# ICSE Board <br> Class IX Physics <br> Paper - 3 

Time: 2 hrs
Total Marks: 80

## General Instructions:

1. Answers to this paper must be written on the paper provided separately.
2. You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.
3. The time given at the head of the paper is the time allotted for writing the answers.
4. Attempt all questions from Section I and any four questions from Section II.
5. The intended marks of questions or parts of questions are given in brackets [].

## SECTION I (40 Marks) <br> Attempt all Questions from this Section

## Question 1

(a) What is the approximate diameter of the orbit of the Earth around the sun
i. in AU
ii. in SI unit?
(b) Two simple pendulums A and B have equal lengths bet their bobs masses are 75 g and 125 g respectively. What would be the ratio of their time periods? Give reason for your answer.
(c) Name two substances which expand on heating.
(d) A body starts moving with uniform acceleration from its state of rest. If it covers distance ' $x$ ' in the first $2 s$ and distance ' $y$ ' in next $2 s$ s, obtain the relation between ' $x$ ' and ' $y$ '.
(e) What is the source of tension in a string on an atomic scale?

## Question 2

(a) A block of wood floats in brine solution of density $1.15 \mathrm{~g} \mathrm{~cm}^{-3}$ such that three-fifth of its volume is immersed into the brine. Calculate the density of wood.
(b) Write the value of universal gravitational constant in SI unit.
(c) Why does an athlete run some distance before taking a jump?
(d) A long metal rod is bent to form a ring with a small gap. If this is heated, will this gap increase or decreases?
(e) Why do birds puff up their feathers in winter?

## Question 3

(a) What is the role of ozone layer in the stratosphere?
(b) At what temperature, will the reading of the Fahrenheit and the absolute scale be the same?
(c) Define renewable resources with an example.
(d) If a person holds a lighted candle in front of a thick glass mirror and views it obliquely, he sees a number of images of the candle. Why are these multiple images observed?
(e) Three plane mirrors are fixed in a vertical plane mutually normal to each other to form three consecutive sides of a cube like $\Pi$. A ray of light is incident in the horizontal plane on the mirror on the left side at its centre at an angle of incidence of $60^{\circ}$. Draw a ray diagram to show the path of the ray reflected from the three mirrors successively.

## Question 4

(a) What are the effects of changes in temperature and pressure on the velocity of sound?
(b) The distance between the 5th and the 15 th crest is 0.4 m . What is the wavelength of sound?
(c) A negatively charged ebonite rod attracts a suspended ball of straw. Does is indicate that the ball is positively charged?
(d) A polythene piece is rubbed with wool as a result of which it acquires a negative charge. Will there be any exchange of mass between the wool and the polythene?
(e) Which type of cell would you like to use if your device requires (i) a current of 70 A for 20 s and (ii) a current of 2 mA occasionally?

## SECTION II (40 Marks)

## Attempt any four Questions from this Section

## Question 5

(a) A Vernier scale has 40 divisions and its main scale is divided in millimeters. It has an error of +0.0125 cm . While measuring the length of a cylinder, the reading on the main scale is 75 mm and the 12 th Vernier scale division coincides with the main scale. Calculate the corrected length.
(b) Draw a graph between effective length ' l ' and square of time period ' T ' ' of a simple pendulum. How will you obtain the value of acceleration due to gravity from the graph?
(c) The mass of a block is 1.35 kg and its volume is $1.5 \times 10^{-3} \mathrm{~m}^{3}$. Find the density of the block. Will this block float in water? Give reason.

## Question 6

(a) An athlete runs around a circular track of circumference 360 m in $(1 / 60) \mathrm{h}$ and reaches the starting point. Calculate,
i. The distance covered by athlete
ii. The displacement
iii. The average speed and
iv. The average velocity.
(b) The table shows the velocity of a two-wheeler at various intervals of time.

| $\mathrm{t}(\mathrm{s})$ | 0 | 5 | 7 | 10 | 15 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{~V}(\mathrm{~m} / \mathrm{s})$ | 10 | 10 | 7 | 10 | 0 |

i. Plot the velocity-time graph.
ii. Calculate the rate of change of velocity between $5 \mathrm{~s}-7 \mathrm{~s}, 7 \mathrm{~s}-10 \mathrm{~s}$ and $10 \mathrm{~s}-15 \mathrm{~s}$.
(c) Derive $v^{2}=u^{2}+2$ as where symbols have their usual meaning.

## Question 7

(a) Show that Newton's first law of motion can be obtained from the second law.
(b)
i. The velocity of a body is continuously changing. Can its speed remain constant?
ii. If the speed is changing, can the velocity of a body remain constant?
iii. Is it possible for a body to have a constant speed in accelerated motion?
(c)
i. The earth attracts a ball with a force of 1 N . If this is the force of action, what would be the force of reaction and who exerts this force?
ii. State two circumstances under which your weight would become zero?

## Question 8

(a)
i. What is second's pendulum? What is its approximate effective length?
ii. A second's pendulum is set up on the surface of the moon, where acceleration due to gravity is $\frac{1}{6}$ th of that of the earth. How is the time period of the pendulum affected? Give a reason in support of your answer.
(b) Indicate on a graph how the density of water at $\left(0^{\circ} \mathrm{C}\right)$ changes when it is gradually heated upto $10^{\circ} \mathrm{C}$.
(c) Why is ice box made from two iron sheets with space in between filled with glass wool?

## Question 9

(a) The angle between the incident ray and the mirror is $30^{\circ}$.

What is the angle of incidence?
What is the angle of reflection?
What is the total angle turned by the ray of light?
(b) Where will the image form if the object is placed at the centre of curvature in front of the concave mirror? Also, state the nature of the image.
(c)
i. Obtain a relation between the velocity, the wavelength and the frequency of the wave.
ii. Distance between the third and the eighth rarefaction is 50 cm . Calculate the wavelength of the wave.

## Question 10

(a) The figure shows a negatively charged ebonite rod A which is brought near an uncharged metal sphere $P$ touching the other uncharged metal sphere $Q$. Both the spheres stand on separate insulating stands.

i. If keeping the $\operatorname{rod} \mathrm{A}$ in position, the sphere Q is removed by holding the insulating stand of it, state the kind of charge on them and give reason to support your answer.
ii. If the $\operatorname{rod} \mathrm{A}$ is removed first and then the sphere Q is removed by holding the insulating stand of it, what kind of charges will be on the spheres P and Q ? Explain.
(b) State three factors on which the resistance of a wire depends. Explain how the resistance depends on the factors stated by you.
(c)
i. Why will heating the magnet strongly remove its magnetism?
ii. What are neutral points?

