

**Sample Paper 19**  
**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 [ ].
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**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) A body is describing a uniform circular motion. Which of the following quantities is/are constant ?
- |                  |                      |
|------------------|----------------------|
| (a) velocity     | (b) speed            |
| (c) acceleration | (d) both (a) and (b) |
- (ii)  $1 \text{ kW} = \dots\dots\dots$
- |   |                         |
|---|-------------------------|
| (a) $1000 \text{ J} / 1000 \text{ sec}$ | (b) $10^{-3} \text{ W}$ |
| (c) $100 \text{ J} / 100 \text{ sec}$   | (d) $1000 \text{ W}$    |
- (iii) An engine of power  $200 \text{ W}$ , operates for  $4 \text{ s}$ . Find the work done by the engine. If the force developed by the engine is  $100 \text{ N}$  Calculate the maximum displacement caused.
- |                     |                     |
|---------------------|---------------------|
| (a) $8 \text{ m}$   | (b) $2 \text{ m}$   |
| (c) $5.6 \text{ m}$ | (d) $3.8 \text{ m}$ |
- (iv) Which of the following radiation gets deflected most in electric or magnetic field ?
- |                         |                         |
|-------------------------|-------------------------|
| (a) $\alpha$ -particles | (b) $\beta$ -particles  |
| (c) X-rays              | (d) $\gamma$ -radiation |

- (v) **Assertion :** Convex mirror is used as a shaving mirror.  
**Reason :** Convex mirror always forms an enlarged image.
- (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 converging lens has a focal length 40 cm. Calculate its power.
- (a)  $- 2.5 \text{ D}$  (b)  $+ 2.5 \text{ D}$   
(c)  $- 1.5 \text{ D}$  (d)  $+ 1.5 \text{ D}$
- (vii) Two notes are produced from a flute and piano, such that they have same loudness and same pitch. The notes so produced differ in their :
- (a) speed (b) wavelength  
(c) frequency (d) waveform
- (viii) The length of seconds hand of a clock is 10 cm. The angular speed of the tip of the hand is
- (a)  $\frac{\pi}{300} \text{ rad s}^{-1}$  (b)  $\frac{\pi}{40} \text{ rad s}^{-1}$   
(c)  $\frac{\pi}{3000} \text{ rad s}^{-1}$  (d)  $\frac{\pi}{30} \text{ rad s}^{-1}$
- (ix) An electric heater draws a current of 5 A, when connected to 220 V mains. Calculate the resistance of its filament.
- (a)  $13 \Omega$  (b)  $37 \Omega$   
(c)  $50 \Omega$  (d)  $44 \Omega$
- (x) A conductor of length 85 cm has a resistance of 3.750. Calculate the resistance of a similar conductor of length 540 cm.
- (a)  $23.82 \Omega$  (b)  $33.82 \Omega$   
(c)  $3.82 \Omega$  (d)  $13.82 \Omega$
- (xi) Calculate the current flowing through an electric drill, connected to 200 V supply, if it drills a hole in a metal plate of mass 500 g, such that its temperature rises from  $10^\circ\text{C}$  to  $60^\circ\text{C}$  in 5 minutes, assuming all the work done is converted into heat energy.  
[S.H.C. of metal  $0.6 \text{ Jg}^{-1}^\circ\text{C}^{-1}$ ]
- (a) 0.80 A (b) 0.38 A  
(c) 0.65 A (d) 0.25 A
- (xii) A waterfall is 1.5 km high. If the temperature of water at its top is  $20^\circ\text{C}$  find its temperature at the bottom of waterfall, assuming all the kinetic energy is converted into heat energy.  
[Take  $g = 10 \text{ ms}^{-2}$  and sp. heat capacity of water  $= 4200 \text{ J Kg}^{-1} \text{ }^\circ\text{C}^{-1}$ ]
- (a)  $13.57^\circ\text{C}$  (b)  $33.57^\circ\text{C}$   
(c)  $23.57^\circ\text{C}$  (d)  $43.57^\circ\text{C}$

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- (xiii) A piece of brass of mass 200 g and  $100^{\circ}\text{C}$  is placed in 400 g of turpentine oil, contained in a copper calorimeter of mass 50 g at  $15^{\circ}\text{C}$ . The final temperature recorded is  $23^{\circ}\text{C}$ . Find the specific heat capacity of turpentine oil.

[SHC for brass =  $370 \text{ J Kg}^{-1} \text{ K}^{-1}$  ; SCH of copper =  $390 \text{ J Kg}^{-1} \text{ K}^{-1}$ ]

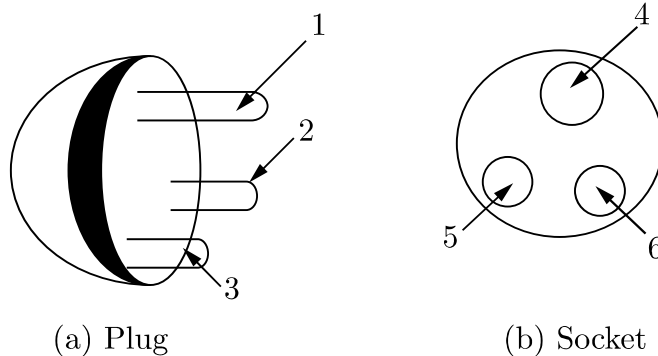
- (a)  $1137.8 \text{ JKg}^{-1} \text{ K}^{-1}$  (b)  $1731.8 \text{ JKg}^{-1} \text{ K}^{-1}$   
(c)  $1371.8 \text{ JKg}^{-1} \text{ K}^{-1}$  (d)  $1317.8 \text{ JKg}^{-1} \text{ K}^{-1}$
- (xiv) Lateral displacement is ?  
(a) perpendicular shift between emergent ray and incident ray.  
(b) parallel shift between incident ray and emergent ray.  
(c) parallel shift between emergent ray and incident ray.  
(d) perpendicular shift between incident ray and emergent ray.
- (xv) Concave lens is also known as ?  
(a) diverging lens (b) dual lens  
(c) converging lens (d) None of the above

## QUESTION 2.

- (i) What do you mean by axis of rotation ? [3]
- (ii) A uniform meter rule weighing 100 gf pivoted at its centre  $O$ . Two weights 150 gf and 250 gf hang from the meter rod as shown. Calculate (a) the total anticlockwise moments about  $O$  (b) the total clockwise moments about  $O$  . [2]
- (iii) The mechanical advantage of a machine is 5 and its efficiency is 80%. It is used to lift a load of 200 kgf to a height of 20 m. Calculate: [2]  
(a) the effort required, and  
(b) the work done on the machine ( $g = 10 \text{ ms}^{-2}$ ).
- (iv) State the energy changes in an oscillating pendulum. [2]
- (v) When an arrow is shot from a bow, it has kinetic energy in it. Explain briefly from where does it get its kinetic energy ? [2]
- (vi) A battery of emf 3 V sends a current of 0.5 A through a wire. Calculate : [2]  
(a) the resistance of the wire  
(b) the heat energy produced in one minute.
- (vii) (a) What is an echo ? [2]  
(b) State two conditions for an echo to take place.

**QUESTION 3.**

- (i) A lens forms an erect, magnified and virtual image of an object. [2]  
(a) Name the lens.  
(b) Draw a labelled ray diagram to show the image formation.
- (ii) (a) Give two characteristic properties of copper wire which make it unsuitable for use as fuse wire. [2]  
(b) Name the material which is used as a fuse wire.
- (iii) The diagrams (a) and (b) given below are of a plug and a socket with arrows marked as 1, 2, 3 and 4, 5, 6 respectively on them. Identify and write Live (*L*), Neutral (*N*) and Earth (*E*) against the correct number. [2]



- (iv) Materials *X*, *Y* and *Z* are solids that are at their melting temperatures. Material *X* requires 200 J to melt 4 kg, *Y* requires 300 J to melt 5 kg and *Z* requires 300 J to melt 6 kg. Rank the materials according to their heats of fusion in descending order. [2]
- (v) Why is the energy distribution of beta decay continuous ? [2]

**SECTION - B**

(Attempt any four questions.)

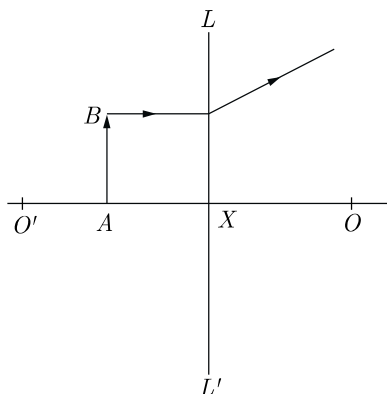
**QUESTION 4.**

- (i) Water in a pond appears to be only three quarters of its actual depth. [3]  
(a) What property of light is responsible for this observation ?  
(b) Illustrate your answer with the help of a ray diagram.

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(ii) Study the diagram below and answer the following questions :

[3]



- Name the lens  $LL'$ .
- What are the points  $O$  and  $O'$  called ?
- Between which points will the image of the object  $AB$  be formed ?
- What is the nature of the image ?

(iii) (a) If a glass block is placed over a mark on paper, the mark seems to rise. Explain.

[4]

(b) What is meant by

- critical angle;
- total internal reflection?

### QUESTION 5.

(i) A uniform metre scale of mass 60 g, carries masses of 20 g, 30 g and 80 g from points 10 cm, 20 cm and 90 cm marks. Where must the knife edge be placed to balance the scale ?

[3]

(ii) (a) The diagram given below shows an object  $O$  and its image  $I$ .

[3]

Copy the diagram and draw suitable rays to locate the lens and its focus. Name the type of lens in this case.



(b) Light passes through a rectangular glass slab and through a triangular glass prism. In what way does the direction of the two emergent beams differ and why ?

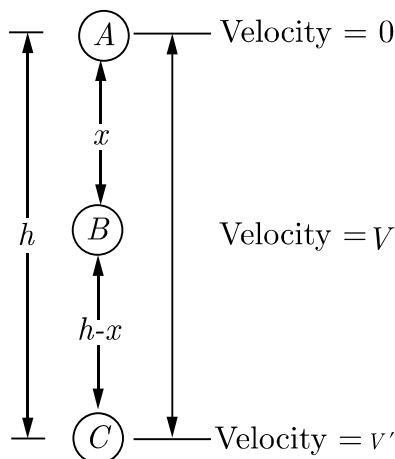
(iii) (a) Explain the conditions under which resonance occurs. State one example of a phenomenon based on resonance.

[4]

(b) What is SONAR ? State the principle on which it is based.

**QUESTION 6.**

- (i) Rahul and Priya are playing on a multistory building. Suddenly Rahul throws a toy of mass 1 kg the toy is falling under the affect of gravity and after sometimes, it reaches on the ground. [3]



- (a) What is the momentum of the toy after 5 s ?  
(b) What is the height of the freely falling body ?
- (ii) A machine is driven by a 100 kg mass that falls 8 m on 4 s. It lifts a load of mass 500 kg vertically upwards. [3]
- (a) What is the force in newton exerted by the falling mass ?  
(b) What is the work done by the 100 kg mass falling through 8 m ?  
(c) What is the power input to the machine ?  
(d) If the efficiency of the machine is 75%, what is the power output ?  
(e) What is the work done by machine in 4 seconds ?
- (iii) (a) Define work and its SI unit. [4]  
(b) Write an expression for the work done by a constant force acting on a body which gets displaced from its initial position in a direction different from the direction of the force.  
(c) Give an example when work done by a force acting on a body is zero even though the body gets displaced from its initial position by the application of force.

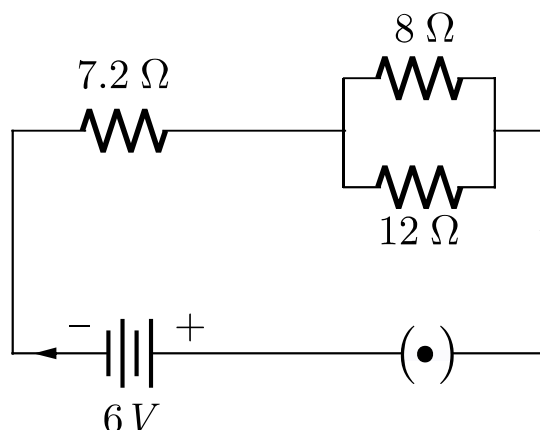
**QUESTION 7.**

- (i) (a) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3 s and 4 s respectively. Calculate the distance between the two cliffs. The speed of sound in the air is  $330 \text{ m s}^{-1}$ . [3]  
(b) Why will an echo not be heard when the distance between the source of sound and the reflecting surface is 10 m ?

- (ii) (a) During the emission of a beta particle, the \_\_\_\_\_ number remains the same. [3]
- (b) A mixture of radioactive substances gives off three types of radiations.
1. Name the radiation which travels with the speed of light.
  2. Name the radiation which has the highest ionizing power.
- (iii) State the conditions for an object to be in: [4]
- (a) stable equilibrium,
  - (b) unstable equilibrium and
  - (c) neutral equilibrium.

**QUESTION 8.**

- (i) What do you mean by the following terms : [3]
- (a) Potential
  - (b) Electromotive force
  - (c) Potential difference ?
- (ii) An element  $P$  disintegrates by  $\alpha$ -emission and the new element suffers two further disintegrations, both by  $\beta$ -emission to form an element  $Q$ . Check if  $P$  and  $Q$  are Isotopes. [3]
- (iii) Three resistors are connected to a 6 V battery as shown in the given figure: [4]



Calculate:

- (a) the equivalent resistance of the circuit.
- (b) total current in the circuit.
- (c) potential difference across the  $7.2 \Omega$  resistor.

**QUESTION 9.**

- (i) Calculate the heat energy that will be released when 5.0 kg of steam at  $100^{\circ}\text{C}$  condenses to form water at  $100^{\circ}\text{C}$ . Express your answer in S.I. unit. (Specific latent heat of vaporisation of steam is  $2268 \text{ kJ/kg}$ ). [3]
- (ii) (a) What is meant by specific heat capacity of a substance ? [3]  
(b) Why does the heat supplied to a substance during its change of state not cause any rise in its temperature?
- (iii) Four cells each of emf 2 V and internal resistance 0.3 ohm are connected in series. The combination is connected in series to an ammeter of negligible resistance, a 1.6 ohm resistor and an unknown resistor  $R_1$ . The current in the circuit is 2 A. [4]  
(a) Draw a labelled circuit diagram for the above arrangement and  
(b) Calculate :  
1. the total resistance of the circuit  
2. the total emf  
3. the value of  $R_1$  and  
4. the potential difference across  $R_1$ .

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