

Sample Paper 18
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.

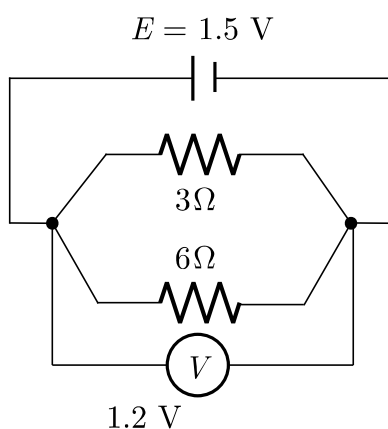
Choose the correct answers to the questions from the given options.

[15]

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

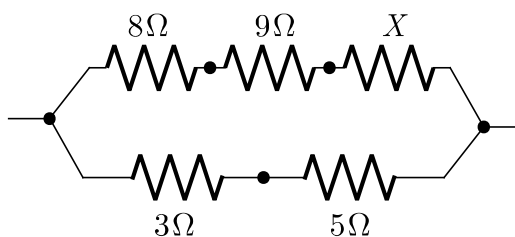
- (i) The turning effect produced in a rigid body around a fixed point by the application of force is called
- | | |
|-----------------------|----------------------|
| (a) movement of force | (b) moment of couple |
| (c) turning force | (d) none of these |
- (ii) For a given mass and velocity the kinetic energy remains constant if
- | | |
|--|--|
| (a) mass and velocity both are squared. | (b) mass is four times and velocity is $\frac{1}{2}$. |
| (c) mass is $\frac{1}{2}$ and velocity is doubled. | (d) none of the above. |
- (iii) An aeroplane is flying at an altitude of 10,000 m at a speed of 300 km/hour. The aeroplane at this height has :
- | | |
|---------------------------------------|---------------------------------------|
| (a) zero kinetic and potential energy | (b) only potential energy |
| (c) only kinetic energy | (d) both kinetic and potential energy |
- (iv) The Sun radiates energy in all directions. The average radiation received on the earth surface from the Sun 1.4 kW/m^2 . The average Earth-Sun distance $1.5 \times 10^{11} \text{ m}$. The mass lost by the Sun per day is ($1 \text{ day} = 86400 \text{ s}$)
- | | |
|-------------------------------------|-------------------------------------|
| (a) $4.4 \times 10^9 \text{ kg}$ | (b) $3.8 \times 10^{14} \text{ kg}$ |
| (c) $3.8 \times 10^{12} \text{ kg}$ | (d) $7.6 \times 10^{14} \text{ kg}$ |

- (v) **Assertion :** Power of a convex lens is positive and that of a concave lens is negative.
Reason : Convex lens forms real image and concave lens forms virtual 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) When an equilateral prism is in minimum deviation position the angle of incidence is :
(a) smaller than the angle of emergence (b) equal to the angle of emergence
(c) greater than the angle of emergence (d) none of these
- (vii) A man stands in between two high rise buildings and blows a whistle. He hears two successive echoes after 0.4 s and 1.6 s. Calculate the distance between buildings [Speed of sound = 332 ms^{-1}]
(a) 132 m (b) 332 m
(c) 232 m (d) 432 m
- (viii) From the given figure, calculate moment of force about (i) P and (ii) Q.
(a) 10 N-m clockwise, 5 Nm anti-clockwise
(b) 5 N-m clockwise, 10 Nm anti-clockwise
(c) 10 N-m clockwise, 10 Nm anti-clockwise
(d) 5 N-m clockwise, 5 Nm clockwise
- (ix) 10^{-10} Nm is equal to dyne cm.
(a) 0.001 (b) 10^{-4}
(c) 10 (d) None of these
- (x) Study the circuit diagram in figure and hence, calculate the internal resistance of cell.



- (a) 0.3Ω (b) 2.8Ω
(c) 0.5Ω (d) 3.0Ω

- (xi) In a parallel circuit
- (a) the equivalent resistance of all resistors is more than any of the individual resistors
 - (b) potential difference across all resistors is same
 - (c) current flowing through all resistors is same
 - (d) none of the above
- (xii) Equivalent resistance of circuit diagram is $6\ \Omega$. Calculate the value of x .



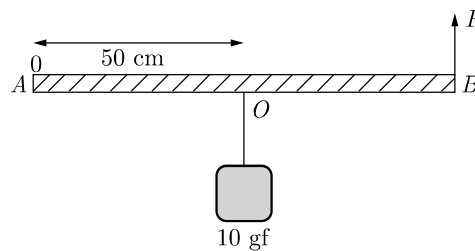
- (a) $8\ \Omega$
 - (b) $7\ \Omega$
 - (c) $9\ \Omega$
 - (d) $10\ \Omega$
- (xiii) In an industrial process 10 kg of water per hour is to be heated from 20°C to 80°C . To do this, steam at 150°C is passed from a boiler into a copper coil immersed in water. The steam condenses in the coil and is returned to the boiler as water at 90°C , how many kg of steam is required per hour ?
(Take, specific heat of steam = $1\text{ cal per g}^\circ\text{C}$ and latent heat of evaporation = 540 cal g^{-1})
- (a) 1 g
 - (b) 10 g
 - (c) 1 kg
 - (d) 10 g
- (xiv) A burner, supplies heat energy at a rate of 20 Js^{-1} . Find the specific heat capacity of a solid of mass 25 g , if its temperature rises by 80°C in one minute.
- (a) $0.6\text{ Jg}^{-1}\ ^\circ\text{C}^{-1}$
 - (b) $1.6\text{ Jg}^{-1}\ ^\circ\text{C}^{-1}$
 - (c) $0.8\text{ Jg}^{-1}\ ^\circ\text{C}^{-1}$
 - (d) $1.2\text{ Jg}^{-1}\ ^\circ\text{C}^{-1}$
- (xv) Refraction of light is the phenomenon of
- (a) bending of light
 - (b) distribution of light
 - (c) movement of light
 - (d) scattering of light
- (xvi) Name the phenomenon occurring in the following figure:



- (a) reflection
- (b) distortion
- (c) refraction
- (d) none of these

QUESTION 2.

- (i) Why do we use a long handle with a screw jack ? [3]
- (ii) A uniform meter 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. (V.R)
- (b) (M.A.) Mechanical advantage
- (iv) A body moves along a circular path. How much work is done in doing so? Explain. [2]
- (v) What type of energy is stored in the spring of a watch? [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 ray of light incident at an angle of incidence i passes through an equilateral glass prism such that the refracted ray inside the prism is parallel to its base and emerges from the prism at an angle of emergence e . [2]
- (a) How is the angle of emergence e related to the angle of incidence i ?
- (b) What can you say about the value of the angle of deviation in such a situation ?
- (ii) (a) A substance has nearly zero resistance at a temperature of 1 K. What is such a substance called? [2]
- (b) State any two factors which affect the resistance of a metallic wire.

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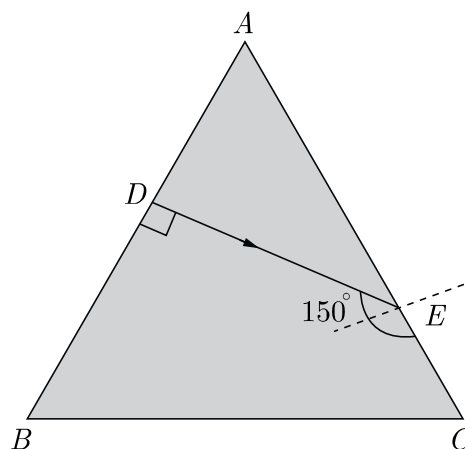
- (iii) Why do we transmit alternating current at high voltage ? [2]
- (iv) 50 g of metal piece at 27°C requires 2400 J of heat energy so as to attain a temperature of 327°C . Calculate the specific heat capacity of the metal. [2]
- (v) A radioactive element A_ZX first emits a β particle and then an alpha particle and the resulting nucleus can be represented P_QY . What are the values of P and Q in terms of A and Z ? [2]

SECTION - B

(Attempt any four questions.)

QUESTION 4.

- (i) The critical angle for the glass of which the equilateral prism ABC is made is 60° . A ray of light incident on the side AB of the prism is refracted along DE such that the angle it makes with the side AC is 150° . Also, $\angle EDB = 90^{\circ}$. Copy the diagram. [3]



- (a) Draw the path of the ray incident on the side AB . (which travels along DE .)
- (b) Show the path along which the ray DE travels from the point E onwards and through the side BC .
- (ii) When a lighted candle is held in front of a thick plane glass mirror, several images can be seen, but the second image is the brightest. Explain. [3]
- (iii) A ray of light of wavelength 5400 \AA suffers refraction from air to glass. Taking ${}_a\mu_g = \frac{3}{2}$, find the wavelength of light in glass. [4]

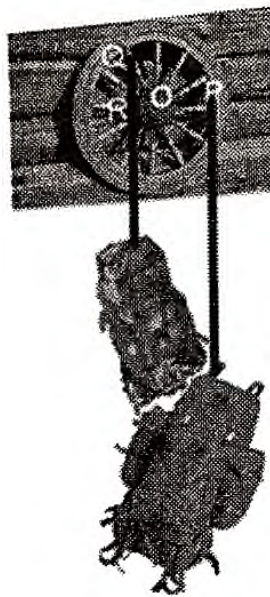
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QUESTION 5.

- (i) A uniform see-saw 4 m long is supported at its centre, Ram weighing 50 kg sits 1 m from the centre of see-saw, where should Geeta weighing 40 kg sit on the other side of the see-saw so as to balance it horizontally ? [3]
- (ii) (a) Why does the sun appear reddish early in the morning ? [3]
(b) Mention two properties and two uses of X -rays.
- (iii) What is resonance ? Give the conditions under which resonance occurs. Give one example of the phenomenon based on resonance. [4]

QUESTION 6.

- (i) [3]



Sumit and Sachin went for a trek and during the journey they visited a cottage. They suspended their bags to the two ropes hangill, from P and Q on a wheel capable of rotating around Q . Sumit suspended his bag to the rope Q and Sachin suspended his bag from the rope P . The wheel remained in equilibrium.

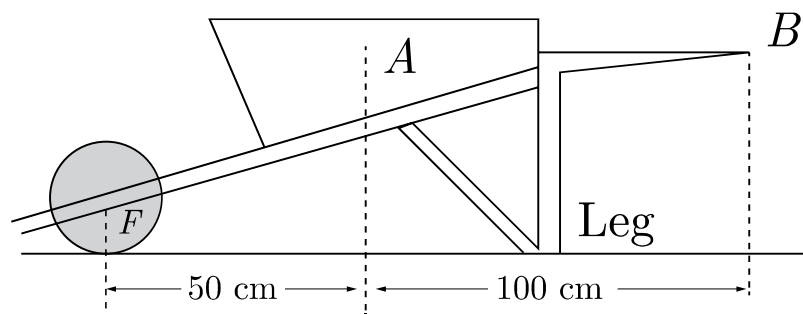
- (a) State with a reason who is carrying a heavier bag.
- (b) Based on the principle of moments, write a mathematical relation that can be used to determine the weight (w) of Sachin's bag, given that the weight of Sumit's bag is 18 kgf.
- (ii) A block and tackle with 5 pulleys is found to have a M.A. of 4 when a load of 5 N is raised by it. Calculate (a) the effort applied (b) V.R. (c) efficiency and (d) the total resistance R due to friction. [3]

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- (iii) State the energy changes in the following cases while in use : [4]
- (a) Loudspeaker
 - (b) A steam engine
 - (c) Microphone
 - (d) An electric bulb
 - (e) Burning coal
 - (f) Electric cell
 - (g) A petrol engine of a running car.

QUESTION 7.

- (i) A sound made on the surface of a lake takes 3 s to reach a boatman. [3]
How much time will it take to reach a diver inside the water at the same depth ?
Velocity of sound in air = 330 ms^{-1}
Velocity of sound in water = 1450 ms^{-1}
- (ii) (a) Fill in the blanks in the following sentences with appropriate words : [3]
- 1. During the emission of a beta particle, the _____ number remains the same.
 - 2. The minimum amount of energy required to emit an electron from a metal surface is called _____ .
- (b) A mixture of radioactive substances gives off three types of radiations.
- 1. Name the radiation which travels with speed of light.
 - 2. Name the radiation which has the highest ionising power.
- (iii) A stationary wheel barrow has its centre of gravity at A . The wheel and the leg are in contact with the ground. The horizontal distance between A and F is 50 cm and that between B and F is 150 cm. [4]
- (a) What is the direction of the force acting at A ? Name the force.
 - (b) What is the direction of the minimum force at B to keep the legs off ground? What is this force called ?
 - (c) The weight of the wheel barrow is 15 kgf. It holds sand of weight 60 kgf. Calculate the minimum force required to keep the leg just off the ground.

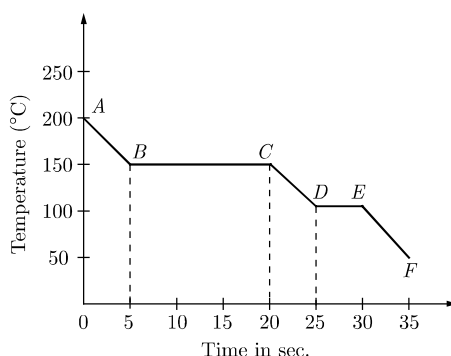


QUESTION 8.

- (i) How does the resistivity of a [3]
 (a) metallic wire,
 (b) semiconductor,
 (c) an alloy such as Constanta depend on temperature?
- (ii) A mixture of radioactive substances gives off three types of radiations. [3]
 (a) Name the radiation which has the maximum penetrating power.
 (b) Name the radiation which has the highest ionizing power.
 (c) Name the radiation which has the highest speed.
- (iii) An electric heater is rated 500 KVA, 200 V. If the heater is operated for 3 hour, calculate the energy consumed : [4]
 (a) in KWh (b) in joule

QUESTION 9.

- (i) Calculate the amount of ice which is required to cool 150 g of water contained in a vessel of mass 100 g at 30°C, such that the final temperature of the mixture is 5°C. (Take specific heat capacity of material of vessel as $0.4 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$, specific latent heat of fusion of ice = 336 J g^{-1} , specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$). [3]
- (ii) The graph represents a cooling curve for a substance being cooled from higher temperature to a lower temperature. [3]
 (a) What is the boiling point of the substance ?
 (b) What happens in the region *DE* ?
 (c) Why is region *DE* shorter than the region *BC* ?



- (iii) A piece of wire having resistance R is cut into four equal parts. [4]
 (a) How will the resistance of each part compare with the original resistance ?
 (b) If the four parts are placed in parallel, how will the joint resistance compare with the resistance of the original wire ?