) A is true but B is false d) A is false but B is true

NLM

1. A bob of mass m is suspended from the ceiling of a train moving with an acceleration 'a' as shown on fig. Find the angle 'θ' in equilibrium position. [ ]



a) $\theta = \tan^{-1}\left(\frac{g}{a}\right)$ b) $\theta = \tan^{-1}\left(\frac{a}{g}\right)$

c) $\theta = \cot^{-1}\left(\frac{a}{g}\right)$ d) $\theta = \cot^{-1}\left(\frac{g}{a}\right)$

2. A reference frame attached to the earth [ ]
   a) is an inertial frame by definition
   b) can not be an inertial frame but the earth is revolving around the sun
   c) is an inertial frame because Newton's laws are applicable in this frame
   d) cannot be an inertial frame because the earth is revolving about its axis.

3. **Assertion (A) :** A rocket moves forward by pushing the surrounding air backwards
   Reason (R) : Rocket drives the necessary thrust to move forward according to newton's third law of motion. [ ]
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R as true but R is not the correct explanation of A
   c) A is true, but R is false
   d) A is false, but R is true

4. **Statement (A) :** Action and Reaction act on two different bodies [ ]
   Statement (B) : Action and Reaction never cancel each other.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is falsed) A is false and B is true

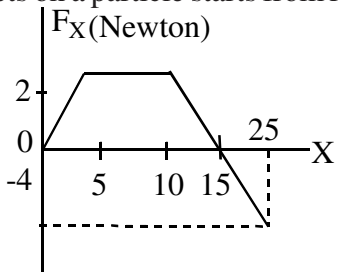
WORK POWER ENERGY

1. A smooth steel ball is moving to and fro about the lowest position 'O' of a frictionless hemispherical bowl. The ball attains a maximum height of 20 cm on either side of 'O'. If g = 10 ms^{-2}, the speed of the ball when it passes through 'O' will be [ ]

   a) $\sqrt{2}ms^{-1}$ b) $2ms^{-1}$ c) $0.2ms^{-1}$ d) $0.02ms^{-1}$

2. **Assertion (A) :** In circular motion work done by all the forces acting on the body is zero
   Reason (R) : Centripetal force and velocity are mutually perpendicular [ ]
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R true and R is not the correct explanation of A
   c) A is true but R is false d) A is false but R is true

3. In the figure the x-component of F_x of a force that acts on a particle starts from rest from the origin. Then, [ ]



   a) The maximum kinetic energy is at x = 15 m
   b) Its speed is zero at x = 25 m
   c) Its kinetic energy is 5 J at x = 5 m
   d) Its kinetic energy is 10 J at x = 10 m

4. **Statement (A):** An engine A can perform a given work in 1hr and engine B can perform the same work in $\frac{1}{2}$ hr. Then B has greater power than A. [ ]

Statement (B): Power is the dot product of force and velocity

a) Both A and B are true b) Both A and B are false
c) A is true, B is false d) A is false, B is true

FORMS OF ENERGY

1. The energy utilised in sun to give light and heat [ ]
a) mass energy b) sound energy c) kinetic energy d) potential energy

2. If you lift a suitcase from the floor and keep it on a table. The work done by you on the suitcase does not depend on (multi option) [ ]
a) The path taken by the suitcase b) The time taken by you in doing so
c) The weight of the suitcase d) Your weight

3. **Assertion (A) :** Energy and workdone have same units. [ ]
Reason (R) : Work done on the body, will be stored in it in the form of energy.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R true and R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

4. **Statement (A) :** Matter can be converted into energy. [ ]
Statement (B) : Energy can be converted into matter.
a) A is true B is false b) A is false B is true
c) Both A and B are true d) Both A and B are false

SOUND

1. Which of the following statements are not correct about a curved mirror [ ]
a) Its focal length depends on wavelength of light
b) Its focal length depends on nature of medium in which the mirror is placed
c) Image formed by it is free spherical aberration
d) All the above

2. If sound wave travel from one medium to another, which of the following remain constant
a) frequency b) phase c) speed d) wavelength

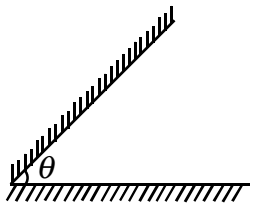
3. **Assertion (A) :** Velocity of sound in solid is more than in air. [ ]
Reason (R) : Bulk modulous of a solid is more than that of air.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R true and R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

4. **Statement (A) :** Longitudinal waves can not travel in vaccume. [ ]
Statement (B) : Tansverse waves can not travel in air media.
a) A is true B is false b) A is false B is true
c) Both A and B are true d) Both A and B are false

REFLECTION OF LIGHT

1. An object is placed infront of the plane mirror of length 'L' at a distance 'd' on its bisector line. An observer is at a perpendicular distance of '3d' from that mirror. If the observer is walking parallel to the mirror, upto what maximum possible distance be can observe the image of the object [ ]
a) 2 L b) 3 L c) 4 L d) 5 L

2. Two mirros are inclined at an angle θ as shown in the figure. Light ray is incident parallel to one of the mirrors. The ray will start retracting its path after third reflection if : [ ]



a) $\theta = 45^\circ$

b) $\theta = 30^\circ$

c) $\theta = 60^\circ$

d) all three

3. **Assertion (A) :** Convex mirror is used as a rear view mirror in automobiles. [ ]
Reason (R) : The field view of convex mirror is more.
a) Both A and R are true, R is the correct explanation of A
b) Both A and R are true, R is not the correct explanation of A.
c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** Radius of curvature of the plane mirror is infinity. [ ]
Statement (B) : Image formed by a plane mirror is erect and of same size as that of object.
a) Both A and B are true b) Both A and B are false
c) A is true and B is falsed) A is false and B is true

ELECTRIC CONDUCTIVITY OF LIQUIDS

1. In liquids, electric current is due to [ ]

a) '–ve' ions b) '+ve' ions c) molecules d) none

2. When the terminals of two copper wires connect to an electric cell are inseerted to a potato

a) greenish blue spot is seen around the positive terminal

b) greenish blue spot is seen around the negative terminal

c) greenish blue spot is seen around the both terminal

d) all the above

3. **Assertion (A) :** Distilled water is not a conducting liquid. [ ]
Reason (R) : Ionic liquids only conduct electricity.
a) Both A and R are true, R is the correct explanation of A
b) Both A and R are true, R is not the correct explanation of A.
c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** In primary cell, chemical energy is converted into electrical energy. [ ]
Statement (B) : In charging cell electrical energy is converted into chemical energy.
a) Both A and B are true b) Both A and B are false
c) A is true and B is falsed) A is false and B is true

IX - CLASS

VECTORS

1. Given that $\vec{A}+\vec{B}+\vec{C}=0$, out of three vectors two are equal in magnitude and the magnitude of third vector is $\sqrt{2}$ times that of either of two having equal magnitude. Then angle between vectors are given by
   a) 30^0 , 60^0, 90^0 b) 45^0, 45^0, 90^0 c) 90^0, 135^0, 45^0 d) 90^0, 135^0, 135^0

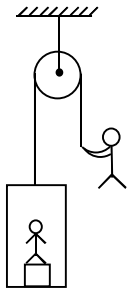
2. 11 forces each P act on a body such that each force makes an angle 30º with the next one. The resultant of the forces is [ ]
   a) zero b) P c) P cos 30º d) $\frac{2P}{\sqrt{3}}$

3. **Assertion (A) :** A vector is described by $\vec{A}=A_x\hat{i}+A_y\hat{j}+A_z\hat{k}$, then A_y is a scalar. [ ]
   Reason (R) : The projection of a vector is a scalar
   a) Both A and R are correct and R is the correct explanation of A
   b) Both A and R are correct but R is not the correct explanation of A
   c) A is correct, R is incorrect d) A is incorrect, R is correct

4. **Statement (A) :** Any two vectors lie in a plane.
   Statement (B) : When a vector is rotated, its magnitude changer. [ ]
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

NLM

1. Find the reading of the machine. Given mass of box = 15 kg, mass of each man = 40 kg and mass of weighing machine = 5 kg. [ ]
   a) 52 kgwt
   b) 42 kgwt
   c) 32 kgwt
   d) 22 kgwt



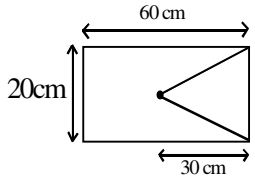
2. The force exerted by the floor of an elevator on the foot of a person standing there is more than the weight of the person if the elevator is [ ]
   a) going up and slowing down b) going up and speeding up
   c) going down and slowing down d) going down and speeding up

3. **Assertion (A) :** A rocket moves forward by pushing the surrounding air backwards
   Reason (R) : Rocket drives the necessary thrust to move forward according to newton's third law of motion. [ ]
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R as true but R is not the correct explanation of A
   c) A is true, but R is false d) A is false, but R is true

4. **Statement (A) :** The mass of a body is a measure of the quantity of the matter in it. [ ]
   Statement (B) : Both mass and inertia have same S.I units.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

CENTRE OF MASS AND COLLISION

1. A triangular sheet is removed from a rectangular sheet as shown in figure. The shift of CM is [ ]



a) 4.2 cm
b) – 4.2 cm
c) 6.67 cm
d) – 6.67 cm

2. For regular shaped bodies centre of mass and centre of gravity [ ]
a) Coincides with one another b) Does not coincides with one another
c) does not coincides with geometric centre d) coincides with geometric centre

3. **Statement (A) :** For an inelastic collision e = 1 . [ ]
Statement (B) : For elastic collision e = 0 .
a) Both A and B are true b) Both A and B are false
c) A is true and B is falsed) A is false and B is true

4. **Assertion (A) :** For perfectly inelastic collision coefficient of restitution is zero [ ]
Reason (R) : Relative velocity of separation = relative velocity of approach for elastic collision
a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect d) A is incorrect, R is correct

GRAVITATION

1. A geostationary satellite is orbiting the earth at a height of 6R above the surface of the earth, R being the radius of the earth. The time period of another satellite at a height 2.5 R from the surface of the earth is

a) $6\sqrt{2}$ hours b) $6\sqrt{2.5}$ hours c) $6\sqrt{3}$ hours d) 12 hours [ ]

2. The magnitude of gravitational field at distance r_1 & r_2 from the center of a uniform solid sphere of radius R and mass M are F_1 & F_2 respectively, then [ ]

a) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 < R$ and $r_2 < R$ b) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 > R$ and $r_2 > R$

c) $\frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$ if $r_1 > R$ and $r_2 > R$ d) $\frac{F_1}{F_2} = \frac{r_1^2}{r_2^2}$ s if $r_1 < R$ and $r_2 < R$

3. **Assertion (A) :** If earth suddenly stops rotating about its axis, then the value of acceleration due to gravity will become same at all the places [ ]

Reason (R) : The value of acceleration due to gravity is independent of rotation of earth.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, but R is false
d) A is false, but R is true

4. **Statement (A) :** Two different planets can have same escape velocity. [ ]
Statement (B) : Gravitational potential of earth at every plane on it is negative.
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

WORK - POWER - ENERGY

1. An automobile of mass 'm' accelerates from rest, while engine supplies constant power p. The velocity is given us a function of time by [ ]

a) $\left(\frac{2pt}{m}\right)^{\frac{3}{2}}$ b) $\left(\frac{2pt}{m}\right)^{\frac{1}{2}}$ c) $\left(\frac{2pt}{m}\right)^{\frac{-1}{2}}$ d) $\left(\frac{pt}{m}\right)^{\frac{1}{2}}$

2. The incorrect statement(s) among the following [ ]
a) If conservative forces are doing negative work then potential energy will increase and Kinetic energy will decrease
b) If kinetic energy is constant, it means work done by conservative force is zero
c) For change in potential energy only conservative forces are responsible, but for change in kinetic energy other than conservative forces are responsible.
d) All of the above are wrong

3. **Assertion (A) :** No work done on a revolving electron around the nucleus of an atom [ ]
Reason (R) : Work done by the centripetal force is always zero
a) Both A and R are true and R is the correct explanation of A
b) Both A and R true and R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

4. **Statement (A) :** A body at rest can have mechanical energy [ ]
Statement (B) : Mechanical energy of a freely falling body decrease gradually
a) Both A and B are true b) Both A and B are false
c) A is true, B is false d) A is false, B is true

FLOATING BODIES

1. If the atmospheric pressure is 76 cm of mercury, at what depth of water the pressure will become 4 atmospheres [ ]
a) 31 m b) 21 m c) 11 m d) 9

2. A sample of metal weight 210 g in air, 180 g in water and 120 g in liquid. Then relative density (RD) of : [ ]

a) metal is 3 b) metal is 7 c) liquid is 3 d) liquid is $\frac{1}{3}$

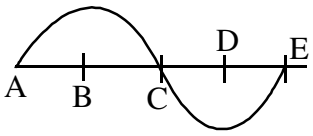
3. **Assertion (A) :** Upthrust on a solid block of iron when immersed in a lake will be less on the surface, than on the bed of the lake. [ ]
Reason (R) : On the surface of lake density of water will be less than that at the bed and upthrust depends on the density of liquid.
a) Both Aand R are correct and R is correct explanation to A
b) Both A and R are correct and R is not correct explanation to A
c) A is true, R is false d) A is false, R is true

4. **Statement (A) :** A closed compartment containing gas is moving with some acceleration in the harizontal direction if the effect of gravity is neglected, the pressure in the compartment will be higher in the rear side than in the front side. [ ]
Statement (B) : Pascal's law holds only for a fluid at rest
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

SOUND

1. 'Hertz' stands for [ ]
   a) second b) second^{-1} c) metre d) metre^{-1}

2. In the given curve half of the wavelength is [ ]
   a) AC b) BC
   c) BD d) DE

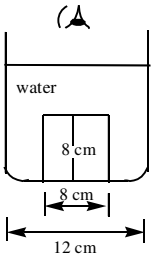


3. **Assertion (A) :** Sound is a mechanical wave [ ]
   Reason (R) : It can exert pressure on the surface.
   a) Both Aand R are correct and R is correct explanation to A
   b) Both A and R are correct and R is not correct explanation to A
   c) A is true, R is false d) A is false, R is true

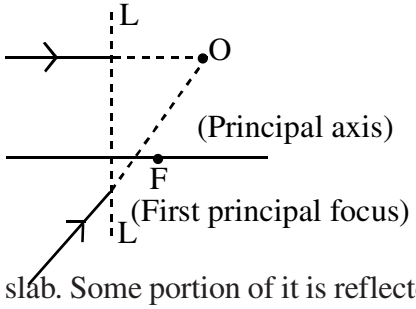
4. **Statement (A) :** Sound waves can reflect from the surface. [ ]
   Statement (B) : Sound waves can also refract when passing from one medium to another.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is falsed) A is false and B is true

REFLECTION & REFRACTION OF LIGHT

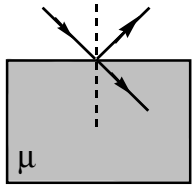
1. A cylindrical vessel of diameter 12 cm contains 800π cm^3. of water. A cylindrical glass piece of diameter 8.0 cm and height 8.0 cm is placed in the vessel. If the bottom of the vesel under the glass piece is seen by the paraxial rays, locate its image. The index of refraction of glass is 1.50 and that of water is 1.33. [ ]
   a) 7.1 cm above the bottom
   b) 9.1 cm above the bottom
   c) 10.1 cm above the bottom
   d) 12.1 cm above the bottom



2. Consider the rays shown in figure. The image of the virtual point object O formed by the lens LL is [ ]
   a) virtual
   b) real
   c) located below the principal axis
   d) located to the left of the lens



3. **Assertion (A) :** A light ray is incident on a glass slab. Some portion of it is reflected and some is refracted. Refracted and reflected rays are always perpendicular to each other. [ ]
   Reason (R) : Angle of incidence is equal to angle of reflection.
   a) Both Aand R are correct and R is correct explanation to A
   b) Both A and R are correct and R is not correct explanation to A
   c) A is true, R is false
   d) A is false, R is true



4. **Statement (A) :** A beam of light rays has been reflected from a rough surface. [ ]
   Statement (B) : Amplitude of incident and reflected rays would be different.
   a) Both A and B are true b) Both A and B are false
   c) A is true and B is false d) A is false and B is true

CURRENT ELECTRICITY

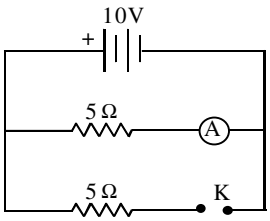
1. The reading of ammeter in the figure. assuming that the internal resistance of battery is zero and key is closed is [ ]

a) 0.25 A

b) 0.5 A

c) 1 A

d) 2 A



2. **Statement A :** Current density direction is along the current at that point. [ ]
Statement B : Current density is a vector quantity.
a) Both A and B are true b) Both A and B are false
c) A is true but B is false d) A is false but B is true

3. There are two copper wires of the same length but different diameters [ ]
a) Thicker wire has more specific resistance than the thinnner wire
b) Thicker wire has less resistance the thinner wire
c) Both have the same resistance
d) Both have the same specific resistance

4. **Assertion (A) :** Two non-ideal batteries are connected in parallel with same polarities on same side. The equivalent emf is smaller than either of the two emf s [ ]
Reason (R) : Two non-ideal batteries are connected in parallel, the equivalent internal resistance is smaller than either of the two internal resistances
a) Both A and R are True and R is the correct explanation of A
b) Both A and R are True and R is not correct explanation of A
c) A is correct and R is incorrect
d) A is incorrect and R is correct.

X - CLASS

VECTORS

1. The resultant of two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. What is the angle between the forces [ ]
a) 120° b) 180° c) 60° d) 90°

2. A situation may be described by using different sets of coordinate axes having different orientations. Which of the following do not depend on the orientation of the axes [ ]
a) The value of a scalar b) component of a vector
c) a vector d) the magnitude of a vector

3. **Statment (A) :** $\frac{scalar}{vector}$ = Scalar or vector [ ]

Statment (B) : $\frac{vector}{vector}$ = Scalar.

a) Both A and B are true b) Both A and B are false
c) A is true but B is false d) A is false but B is true

4. **Assertion (A):** $\overline{A}+\overline{B}+\overline{C}=\overline{0}$ then $\overline{A}\times\overline{B}=\overline{B}\times\overline{C}\times\overline{A}$ [ ]
Reason (R) : The vector sum of 3 vectors can never be zero.
a) Both A and R are true and R is the correct explanation of the A.
b) Both A and R are true but R is not the correct explanation of the A.
c) A is true But R is false d) A is false But R is true

NLM

1. A hammer of mass M strikes a nail of mass m with velocity of V m/s and drives it 'a' meter into fixed block of wood. The average resistance of wood to the penetration of the nail is [ ]

a) $\frac{M}{M+m}\left(\frac{V^2}{2a}\right)$ b) $\frac{M^2}{\left(M+m^2\right)}\left(\frac{V^2}{2a}\right)$ c) $\frac{M+m}{M}\left(\frac{V^2}{2a}\right)$ d) $\frac{M^2}{(M+m)}\left(\frac{V^2}{2a}\right)$

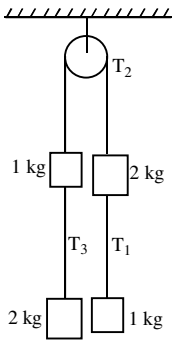
2. In the figure shown, all the strings are massless and friction is absent everywhere. Choose the correct options. [ ]

a) $T_1 > T_3$

b) $T_3 > T_1$

c) $T_2 > T_1$

d) $T_2 > T_3$



3. **Assertion (A) :** A table cloth can be pulled from a table without dislodging the dishes. [ ]
Reason (R) : To every action there is an equal and opposite reaction.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R as true but R is not the correct explanation of A
c) A is true, but R is false d) A is false, but R is true

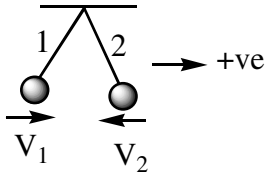
4. **Statement (A) :** A solid body of density half that of water, falls from a height of 10 m and then enters into water. The depth to which it will go in water is 10 m.
Statement (B) : Inside water a body experience buoyant force . [ ]
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

CENTER OF MASS AND COLLISION

1. Two pendulum bobs of mass m and 2m collide elastically at the lowest point in their motion. If both the balls are released from a height H above the lowest point, the heights do they rise for the first time after collision are [ ]

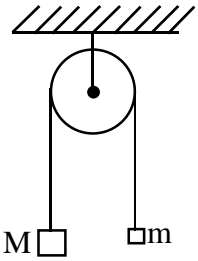
a) $\frac{25H}{9},\frac{H}{10}$ b) $\frac{25H}{9},\frac{H}{9}$

c) $\frac{H}{9},\frac{25H}{9}$ d) $\frac{H}{10},\frac{25H}{9}$



2. **Statement (A) :** A ball hits a bus moving towards it. If the collision is inelastic they move together.
Statement (B) : Inelastic collision arises due to loss in K.E during collision. [ ]
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

3. A light rope passes over a light frictionless pulley attached to the ceiling. An object with a large mass is tied to one end and an object with a smaller mass is tied to the other end Both masses are released from rest. Which of the following statement(s) is /are false for the system consisting of the two moving masses while string remains taut. [ ]



a) The centre of mass remains at rest

b) The net external force is zero

c) The velocity of the centre of mass is a constant

d) The acceleration of the centre of mass is g downward

4. **Assertion (A) :** Two particles starting from rest, moves towards each other under a mutual force of attraction. The velocity of centre of mass is zero.
Reason (R) : Internal forces do not alter the state of motion of centre of mass [ ]
a) Both A and R are correct and R is the correct explanation of A
b) Both A and R are correct but R is not the correct explanation of A
c) A is correct, R is incorrect d) A is incorrect, R is correct

SHM

1. The differential equation representing the SHM of a particle is $9\frac{d^2y}{dt^2}+4y=0$. The time period of the particle is [ ]

a) $\frac{\pi}{3}s$ b) πs c) $\frac{2\pi}{3}s$ d) $3\pi s$

2. Which of the following quantities are always negative in a single harmonic motion [ ]
a) $\bar{F}.\bar{a}$ b) $\bar{v}.\bar{r}$ c) $\bar{a}.\bar{r}$ d) $\bar{F}.\bar{r}$

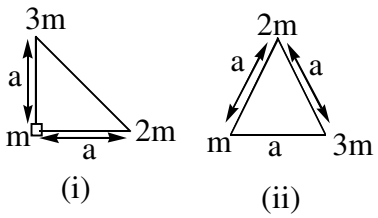
3. **Assertion (A) :** We can call circular motion also as SHM. [ ]
Reason (R) : Angular velocity in uniform circular motion and angular frequency in simple harmonic motion have the same meanings.
a) Both 'A' and R are correct and 'R' is the correct explanation of 'A'
b) Both 'A' and 'R' are correct but R is not the correct explanation of A
c) 'A' is false, R is true d) 'A' is true, R is false

4. **Statement (A) :** During SHM kinetic energy is converted into potential energy and vice - versa.
Statement (B) : Total mechanical energy of Simple Harmonic oscillator is directly proportional to square of the frequency of oscillation [ ]
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

GRAVITATION

1. An iron ball and cork ball of the same radius are released from the same height in vacuum both of them reach the ground simultaneously. It is because [ ]
a) Acceleration due to gravity is independent of the mass of falling bodies.
b) Acceleration due to gravity in vacuum is independenet of the size of the bodies
c) In vacuum, the acceleration due to gravity is zero
d) In vacuum, there is no resistance to the motion of the balls.

2. Consider two configuration of a system of three particles of masses m, 2m and 3m, the work done by external agent in changing the configuration of the system from figur (i) to figur (ii) is [ ]



a) zero b) $-\frac{6Gm^2}{a}\left[1+\frac{1}{\sqrt{2}}\right]$ c) $-\frac{6Gm^2}{a}\left[1-\frac{1}{\sqrt{2}}\right]$ d) $-\frac{6Gm^2}{a}\left[2-\frac{1}{\sqrt{2}}\right]$

3. **Assertion (A) :** A body becomes weightless at the centre of earth. [ ]

Reason (R) : As distance from centre of earth decreases, acceleration due to gravity increases
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, but R is false d) A is false, but R is true

4. **Statement (A) :** The principle of superposition is not valid for gravitational field. [ ]
Statement (B) : Gravitational force is a conservative.
a) Both A and B are true b) Both A and B are false
c) A is true and B is false d) A is false and B is true

HEAT

1. Two liquids A and B are at 30°C and 20°C respectively when they are mixed in equal masses, the temperature of the mixture is found to be 26°C. The ratio of their specific heat is [ ]
a) 4 : 3 b) 3 : 4 c) 2 : 3 d) 3 : 2

2. **Assertion (A) :** One can not change water into steam by sending steam at 100ºC. [ ]

Reason (R) : At thermal equilibrium heat exchange can not takes place between two systems.
a) Both A and R are true and R is the correct explanation of A
b) Both A and R are true and R is the not correct explanation of A
c) A is true, R is false d) A is false, R is true

3. When two samples at different temperaures are mixed the temperature of mixture [ ]
i) equal to lower or higher temperature
ii) greater than lower but less than higher temperature
iii) average of lower and higher temperatures
a) both i and ii are true b) both ii and iii are true
c) both i and iii are true d) i, ii, iii are true

4. **Statment (A) :** When a hot body is kept in contact with cold body the average kinetic energy of the molecule in cold body is decreased.
Statment (B) : Two objects made from same material but have different masses, the two are placed in contact with heater for same time then the llighter body experience the temperature change with greater magnitude. [ ]
a) A is true but B is false b) Both A and B are true
c) A is false but B is true d) Both A and B are false

REFLECTION AND REFRACTION

1. A convex lens produces a double size real image when an object is placed at a distance of 18cm from it. The position of object to produce a triple size real image is [ ]
   a) 10 cm b) 18 cm c) 16 cm d) 32 cm

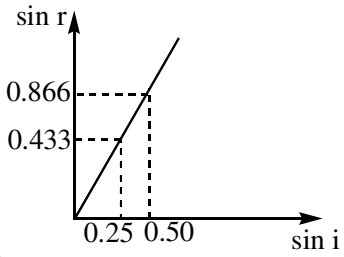
2. Light is incident from a medium A to medium B. The graph of sine of anlge of incidence i versus Since of anlge of refraction r is shown in fig. which of the following is/are correct ? [ ]

   1) Total internal reflection ocurs above a certain value of i.

   2) Total internal reflection will not occur for any value of i

   3) Wavelength of light in medium B is $\sqrt{3}$ times that in medium A.

   4) Wavelength of light in medium B is $1/\sqrt{3}$ times that in medium A.



   a) 1 and 3 b) 2 and 3 c) 1 and 4 d) 2 and 4

3. **Assertion (A):** Critical angle of light passing from glass to air is minimum for violet colour.
   Reason (R) : The wavelength of blue light is greater than the wave length of other colours
   a) Both A and R are true and R is the correct explanation of the A. [ ]
   b) Both A and R are true but R is not the correct explanation of the A.
   c) A is true But R is false d) A is false But R is true

4. **Statment (A) :** Just before sunset, the sun appears to be elliptical because of atmospheric refraction.
   Statment (B) : Sky appears blue because of atmospheric refraction. [ ]
   a) A is true but B is false b) Both A and B are true
   c) A is false but B is true d) Both A and B are false

CURRENT ELECTRICITY

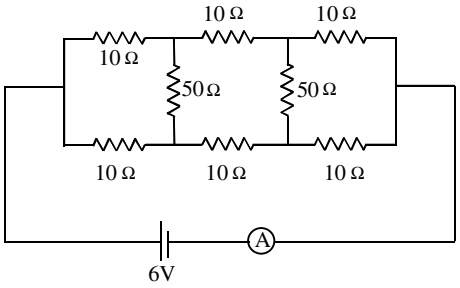
1. The current measured by the ammeter in the circuit given below is [ ]

   a) 0.6A

   b) 0.4A

   c) 0.8A

   d) 1.0A



2. The equivalent resistance of the parallel combination is [ ]
   a) smaller than the largest resistance b) larger than the largest resistance
   c) smaller than the smallest resistance d) larger than the smallest resistance

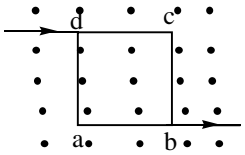
3. **Assertion (A) :** When the radius of a copper wire is doubled the specific resistance gets increased

   Reason (R) : Specific resistance is indepenent of cross - section of the material used [ ]
   a) Both A and R are true and R is the correct explanation of A
   b) Both A and R are true and R is the not correct explanation of A
   c) A is true, R is false d) A is false, R is true

4. **Statment (A) :** The resistivity of all pure metals increases with increas in temperature [ ]
Statment (B) : A conducting wire offers resistance to the flow of electrons, repel each other in the wire.
a) A is true but B is false b) Both A and B are true
c) A is false but B is true d) Both A and B are false

MAGNETIC FIELD

1. A current of 2A enters at the corner 'd' of a square frame abcd of side 20 cm and leaves at the opposite corner 'b'. A magnetic field B = 0.1 T exists in the space in a direction perpendicular to the plane of the frame as shown in the figure. The magnitude and direction of the magnetic forces on the four sides of the frame are [ ]



a) 0.02 N on each wire, on **da** and **cb** towards left and on **dc** and **ab** downwards
b) 0.02 N on each wire on **da** and **cb** towards right and on **dc** and **ab** horizontally
c) 0.4N on each wire, on **da** and **cb** towards left and on **dc** and **ab** downwards
d) 0.04 N on each wire on **da** and **cb** towards right and on **dc** and **ab** horizontally

2. Two ions have equal masses, but one is singly ionized and the other is doubly ionized. They are projected from the same place in a uniform magnetic field with the same velocity perpendicular to the field.
a) both ions will go along circles of equal radii [ ]
b) the circle described by the single - ionized charge will have a radius double that of the other circle.
c) the two circles do not touch each other
d) the two circles touch each other.

3. **Assertion (A):** A magnetic field is interacts with a moving charge and not with a stationary charge. [ ]
Reason (R) : A moving charge produces a magnetic field.
a) Both A and R are true and R is the correct explanation of the A.
b) Both A and R are true but R is not the correct explanation of the A.
c) A is true But R is false d) A is false But R is true

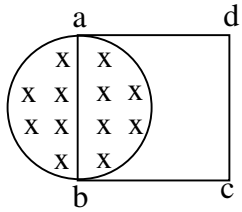
4. A charge is projected in a region of magnetic field (no other field is present) [ ]

Statment (A) : K.E energy of charged particle will remain constant

Statment (B) : Work done by magnetic force on moving charge particle is zero.
a) Both A and B are true b) Both A and B are false
c) A is true but B is false d) A is false but B is true

ELECTRO MAGNETIC INDUCTION

1. A uniform magnetic field B exists in a cylindrical region of radius 10 cm as shown. A uniform wire of length 80 cm and resistance 4Ω is bent into a square frame and is placed with one side along a diameter of the cylindrical region. If the magnetic field increases at a constant rate of 0.010 T/s then the current induced in the frame is [ ]



a) 2.9×10^{-5} A
b) 3.9×10^{-5} A
c) 4.9×10^{-5} A
d) 5.9×10^{-5} A

2. Two solenoids have indentical geometrical construction but one is made of thick wire and the other of thin wire. Which of the following quantities are different for the two solenoids [ ]
a) self - inductance
b) rate of joule heating if the same current goes through them
c) magnetic field energy if the same current goes though them
d) time constant if one solenoid is connected to one battery and the other is connected to another battery

3. **Assertion (A):** An induced emf is generated when magnet is withdrawn from the solenoid.
Reason (R) : The relative motion between magnet and solenoid induces emf.
a) Both A and R are true and R is the correct explanation of the A. [ ]
b) Both A and R are true but R is not the correct explanation of the A.
c) A is true But R is false d) A is false But R is true

4. **Statment (A) :** Induced emf depends only on number of turns in coil. [ ]

Statment (B) : Induced emf increases with increase in number of turns of coil.
a) Both A and B are true b) Both A and B are false
c) A is true but B is false d) A is false but B is true