

Sample Paper 17
ICSE Class X 2023-24
Physics
Science Paper - 1

Time: 2 Hours

Max. Marks: 80

General Instructions:

1. Answer to this Paper must be written on the paper provided separately.
 2. You will not be allowed to write during first 15 minutes.
 3. This time is to be spent in reading the question paper.
 4. The time given at the head of this Paper is the time allowed for writing the answers.
 5. Section A is compulsory. Attempt any four questions from Section B.
 6. The intended marks for questions or parts of questions are given in brackets [].
-

SECTION - A

(Attempt all questions from this Section.)

QUESTION 1.

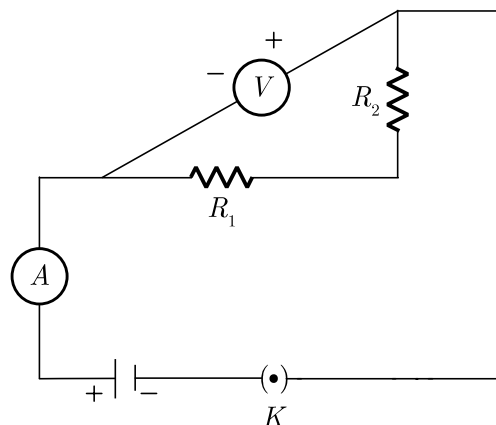
Choose the correct answers to the questions from the given options.

[15]

(Do not copy the questions, write the correct answer only.)

- (i) Calculate the force which will produce a moment of force of 1575 dyne-cm, when the perpendicular distance between point of application of force and turning point is 45 cm.
- | | |
|-------------|-------------|
| (a) 75 dyne | (b) 45 dyne |
| (c) 35 dyne | (d) 25 dyne |
- (ii) Calculate the height through which a crane can lift a load of 4 tonne when a motor of 1000 W is operating for 20 sec.
- | | |
|-----------|---------|
| (a) 1 m | (b) 4 m |
| (c) 0.5 m | (d) 2 m |
- (iii) The SI unit of work is joule. It is expressed in terms of mass, length and time as
- | | |
|-----------------------------------|--|
| (a) $\text{kg m}^3 \text{s}^{-2}$ | (b) $\text{kg}^2 \text{m}^2 \text{s}^{-2}$ |
| (c) $\text{kg m}^2 \text{s}^{-3}$ | (d) $\text{kg m}^2 \text{s}^{-2}$ |
- (iv) The atoms of different elements having same mass number, but different atomic numbers are called :
- | | |
|--------------|-------------------|
| (a) isotopes | (b) isobars |
| (c) isomers | (d) none of these |

- (v) **Assertion :** When light from sun is focused on a sheet of paper using a convex lens, the paper begins to burn producing smoke. It may even catch fire after a while.
Reason : Convex lens is a converging lens.
- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
 (b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
 (c) Assertion is true but Reason is false.
 (d) Both Assertion and Reason are false.
- (vi) A convex lens forms a real image 4 times magnified when placed at a distance of 6 cm from the lens. Calculate the focal length of the lens.
- (a) 6.8 cm (b) 8.8 cm
 (c) 2.8 cm (d) 4.8 cm
- (vii) The sound level at a point is increased by 30 dB. By what factor is the pressure amplitude increased ?
- (a) 16 times (b) 10 times
 (c) 32 times (d) 8 times
- (viii) A see-saw 8 m long is balanced in the middle. Two children of mass 30 kgf and 40 kgf are sitting on the same side of the fulcrum at a distance of 1.5 m and 3.5 from the fulcrum respectively. Where must a lady weighing 60 kgf sit from the fulcrum, so as to balance the see-saw ?
- (a) 6.15 m (b) 4.15 m
 (c) 3.08 m (d) 2.17 m
- (ix) I. The resistors R_1 and R_2 have not been correctly connected in parallel.
 II. The voltmeter has not been correctly connected in the circuit.
 III. The ammeter and the key have not been correctly connected in the circuit.



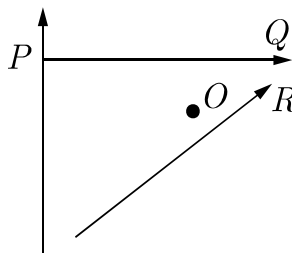
Out of these three, the actual fault in this circuit is are

- (a) Both I and II (b) Both II and III
 (c) Only II (d) Only I

- (x) A bulb of resistance 4000 is connected to 200 V mains. Calculate the magnitude of current.
(a) 0.5 A (b) 0.3 A
(c) 0.9 A (d) 0.10 A
- (xi) A fuse wire is connected in before the switch.
(a) neutral wire (b) live wire
(c) earth wire (d) either (a) or (c)
- (xii) A vessel from which the air is rapidly being pumped out contains 100 g of water at 0°C . The intensive evaporation causes a gradual freezing of the water. What part of the original water can be converted into ice by this method ?
(a) 60% (b) 78%
(c) 86.2% (d) 56%
- (xiii) A solid of mass 1.2 kg has specific. heat capacity of $1.4 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$. Calculate its heat capacity in SI units.
(a) 1680 JK^{-1} (b) 680 JK^{-1}
(c) 80 JK^{-1} (d) 1860 JK^{-1}
- (xiv) Lateral displacement with increase in angle of incidence.
(a) remains same (b) keeps changing
(c) increases (d) decreases
- (xv) A ray of light from the light house reaches the submarine which is under water. The sailor places a plane mirror such that angle between the light ray and the mirror is 0° . Where would he see the light house ?
(a) he won't see the light source at all
(b) at the same position as no refraction occurs
(c) it is pitch dark to relocate the light from the submarine.
(d) at the same position as light reverses along the same path

QUESTION 2.

- (i) Which type of motions are exhibited by a vehicle and its wheels ? [3]
- (ii) P , Q and R are three coplanar forces which act as shown in the figure. [2]

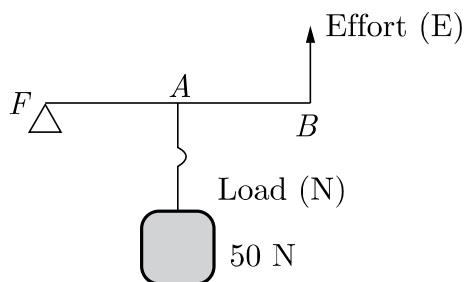


A point O lies in the same plane, $P = Q = R = 6 \text{ N}$.

- (a) Which force has the least moment about O ?
(b) Which force has the greatest moment about O ? Give a reason.

(iii) The diagram shows a lever in use.

[2]



(a) To which class of lever does it belong ?

(b) If $FA = 40 \text{ cm}$, $AB = 60 \text{ cm}$, then find the mechanical advantage of the lever.

(iv) Which physical quantity does the electron volt measure ? How is it related to the SI unit of this quantity ? [2]

(v) Write the circumstances in which work done by a force is zero. [2]

(vi) A 25 W and a 100 W bulb are joined in parallel and connected to the A.C. mains. Which bulb will glow brighter ? [2]

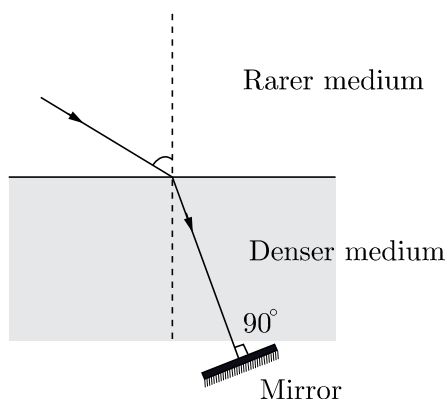
(vii) A bucket kept under a running tap is getting filled with water. A person sitting at a distance is able to get an idea when the bucket is about to be filled. [2]

(a) What change takes place in the sound to give this idea ?

(b) What causes the change in the sound ?

QUESTION 3.

(i) A ray of light is moving from a rarer medium to a denser medium and strikes a plane mirror placed at 90° to the direction of the ray as shown in the diagram. [2]



(a) Copy the diagram and mark arrows to show the path of the ray of light after it is reflected from the mirror.

(b) Name the principle you have used to mark the arrows to show the direction of the ray.

Continue on Next Page...

- (ii) A device is used to transform 12 V A.C. to 200 V A.C. [2]
(a) What is the name of this device ?
(b) Name the principle on which it works.
- (iii) How can you determine the direction of magnetic field lines produced by a straight wire ? [2]
- (iv) A hot solid of mass 60 g at 100°C is placed in 150 g of water at 20°C . The final steady temperature recorded is 25°C . Calculate the specific heat capacity of the solid. [2]
[Specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ }^{\circ}\text{C}^{-1}$]
- (v) (a) Name the different radiations which are emitted by the radioactive substance. [2]
(b) Are all the radiations mentioned by you, emitted in a single radioactive decay ?

SECTION - B

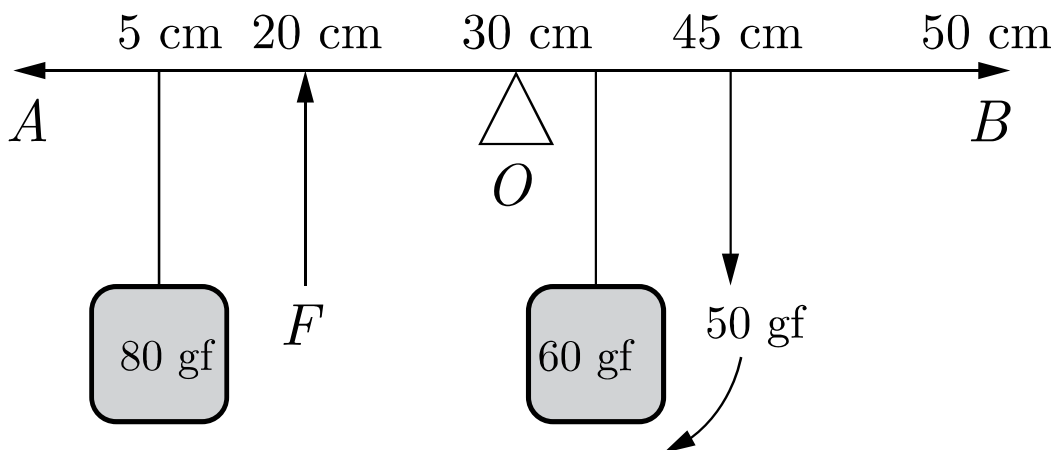
(Attempt any four questions.)

QUESTION 4.

- (i) (a) Draw a labelled ray diagram to illustrate [3]
1. critical angle
2. total internal reflection, for a ray of light moving from one medium to another.
(b) Write a formula to express the relationship between refractive index of the denser medium with respect to rarer medium and its critical angle for that pair of media.
- (ii) Give in the tabular form the difference between a Real Image and a Virtual Image. [3]
- (iii) How will you investigate the existence of ultraviolet and infra-red radiation at the ends of the spectrum ? [4]

QUESTION 5.

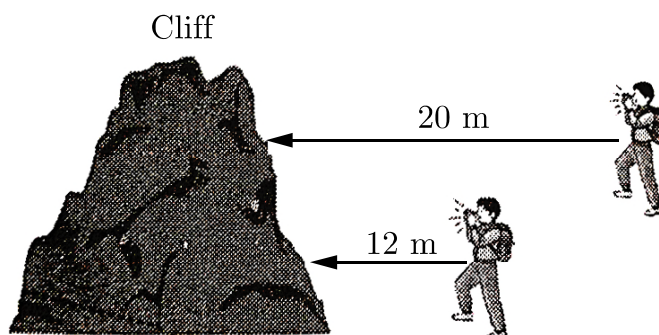
- (i) A uniform meter scale of weight 50 g f is balanced at 30 cm mark when weights of 80 g f and 60 g f act at 5 cm mark and 45 cm mark respectively. What force must be applied at 20 cm mark to balance the meter scale ? [3]



- (ii) (a) What rays exist beyond the visible-red end of the electromagnetic spectrum? State one use and one method of detecting these rays. [3]
 (b) What do you mean by a pure and an impure spectrum? What is Newton's colour disc?
- (iii) (a) Name any two electromagnetic waves which have a frequency higher than that of violet light. State one use of each. [4]
 (b) State two ways by which the frequency of transverse vibrations of a stretched string can be decreased.

QUESTION 6.

- (i) Uttam and Nitesh are standing at a distance of 12 m and 20 m respectively from a cliff. They start shouting their names. They want to hear clear echo of their sound ? [3]
 (a) Will Nitesh and Uttam be able to hear a clear echo of their own sound ?
 (b) Can you explain the condition for a sound to form an echo ?



- (ii) A pulley system has four pulleys in all and is 90% efficient. Calculate (a) M.A. (b) Effort required to lift a load of 1000 N (c) Resistance due to movable parts of machine and friction. [3]
- (iii) Two bodies of equal masses move with the uniform velocities v and $3v$ respectively. Find the ratio of their kinetic energies. [4]

Continue on Next Page...

QUESTION 7.

- (i) A person standing between two vertical cliffs and 480 m from the nearest cliff shouts. He hears the first echo after 3 s and the second echo 2 s later. Calculate: [3]
- (a) The speed of sound.
- (b) The distance of the other cliff from the person.
- (ii) (a) [3]
1. What is the value of the speed of gamma radiations in air or vacuum?
 2. Name a material which exhibits fluorescence when cathode rays fall on it.
- (b) Give any two important sources of background radiation.
- (iii) (a) Draw a diagram to show a block and tackle pulley system having a velocity ratio of 3 marking the direction of load (L), effort (E) and tension (T). [4]
- (b) The pulley system drawn lifts a load of 150 N when an effort of 60 N is applied. Find its mechanical advantage.
- (c) Is the above pulley system an ideal machine or not ?

QUESTION 8.

- (i) There are three pins in an electric plug top. Answer the following : [3]
- (a) How would you identify the earth pin ?
- (b) In which of the three connecting wires should the electric switch be connected ?
- (c) Explain why a switch should not be touched with wet hands.
- (ii) A mixture of radioactive substances gives off three types of radiations. [3]
- (a) Name the radiation similar in nature to X -rays.
- (b) Name the radiation which is deviated most in a magnetic field.
- (c) Name the radiation which is not affected by an electric field.
- (iii) A heating coil is immersed in a calorimeter of heat capacity $50 \text{ J}^\circ\text{C}^{-1}$ containing 1.0 kg of a liquid of specific heat capacity $450 \text{ J kg}^{-1}^\circ\text{C}^{-1}$. The temperature of liquid rises by 10°C when 2.0 A current is passed for 10 minutes. [4]
- Find: (a) the resistance of the coil (b) the potential difference across the coil. State the assumption used in your calculations.

QUESTION 9.

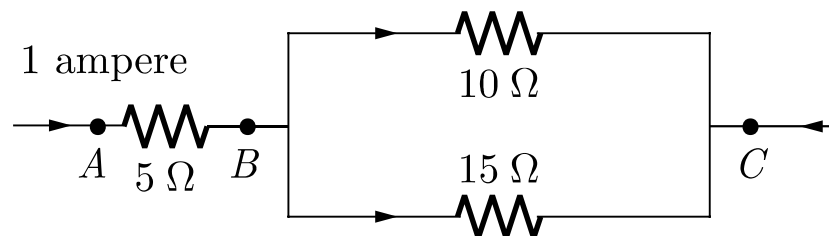
- (i) 0.5 kg of ice at -10°C is heated until whole of it evaporates. Find the amount of heat required. [3]

[Given : latent heat of ice = $336 \times 10^3 \text{ J/kg}$; latent heat of steam = $2268 \times 10^3 \text{ J/kg}$ and specific heat capacity of ice = $2.1 \times 10^3 \text{ J/kg } ^{\circ}\text{C}$]

- (ii) Define the terms : [3]

- (a) Heat capacity and
- (b) Specific heat capacity.

- (iii) Three resistors are connected as shown in the diagram. A current of 1 ampere flows through the 5 ohm resistor as shown in the diagram. [4]



- (a) What is the current through the other two resistors ?
- (b) What is the potential difference across AB and AC ?
- (c) What is the total resistance of the combination ?
