

**Sample Paper 8**  
**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.)

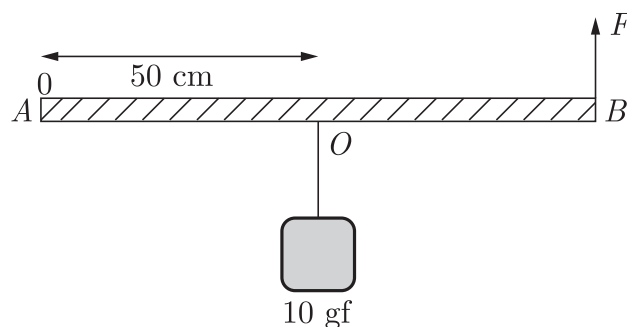
- (i) The point of action of force on a rigid body is :
- (a) Fixed point, but can be transferred anywhere opposite to the direction of force.
  - (b) Fixed point on rigid body
  - (c) Fixed point but can be transferred any where along the line of action of force.
  - (d) Fixed point but can be transferred anywhere along the direction of force.
- (ii) Power = .....
- |                        |                 |
|------------------------|-----------------|
| (a) time $\times$ work | (b) work / time |
| (c) work $\times$ time | (d) time / work |
- (iii) A parrot flying at a height of 300 m above sea level with a force of 10 N .....
- |                               |                        |
|-------------------------------|------------------------|
| (a) does work equal to 3000 J | (b) does negative work |
| (c) does no work              | (d) none of the above  |
- (iv) The radiations given out by radioactive elements :
- (a) ionise the gases
  - (b) are affected by electrostatic and magnetic fields
  - (c) affect photographic plates
  - (d) all of these

- (v) **Assertion :** Long distance power transmission is done at high voltage.  
**Reason :** At high voltage supply power losses are less.
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).  
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).  
(c) Assertion (A) is true but reason (R) is false.  
(d) Assertion (A) is false but reason (R) is true.
- (vi) A convex lens can be regarded as a set of prisms and a glass slab, such that refracting angle of the prisms  
(a) continuously increases in outward direction    (b) remains same in outward direction  
(c) continuously decreases in outward direction    (d) none of these
- (vii) The spread of a glacier in the arctic region can be judged by a submarine by using the principle of  
(a) reflection of sound    (b) refraction of sound  
(c) repetition of sound    (d) none of the above
- (viii) Sound waves of wavelength  $\lambda$  travelling in a medium with a speed of  $v$  m/s enter another medium, where its speed is  $2v$  m/s. What will be the wavelength sound waves in the second medium ?  
(a)  $2\lambda$     (b)  $4\lambda$   
(c)  $\lambda$     (d)  $3\lambda$
- (ix) A soldering iron draws an energy of 43200 J in 4min, when the current flowing through its element is 6 A, calculate the resistance of its heating element.  
(a)  $2\ \Omega$     (b)  $3\ \Omega$   
(c)  $8\ \Omega$     (d)  $5\ \Omega$
- (x) The unit for electric work in SI system :  
(a) watt    (b) Joule  
(c) watt second    (d) watt hour
- (xi) A coil wound around a piece of soft iron can become an electromagnet only when  
(a) the circuit is open  
(b) a magnetic compass is present in the vicinity  
(c) a galvanometer is connected to the circuit  
(d) a current flows in the circuit
- (xii) A power drill of 400 W makes a hole in a lead cube of specific heat capacity  $0.13\ \text{Jg}^{-1}\ ^\circ\text{C}^{-1}$  in 80 s. If the temperature of lead rises from  $27^\circ\text{C}$  to  $317^\circ\text{C}$ , calculate the mass of the lead cube.  
(a) 120.5 g    (b) 420.5 g  
(c) 820.5 g    (d) 620.5 g

- (xiii) If 1 g of steam is mixed with 1 g of ice, then the resultant temperature of the mixture is  
(a)  $270^{\circ}\text{C}$  (b)  $100^{\circ}\text{C}$   
(c)  $230^{\circ}\text{C}$  (d)  $50^{\circ}\text{C}$
- (xiv) A fish while on the surface of water has its angle of view as  $a$ , while it is in water the angle of vision becomes  $\beta$ . Compare the two angles of view.  
(a)  $a = \beta$  (b)  $a < \beta$   
(c)  $a > \beta$  (d) can't say
- (xv) X-rays are produced by  
(a) oscillating circuits in special vacuum tubes  
(b) nucleus of an atom, by the destruction of high energy particle  
(c) excitation of outermost electronic shell of an atom  
(d) excitation of inner electron of atom and its sudden annihilation of high energy free electrons

## QUESTION 2.

- (i) What is the relation between mechanical advantage, velocity ratio and efficiency of a single fixed pulley? [3]
- (ii) A uniform metre rule of weight 10 gf is pivoted at its  $O$  mark. [2]  
(a) What moments of the force depress the rule ?  
(b) How can it be made horizontal by applying a least force ?



- (iii) An effort of 6 kgf is applied on a machine through a displacement of 90 cm, when a load of 100 kgf moves through a distance of 4 cm. Calculate : [2]  
(a) Velocity ratio.  
(b) M.A.
- (iv) A body moves along a circular path. How much work is done in doing so? Explain. [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) Two resistors of resistance 2 ohm and 3 ohm in parallel are connected to a cell of emf 1.5 V and internal resistance 0.3 ohm. Draw a labelled circuit diagram showing the above arrangement and the current drawn from the cell. [2]
- (vii) Name the subjective property of [2]  
(a) sound related to its frequency.  
(b) light related to its wavelength.

**QUESTION 3.**

- (i) (a) Name the high energetic invisible electromagnetic waves which help in the study of the structure of crystals. [2]  
(b) State an additional use of the waves mentioned in part (a).
- (ii) (a) Name the device used to protect the electric circuits from overloading and short circuits. [2]  
(b) On what effect of electricity does the above device work ?
- (iii) Why is soft iron preferred to be used as the core of the electromagnet of an electric bell ? [2]
- (iv) 250 g of water at 30°C is present in a copper vessel of mass 50 g. Calculate the mass of ice required to bring down the temperature of the vessel and its contents to 5°C. [2]  
Specific latent heat of fusion of ice =  $336 \times 10^3 \text{ J kg}^{-1}$   
Specific heat capacity of copper vessel =  $400 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$   
Specific heat capacity of water =  $4200 \text{ J kg}^{-1} \text{ }^\circ\text{C}^{-1}$ .
- (v) Is it possible for hydrogen atom isotope to emit alpha particle ? Explain. [2]

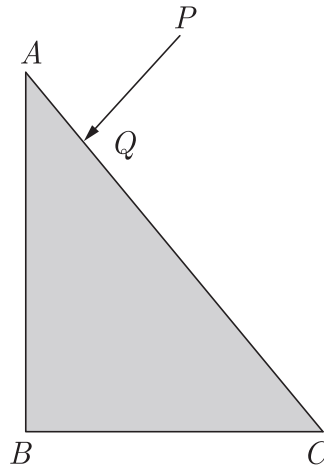
**SECTION - B**

(Attempt any four questions.)

**QUESTION 4.**

- (i) Give one use each of the electromagnetic radiations given below: [3]  
(a) Microwaves  
(b) Ultraviolet radiations  
(c) Infrared radiations.
- (ii) What do you mean by reversibility of light? [3]

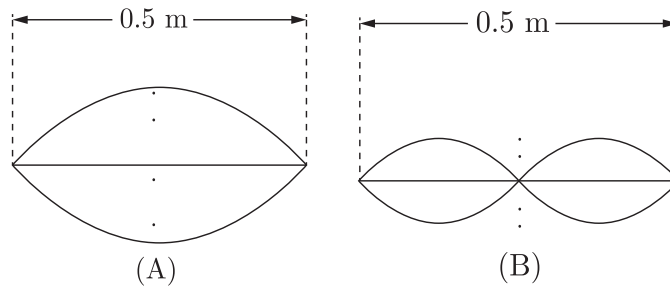
- (iii) (a) (1) What is meant by the term 'critical angle'? [4]  
(2) How is it related to the refractive index of the medium?  
(3) Does the depth of a tank of water appear to change or remain the same when viewed normally from above?
- (b) A ray of light  $PQ$  is incident normally on the hypotenuse of a right angled prism  $ABC$  as shown in the diagram given below:



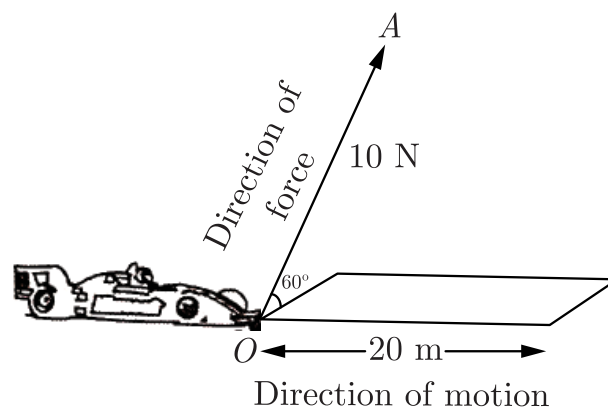
- (1) Copy the diagram and complete the path of the ray  $PQ$  till it emerges from the prism.  
(2) What is the value of the angle of deviation of the ray?  
(3) Name an instrument where this action of the prism is used.

### QUESTION 5.

- (i) The refractive index of glass is  $\frac{3}{2}$ . What is the critical angle for glass air surface ?  
( $\sin 42^\circ = 2/3$ ) [3]
- (ii) How does the value of angle of deviation produced by a prism change with an increase in the : [3]  
(a) value of angle of incidence?  
(b) wavelength of incident light?
- (iii) A stretched wire 0.5 m long is made to vibrate in two different modes as shown in diagram (A) and (B) given below [4]  
(a) If the wavelength of the wave produced in mode (A) is 1 m, what is the wavelength of the wave produced in mode (B) of the following diagram?  
(b) In which case is the note produced louder? Give a reason for your answer.  
(c) In which case is the pitch of the note produced higher ? Give a reason for your answer.

**QUESTION 6.**

(i) [3]



Monu pulls a toy car through a distance of 20 m on smooth and horizontal floor. The string field is Monu's hand makes an angle  $60^\circ$  with horizontal surface. If the force applied by the Monu be 10 N,

- calculate the work done by the Monu is pulling the car.
- If the string makes an angle  $30^\circ$  with the horizontal surface, then calculate work done.

(ii) An effort of 6 kgf is applied on a machine through a displacement of 90 cm, when a load of 100 kgf moves through a distance of 4 cm. Calculate : [3]

- Velocity ratio.
- M.A.
- % age efficiency of machine.

(iii) A body of mass ( $m$ ) is moving with a uniform velocity. A force is applied on the body due to which its velocity changes. How much work is being done by the force? [4]

**QUESTION 7.**

(i) A pendulum has a frequency of 4 vibrations per second. An observer starts the pendulum and fires a gun simultaneously. He hears the echo from the cliff after 6 vibrations of the pendulum. If the velocity of sound in air is  $340 \text{ m s}^{-1}$ , find the distance between the cliff and the observer. [3]

- (ii) A nucleus  ${}_{11}^{24}\text{Na}$  emits a beta particle to change into Magnesium (Mg). [3]
- (a) Write the symbolic equation for the process.
- (b) What are numbers 24 and 11 called ?
- (c) What is the general name of  ${}_{12}^{24}\text{Mg}$  with respect to  ${}_{11}^{24}\text{Na}$  ?
- (iii) (a) State the class of levers and the relative positions of load ( $L$ ), effort ( $E$ ) and fulcrum ( $F$ ) in each of the following cases : [4]
- (1) A bottle opener
- (2) Sugar tongs.
- (b) Why is less effort needed to lift a load over an inclined plane as compared to lifting the load directly?

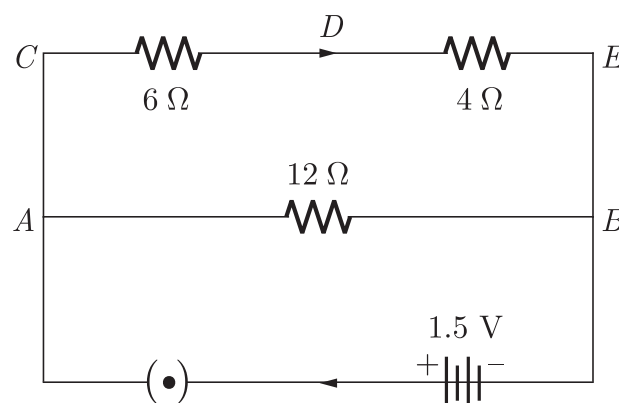
**QUESTION 8.**

- (i) (a) Draw a simple labelled diagram of a D.C. electric motor. [3]
- (b) What is the function of the split rings in a D.C. motor?
- (c) State one advantage of AC over DC.
- (ii) A radioactive nucleus undergoes a series of decays according to the sequence : [3]

$$X \xrightarrow{\beta} X_1 \xrightarrow{\alpha} X_2 \xrightarrow{\alpha} X_3$$

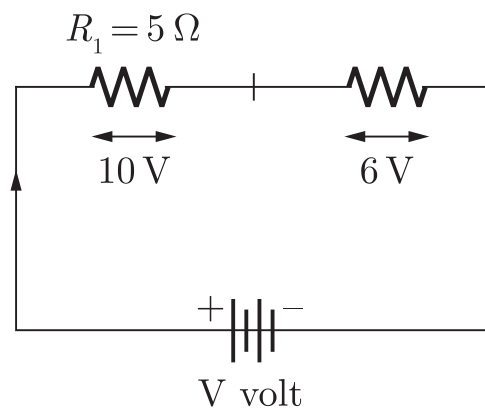
If the mass number and atomic number of  $X_3$  are 172 and 69 respectively, what is the mass number and atomic number of  $X$  ?

- (iii) In the circuit shown in figure, calculate [4]
- (a) the current through the arms  $AB$ ,  $AC$  and  $CDE$
- (b) the potential difference across  $AB$ ,  $CD$  and  $DE$



**QUESTION 9.**

- (i) In a laboratory experiment to measure specific heat capacity of copper, 0.02 kg of water at  $70^{\circ}\text{C}$  was poured into a copper calorimeter with a stirrer of mass 0.16 kg initially at  $15^{\circ}\text{C}$ . After stirring, the final temperature reached to  $45^{\circ}\text{C}$ . [3]  
Specific heat of water is taken as  $4200 \text{ J/kg } ^{\circ}\text{C}$ .
- (a) What is the quantity of heat released per kg of water per  $1^{\circ}\text{C}$  fall in temperature?
- (b) Calculate the heat energy released by water in the experiment in cooling from  $70^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ .
- (c) Assuming that the heat released by water is entirely used to raise the temperature of calorimeter from  $15^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ , calculate the specific heat capacity of copper.
- (ii) Give one example of each where high specific heat capacity of water is used (a) in cooling and (b) as heat reservoir. [3]
- (iii) Two resistors are connected in series as shown in the diagram : [4]



- (a) What is the current through the 5 ohm resistor ?
- (b) What is the current through  $R$  ?
- (c) What is the value of  $R$  ? and
- (d) What is the value of  $V$  ?

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