

Sample Paper 15
ICSE Class X 2023-24
Physics
Science Paper - 1

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.)

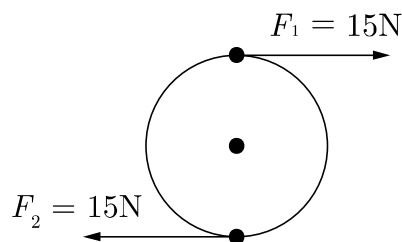
QUESTION 1.

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

[15]

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

- (i) Two forces F_1 and F_2 are applied on a circular body such that moment of couple is 9 Nm in clockwise direction. Calculate the radius of circular body.



- (a) 10 cm (b) 60 cm
(c) 30 cm (d) 40 cm

- (ii) A body possesses kinetic energy of 'X' J. If the mass of body increases 49 times determine its final velocity if Kinetic energy remains constant.

- $1/X$ the original velocity.
- $1/5^{\text{th}}$ the original velocity.
- $1/2$ the original velocity.
- $1/7^{\text{th}}$ the original velocity.

- (iii) The heart of a deer chased by a tiger beats 200 times in a minute and does a work of 1.4 joules per beat. What is the power of heart ?
(a) 4.670 (b) 1.000
(c) 12.300 (d) 8.760
- (iv) Two forces each of magnitude 2 N act vertically upward and downward respectively on two ends of a uniform rod of length 1m, freely pivoted at its centre. Determine the resultant moment of forces about the mid-point of the rod.
(a) 6 Nm (b) 2 Nm
(c) 4 Nm (d) 1 Nm
- (v) **Assertion :** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will increase.
Reason : The power dissipated in the circuit is directly proportional to the resistance of the circuit.
(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) Name the machine shown in the figure using gamma radiations in detecting fracture or malignant cells in our body.



- (a) MRI machine (b) X ray machine
(c) ECG monitor (d) None of these
- (vii) By decreasing the amplitude of a pure note its :
(a) loudness decreases (b) wavelength decreases
(c) quality changes (d) speed decreases
- (viii) Huge trailer trucks have their steering wheel of diameter.
(a) least (b) large
(c) small (d) all of these

- (ix) A cell of e.m.f 1.8 V is connected to an external resistance of $2\ \Omega$, when potential difference recorded at the ends of resistance is 1.6 V. Calculate the internal resistance of the cell.
- (a) $3\ \Omega$ (b) $1.30\ \Omega$
(c) $2.8\ \Omega$ (d) $0.25\ \Omega$
- (x) Step up transformers are used :
- (a) for distribution power in localities.
(b) for saving sensitive appliances, such as F.V. and A.C.
(c) for long distance transmission of power.
(d) any of these.
- (xi) Resistance of a conductor of length 75 cm is $3.25\ \Omega$. Calculate the length of a similar conductor, whose resistance is $13.25\ \Omega$.
- (a) 105.76 cm (b) 305.76 cm
(c) 205.76 cm (d) 405.76 cm
- (xii) A liquid of mass 100 g loses heat at a rate of $200\ \text{Js}^{-1}$ for 1 minute. If the temperature of liquid drops by 100°C , Calculate the specific heat capacity of the liquid.
- (a) $0.6\ \text{Jg}^{-1}\ ^\circ\text{C}^{-1}$ (b) $1.2\ \text{Jg}^{-1}\ ^\circ\text{C}^{-1}$
(c) $0.8\ \text{Jg}^{-1}\ ^\circ\text{C}^{-1}$ (d) $1.6\ \text{Jg}^{-1}\ ^\circ\text{C}^{-1}$
- (xiii) A villager uses a single fixed pulley while a person in urban areas uses the combination of single fixed and single movable pulley. Which out of the two are more effective ?
- (a) Single fixed and single movable (b) Single fixed
(c) None of the above (d) Both (a) and (b)
- (xiv) Which lens has both the surfaces as concave?
- (a) plano-convex (b) plano-concave
(c) bi-convex (d) bi-concave
- (xv) The region of spectrum, which extends beyond violet end of visible spectrum is called spectrum.
- (a) Ultraviolet (b) Green
(c) Green Yellow (d) Infrared

QUESTION 2.

- (i) What do you mean by axis of rotation ? [3]
- (ii) Explain briefly the role of the position of CG in [2]
- (a) loading a ship
(b) sitting/standing on the upper deck of a bus.
- (iii) It takes 20 s for a person to climb up the stairs while another person B does the same in 15 s. Compare the (a) work done (b) power developed by the person A and B . [2]

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- (iv) How are kinetic energy and momentum related ? [2]
- (v) A satellite revolves around a planet in a circular orbit. What is the work done by the satellite at any instant ? Give a reason. [2]
- (vi) A wire of uniform thickness with a resistance of $27\ \Omega$ is cut into three equal pieces and they are joined in parallel. Find the resistance of the parallel combination. [2]
- (vii) (a) Sometime when a vehicle is driven at a particular speed, a rattling sound is heard. Explain briefly, why this happens and give the name of the phenomenon taking place. [2]
(b) Suggest one way by which the rattling sound could be stopped.

QUESTION 3.

- (i) (a) How is the refractive index of a medium related to its real depth and apparent depth ? [2]
(b) Which characteristic property of light is responsible for the blue color of the sky ?
- (ii) How does the power rating of a device help us to decide about the type of leads (connecting wires) to be used for that ? [2]
- (iii) State two advantages of an electromagnet over a permanent magnet. [2]
- (iv) A block of lead mass 250 g at 27°C was heated in a furnace till it completely melted. Find the quantity of heat required (a) to bring the block to melting point, (b) to completely melt the block at its melting point. (m. pt. of lead = 327°C , specific heat capacity = $0.13\ \text{J/g K}$, specific latent heat of fusion = $26\ \text{J/g}$) [2]
- (v) What do you mean by atomic nucleus? Who discovered it ? [2]

SECTION - B

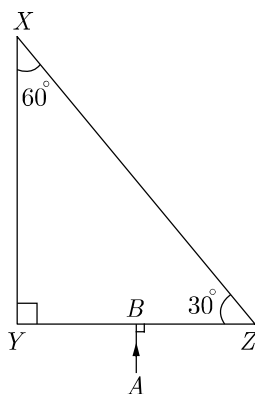
(Attempt any four questions.)

QUESTION 4.

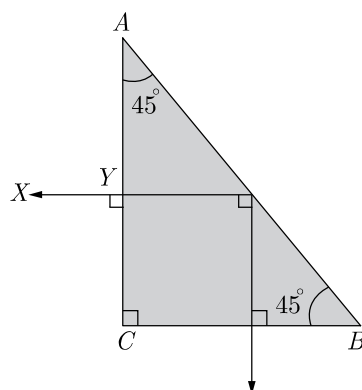
- (i) A prism deviates a monochromatic ray of light through an angle ' δ ', when the angle of incidence at the surface of the prism is ' i '. [3]
(a) Draw a graph showing the variation of ' δ ' with ' i '. On your graph show the angle of minimum deviation.
(b) What is the relation between the angle of incidence and the angle of emergence when the ray suffers minimum deviation.

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- (ii) (a) Suggest one way, in each case, by which we can detect the presence of: [3]
 1. Infrared radiations.
 2. Ultraviolet radiations.
 (b) Give one use of infrared radiations.
- (iii) (a) The following diagram shows a 60° , 30° , 90° glass prism of critical angle 42° . Copy the diagram and complete the path of incident ray AB emerging out of the prism making the angle of incidence on each surface. [4]



- (b) A ray of light XY passes through a right-angled isosceles prism as shown below

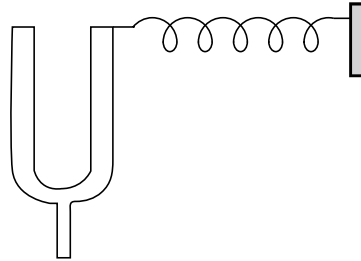


- What is the angle through which the incident ray deviates and emerges out of the prism ?
 - Name the instrument where this action of prism is put into use.
 - Which prism surface will behave as a mirror ?
- (c) Draw the diagram of a right-angled isosceles prism which is used to make an inverted image erect.

QUESTION 5.

- (i) A point object is placed at a distance of 12 cm from a convex lens on its principal axis. Its image is formed on the other side of the lens at a distance of 18 cm from the lens. Find the focal length of the lens. Is the image magnified ? Justify your answer. [3]
- (ii) (a) During sunset and sunrise, the sun is seen even when it is slightly below the horizon. Explain. [3]
 (b) What is spectrum? Show its formation with the help of a neat labelled ray diagram.

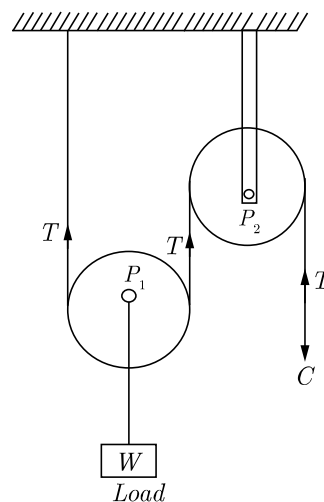
- (iii) (a) The figure below shows a tuning fork with one of its prongs fastened to one end of a spring whose other end is fastened to a rigid support. When the tuning fork is made to vibrate, how does the pattern of the coils of the spring change ? [4]



- (b) What do you understand by the terms ?
1. Wavelength
 2. Frequency and
 3. Amplitude of a wave.
- (c) Which of the above determine the loudness of a sound wave ? What is the relationship between loudness and your answer in (b) above ?

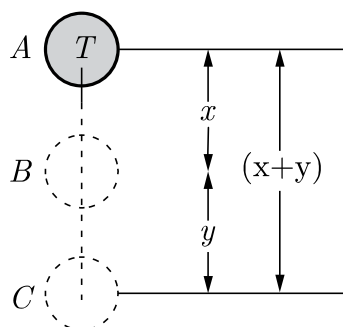
QUESTION 6.

- (i) Consider the combination of a movable Pulley P_1 with a fixed pulley P_2 used for lifting a load w . [3]

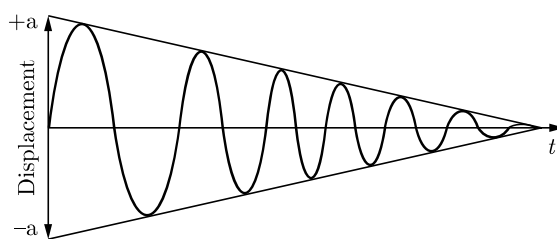


- (a) What is the function of the fixed pulley P_2 ?
- (b) If the free end of the string moves through a distance y , find the distance by which the load w is raised.
- (c) Calculate the force to be applied at C to just raise the load $w = 30$ kgf, neglecting the weight of the pulley P_1 and friction.

- (ii) A block and tackle pulley system has a velocity ratio 3. [3]
 (a) Draw a labelled diagram of this system. In your diagram, indicate clearly the points of application and the directions of the load and effort.
 (b) Why should the lower block of this pulley system be of negligible weight ?
- (iii) An object of mass m is allowed to fall freely from point A as shown in the figure. Calculate the total mechanical energy of the object at: [4]

(a) point A (b) point B (c) point C **QUESTION 7.**

- (i) The diagram below shows the displacement-time graph for a vibrating body. [3]
 (a) Name the type of vibrations produced by the vibrating body.
 (b) Give one example of a body producing such vibrations.
 (c) Why is the amplitude of the wave gradually decreasing ?
 (d) What will happen to the vibrations of the body after sometime ?



- (ii) A nucleus A_ZX emits an alpha particle followed by γ -emission; thereafter it emits two β -particles to form X_3 . [3]
 (a) Copy and complete the values of A and Z for X_3
 ${}^A_ZX \xrightarrow{-\alpha} X_1 \xrightarrow{-\gamma} X_2 \xrightarrow{-2\beta} \dots X_3$
 (b) Out of alpha (α), beta (β) and gamma (γ) radiations-
 1. which radiation is the most penetrating ?
 2. which radiations are negatively charged ?
- (iii) (a) [4]
 1. On what factor does the position of the centre of gravity of a body depend ?
 2. What is the SI unit of the moment of force ?
 (b) Name the factors affecting the turning effect of a body.

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QUESTION 8.

- (i) What do you mean by current carriers? What are current carriers in : [3]
1. solid conductors
 2. liquids
 3. gases ?
- (ii) (a) Name the characteristic of sound in relation to its waveform. [3]
- (b) A person standing between two vertical cliffs and 480 m from the nearest cliff shouts. He hears the first echo after 3 s and the second echo 2 s later.
Calculate:
1. The speed of sound.
 2. The distance of the other cliff from the person.
- (iii) (a) [4]
1. A fuse is rated 8 A. Can it be used with an electrical appliance rated 5 kW, 200 V ? Give a reason.
 2. Name two safety devices which are connected to the live wire of a household electric circuit.
- (b) An electric iron is rated 220 V, 2 kW.
1. If the iron is used for 2 h daily, find the cost of running it for one week if it costs ₹ 4.25 per kWh.
 2. Why is the fuse absolutely necessary in a power circuit ?

QUESTION 9.

- (i) Steam at 100°C is passed over 1000 g of ice at 0°C . After sometime, 600 g of ice at 0°C is left and 450 g of water at 0°C is formed. Calculate the specific latent heat of vaporisation of steam. [3]
(Given : specific heat capacity of water = $4200 \text{ J/kg }^{\circ}\text{C}$ and specific latent heat of fusion of ice = 336000 J/kg .)
- (ii) 1. 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]
2. Give one example where high specific heat capacity of water is used as a heat reservoir.
 3. Give one example where high specific heat capacity of water is used for cooling purposes.
- (iii) What is a solenoid ? Explain with the help of a figure how a solenoid behaves like a bar magnet ? [4]