# II PRE-BOARD EXAMINATION : 2024-25

## CLASS : X (ICSE)

## SCIENCE PAPER - 1 [PHYSICS]

*(Maximum Marks: 80)*

*(Time allowed: Two hours)*

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*Answer to this paper must be written on the paper provided separately.*

*You will not be allowed to write during first 15 minutes.*

*This time must be spent in reading the question paper.*

*The time given at head of this paper is the time allowed for writing the answers.*

*Section-A is compulsory. Attempt any four questions from Section-B.*

*The intended marks for the questions are given in the brackets [ ].*

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## SECTION- A

*(Attempt all questions from this section)*

[1×15=15]

**Question 1**

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

(Do not copy the questions. Write the correct answers only.)

(i)     The wheel of a moving vehicle posses :        [1]

    (a)   translational kinetic energy

    (b)   vibrational kinetic energy

    (c)   rotational kinetic energy

    (d)   both rotational and translational kinetic energy

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**This paper consists of 14 printed pages.**

**Turn Over**

(ii) if common salt is added to water, it boils at a temperature of : [1]

   (a)   $100°$

   (b)   lower than $100°$

   (c)   higher than $100°C$

   (d)   cannot say

(iii) Two fuse wires E and F are marked 5 A and 15 A respectively,

then : [1]

   (a)   Only E must be connected to live wire and F to neutral

   (b)   E can be connected to neutral wire

   (c)   Only F needs to be connected to live wire

   (d)   E ad F both must be connected to live wire

(iv) A rain drop falling on the earth is under dynamic equilibrium and

has : [1]

   (a)   variable velocity

   (b)   constant velocity

   (c)   increasing velocity

   (d)   decreasing velocity

(v) A ray of light travels from a medium of refractive Index $\mu_1$ to a medium of refractive index $\mu_2$. If angle of incidence is 'i' and angle of refraction is 'r' then $\dfrac{\sin i}{\sin r}$ is equal to : [1]

(a) $\mu_1$

(b) $\mu_2$

(c) $\dfrac{\mu_2}{\mu_1}$

(d) $\dfrac{\mu_1}{\mu_2}$

(vi) Specific heat capacity of copper is 0.09 Cal $g^{-1}$ $^\circ C^{-1}$. What will be heat capacity of a copper sphere of mass 800 gram? [1]

(a) $1.13 \times 10^{-4}$ Cal $^\circ C^{-1}$

(b) 72 J $^\circ C^{-1}$

(c) 72 Cal $^\circ C^{-1}$

(d) None of these

(vii) A moving magnetic produces : [1]

(a) Electric current in closed coil

(b) Static electric field

(c) Static magnetic field

(d) None of the above

Turn Over

(viii) Resonance is often undesirable in which of the following [1]

situations

    (a)   Bridges during storng winds of earth quakes

    (b)   Musical instrument

    (c)   Tuning a radio

    (d)   Wireless communications

(ix)  **Assertion (A) :** The temperature coefficient of resistance is always [1]

        positive.

    **Reason (R)**  : On increasing the temperature, the resistance of

        metal and alloys increases.

    (a)   Both A and R are true and R is correct explanation.

    (b)   Both A and R are true but and R is not correct explanation.

    (c)   A is false but R is true.

    (d)   A is true but R is false.

(x)  A ray of light experiences total internal reflection. While entering

from medium A to medium B. Which of the following option is

correct. [1]

| option | refractive index of | angle of incidence is |
|--------|---------------------|------------------------|
| (a) | A is greater than B | less than the critical angle |
| (b) | A is less than B | equal to the critical angle |
| (c) | A is greater than B | greater than the critical angle |
| (d) | A is less than B | equal to the critical angle |

(xi)  A lever for which MA < 1 has : [1]

(a)  Effort between fulcrum and load

(b)  Load between effort and fulcrum

(c)  Load and effort acting on same point

(d)  Load and effort in same direction

(xii) Which of the following statement is correct for the figure shown
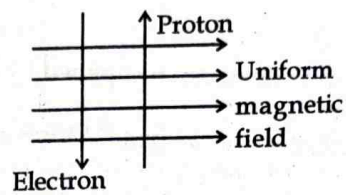
below? [1]



(a)  Both the particles will move in to the plane of paper

(b)  Both particles will move out of the plane of paper

(c)  Electron will move in to the plane of paper while proton will

move away of the plane of paper

(d)  None of the above

(xiii) The number of beta particles emitted by a radioactive substance is

twice the number of alpha particle emitted by it. The resulting

daughter nuclei is an: [1]

(a)  isobar of parent

(b)  isomer of parent

(c)  isotope of parent

(d)  isotone of parent

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(xiv) On application of a voltage across x and y as shown in the figure, if the current flowing through 3 Ω resistor is 2 A, then what will be reading of Ammeter? [1]

(a)  3 A

(b)  6 A

(c)  4 A

(d)  2 A
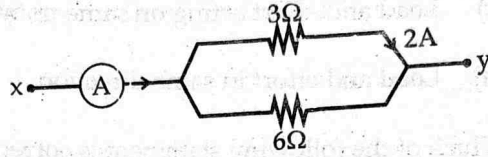


(xv) A window pane is 2 m wide. It can be opened by applying a 50 N force normally at midpoint of window pane. Moment of force required to open the window pane will be : [1]

(a)  25 Newton-meter

(b)  100 Newton-meter

(c)  50 Newton-meter

(d)  10 Newton-meter

Question 2

(i) Complete the following by choosing the correct answer from the bracket. [6]

(a) Resistivity of germanium is _____ (directly/inversely) proportional to the temperature.

(b) Water is used in cold countries as heating reservoir for wine and juice bottles to prevent their _____ (freezing/cooling) due to _____ (high/low) specific heat.

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**Turn Over**

(c)     A wire stretched between two fixed supports is plucked exactly in the middle then released, it executes _____ (natural/damped/forced) vibration.

(d)     Apparent depth is more for _____ (violet/red/yellow) and apparent shift is less for _____ (violet/red/yellow) colour of light

(ii)    Write two advantages of A.C. over D.C.                                          [2]

(iii)   Three cylindrical copper conductors along with their face area and length are shown in figure. Which geometry will have highest resistance? Justify your answer with reason.                      [2]



(a)                        (b)                        (c)
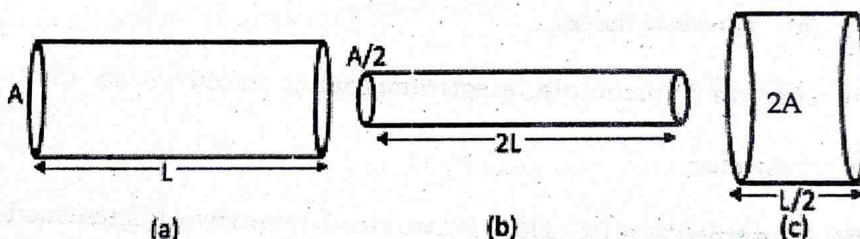
## Question 3

(i)     If 10 resistances of 1 ohm each are connected in series and then connected in parallel. Find the ratio of their equivalent resistance in both the cases.                                                 [2]

(ii)    A uniforms metre scale of mass 60 g, carries 20 g, 30 g and 80 g at 10 cm, 20 cm and 90 cm marks. Where must the scale be hanged with string to balance the scale?                                       [2]

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(iii) A mixture of radioactive substances gives off three types of radiation: [2]

   (a) Name the radiation that travel with the speed of light.

   (b) Name the radiation which has highest ionising power

(iv) A substance has nearly zero resistance at a temperature of 4 k. What is such a substance called? Give one example of such a substance. [2]
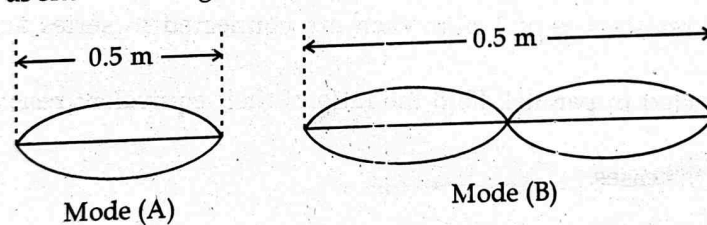
(v) A lift is designed to carry a lead of 4000 kg through 10 floors of a building in 10 second. The average height of each floor is 6 m. Calculate : [2]

   (a) velocity of lift

   (b) power of the lift

(vi) On which principle, electromagnet is based? Also state the principle. [2]

(vii) A stretched wire 0.5 m long is made to vibrate in two different modes as shown in diagram. [3]



Mode (A)        Mode (B)

   (a) If the wavelength of the wave produced in mode A is 1 m, then what is the wavelength of the wave produced in mode B ?

   (b) In which case is the note produced louder?

   (c) In which case is the pitch of the note produced is higher.

## SECTION-B

### (Attempt any four questions)

**Question 4**

(i) (a) Explain how are nuclear wastes generated? [1]

(b) Why do they pose a threat to the environment? [1]

(c) State one way for the safe disposal of these wastes. [1]

(ii) Two men 0.68 km apart stand at the same distance from a vertical cliff. One of them fires a shot and other hear the echo 3 seconds after hearing the direct sound. Find the distance of the men from the cliff assuming the velocity of sound to be 340 m/sec. [3]

(iii) (a) Explain the meaning of the statement "current rating of a fuse is 5A". [1]

(b) In the transmission of power, the voltage of power generated at the generating stations is stepped up from 11 kv to 132 kv before it is transmitted. Why? [1]

(c) Draw the diagram of dual control switch when the appliance is switched 'ON'. [1]

(d) Name the colour codes of the wires which is connected to the metallic body of an appliance. [1]

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Question 5

(i) A lens of focal length 15 cm forms an erect image three times the size

of object on a screen :

(a) State kind of lens

(b) Position of object from the lens

(c) Position of screen from the lens.                                    [3]

(ii) 85 g of water at 30°C is cooled to 5°C by adding certain mass of ice at

0°C. Find the mass of ice required.                                       [4]

[SHC of water = 4.2 $Jg^{-1}$ °$C^{-1}$, SLH of fusion of ice = 336 $Jg^{-1}$]

(iii) In the given diagram, a vibrating tuning fork is kept near the mouth of

a burette filled with water. The length of air column is so adjusted by

opening the tap of the burette such that a loud sound is heard at a

length of 5 cm of the air column.                                         [3]



Tuning fork

5 cm

Water
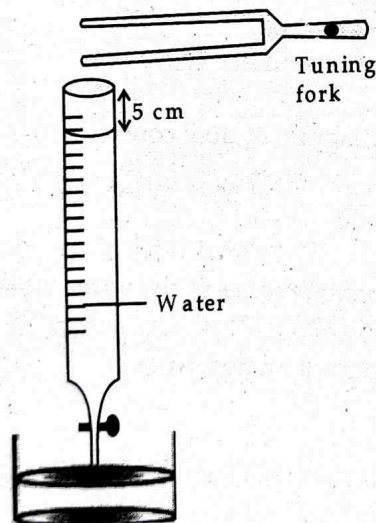
(a) Name the phenomenon.

(b) Why is loud sound heard at this particular length?

(c) If tuning fork is replaced with a tuning fork of higher frequency, should the length of air column increase/decrease to produce a loud sound? Give reason.

## Question 6

(i) By placing two isosceles prisms in the given diagram, show how a ray of light can be bent. show the ray diagram after placing the prisms. [3]
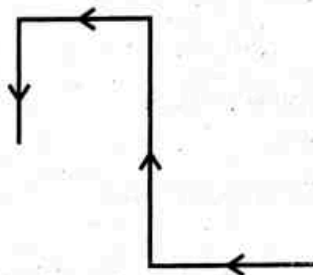


(ii) An eletromagnetic radiation is used to detect the fracture, diseased organs, stones in body and scientific research. [3]

(a) Identify the radiation.

(b) What is the wavelength of this radiation.

(c) Where is this radiation produced?

(iii) At a height of 80 m above the ground an object of mass 5 kg is released from rest. It hits the ground with some speed and rebounds with a speed of 10 m/s. The gravitational field strength is 10 N/Kg. How much energy is converted in to heat and sound on impact? [4]

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## Question 7

(i) Draw a well labelled diagram of D.C. motor and state its principle. [4]

(ii) Figure shows a steal ball placed at the periphery of a curved smooth glass in which a ball is released from point A. [3]
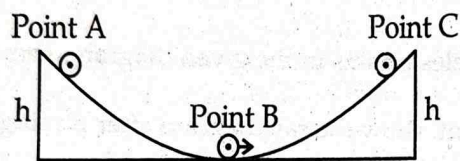


(a) Name the law involved in this

(b) At which point, K.E. is maximum

(c) Explain with this example, how this phenomenon helps to understand energy conservation.

(iii) (a) A marble at the bottom of a tumbler containing water to a depth of 0.2 m appears to be 0.04 m raised above from the bottom. [2] Calculate the refractive index of water. Also write the name of the phenomenon due to which marble seems to be raised.

(b) Can absolute refractive index of a medium be less then 1, if not, why? [1]

Question 8

(i) The refractive index of the material of a concave lens is 'n'. It is immersed in a medium of refractive index 'n'. A parallel beam of light is incident on the lens. Trace the path of refracted rays in each of the following cases :                                    [3]

(a) $n_1 < n$

(b) $n_1 = n$

(c) $n_1 > n$

(ii) Name the material for making :                                    [3]

(a) Standard resistance

(b) Fuse wire

(c) Connection wires

(iii) (a) State two advantages of connecting the appliances in parallel combination as compared to series combination :                                    [2]

(b) Why is earthing absolutely necessary in a power circuit?                                    [1]
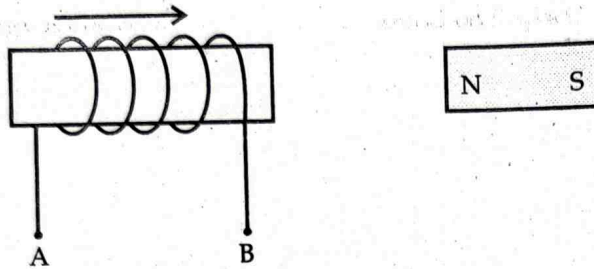
(c) State the function of Kwh metre.                                    [1]

## Question 9

(i) Differentiate between STEP UP transformer and STEP DOWN transformer.
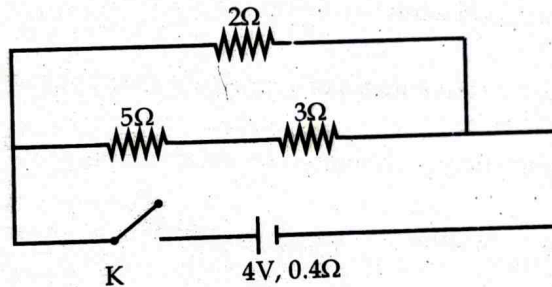
On what principle transformer is based. [3]

(ii)



(a) In what direction induced current flow in the coil. [3]

(b) Name the law used to arrive at the conclusion in part (a).

(c) How would the current in the coil is altered if the coil was made to move three times fast.

[4]

(iii)



(a) Calculate the resistance of the circuit when key k is closed.

(b) Calculate the current through $3\Omega$ resistance when the circuit is complete.

| Q1 i) d | vi) c | xi) a | 1×15 |
|---|---|---|---|
| ii) c | vii) a | xii) a | |
| iii) d | viii) a | xiii) c | |
| iv) b | ix) c | xiv) a | |
| v) c | x) c | xv) c | |

Q.2 i) a) inversely                                                    1×6

b) freezing , high

c) forced

d) red, red

(ii) • magnitude of ac can be increased or decreased   1+1

• ac can be transmitted over a long distance

without much loss of energy

(or any other 2 correct)                               1

(iii) geometry b.

As for a.   $R_1 = \rho \dfrac{L}{A} = \rho \dfrac{L}{A} = R$ (let)

for b,   $R_2 = \rho \cdot \dfrac{2L}{A/2} = 4 \cdot \rho \dfrac{L}{A} = 4R$

for c,   $R_3 = \rho \cdot \dfrac{L/2}{2A} = \dfrac{\rho L}{4A} = \dfrac{1}{4} R$         1

So, for b, R is highest.                               1

Q.3 (i)  $R_S = 10 \times 1 = 10\,\Omega$         $R_P = 1/10\ \Omega$

$\dfrac{R_S}{R_P} = \dfrac{10}{4/10} = \dfrac{100}{1}$                         1

$R_S : R_P = 100 : 1$                                  1

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(ii) correct diagram.                                  1

correct calculation                                    1

(iii) γ                                                1

α                                                      1

(iv) superconductor                                    1

Mercury below 4.2 K / lead below 7.25k, / Niobium below 92k   1

(v) $v = \dfrac{10 \times 6}{10} = 6\ ms^{-1}$           1

$P = F \times v = mg \times v$

$= 4000 \times 10 \times 6 = 240 \times 10^3 w = 240\,kW$     1

(vi) magnetic effect of electric current               1

when electric current flows through a conductor,       1

magnetic field is produced.

(vii) a)    0.5 m                                      1

b)     A                                              1

c)     B                                              1

## SECTION B
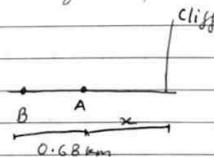
Q.4 (i) a. any one correct source of nuclear waste.    1

b. any one correct point                               1

c. any one correct way for safe disposal               1

(ii)

diagram.                                               1

distance b/w men & cliff =

$\dfrac{1}{2}$ distance covered by

sound

$= \dfrac{1}{2} \times 340 \times 3$                     1

$= 510\ m$                                             1

(iii) a. It means maximum current which can            1

flow through fuse is 5A.

b. To reduce energy loss in the form of                1

heat energy.

iii) correct diagram — 1

iv) green or yellow — 1

**Q.5(i)** a. convex lens — 1

(b) $f = +15\,cm$ $I = 30 \Rightarrow m = 3$

$\Rightarrow v = 3u$

$\Rightarrow v = -3x,\quad u = -x$

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{15} = \frac{1}{-3x} - \frac{1}{-x} = -\frac{1}{3x} + \frac{1}{x} = \frac{-1+3}{3x} = \frac{2}{3x}$$

$x = 10\,cm$, in front of lens — 1

(ii) position of screen $= -3x$

$= 30\,cm$, in front of lens — 1

(ii)

$85g$ of water at $30°C \xrightarrow{Q_1}$ water at $5°C$

'm' g of ice at $0°C \xrightarrow{Q_2}$ water at $0°C \xrightarrow{Q_3}$ water at $5°C$

$Q_1 = 85 \times 4.2 \times 25 = 8925$ — 1

$Q_2 = mL = m \times 336 = 336\,m$ — 1

$Q_3 = m \times 4.2 \times 5 = 21\,m$ — 1

Heat energy lost by hot body = heat energy gained by cold body

$Q_1 = Q_2 + Q_3$

$8925 = 336\,m + 21\,m$

$357\,m = 8925$

$m = \dfrac{8925}{357} = 25\,g$ — 1
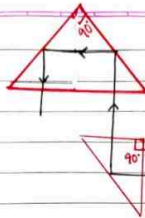
(iii) a. resonance — 1

b. 'f' of air column matches with 'f' of tuning fork — 1

c. length of air column must be decreased — 1/2

as f of air column $\propto \dfrac{1}{l}$ — 1/2

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YOUVA

**Q.6 (i)**



• correct identification of position of prisms. — 1
• correct drawing of I prism — 1
• correct drawing of II prism. — 1

(ii) a. x-rays — 1

b. $0.01\,nm$ to $10\,nm$ — 1

c. It can be produced, when highly energetic electrons are stopped by a heavy metal target of high M.P. — 1

(iii) PE of the object at $80\,m = 5 \times 10 \times 80$

$= 4000\,J$ — 1

KE before it hits the ground $= 4000\,J$ — 1

KE after it hits the ground $= \frac{1}{2} \times 5 \times 10^2 = 250\,J$ — 1

so energy converted into heat and sound $= 4000 - 250$

$= 3750\,J$ — 1

**Q.7(i)** correct diagrams with labelling of atleast 4 parts — 3

principle — 1

(ii) a) law of conservation of energy

b) At point B

c) At point A - more h → more PE, & v = 0 ⇒ KE = 0

At point B - h = 0 → PE = 0, v = max ⇒ KE = max

so, (PE at A is equal to KE at B) or PE at A changes into KE at B and total energy remains conserved.

(iii) a. $RD = 0.2\,m$   shift $= 0.04\,m$

shift $= RD\left(1 - \dfrac{1}{\mu}\right)$

$0.04 = 0.2\left(1 - \dfrac{1}{\mu}\right)$

$1 - \dfrac{1}{\mu} = \dfrac{0.04}{0.20} = \dfrac{1}{5} \Rightarrow \dfrac{1}{\mu} = 1 - \dfrac{1}{5} = \dfrac{4}{5}$

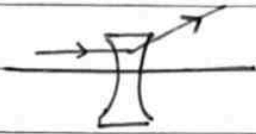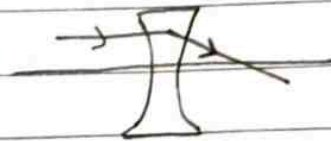$\Rightarrow \mu = \dfrac{5}{4} = 1.25$

Refraction of light                                                                1

No, As $\mu = \dfrac{c}{v}$ and speed of light is maximum 1
in vaccum.

Q.8(i) | a.) $n_1 < n_2$         c.)       1+1
&

b.) $n_1 = n$                                                   1

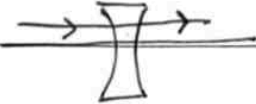(ii) | a.) manganin  or  constantan                                               1

b.) alloy of lead and tin                                                          1

c.) copper or aluminium                                                            1

(iii) | a.) i) all appliances will get same pd for their                           1
perfect working.

ii.) Each appliance operates independently without 1
being affected by the presence of other appliances.

b.) So that if in case heavy current flows due to        1
short circuiting, it passes through earth wire & prevents
ckt from fire.

c.) It is used to measure no. of units (electrical         1
energy) consumed.


Q.9(i) any two correct differences                                                2
Electromagnetic induction                                                         1

(ii) | a.) A to B                                                                   1

b.) leng's law                                                                      1

c.) three times                                                                    1

(iii) | a.) $5\Omega$ & $3\Omega$ are in series.

$R' = 5 + 3 = 8\Omega$.

$R'' = \dfrac{8 \times 2}{8 + 2} = 1.6\Omega$                                      1

$R_{net} = 1.6 + 0.4 = 2.0\,\Omega$                                                1

$I_{net} = I = \dfrac{4}{2} = 2\,A$                                                1

$I(\text{in } 3\Omega) = I(\text{in } 8\Omega) = I_1'$

$I_1 = \dfrac{I\,R_2}{R_1 + R_2}$