ICSE Board
Class X Physics
Gold Series
Sample Paper - 3

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) A thread with a stone tied to its one end is whirled in a horizontal circle. What is responsible for the centripetal force?

(b) A train is travelling on a one-level track at a speed of 72 km/h. It is pulled by an engine which exerts a force of 12,000 N. Calculate the power of the engine in kilowatts.

(c) What is an inclined plane? Give two examples of its use in daily life.

(d) A load of 800 N is lifted through a height of 2 m by an effort of 40 N applied at a distance of 50 m. Calculate the efficiency.

(e) A ball of mass 8 kg is dropped from a height of 10 m. What is the velocity with which it strikes the ground?

Question 2   **[10]**

(a) When a bird looks at a fish in water, does it appear raised or deeper than it actually is? Similarly, when a fish looks at a bird, does it appear nearer or further away?

(b) Complete the diagram by drawing the corresponding incident ray.
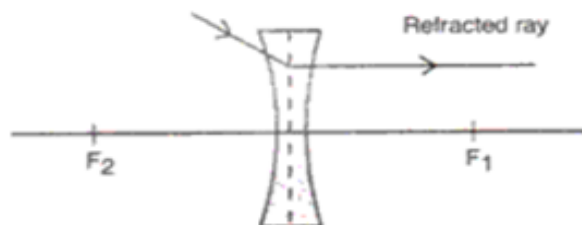
(c) State four uses of a hand lens.

(d) Two convex lenses each of focal length f are separated by an equal distance of 2f. With the help of a ray diagram show that a parallel beam of light remains parallel after refraction through both lenses.

(e) Write two uses of ultraviolet radiation.

Question 3 **[10]**

(a) PQ is the incident ray as shown on Prism ABC. Show the corresponding refracted and emergent rays.
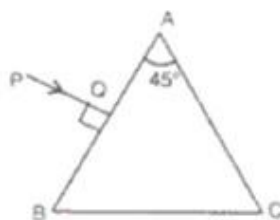
(b) Which of these quantities; (i) frequency, (ii) wavelength and (iii) amplitude determine the loudness of a sound wave? How is loudness related to the above mentioned quantity?

(c) 1080 g of ice at 0°C is mixed with 1080 g of water at 80°C. Calculate the final temperature of the mixture.

(d) Which molecules, ice at 0°C or water at 0°C, have greater potential energy? Why?

(e) Which lamp has greater resistance, a 40-W lamp or a 60-W lamp, when connected to the same supply?

Question 4 **[10]**

(a) Can you connect resistors of $2\,\Omega$, $3\,\Omega$ and $6\,\Omega$ to produce an effective resistance of $4\,\Omega$? If yes, how?

(b) State the factors on which the e.m.f. of a cell depends.

(c) A DC motor is rotating in the anticlockwise direction. How can you reverse the direction of the motor?

(d)

   i. What is the purpose of using C-14 dating?

   ii. Name the two wires of a household wiring circuit which are of the same potential.

(e) Complete the following reaction by inserting the appropriate quantity in the spaces marked by asterisks.

$$^{235}_{92}\text{U} + ^{*}_{0}\text{n} \rightarrow ^{*}_{s1}\text{Nb} + 4^{1}_{0}\text{n} + *$$
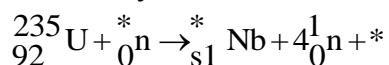
Section 2 (40 Marks)
**Attempt any four questions from this section**

Question 5 **[10]**

(a)
   i.   Why isn't a machine 100% efficient?
   ii. Why do we use a bicycle in spite of it being a mechanical disadvantage?

(b) Two forces each of magnitude 3 N act vertically upwards and downwards on the two ends of a uniform rod of length 1 m freely pivoted at its centre. Determine the resultant moment of the forces about the midpoint of the rod.

(c) A pulley system lifts a load of 600 N by an effort of 200 N. If the resistance due to the movable parts of the machine is 400 N, find
   i.   MA
   ii. VR
   iii. Number of pulleys
   iv. Efficiency

Question 6 **[10]**

(a) How will you experimentally determine the focal length of a convex lens by the distant object method?

(b) Give the list of seven types of radiations, in the order of their increasing wavelength, which make up the complete electromagnetic spectrum.

(c)
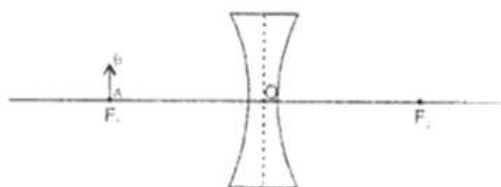
The above diagram shows a small linear object AB placed at the principal focus F_1 of a diverging lens. Points O and F_2 are the optical centre and the first focus of the lens. Using two rays, draw a ray diagram to locate the image formed in the lens. Mention two characteristics of this image.

Question 7 **[10]**

(a) Give reasons for the following
   i.   The sound of a kettle drum is unmusical.
   ii. The rattling of a factory is unpleasant.

(b) What is the function of the wooden box in a sonometer? Does it increase or decrease the duration of emission?

(c)
   i.   Is fire extinguished more effectively using hot water or cold water?
   ii. In a calorimeter box, the calorimeter is surrounded by a coaxial shining cylindrical vessel. Why?
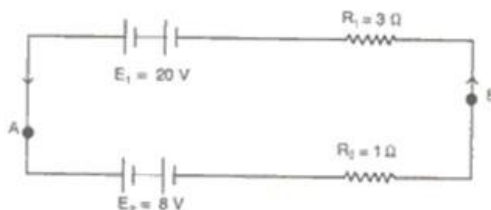
Question 8 **[10]**

(a) An arrow-shaped object is placed at a distance of 40 cm from a convex lens of focal length 200 mm. Draw a ray diagram showing how the image of this object is formed. What is the nature of this image?

(b)
   i.   What is the power of a converging lens of focal length 0.25 m?
   ii. What is the focal length of lens of power –5D?
   iii. If lenses (i) and (ii) are put together, what is the power of this combination?

(c) What is an echo? An observer situated between two parallel cliffs emits an intense sound. Two successive echoes are then heard after 5 s and 7 s, respectively. Calculate the distance between the cliffs. Take the velocity of sound as 332 m/s.
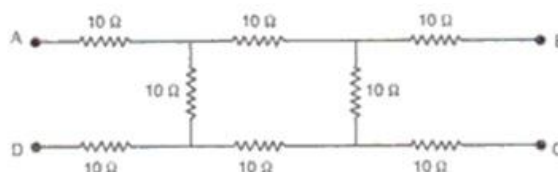
Question 9 **[10]**

(a) Describe the ring main system of distribution of power (Only diagram is required).

(b) In the circuit given below, find the potential difference between points A and B. Assume that both batteries have zero internal resistance.

(c)
   i.   Find the effective resistance across (1) A and B, and (2) A and C in the network shown below:

   ii. Draw magnetic field lines created due to a current-carrying circular ring.

Question 10 [10]

(a) Give the reason for the energy release in a nuclear fission reaction.

(b) In the following nuclear fusion reaction equations, replace a, b, c, d with proper mass number or atomic symbol:

$$^2_1H + {}^2_1H \rightarrow {}^a_2He + {}^1_0b + 3.3 \ MeV$$

$$^3_2He + {}^2_1H \rightarrow {}^c_2He + {}^1_1d + 18.3 \ MeV$$
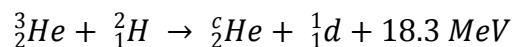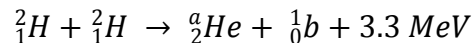
(c) Why does nuclear fusion require high temperature and high pressure?

(d) Give one constructive and destructive use of the nuclear fission reaction.

(e) What is the difference between:
    i.   A β-particle and an electron
    ii. An α-particle and a helium nucleus
    iii. Give two equations of each representing α-decay and β-decay.