ICSE Board
Class X Physics
Sample Paper - 6

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

Question 1   **[10]**
(a) A glass prism produces dispersion, but a rectangular glass does not. Why?
(b) If rays of red, green, violet and yellow light are allowed to fall on a prism, then for which colour will the angle of deviation be maximum? For which colour will it be minimum?
(c) Trace the path of the ray through and inside the prism ABC to get total internal reflection.
Critical angle for the material of the prism w.r.t. air is 45°.
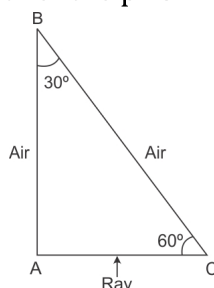
(d) Differentiate between infra-red rays and ultra violet rays in terms of their
  i.   Action on photographic plate
  ii. Uses
(e) Define angle of deviation.

Question 2   **[10]**
(a) Two forces F_1 and F_2 such that $F_1 > F_2$ act on a mass m.
  i.   What change in motion will be observed in the two cases?
  ii. What is the ratio of the two observed characteristics of the change in motion?
(b) i.   Which of the following machines always gives us a gain in force?
      1.   Pair of scissors
      2.   Fire tong
      3.   Staircase
      4.   Single fixed pulley
  ii. Efficiency of a single movable pulley is not 100%. Give two reasons.

(c) A wasp of mass 20 g flies vertically upwards at a speed of 50 cm/sec. What is the power generated in its wings? [g = 10 ms⁻²]

(d) i. A body is acted upon by a force. State two conditions under which the work done could be zero.

ii. Give an example in which the force does no work on the body.

(e) For the oscillation of a simple pendulum, state the position of the bob where its

i. Acceleration is maximum

ii. Kinetic energy is maximum

Question 3 [10]

(a) A conducting wire carrying a current produces a magnetic field.

i. How is the magnetic field detected?

ii. How is the plane of the electric field and that of the magnetic field oriented with respect to each other?

(b) A coil carrying a current when placed in a magnetic field experiences a turning effect.

i. Name a device which makes use of this effect.

ii. State one way, non-electrical or magnetic, in which this turning effect can be increased.

(c) State two differences between a motor and an AC generator related to

i. Energy conversion

ii. Function of the carbon-brushes

(d) Two wires are of equal mass and material, but one is half the length of the other. What will be the ratio between their resistances?

(e) Mention two factors on which the emf of a cell depends.

Question 4 [10]

(a) Write the conditions necessary for the formation of an echo.

(b) i. A public address (PA) system is used for a large gathering.
Which characteristics of vibration in the output are increased?

1. Frequency   2. Velocity

3. Amplitude   4. Harmonics

ii. 'Bel' measures   Choose the correct option.

1. Loudness

2. Relative loudness of sound

(c) Why is it that ice cubes added to a drink cool it much faster than ice cold water added to it?

(d) Two resistors, R_1 and R_2, are first connected in series and then in parallel across the same source.

i. In which case is the current through the source greater?

ii. In which case is the rate of conversion of electrical energy to heat energy greater?

(e) Compare electrical potential difference 'V', where work = Q × V (Q, the charge) with gravitational potential difference work = mgh relating (i) Q and (ii) V with respective symbols in case of gravitational potential.

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

Question 5   **[10]**
   (a) PP' is the principal axis of a lens and MN and NN' are the incident and refracted rays of the lens.
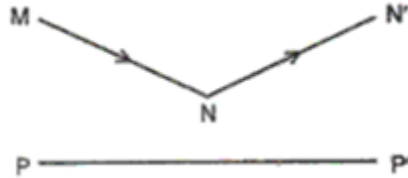
   i.   Copy the diagram and mark 'O', the optical centre of the lens.
   ii. With the object being at infinity, draw another ray parallel to MN passing through the lens.
   iii. Identify the lens type and find the position of the principal focus.
   iv. Locate the position of the image formed.
   (b) State two factors, other than the angle of incidence, which affect the deviation of light through a prism.
   (c) State Snell's Law.
   (d) The bottom of a swimming pool appears raised. Why?

Question 6   **[10]**
   (a) A world weightlifting record is held by Sergei Didyk of USSR. He lifted 261 kg to a height of 2.3 m in 4 s. Find the
      i.   Weight lifted by Didyk
      ii. Work done by him
      iii. Power developed by him (Take g = 10 m/s^2)
   (b) Ramesh applies a force of 6 kgf to draw a 4.8 kg bucket of water from a well using a single fixed pulley. Assuming that all of the extra force applied is to overcome frictional force, calculate the force of friction, mechanical advantage and efficiency.
   (c) With illustrative diagrams, show that the sum of KE and PE is a constant at every point of oscillation of a simple pendulum, qualitatively.

Question 7   **[10]**
   (a) An electric bulb is marked 200 V, 100 W.
      i.   What do the markings mean?
      ii. Another bulb is marked 200 V, 50 W. Which of the two has a coil of higher resistance?
      iii. What will be the energy used by the first bulb if it is used for 10 hours a day for 10 days?
      iv. What is the cost of the energy used if 1 kWh is priced at Rs 1.60?
   (b) What mass of water at 100°C is to be added to 5 kg of water at 10°C to prepare a water bath at 30°C? State the assumption used in solving the problem.
   (c) Name the waves used in the operation of
      i.   SONAR
      ii. RADAR

Question 8 **[10]**

(a) What is nuclear fusion? Give two of its applications.

(b) 'Radioactivity is a nuclear phenomenon'. Comment on this statement.

(c) Differentiate between nuclear fission and nuclear fusion.

(d) Complete the following fusion reactions:

$a)\ {}_2^3He + {}_2^3H \longrightarrow {}_2He + {}_1H + energy$

$b)\ {}_1^2H + {}_1^2H \longrightarrow {}_2He + {}^1n + energy$

$c)\ {}_{92}^{235}U + {}_0^1n \longrightarrow {}_{56}Ba + {}^{92}Kr + 3{}_0^1n + \ldots\ldots\ldots$

Question 9 **[10]**

(a) State the differences between an echo and a resonant vibration.

(b) Give one example each of a

   i. Free vibration

   ii. Forced vibration

(c) 65 g of ice at 0°C is added to 150 g of water at 50°C and the mixture attains a temperature of 10°C. What is the value of the latent heat of fusion of ice?

(d) Define: i. Specific heat capacity

        ii. Thermal capacity

Name the units in which they are measured in the SI system.

Question 10 **[10]**

(a) Draw a labelled circuit diagram and the necessary measuring instruments used to verify Ohm's law in the laboratory. State for which part of the circuit the law is verified.

(b) What electrical property is the same when resistors are joined

   i. In series

   ii. In parallel

(c) State the functions of the following in house circuitry and household devices.

   i. Electric meter

   ii. Distribution box

   iii. Cartridge type of fuse

   iv. Three-pin plug