ICSE Board
Class X Physics
Sample Paper - 7

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**.*

Section I (40 Marks)
Attempt *all* questions from this section

Question 1   **[10]**

(a) Name any two electromagnetic waves which have a frequency higher than that of violet light. State one use of each.

(b) State two ways by which the frequency of transverse vibration of a stretched string can be decreased.

(c) Why does the temperature of the surrounding start falling when the ice of a frozen lake starts melting?

(d) Four resistors of 2.0Ω each are joined end to end to form a square ABCD. Calculate the equivalent resistance of the combination between any two adjacent corners.

(e) In a three-pin plug, why is the earth pin made longer and thicker than the other two pins?

Question 2   **[10]**

(a) Which physical quantity does the electron volt measure? How is it related to the SI unit of this quality?

(b) What should be the angle between force and displacement to get
 (i) Minimum work (ii) Maximum work

(c) What are non-contact forces?

(d) The work done by the heart is 1 joule per beat. Calculate the power of the heart if it beats 72 times in one minute.

(e) Mention two properties of a wave—one property which varies and the other which remains constant when the wave passes from one medium to another.

Question 3   **[10]**

(a) Draw a labelled diagram of an AC generator.

(b) Calculate the heat energy that will be released when 5.0 kg of steam is converted to water at 100°C. Express your answer in SI units (Specific latent heat of vaporisation of steam is 2268 kJ/kG).

(c) How many alpha and beta particles are emitted when Uranium nucleus $_{92}^{238}U$ decays to Lead $_{82}^{206}Pb$?

(d) State two factors on which the rate of emission of electrons from a heated surface depends.

(e) State the energy change which takes place when a magnet is moved inside a coil having a galvanometer at its ends. Name this phenomenon.

Question 4 [10]

(a) i. State the law of conservation of energy.

ii. Name the chief energy transformation that occurs (1) In a loudspeaker (2) In an electrical cell (primary).

(b) i. Define an inclined plane.

ii. Draw a labelled sketch of a Class II lever. Give one example of such a lever.

(c) The figure shows the combination of a movable pulley P_1 with a fixed P_2 used for lifting a load W.
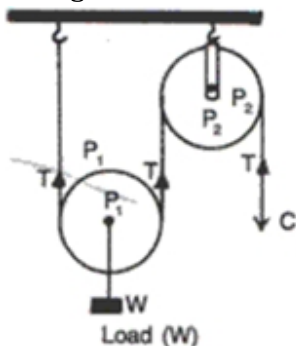

Load (W)

i. State the function of the fixed pulley P_2.

ii. If the free end of the string moves through a distance x, find the distance by which the load W is raised.

iii. Calculate the force that has to be applied at C to just raise the load W = 20 kgf, neglecting the weight of the pulley P_1 and air friction.

Section II (40 Marks)
Attempt *any four* questions from this section

Question 5 [10]

(a) Water falls from a height of 50 m. Calculate the rise in temperature of water when it strikes the bottom. g = 10 ms^{-2}, specific heat capacity of water = 4200 Jkg$^{-1\circ}$C^{-1}.

(b) i. What is the difference between kW and kWh?

ii. Prove that 1 kWh = 3.6 MJ.

iii. What is the practical unit of power?

(c) i. What is the difference between echo and reverberation? Calculate the minimum distance between the object and the source at which the echo can be distinctly heard?

ii. Can sound be clearly heard on the surface of the moon?

Question 6 **[10]**

(a) The ray diagram given below illustrates the experimental setup for the determination of focal length of a converging lens using a plane mirror.
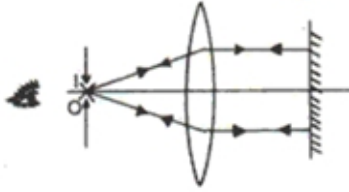

   i.   State the magnification of the image formed.
  ii.   Write two characteristics of the image formed.
 iii.   What is the name given to the distance between the object and the optical centre of the lens in the diagram?

(b) i. A glass slab is placed over a page on which the word VIBGYOR is printed with each letter in correspondence to its colour.
   1. Will the image of all the letters be in the same place?
   2. If not, state which letter will be raised to the maximum. Give reasons to support your answer.
   ii. State two main differences between a convex lens and a concave lens.

(c) i. What is meant by refraction?
   ii. Express the refractive index µ of a medium.
   1. In terms of the velocity of light
   2. In terms of the angle of incidence i in the air and the angle of refraction r in a denser medium
   iii. If a ray of light passes from medium I to medium II without any change in direction, what can be said about the refractive indices of these media (angle i is not 0°)?

Question 7

[10]

(a) An electrical appliance is rated 1500 W, 250 V. This appliance is connected to a 250 V mains. Calculate:
   i. Current drawn
   ii. Electrical energy consumed in 6 hours
   iii. Cost of electrical energy at Rs 2.50 per kWh

(b) i. State the function of a split ring in a DC motor.
   ii. What do you mean by electromagnetic induction? What is the necessary condition for electromagnetic induction?

(c) In the following figure, A, B and C are three ammeters. Ammeter B reads 0.5 A. (All the ammeters have negligible resistance.)

Calculate: i. Readings in ammeters A and C
   ii. Total resistance of the circuit
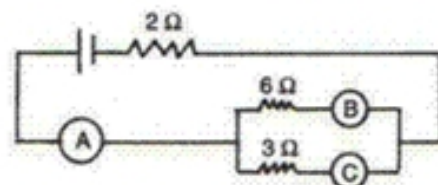
Question 8 [10]

(a) A radar is able to detect the reflected waves from an enemy's aeroplane after a time interval of 0.02 ms. If the velocity of the wave is 3×10^8 ms^{-1}, calculate the distance of the plane from the radar.

(b) A piece of ice is heated at a constant rate. The variation of temperature with the heat input is shown in the graph given below:
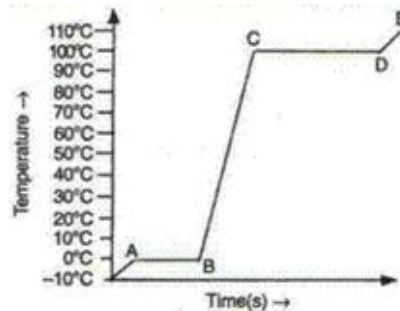
i. What is represented by AB and CD?

ii. What conclusion can you draw regarding the nature of ice from the above graph?

(c) If there is no heat loss to the surroundings, the heat released by the condensation of m_1 kg of steam at 100°C can be used to convert m_2 kg of ice at 0°C into water at 10°C.

Find: 1. Heat lost by steam in terms of m_1

2. Heat gained by ice in terms of m_2

3. Form a heat equation and find the ratio of $m_2:m_1$ from it

Specific latent heat of vaporisation of steam = 2268 kJ/kg, specific latent heat of fusion of ice = 336 kJ/kg, specific heat capacity of water = 4200 J/kg °C.

Question 9 [10]

(a) i. State Ohm's law.

ii. Diagrammatically illustrate how you would connect a key, a battery, a voltmeter, an ammeter, an unknown resistance R and a rheostat so that it can be used to verify Ohm's law.

(b) State in brief the meaning of each of the following:

i. Heat capacity of a body is 50 J°C^{-1}.

ii. Specific heat capacity of copper is 0.4 J g^{-1}°C^{-1}.

iii. Specific latent heat of ice is 336000 J kg^{-1}.

(c) Draw a neat and labelled diagram to show the structure of an AC generator.

Question 10 [10]

(a) What do you mean by radioisotopes? Give some uses of radioactive isotopes.

(b) i. Mention two important precautions that should be taken while handling radioactive materials.

ii. State one use of radioisotopes.

(c) i. In a nuclear fusion reaction, the loss in mass is 0.6%. How much energy is released in the fusion of 10 kg mass?

ii. What are controlled and uncontrolled reactions?