

**ICSE Board  
Class X Physics  
Gold Series  
Sample Paper - 1**

**Time: 1½ 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 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 1 (40 Marks)**

**Attempt all questions from this section.**

**Question 1**

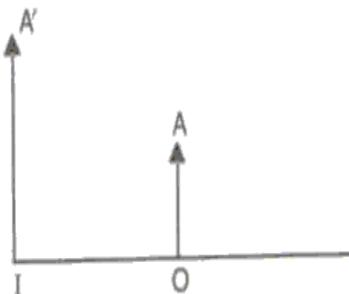
**[10]**

- (a) Can the couple acting on a rigid body produce translatory motion?
- (b) Obtain the relation between SI and CGS units of work.
- (c) Can a machine be 100% efficient? If not, explain why.
- (d) In a single movable pulley, if the weight of the load is  $L$  and the weight of the movable pulley is  $W$ , find the expression for its mechanical advantage.
- (e) Two objects of mass 5 g and 35 g have equal momentum. What is the ratio of their kinetic energies?

**Question 2**

**[10]**

- (a) Two identical glass beakers contain 100 ml of water at the same temperature. In one beaker,  $m$  kg of steam is allowed to flow at 373 K. In the other beaker,  $m$  kg of water is added at 100°C. In which beaker will the water be observed to have a higher temperature and why?
- (b) Complete the ray diagram in the case given below to show the formation of the image.  
Find the position, nature and focal length of the lens.



- (c) How are the angle of incidence and the angle of emergence related to each other in minimum deviation?
- (d) In glass, which coloured light travels fast and why?
- (e) (Red + Blue + Yellow) light is incident on a glass block and on a prism. Show the diagrams by drawing the refracted and emergent rays.

**Question 3**

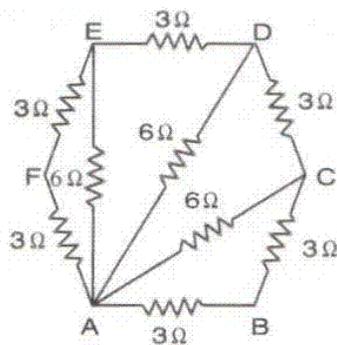
**[10]**

- (a) The lateral displacement of a ray of light passing through a parallel-sided glass slab depends on which factors?
- (b) Reema fires a gun in front of a building 167 m away. If the speed of sound is 334 m/s, calculate the time interval in which she hears an echo.
- (c) On a wintry night, we feel warmer when clouds cover the sky than when the sky is clear. Explain why.
- (d) Comment on the statement ‘The specific latent heat of ice is  $3,36,000 \text{ J kg}^{-1}$ ’.
- (e) A transmission line having a total resistance of  $0.2 \Omega$  delivers 10 kW at 220 V to a small factory. Calculate the power loss in the line.

**Question 4**

**[10]**

- (a) How will you locate a current-carrying wire concealed in a wall?
- (b) Calculate the effective resistance between A and C in the figure given below.



- (c) Why do we use steel or alnico for making permanent magnets? In which devices are permanent magnets used?
- (d) Do  $\alpha$ -decay and  $\beta$ -decay cause a change of element?
- (e) Why is it advisable to view a TV screen from a distance of about 12 feet?

**Section 2 (40 Marks)**

Attempt *any four* questions from this section.

**Question 5**

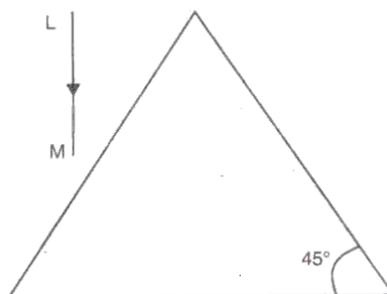
**[10]**

- (a)
- i. Which simple machine is used by labourers to load heavy barrels on a truck?
  - ii. Does a single fixed pulley help us to multiply force? In what way is it useful?
- (b) A see-saw 8 m long is balanced in the middle. Two children of mass 30 kg and 40 kg are sitting on the same side of the fulcrum at a distance of 1.5 m and 3.5 m, respectively. Where must a lady of mass 60 kg sit from the fulcrum so as to balance the see-saw?
- (c) A water pump can raise 20 kg of water through a height of 10 m in 10 s. What is the total work done by the pump? What is its power? (Take  $g = 10 \text{ ms}^{-2}$ )

**Question 6**

**[10]**

- (a) An object is placed in front of a converging lens at a distance greater than twice the focal length. Draw a ray diagram to show the formation of the image and state the nature of the image.
- (b) For the incident ray LM shown, complete the diagram to show the path of the ray into and out of the prism. The critical angle of glass is  $42^\circ$ .

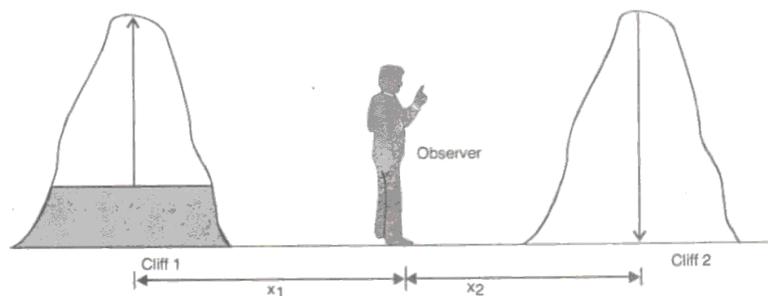


- (c) For the same angle of incidence, the angles of refraction in three different media I, II and III are  $15^\circ$ ,  $25^\circ$  and  $35^\circ$ , respectively. In which medium will the speed of light be minimum?

**Question 7**

**[10]**

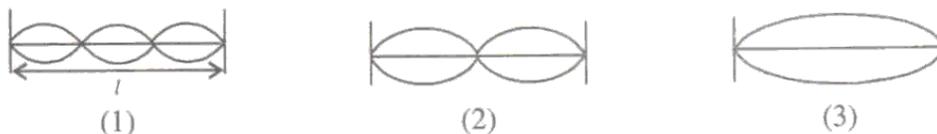
- (a) An observer standing between two parallel cliffs emits an intense sound note. Two successive echoes are then heard after 5 s and 7 s. Calculate the distance between the cliffs (velocity of sound =  $340 \text{ m s}^{-1}$ ).



- (b) Give two dissimilarities and similarities between sound waves and light waves.

(c)

- i. What adjustment will you make for tuning a stringed instrument such as a violin to emit a desired pitch?
- ii. The figure below shows the modes of vibrations of a string:



1. Which of these represents vibration of the largest amplitude and fundamental note?
2. What is the ratio of frequency between (3), (2) and (1)?

**Question 8**

**[10]**

- (a) Equal quantities of salt are dissolved in two identical vessels filled with water. The salt is in the form of a large crystal in one vessel and it is in the form of powder in the other. In which vessel will the temperature of the solution be higher after the salt has completely dissolved?
- (b) 1 kg of ice at  $-10^\circ\text{C}$  is heated at a constant rate until the whole of it vapourises. How much of heat is required?  
 Given: Latent heat of ice =  $336 \times 10^3 \text{ J kg}^{-1}$   
 Latent heat of steam =  $2268 \times 10^3 \text{ J kg}^{-1}$   
 Specific heat capacity of ice =  $2.1 \times 10^3 \text{ J kg}^{-1} \text{ K}^{-1}$   
 Specific heat capacity of water =  $4.2 \times 10^3 \text{ J kg}^{-1} \text{ K}^{-1}$
- (c) 40 g of water at  $60^\circ\text{C}$  is poured into a vessel containing 50 g of water at  $20^\circ\text{C}$ . The final temperature of the mixture is  $30^\circ\text{C}$ . Taking the specific heat capacity of water as  $4.2 \text{ J g}^{-1} \text{ K}^{-1}$ , calculate the thermal capacity of the vessel.

**Question 9****[10]**

- (a) What is an electric fuse? Give two characteristics of a fuse.
- (b) Draw a properly labelled diagram of a simple alternating current generator.
- (c) An electric bulb is marked 100 W, 230 V. If the supply voltage drops to 115 V, what is the heat and light energy produced by the bulb in 20 minutes?

**Question 10****[10]**

- (a) Energy released per nuclear fission reaction is 190 MeV. Give this energy in terms of joules.
- (b)
  - i. In an isotope of uranium, which particles are the same in number?
  - ii. Why does the nucleus of an atom become radioactive?
- (c) Mention  $\alpha$ ,  $\beta$  and  $\gamma$  in
  - i. Increasing order of their penetrating power
  - ii. Decreasing order of their ionising power
  - iii. Complete the following nuclear reaction:

