Sample Paper 14

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 answers only.)

(i) A uniform meter scale balances horizontally on a knife edge placed at 55 cm mark, when a mass of 25 g is supported from one end. Draw the diagram of the arrangement. Calculate mass of the scale.

(a) 400 g (b) 275 g
(c) 100 g (d) 225 g

(ii) Kinetic energy of a body is independent of .....

(a) time for which force is applied (b) elasticity of the body
(c) force applied (d) none of the above

(iii) If the force acting on a body is inversely proportional to its speed, then its kinetic energy is

(a) a constant
(b) inversely proportional to time
(c) linearly related to time
(d) inversely proportional to the sequence of time

(iv) To study the age of excavated material of archaeological significance we study the rate of decay of an isotope of

(a) Uranium (b) Cobalt
(c) Carbon (d) Chlorine

(v) **Assertion :** 40 W tube light give more light in comparison to 40 w bulb.
Reason : Light produced is same from same power.
(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 thick glass slab with a silvered side forms multiple images on account of :
(a) refraction of light
(b) both reflection and refraction of light
(c) reflection of light
(d) dispersion of light

(vii) The frequency of a source is 20 kHz. The frequency of sound wave produced by it in water and air will be
(a) $>$ 20 kHz
(b) $<$ 20 kHz
(c) same as that of source
(d) depend upon velocity

(viii) The perpendicular distance between the point of application of force and the turning point is 1.75 m, when a force of 80 N acts on a rigid body. Calculate the moment of force.
(a) 370 Nm
(b) 180 Nm
(c) 220 Nm
(d) 140 Nm

(ix) A current of 0.2 A flows through a conductor of resistance 4.5 Ω. Calculate potential difference at the ends of conductor.
(a) 0.3 V
(b) 0.7 V
(c) 0.10 V
(d) 0.9 V

(x) An electric heater draws a current of 3.5 A at a potential difference of 250 V. Calculate the power of four such heaters.
(a) 1500 W
(b) 3500 W
(c) 2500 W
(d) 4500 W

(xi) A wire of length 40 cm and area of cross-section 0.1 mm^2 has a resistance of 0.8Ω.The specific resistance of the wire is
(a) $0.00003\Omega - cm$
(b) $0.00004\Omega - cm$
(c) $0.00001\Omega - cm$
(d) $0.00002\Omega - cm$

(xii) 50 g of a hot solid of specific heat capacity 0.25 $Jg^{-1}{}^{\circ}C^{-1}$ and at 100°C is placed in 80 g of cold water, when the temperature of cold water rises by 3°C. Find the initial temperature of cold water.
(a) 6.36°C
(b) 26.36°C
(c) 16.36°C
(d) 36.36°C

Continue on Next Page...

(xiii) Velocity ratio being a pure ratio is a ..... quantity.
(a) vector (b) unitless
(c) meaningful (d) smart

(xiv) A plano-lens has one surface ..... and the other surface plane.
(a) rectangular (b) triangular
(c) oval (d) spherical

(xv) A light which consists of one colour or one wavelength only is called .....
(a) Polychromatic (b) Ultraviolet
(c) Monochromatic (d) Infrared

QUESTION 2.

(i) Can the centre of gravity of a body be outside it ? If yes, give one example. [3]

(ii) What do you mean by (a) a rigid object, and (b) a non-rigid object? [2]

(iii) A body moves a distance of 5 m on a smooth horizontal surface under the influence of a force of 20 N. Calculate the work done by the force when [2]
(a) the force acts along the horizontal surface and
(b) the force acts along a direction at an angle of 60° with the horizontal surface.

(iv) State the transformation of energy which takes place in the following when current is drawn from them : [2]
(a) An electric cell
(b) A generator

(v) What is the work done by a coolie walking on a horizontal platform with a load on his head? [2]

(vi) A cell supplies a current of 0.6 A through a 2 Ω coil and a current of 0.3 A through a 8 Ω coil. Calculate the e.m.f. and the internal resistance of the cell. [2]

(vii) The rear view mirror of motor bike starts vibrating violently at some particular speed of motor bike. [2]
(a) Why does this happen?
(b) What is the name of the phenomenon taking place ?

QUESTION 3.

(i) An object is placed in front of a lens between its optical centre and the focus and forms a virtual, erect and diminished image. [2]

(a) Name the lens which formed this image.
(b) Draw a ray diagram to show the formation of the image with the above stated characteristics.

(ii) Explain briefly the function of the following in the household wiring (a) a three pin plug and (b) main switch. [2]

(iii) Under what circumstances does one get an electric shock from an electric gadget? [2]

(iv) A piece of ice of mass 40 g is dropped into 200 g of water at 50°C. [2]
Calculate the final temperature of water after all the ice has melted. (specific heat capacity of water $= 4200\,\text{J/kg}^\circ\text{C}$, specific latent heat of fusion of ice $= 336 \times 10^3\,\text{J/kg}$).

(v) How are β-rays emitted from a nucleus while it does not contain electrons ? [2]

SECTION - B

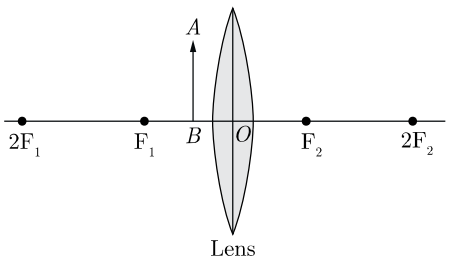
(Attempt any four questions.)

QUESTION 4.

(i) Can one burn a piece of paper in day light by just using a convex lens instead of a matchstick or any direct flame ? Support your answer with the help of an appropriate ray diagram. [3]

(ii) The diagram shows an object O, and its image 'I' formed by a lens. In the diagram, draw the lens and the rays to show how the image is formed. Mark focus F of the lens. Name the lens. [3]

(iii) (a) An object AB is placed between O and F_1 on the principal axis of converging lens as shown in the diagram. [4]



Copy the diagram and by using three standard rays starting from point A, obtain an image of the object AB.

(b) An object is placed at a distance of 12 cm from a convex lens of focal length 8 cm. Find :

(a) the position of the image

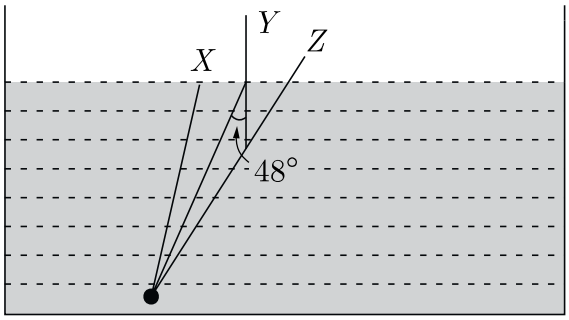
(b) nature of the image

QUESTION 5.

(i) (a) Can the absolute refractive index of a medium be less than one ? [3]

(b) A coin placed at the bottom of a beaker appears to be raised by 4.0 cm. If the refractive index of water is 4/3, find the depth of the water in the beaker.

(ii) (a) The diagram shows a point source P inside a water tank. Path of the three rays X, Y and Z into the water is shown in the diagram. If the critical angle for water-air pair is 48° show the path of these rays after striking the water surface. [3]



(b) Why does the sky appear dark instead of blue to the passengers at very high altitudes or to an astronaut?

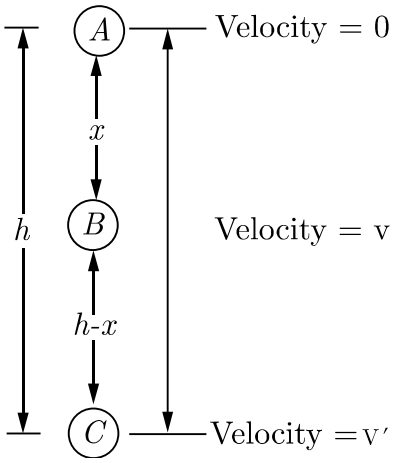
(iii) (a) What do you understand by the terms: [4]

1. wavelength,
2. frequency and
3. amplitude of a wave ?

(b) Which of the above determine the loudness of a sound wave? What is the relationship between loudness and your answer in (c) (a) above ?

QUESTION 6.

(i) Rahul and Priya are playing on a multistorey 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 10 s?
(b) What is the height of the freely falling body?

(ii) Figure-3 shows a block and tackle of 5 pulleys. [3]
(a) Copy the diagram and complete it by drawing a string around the pulleys. Mark the positions of the load and the effort.
(b) If the load is raised by 1 in, through what distance will effort move?

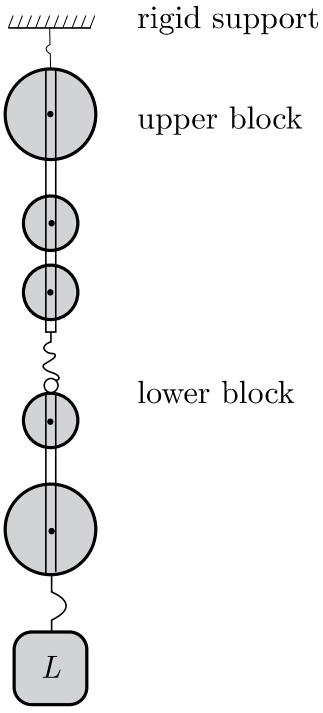


Fig.3

(iii) (a) State the SI unit of the momentum of a body. [4]
(b) How is work done related to the applied force?
(c) By what factor does the kinetic energy of a moving body change when its speed is reduced to halt ?

Continue on Next Page...

QUESTION 7.

(i) A pendulum has a frequency of 5 vibrations per second. An observer starts the pendulum and fires a gun simultaneously. He hears the echo from the cliff after 8 vibrations of the pendulum. If the velocity of sound in air is 340 ms^{-1}, what is the distance between the cliff and the observer ? [3]

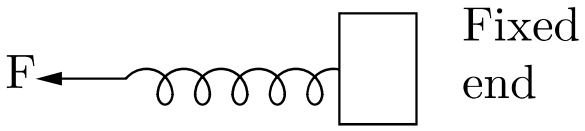
(ii) (a) Give one difference between a chemical change and a nuclear change. [3]

(b) Copy and complete the following nuclear equations by filling the correct values in the blanks :

$$^{238}_{92}P \xrightarrow{-\alpha} {}^{\cdots}_{\cdots}P_1 \xrightarrow{-\beta} {}^{\cdots}_{\cdots}P_2 \xrightarrow{-\beta} {}^{\cdots}_{\cdots}P_3$$

(iii) (a) Give any two effects of a force on a non-rigid body. [4]

(b) One end of a spring is kept fixed while the other end is stretched F by a force as shown in the diagram.



1. Copy the diagram and mark on it the direction of the restoring force.
2. Name one instrument which works on the above principle.

(c)

1. Where is the center of gravity of a uniform ring situated?
2. 'The position of the center of gravity of a body remains unchanged even when the body is deformed.' State whether the statement is true or false.

QUESTION 8.

(i) (a) Explain briefly how a magnet can be demagnetized using an alternating current. [3]

(b) State two ways by which the emf in an A.C. Generator can be increased.

(ii) Rohit playing a flute and Anita playing a piano emit sounds of same pitch and loudness. [3]

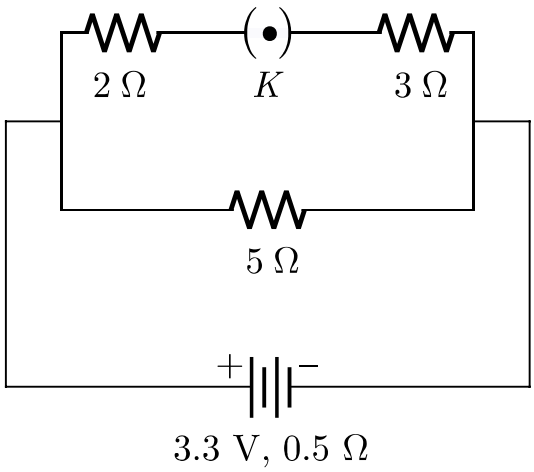
(a) Name one characteristic that is different for waves from the two different instruments.

(b) If now the loudness of the sound from flute becomes four times that of the sound from piano, then write the value of the ratio $A_F : A_P$ (where, A_F = amplitude of sound wave from flute, A_P = amplitude of sound wave from piano)

(c) Define pitch of a sound.

Continue on Next Page...

(iii) The diagram shows a circuit with the key k open. [4]



Calculate:

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

(b) the current drawn from the cell when the key k is open.

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

(d) the current drawn from the cell when the key k is closed.

QUESTION 9.

(i) The temperature of 600 g of cold water rose by 15°C when 300 g of hot water at 50°C was added to it. What was the initial temperature of cold water? [3]
Given : specific heat capacity of water is 4.2 J/g °C.

(ii) (a) When 1 g of ice at 0 °C melts to form 1 g of water at 0 °C then, is the latent heat absorbed by the ice or given out by it? [3]
(b) Give one example where high specific heat capacity of water is used as a heat reservoir.

(iii) Explain the following: [4]

(a) Why tungsten is used almost exclusively for filament of an incandescent bulbs?

(b) Why are the conductors of electric heating devices such as toasters and electric irons made of alloy rather than a pure metal ?

(c) Why a series arrangement is not found satisfactory for house lights ?

(d) Why is the resistance of a given wire inversely proportional to its cross-sectional area?

****