

THE FIRST PRE-BOARD EXAMINATION 2020-21
CLASS X (ICSE)
SCIENCE Paper-I
PHYSICS

Time: Two hours

Maximum marks: 80

Instructions:

- * Answers to this paper must be written on the answer script provided separately.
- * You will **NOT** be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
- * The time given at the head of this paper is the time allowed for writing the answers.
- * All subsections of each question must be answered in the correct order.
- * Please **do not** write anything on the question paper except your name and roll number.
- * The intended marks for questions or parts of questions are given in brackets [].
- * **Section I** is compulsory. Attempt any **four** questions from **Section II**.

SECTION I [40 marks]

Attempt **all** questions from this Section.

Question 1

- (a) State two conditions for a body to be in equilibrium. [2]
- (b) The work done by a fielder when he takes a catch in cricket match is negative. Explain. *Fielder applies force opposite to direction of displacement.* [2]
- (c) Can the centre of gravity of a body be situated outside its material? Give an example. [2]
- (d) A machine act as:
(i) a force multiplier. *less mass*
(ii) speed multiplier. *more less*
In each case state whether the velocity ratio is more than or less than 1. [2]
- (e) The energy of an electron is 4.0×10^{-19} J. Express it in eV. = $\frac{4.0 \times 10^{-19}}{1.6 \times 10^{-19}}$ [2]
4 = 2.5

Question 2

- (a) A ball of mass 0.20 kg is thrown vertically upwards with an initial velocity of 20ms^{-1} . Calculate the maximum potential energy it gains as it goes up. [2]
- (b) For which colour of white light, is the refractive index of a transparent medium [2]
(i) the least, (ii) the most?
- (c) Draw a ray diagram to show the refraction of a monochromatic ray through a prism when it suffers minimum deviation. [2]

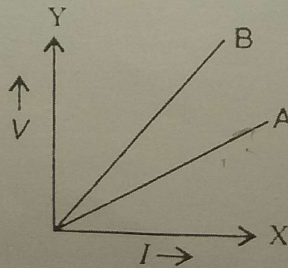
- (d) State the condition for each of the following: [2]
- (i) a lens has both its focal length equal. *pg-116 (table)*
- (ii) a ray passes undeviated through the lens.
- (e) What is meant by the statement 'the critical angle for diamond is 24° '? [2]

Question 3

- (a) State the range of wavelength of ultraviolet radiations. Name one of its sources. [2]
- (b) State two ways of increasing the frequency of vibrations of a stretched string. [2]
- (c) The ratio of amplitude of two waves of same pitch is 3:4. What is the ratio of their: [2]
- (i) loudness? *9:16* (ii) frequency? *1:1*
- (d) Differentiate between heat capacity and specific heat capacity. [2]
- (e) To which wire is the metallic case of an electric appliance connected? Give the reason. [2]

Question 4

- (a) Give two difference between ohmic and non-ohmic resistance. [2]
- (b) What is the effect of increase in pressure on the melting point of ice and boiling point of water? [2]
- (c) The V-I graph for a series combination and for parallel combination of two resistors is shown in figure. Which of two A or B, represents the parallel combination? [2]



- (d) Why are infra-red radiations preferred over ordinary visible light for taking photographs in fog? [2]
- (e) State one use and one harmful effect of radioactivity. [2]

SECTION II [40 marks]

Attempt any four questions from this Section.

Question 5

- (a) An electric heater of power 3kW is used for 10h. How much energy does it consume? Express your answer in:
- 3.6×10^6
 $30 \times 3.6 \times 10^6 = 108 \times 10^6$
- (i) kWh
(ii) joule [3]
- (b) Two forces each of magnitude 2N act vertically upwards and downwards respectively at the two ends of a uniform rod of length 1m which is pivoted at its centre. Draw a diagram of arrangement and determine the resultant moment of forces about the mid point of rod. [3]
- (c) A block and tackle system has 5 pulleys. If an effort of 1000N is needed in downward direction to raise a load of 4500N, calculate:
- (i) the mechanical advantage.
(ii) the velocity ratio, and
(ii) the efficiency of the system. [4]

Question 6

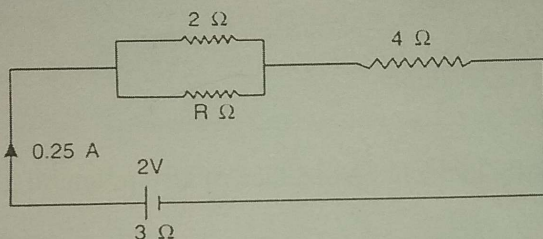
- (a) A ray of light is normally incident on one face of an equilateral glass prism. Answer the following: [3]
- (i) What is the angle of incidence on the first face of the prism?
(ii) What will be the angle of incidence at the second face of the prism?
(iii) Will the light ray suffer minimum deviation by the prism?
- (b) Is it possible to burn a piece of paper using a convex lens in day light without using a match box or any direct flame? Draw a ray diagram to support your answer. [3]
- (c) A convex lens forms an erect and three times magnified image of an object placed at a distance 10 cm in front of it. Find: [4]
- (i) the position of the image
(ii) the focal length of lens.

Question 7

- (a) Give one example each of natural vibration, forced vibration and resonance. [3]
- (b) (i) Name the characteristics of sound which enables a person to differentiate between two sounds with equal loudness but having different frequencies.
(ii) Define the characteristics named by you in (i)
(iii) Name the characteristic of sound which enables of person to differentiate between two sounds of the same loudness and frequency but produced by different instruments. [3]
- (c) A boy stands 60m in front of a tall wall and claps. The boy continues to clap every time an echo is heard. Another boy finds that the time taken between the first and fifty-first clap is 18s. Calculate the speed of sound. [4]

Question 8

- (a) (i) Two wires of same material and same length have radii r_1 and r_2 respectively. Compare their resistances and their resistivities. [2]
- (ii) Name the material used to make filament of a bulb. [1]
- (b) Name the factors on which the heat produced in a wire depends when current is passed on it, and state how does it depends on the factors stated by you. [3]
- (c) The circuit diagram shows three resistors 2Ω , 4Ω and $R\Omega$ connected to a battery of e.m.f. $2V$ and internal resistance 3Ω . If main current of $0.25A$ flows through the circuit, find:
- (i) the potential difference across the 4Ω resistor.
- (ii) the potential difference across the internal resistance of the cell.
- (iii) the potential difference across the $R\Omega$ resistor.
- (iv) the value of R . [4]



Question 9

- (a) State three differences between heat and temperature. [3]
- (b) 1 kg of ice at 0°C is heated at a constant rate and its temperature is recorded after every 30 s till water is formed at 90°C . Draw a temperature time graph to represent the change of phases. [3]
- (c) A hot iron ball of mass 0.2 kg is added into 0.5 kg of water at 10°C . The resulting temperature is 30°C . Calculate the temperature of hot ball. Specific heat capacity of iron = $336\text{ J kg}^{-1}\text{ K}^{-1}$ and specific heat capacity of water = $4.2 \times 10^3\text{ J kg}^{-1}\text{ K}^{-1}$. [4]

Question 10

- (a) A certain nucleus A (mass number 238 and atomic number 92) is radioactive and becomes a nucleus B (mass number 234 and atomic number 90) by the emission of a particle.
- (i) Name the particle emitted.
- (ii) Explain how you arrived at your answer.
- (iii) State the change in the form of a reaction. [3]
- (b) State the properties each of alpha, beta and gamma radiations in terms of: [3]
- (i) nature
- (ii) mass
- (iii) charge
- (c) A boy of mass 40 kg climbed up a flight of 30 steps each 20 cm high in 2 minutes and a girl of mass 30 kg does the same in 1.5 minutes. Compare [4]
- (i) the work done
- (ii) the power developed by them. ($g = 10\text{ ms}^{-2}$).