

**ICSE Board  
Class X Physics**

**Sample Paper - 2**

**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) Why does the speed of a falling body increase continuously?
- (b) Two bodies of equal mass are dropped from a cliff. At any instant, which physical quantity (momentum, acceleration, kinetic energy and potential energy) will be the same?
- (c) Name a machine which is used to (i) Multiply speed, (ii) Multiply force, (iii) Change the direction of effort to a convenient direction, (iv) Change the point of application of effort to a convenient point.
- (d) Calculate the length of the arm of a couple if a force of 13 N produces a moment of couple of 14.3 N m.
- (e) A ray of light travels from one medium to another, and it bends. State the condition when the angle of deviation of the ray is (i) Positive and (ii) Negative.

**Question 2**

**[10]**

- (a) A ray of light is passed from a transparent medium A to transparent medium B. Does it
  - i. Speed up
  - or
  - ii. Slow downState in each case the relation between refractive index ( $> = <$ ) of both media.
- (b) Five immiscible transparent liquids (I, II, III, IV and V) are placed in a rectangular container of glass with the liquids making layers in the increasing order of their refractive indices 1.51, 1.53, 1.61, 1.62 and 1.63, respectively, from top of the level in the container to the bottom. The container is illuminated from the side and a small glass piece ( $\mu = 1.61$ ) is gently dropped into the container. In which liquid, the descending glass piece will not be visible?

- (c) A convex lens forms a real image of a point object placed on its principal axis. If the upper half of the lens is painted black, will the image be shifted? Will the intensity of the image increase or decrease?
- (d) Which material prism is used for obtaining the spectrum of ultraviolet radiation and why?
- (e) A waiter uses a sound pipe to communicate with the chef in the kitchen. Name the principle on which the sound pipe works. Draw a suitable diagram.

**Question 3****[10]**

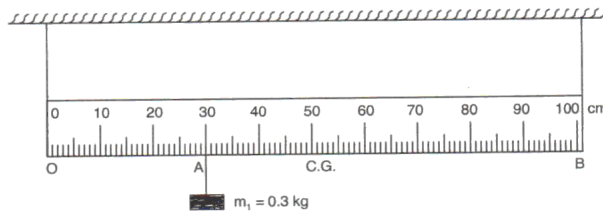
- (a) Name the waves which are used in
- Sound navigation and ranging to find the depth of the sea
  - Radio detection and ranging to detect the presence of an enemy's aeroplane in its path
- (b) Three equal resistors of resistance  $r$  are first connected in series and then connected in parallel. What will be the ratio of maximum to minimum resistance?
- (c) A negative charge released from a point P moves along the line PQ. The potential at P is 10 V and varies uniformly along PQ. What will be the potential at Q (less than, equal to or greater than 10 V)?
- (d) Resistance of two lamps is in the ratio 4:5. What will be the ratio of their wattage if both lamps are given the same voltage?
- (e) Name the three wires of the cable which are used to supply power to a house from the city sub-station.

**Question 4****[10]**

- (a) Name two rules used to determine the direction of induced current in a closed circuit of the coil.
- (b) Temperature of a solid body is observed to be constant during a period. Give two inferences for this period.
- (c) When a solid melts or a liquid boils, the temperature does not increase even when heat is supplied. Where does the energy go?
- (d) What is the use of a control grid in an electron gun?
- (e) Which reaction is the source of solar energy?

**Section 2 (40 Marks)**
**Attempt *any four* questions from this section**
**Question 5**
**[10]**

- (a) A metre scale of mass 0.2 kg is suspended by two strings at each end as shown in the figure.



A body of mass 0.3 kg is suspended by a weightless string at the 0.3 m mark. Calculate the tensions in the string by which the metre scale is suspended. (Take  $g = 10 \text{ m/s}^2$ )

- (b) Determine the nature of work (positive, negative or zero) done on the body in the following cases:
- When a body is displaced along a horizontal surface.
  - A ball falling freely under the action of gravity.
  - When two similar charges approach each other, and they repel each other.
- (c) The following table shows highway code data of braking distance for cars at different initial speeds:

<b>Initial speed (m/s)</b>	10	15	20	25	30
<b>Braking distance (m)</b>	6	13.5	?	37.5	54

Plot a graph of the braking distance against 'square of the initial speed'.

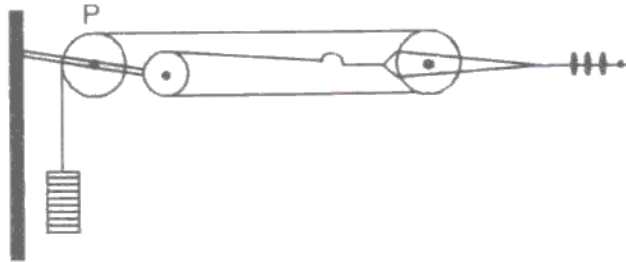
How does the initial kinetic energy of the car

- Affect the square of the speed while decelerating
- Affect the braking distance

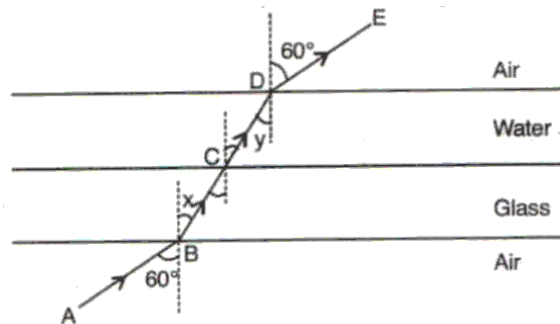
**Question 6**

**[10]**

- (a) The figure given below shows a wire of a rail's electrification system being held taut by pulleys.



- i. By what factor is the force multiplied?
  - ii. What is the purpose of the pulley P?
  - iii. Why are pulleys used?
- (b) A ray parallel to the principal axis is incident on the convex lens  $L_1$ . The ray after refraction through the lens  $L_1$  is intercepted by concave lens  $L_2$ . After refraction, it appears to meet at point F which serves as the focus for both lenses. Draw a ray diagram representing the same. If the distance of F from the optical centre of lens  $L_1$  is 30 cm and lens  $L_2$  is 20 cm, give the focal length of both lenses.
- (c)



Define refractive index. The figure shows a glass slab of uniform thickness lying horizontally. Above it is a layer of water. A ray of light AB is incident on the lower surface of glass which is refracted successively at B, C and D, the points where it crosses the interfaces. Calculate:

- i.  $\angle x$
- ii.  $\angle y$
- iii. Refractive index for light passing from water to glass. Refractive indices of glass and water are  $3/2$  and  $4/3$ , respectively.

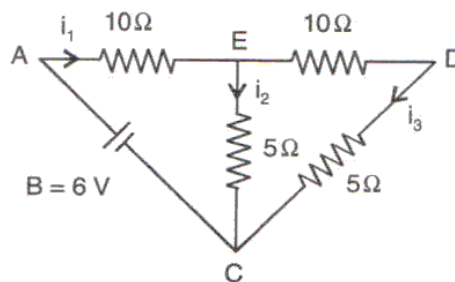


**Question 7**
**[10]**

- (a) Name three consequences of total internal reflection.
- (b) i. Match the properties of sound vis-à-vis pitch, quality and loudness with the quantities of waveform, frequency and intensity.  
 ii. A pitcher is placed below a running tap of water. As the pitcher fills up, sound becomes more and more shrill. Why?
- (c) Define echo. Two men at a distance of 0.68 km from each other stand at the same distance from a vertical hillock. One of them fires a shot and the other hears its echo 3 s after hearing the direct sound. Find the distance of the men from the hillock assuming the velocity of sound to be 340 m/s.

**Question 8**
**[10]**

- (a) What is meant by the electromotive force of a cell? A cell B of 6 V and negligible internal resistance is connected to a combination of resistors shown in the figure. What is the effective value of the resistance connected across the terminals of the cell? What are the values of current  $i_1$  and  $i_3$ ?



- (b) What is a fuse? Name the materials of the fuse. State any two characteristics of a fuse wire. How is a fuse inserted in an electric circuit?
- (c) Draw a labelled diagram of a DC motor. State two ways to increase the speed of rotation of the coil.

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

- (a) The temperature of a brass cylinder of mass 100 g was raised to  $100^{\circ}\text{C}$  and transferred to a thin aluminium can of negligible heat capacity containing 150 g of paraffin at  $11^{\circ}\text{C}$ . If the final steady temperature after stirring was  $20^{\circ}\text{C}$ , calculate the specific heat capacity of paraffin. Neglect heat losses. Specific heat capacity of brass =  $380 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$ .
- (b) 160 g of molten silver at its melting point  $960^{\circ}\text{C}$  is allowed to solidify at the same temperature and gives out 16800 J of heat. What is the specific latent heat of silver in SI unit? If the mean specific heat capacity of silver is  $230 \text{ J/kg}^{\circ}\text{C}$ , how much additional heat does it give out in cooling to  $-40^{\circ}\text{C}$ ?
- (c)
- Why is hydrogen considered a very efficient cooling gas for enclosed electric generators?
  - Why is steam used for running trains?

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

- (a) What is the difference between an  $\alpha$ -particle and a helium atom? Name two origins of background radiation.
- (b) Give three differences between nuclear fusion and nuclear fission.
- (c) In the figure given below,  $\alpha$ ,  $\beta$  and  $\gamma$  radiations are coming from a radioactive source placed in a thick lead container and passing through the electrodes as shown in the figure. Show the deflection of these rays when it is passing through the electrodes and afterwards.

