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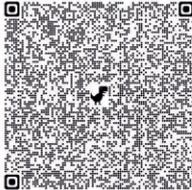
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Debashis Pati
Author is the 1st individual to write preparatory books on various topics of "multiple" Spelling Bee competitions in India. He has written the Maximum Number of Spelling Books as well as Tests in the world.

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Class 10
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According to latest ICSE syllabus
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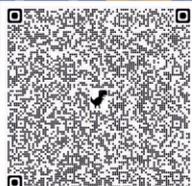
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According to latest ICSE syllabus
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40 TEST PAPERS

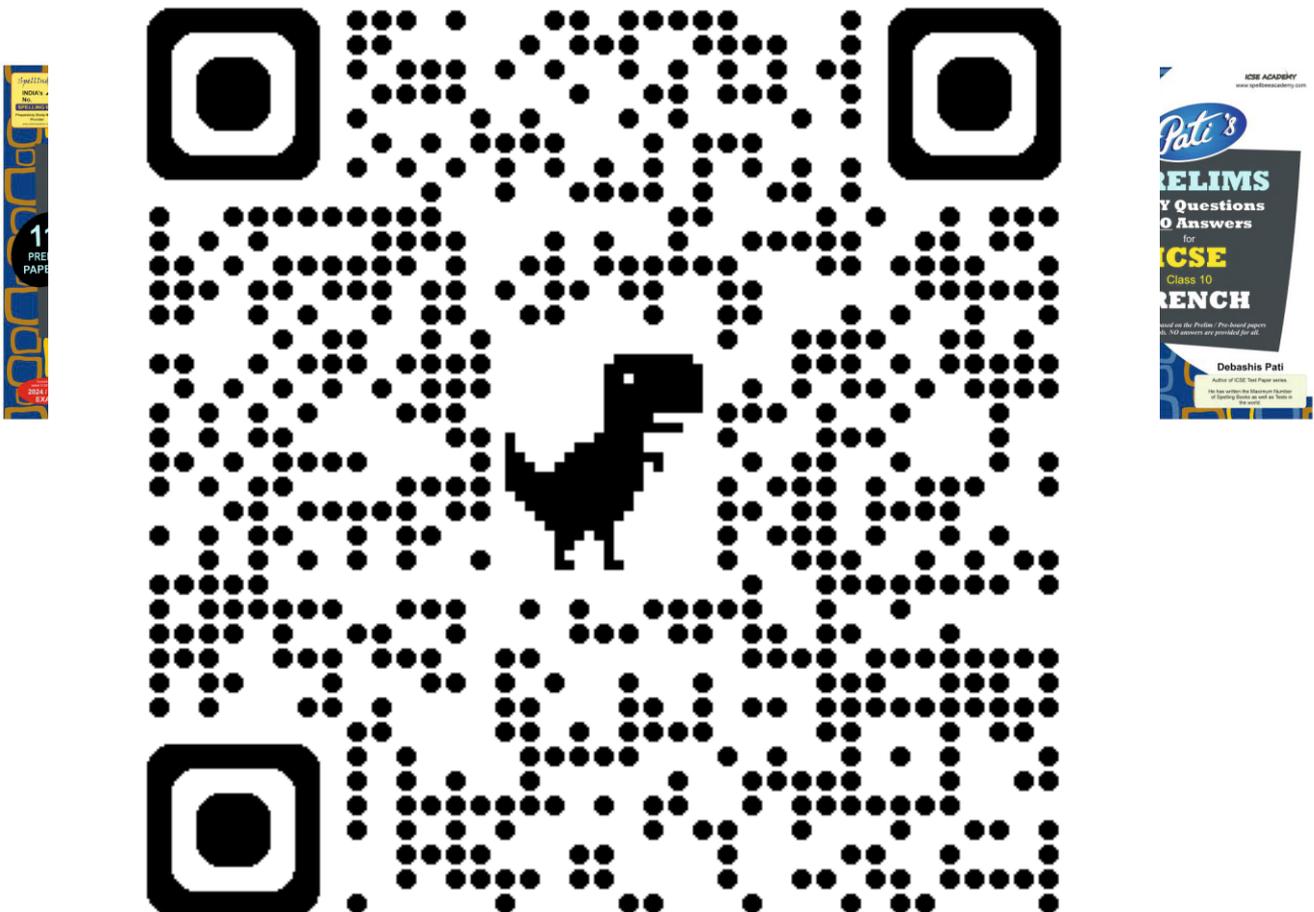
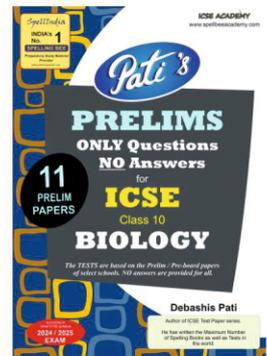
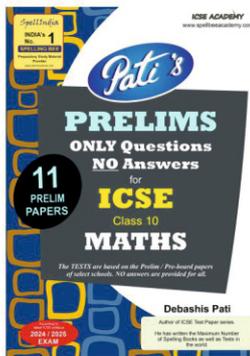
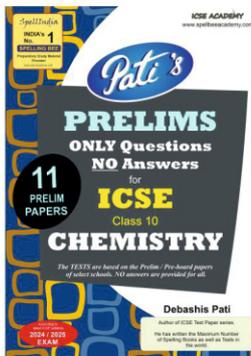
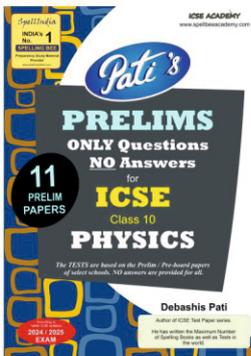
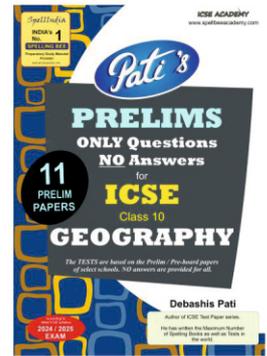
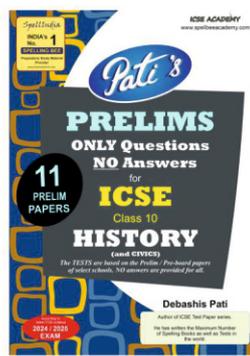
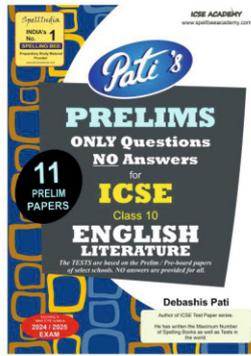
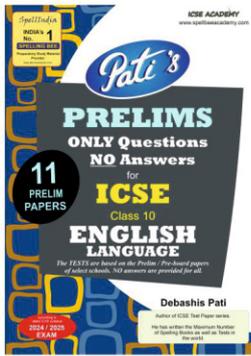
The TESTS are based on the Prelim / Pre-board papers of various schools. Answers are provided for all.
Competency Based Questions and 3 Specimen Papers are provided.

According to latest ICSE syllabus
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Set 3a : Question Papers

(In this flipbook)

1. Karnataka ICSE Schools Association
2. Vibgyor High, Mumbai
3. Sulochanadevi Singhanian, Thane - Set A
4. Sulochanadevi Singhanian, Thane - Set B
5. Hiranandani Foundation, Powai, Mumbai
6. AVM Group, Mumbai
7. G D Somani, Mumbai
8. Queen Mary, Mumbai
9. SS Ravishankar Vidya Mandir, Mumbai
10. Ryan Group, Mumbai

2025-2026 - Prelim 2



ICSE ACADEMY

Set 3b: Question Papers

(Not in this flipbook but in flipbook for 3b)

11. Cressmonde World, Mumbai
12. Euro, Mumbai
13. Jankidevi, Mumbai
14. N L Dalmia, Mumbai
15. NES, Mumbai
16. Pawar Public, Bhandup, Mumbai
17. Pawar Public, Kandivali, Mumbai
18. Shishuvan, Mumbai
19. Vissanji, Mumbai
20. Cathedral & John Connon, Mumbai



ICSE ACADEMY

Set 3c: Question Papers

(Not in this flipbook but in flipbook for 3c)

21. St Gregorios, Mumbai
22. Bai Avabai F Petit Girls, Mumbai
23. J B Petiti Girls, Mumbai
24. Bombay Scottish, Mahim, Mumbai
25. DPS Megacity, Kolkata
26. Loreto House Kolkata
27. Primus Public, Bangalore
28. St Vincent's, Asansol
29. Kapol Vidyanidhi, Mumbai - Set A
30. Kapol Vidyanidhi, Mumbai - Set B



ICSE ACADEMY

Set 3d : Question Papers

(Not in this flipbook but in flipbook for 3d)

31. J B Vachcha, Mumbai
32. Greenacres, Mumbai
33. Sadhu Vaswani, Sanpada, Vashi
34. Vasant Vihar, Thane
35. St Mary's, Mazgaon, Mumbai
36. Dhirubhai Ambani International, Mumbai

Question Paper 1



KARNATAKA ICSE SCHOOLS ASSOCIATION ICSE STD. X Preparatory Examination 2026

Subject : PHYSICS

Duration: 2 Hour

Maximum Marks: 80

Date:23-01-2026

General Instructions

Answers to this paper must be written on the paper provided separately.

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

This time is to be spent in reading the Question Paper.

The time given at the 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 questions or parts of questions are given in brackets [].

SECTION A (40 Marks)

(Attempt all questions from this Section)

Question 1

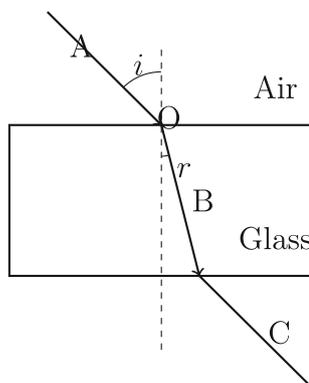
Choose the correct answers to the questions from the given options:

[15]

- (i) A uniform metre scale of weight W is balanced at the 40 cm mark when a weight of 20 gf is suspended at the 10 cm mark. The value of W is:
- (a) 40 gf
 - (b) 60 gf
 - (c) 20 gf
 - (d) 80 gf
- (ii) If the kinetic energy of a body increases by 300%, its momentum will increase by:
- (a) 100%
 - (b) 200%
 - (c) 300%
 - (d) 50%
- (iii) A light ray enters a glass slab ($n = 1.5$) from air. If the speed of light in air is 3×10^8 m/s, the time taken by the light to cross the glass slab of thickness 2 cm is:
- (a) 10^{-10} s
 - (b) 10^{-8} s
 - (c) 0.67×10^{-10} s
 - (d) 1.5×10^{-10} s

- (iv) A coolie carrying a load on his head walks on a level road. He then climbs up a slope. The work done by him against gravity is zero:
- (a) In both cases
 - (b) Only when walking on the level road
 - (c) Only when climbing the slope
 - (d) In neither case
- (v) Which of the following statements is true regarding a block and tackle system?
- (a) The weight of the movable block reduces the M.A.
 - (b) The weight of the movable block increases the M.A.
 - (c) Friction between the pulleys increases the V.R.
 - (d) The number of strands supporting the load determines the M.A. exactly in an actual machine.
- (vi) When a ray of light passes through a prism, the angle of incidence i is such that the angle of emergence e is equal to i . In this position:
- (a) The refracted ray inside the prism is parallel to the base (for an equilateral prism).
 - (b) The angle of deviation is maximum.
 - (c) The angle of refraction at the first face is equal to the angle of prism.
 - (d) Dispersion is zero.
- (vii) A pendulum A of length L and another pendulum B of length $4L$ are suspended from the same support. If A is set into vibration:
- (a) B will vibrate with the same amplitude as A .
 - (b) B will remain stationary.
 - (c) B will vibrate with a very small amplitude.
 - (d) B will vibrate with resonance.
- (viii) The graph of voltage (V) vs current (I) for a non-ohmic conductor is:
- (a) A straight line passing through the origin.
 - (b) A curve passing through the origin.
 - (c) A straight line with a negative slope.
 - (d) A straight line parallel to the I -axis.
- (ix) Three identical bulbs are connected in series to a battery. If one bulb fuses and the circuit is reconnected with the remaining two bulbs, the brightness of the remaining bulbs will:
- (a) Decrease
 - (b) Increase
 - (c) Remain the same
 - (d) Become zero
- (x) A current-carrying solenoid behaves like a bar magnet. The polarity of the face of the solenoid depends on:
- (a) The strength of the current.

- (b) The number of turns per unit length.
 (c) The direction of current flow.
 (d) The material of the core.
- (xi) A radioactive nucleus emits a beta particle. The daughter nucleus has:
 (a) The same atomic number but different mass number.
 (b) One proton more and one neutron less than the parent.
 (c) One proton less and one neutron more than the parent.
 (d) The same mass number and same atomic number.
- (xii) Specific heat capacity of substance A is $380 \text{ J/kg } ^\circ\text{C}$ and substance B is $420 \text{ J/kg } ^\circ\text{C}$. If both are supplied with the same amount of heat and have the same mass:
 (a) A will show a greater rise in temperature.
 (b) B will show a greater rise in temperature.
 (c) Both will show the same rise.
 (d) A will melt first.
- (xiii) The color of a star indicates its:
 (a) Distance from the earth
 (b) Velocity
 (c) Temperature
 (d) Size
- (xiv) Which of the following is NOT a property of magnetic field lines?
 (a) They form continuous closed loops.
 (b) They crowd near the poles.
 (c) Two field lines can intersect at the neutral point.
 (d) They start from the North pole and end at the South pole outside the magnet.
- (xv) The diagram below shows a ray of light AO incident on a rectangular glass block.



If the angle of incidence i is increased, the lateral displacement of the emergent ray will:

- (a) Increase
 (b) Decrease

- (c) Remain same
- (d) First increase then decrease

Question 2

- (i) Complete the following by choosing the correct answers from the bracket: [5]
 - (a) If the refractive index of a medium decreases, the critical angle for that medium _____.
(Increases / Decreases / Remains same)
 - (b) In a single movable pulley system, if the weight of the pulley is considered, the mechanical advantage is _____ 2. (Greater than / Less than / Equal to)
 - (c) High voltage power transmission is used to minimize _____ loss. (Current / Power / Voltage)
 - (d) The penetration power of α -radiation is _____ times that of β -particles. (10 / 100 / 1000)
 - (e) When ice melts at 0°C, its volume _____. (Increases / Decreases / Remains constant)
- (ii) A uniform metre scale of weight 10 gf is pivoted at the 0 cm mark. What moment of force must be applied to keep it horizontal? [2]
- (iii) A ray of light incident at an angle of 48° on a prism of refracting angle 60° suffers minimum deviation. Calculate the angle of minimum deviation. [2]
- (iv) Why does the filament of an electric bulb have a high resistance and high melting point? [2]
- (v) Why are ice cubes preferred to ice cold water in cool drinks? [2]
- (vi) State two safety precautions to be taken while handling radioactive substances. [2]

Question 3

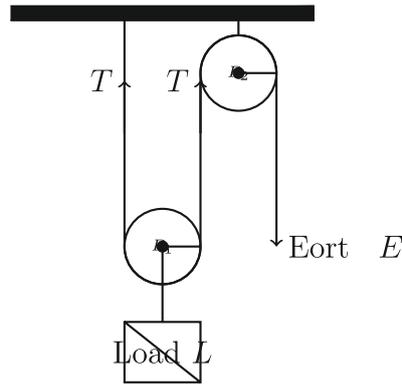
- (i) Dene Couple. Calculate the moment of a couple consisting of two forces of 15 N each separated by a perpendicular distance of 0.5 m. [2]
- (ii) The wavelength of a sound wave is 50 cm. Calculate its frequency if the speed of sound is 330 m/s. Is this sound audible to humans? [2]
- (iii) State the energy changes in an oscillating simple pendulum involving friction (damping). [2]
- (iv) Calculate the total resistance between points A and B if two resistors of 6 Ω are connected in parallel, and this combination is connected in series with a 3 Ω resistor. [2]
- (v) State two ways to increase the speed of rotation of a D.C. motor. [2]

SECTION B (40 Marks)

(Attempt any **four** questions from this Section)

Question 4

- (i) Study the diagram of the pulley system shown below:



- (a) Name the type of pulley system shown.
- (b) What is the Velocity Ratio (V.R.) of this system?
- (c) If the efficiency is 80%, calculate the Effort required to lift a load of 400 N.

[3]

(ii) A ball of mass 50 g is thrown vertically upwards with a velocity of 20 m/s.

- (a) Calculate the maximum height attained.
- (b) Calculate the potential energy at the highest point.
- (c) At what height will its kinetic energy be equal to its potential energy? ($g = 10 \text{ m/s}^2$)

[3]

(iii) A uniform metre rule of weight 100 gf is pivoted at its center. A 200 gf weight is suspended at the 10 cm mark.

- (a) In which direction will the rule tilt?
- (b) Where should a 150 gf weight be suspended to balance the rule?
- (c) Calculate the resultant moment if the 150 gf weight is removed.

[4]

Question 5

(i) An object is placed at a distance of 30 cm from a convex lens of focal length 20 cm.

- (a) Calculate the image distance.
- (b) Find the magnification.
- (c) If the object is moved 15 cm towards the lens, what will be the nature of the new image?

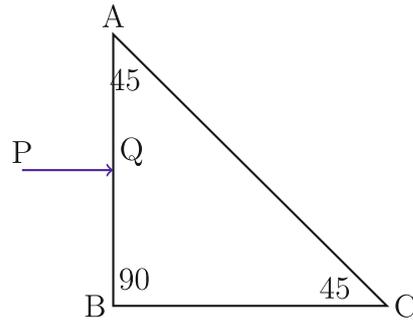
[3]

(ii) (a) Define Refractive Index in terms of the speed of light.

- (b) A coin at the bottom of a beaker containing water ($n = 1.33$) appears to be raised by 3 cm. Find the real depth of water.

[3]

(iii) Refer to the diagram given below. A ray of light PQ is incident normally on the face AB of a glass prism ($n = 1.5$) having angles 45° , 90° , 45° .

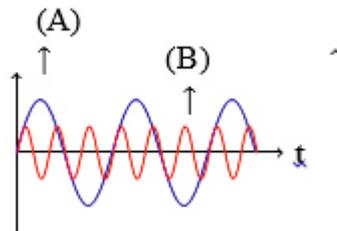


- Copy and complete the path of the ray until it emerges from the prism.
- Calculate the angle of deviation.
- Name a device where such an action of the prism is used.

[4]

Question 6

- (i) The displacement-time graphs for two sound waves A and B are shown below:



- Which wave has a higher pitch? Give a reason.
- Which wave is louder? Give a reason.
- If the time period of wave A is 0.02s, what is its frequency?

[3]

- (ii) (a) Why does the smoke from a fire look white?

- (b) The ratio of amplitudes of two waves is 3:5. What is the ratio of their intensities (loudness)?

[3]

- (iii) (a) A wire stretched between two fixed supports is plucked. Name the type of vibrations produced.

- (b) Resonance is a special case of forced vibrations. Explain why.

- (c) A tuning fork of frequency 256 Hz resonates with a sonometer wire of length 20 cm. If the length of the wire is increased to 40 cm (keeping tension constant), will resonance occur? Justify.

[4]

Question 7

- (i) A battery of electromotive force (emf) 12 V and internal resistance 2 Ω is connected in series with two resistors of 4 Ω and 6 Ω .

- Draw the circuit diagram to represent this arrangement.
- Calculate the current in the circuit.
- Calculate the terminal voltage of the battery.

- [3]
- (ii) (a) An electric geyser is rated 2000 W, 220 V. Calculate the monthly cost of using it for 30 minutes daily at 5 per unit. (1 month = 30 days).
- (b) Why is the earth pin thicker and longer than the other pins in a three-pin plug?
- [3]
- (iii) (a) Draw a circuit diagram to show how a staircase lamp is controlled by two switches (Dual Control Switch).
- (b) State two advantages of connecting appliances in parallel.
- [4]

Question 8

- (i) A piece of ice of mass 50 g at 10 °C is heated to convert it into water at 20 °C. Calculate the total heat energy supplied. (Specific heat capacity of ice = 2.1 J/g °C, Sp. latent heat of fusion = 336 J/g, Sp. heat capacity of water = 4.2 J/g °C).
- [3]
- (ii) (a) Differentiate between Heat Capacity and Specific Heat Capacity.
- (b) Why are burns caused by steam more severe than those caused by boiling water at the same temperature?
- [3]
- (iii) 40 g of water at 60 °C is poured into a calorimeter of mass 50 g at 20 °C. The final temperature is 50 °C. Calculate the specific heat capacity of the material of the calorimeter. (Sp. heat capacity of water = 4200 J kg⁻¹ K⁻¹).
- [4]

Question 9

- (i) (a) A radioactive nucleus emits a beta particle. Does its mass number change? Explain.
- (b) Which part of the atom emits radioactive radiation?
- (c) Why are lead boxes used to store radioactive materials?
- [3]
- (ii) Complete the following nuclear reactions:
- (a) ${}_{92}\text{U}^{238} \rightarrow {}_{90}\text{Th}^{234} +$
- (b) ${}_{11}\text{Na}^{24} \rightarrow {}_{12}\text{Mg}^{24} +$
- [3]
- (iii) (a) Differentiate between nuclear fission and nuclear fusion.
- (b) State one safety precaution while establishing a nuclear power plant.
- (c) Name the moderator used in a nuclear reactor.
- [4]

VIBGYOR HIGH

Second Preliminary Examination

AY 2025-2026

PHYSICS

Grade: X

Max. Marks: 80

Date: 08/01/2026

Time Allowed: 2 hours

INSTRUCTIONS:

- Answers to this paper must be written on the paper provided separately.
 - You will not be allowed to write during the first 15 minutes.
 - This time is to be spent in reading the question paper.
 - The time given at the head of this paper is the time allowed for writing the answers.
 - The intended marks for questions or parts of questions are given alongside the questions.
 - Section I is compulsory. Attempt any four questions from Section II.
 - This question paper consists of 14 printed pages.
-

SECTION I (40 Marks)

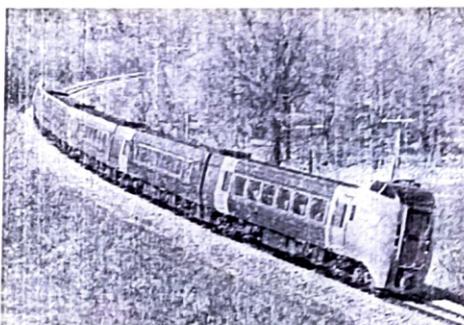
Attempt all questions from this Section.

Question 1 Choose the correct answers to the questions from the given options. [15]

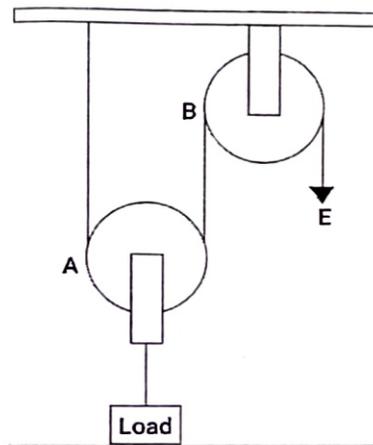
(Do not copy the question, write the correct answers only.)

- (i) For stable movement at high speed on curved path, few bullet trains tilt.

The centre of gravity of the trains:



- (a) shifts inwards to balance centrifugal force.
 - (b) does not shift.
 - (c) shifts outwards to balance centrifugal force.
 - (d) shifts upwards to balance its weight.
- (ii) The diagram below shows the pulley arrangement. If the free end of the string moves through a distance 4 m, the distance by which the load is raised is:



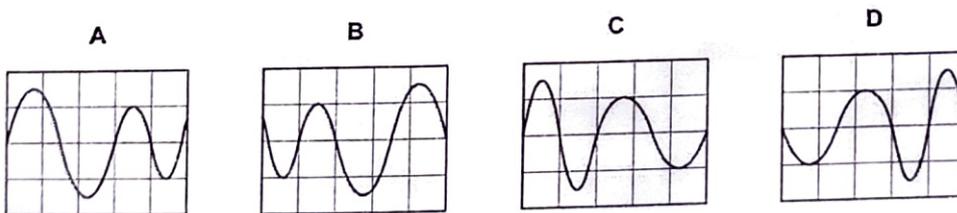
- (a) 4
 - (b) 8
 - (c) 2
 - (d) 16
- (iii) Assertion(A): A heavier object placed at a far distance from the pivot point will have the same moment as a lighter object placed close to the pivot point.
- Reason (R): The moment of force is determined by the magnitude of the force along with its distance from the pivot point.
- (a) Both A and R are true and R is the correct explanation of A.
 - (b) Both A and R are true but R is not the correct explanation of A.
 - (c) A is true but R is false.
 - (d) A is false but R is true.
- (iv) By emitting an electron, a neutron may change into:
- (a) electron
 - (b) proton
 - (c) positron
 - (d) beta-particle

- (v) When light enters from air to glass, it bends toward the normal. If red, blue, and yellow colours are allowed to enter the same glass block at the same angle of incidence, then for which colour, the value of $\angle i - \angle r$ be greater?
- (a) green
(b) red
(c) blue
(d) yellow

- (vi) Which of the following lens was used in the original Galilean telescope?

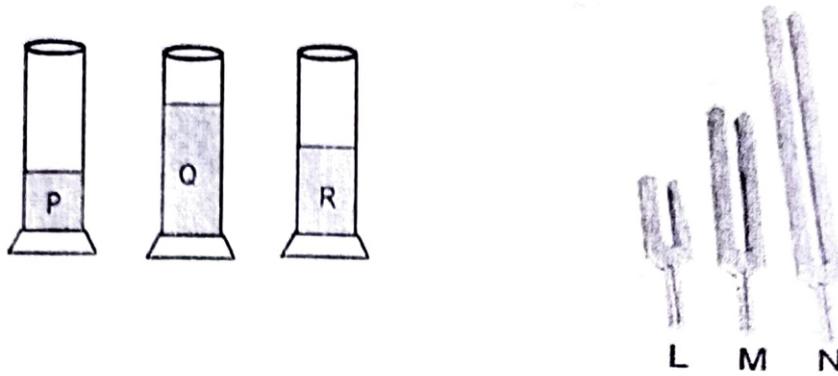


- (a) Both convex
(b) One convex and one concave
(c) Both concave
(d) One plano convex and one concave
- (vii) Four sound waves of same frequency are displayed on the screen of a cathode-ray oscilloscope. Which sound wave gets louder and has a pitch that decreases?



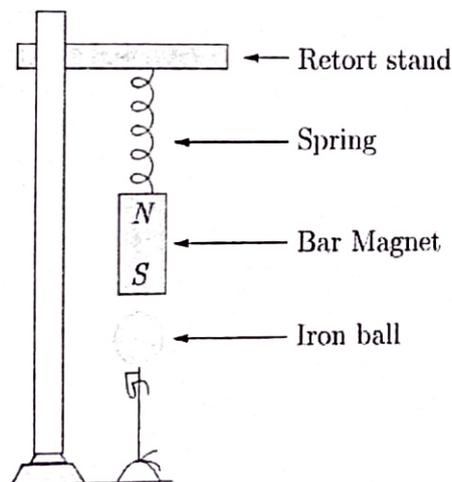
- (a) A
(b) B
(c) C
(d) D

(viii)



The above picture shows three cylinders filled with water to a different extent. The tuning forks L, M and N in vibration produce louder sound when held above the mouth of the cylinders. Which combination is correct for hearing a louder sound of the tuning fork?

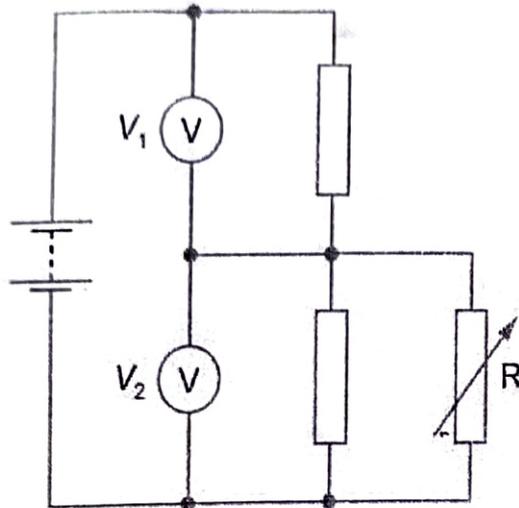
- (a) L – R, M – Q, N – P
 - (b) L – P, M – Q, N – R
 - (c) L – R, M – P, N – Q
 - (d) L – Q, M – R, N – P
- (ix) Ravi designed the toy shown below using a bar magnet, a spring and an iron ball.



Which of the following correctly shows how the forces are interacting to keep the ball floating ?

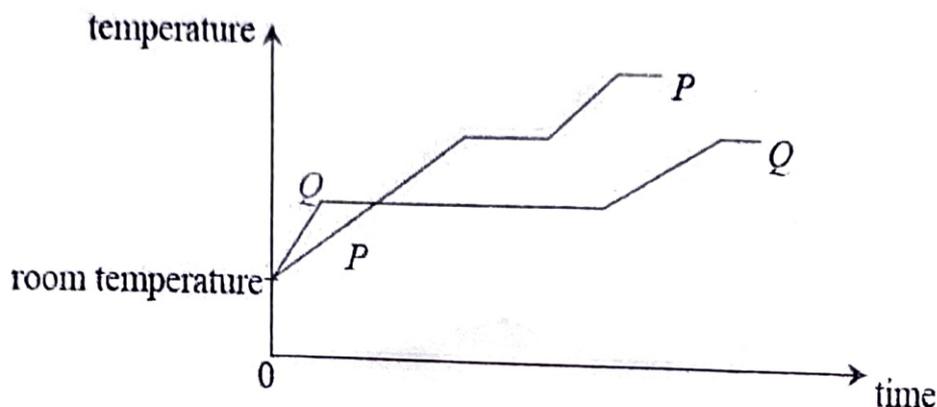
- (a) Magnetic force is equal to gravitational force
- (b) The sum of elastic spring force and gravitational force is equal to frictional force
- (c) Elastic spring force is equal to magnetic force
- (d) The sum of elastic spring force and magnetic force is equal to gravitational force.

- (x) The circuit diagram shows a variable resistor R connected in parallel to the lower half of a potential divider.
The resistance of R increases.
What happens to the two voltmeter readings?



	V_1	V_2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- (a) A
(b) B
(c) C
(d) D
- (xi) Which safety precautions must be taken when wiring an electrical kettle that has a stainless-steel outer casing?
- (a) It must be earthed and have a fuse in the live wire.
 - (b) It must be earthed and have a fuse in the neutral wire.
 - (c) It needs a fuse in the live wire but does not need to be earthed.
 - (d) It needs a fuse in the neutral wire but does not need to be earthed.
- (xii) The graph shows the variation in temperature of equal masses of two substances P and Q when they are separately heated by identical heaters.
Which deduction is correct ?



- (a) The melting point of P is lower than that of Q.
- (b) The specific heat capacity of P in solid state is larger than that of Q.
- (c) The specific latent heat of fusion of P is larger than that of Q.
- (d) The energy required to raise the temperature of P from room temperature to boiling point is more than that of Q.
- (xiii) A liquid of mass 100 g loses heat at a rate of 200 J s^{-1} for 1 minute. If the temperature of liquid drops by 100°C , Calculate the specific heat capacity of the liquid.
- (a) $0.6 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
- (b) $1.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
- (c) $0.8 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
- (d) $1.6 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
- (xiv) A ray of light from the light house reaches the submarine which is under water. The sailor places a plane mirror such that angle between the light ray and the mirror is 90° . Where would he see the light house?
- (a) He won't see the light source at all.
- (b) At the same position as no refraction occurs.
- (c) The location of submarine is shifted upwards.
- (d) At the same position as the light reverses along the same path.
- (xv) A beam of monochromatic light undergoes minimum deviation through an equilateral prism. With respect to its base, the beam will pass through the prism:
- (a) parallel to the base
- (b) perpendicular to the base
- (c) at 45° with the base
- (d) at 60° with the base

Question 2

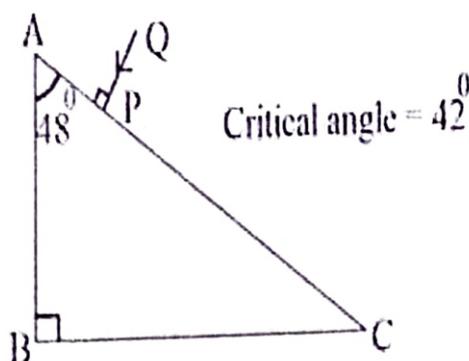
[10]

(i) Fill in the blanks. Choose the correct answers to the questions from the given options. [6]

- (a) Water from a tap is allowed to fall in a vessel with a thin neck. The pitch of sound produced by falling water with the volume of water in the vessel. (increases, remains same, decreases)
- (b) The boiling point of water.....(increases, decreases, remains constant) when salt is added in it.
- (c) In a lab experiment, a chord stretched between two fixed supports is plucked precisely at the centre after which it is released. The type of vibrations executed by string is..... (forced vibration, damped vibration, natural vibration)
- (d) Water is sprinkled over farms during severe frost conditions because it (stores, increases, releases) large amount of heat hence preventing crops from damage.
- (e) Force towards the right of fulcrum acting upwards are considered to produce..... [positive / negative / zero] torque.
- (f) Class II lever are designed to have(MA = VR, MA > VR, MA < VR)

(ii) Differentiate between radioactive decay and nuclear fission. [2]

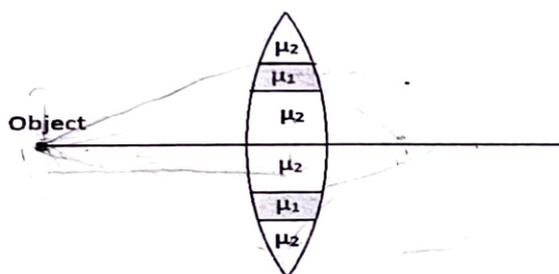
(iii) The diagram below shows a glass prism of a critical angle 42° . [2]



Redraw the well labelled diagram and complete the path of the light ray PQ till it emerges out of the prism.

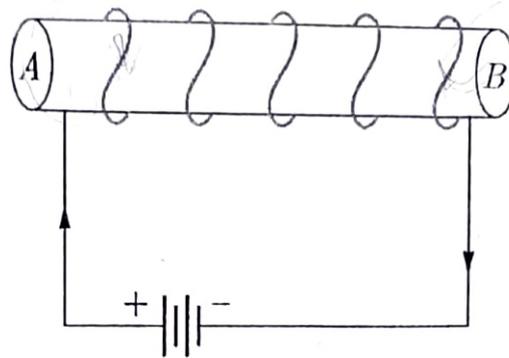
Question 3

- (i) In an industrial setting, a copper wire of fixed resistance is used for transmitting electric current in a factory. Due to certain mechanical adjustments, the wire gets stretched to three times its original length. The engineers need to assess the impact of this change on the wire's performance. [15]
[3]
- (a) As an engineer, how would you calculate the new resistance of the copper wire after it has been stretched to thrice its original length?
- (b) Explain what happens to the specific resistance (resistivity) of the wire after stretching.
- (c) How would this change in resistance affect the efficiency of current transmission in the factory?
- (ii) A man pulls a box on a horizontal floor through a distance of 20 m with a force of 30N applied along a rope tied to the box and making an angle of 60° with the horizontal. Calculate the work done. [2]
- (iii) The lens shown in the figure is made of two different materials of refractive indices μ_1 and μ_2 respectively. [2]



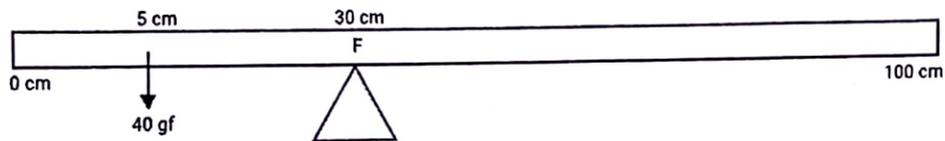
A point object is placed on the principal axis.

- (a) How many images of the object will be formed by the lens?
- (b) Explain why?
- (iv) A lens of focal length 20 cm forms an inverted image at a distance 60 cm from the lens. [2]
- (a) How far is the lens present in front of the object?
- (b) Calculate the magnification of the image.
- (v) A type of single pulley is very often used as a machine, even though it does not give any gain in mechanical advantage. [2]
- (a) Name the type of pulley used.
- (b) For what purpose is such a pulley used?
- (vi) (a) You have been provided with a solenoid AB. [2]



- I. What is the polarity at end A?
- II. Why it is more economical to transmit electrical energy at high voltage and low current?

(vii) A uniform meter scale is in equilibrium as shown in the diagram. [2]



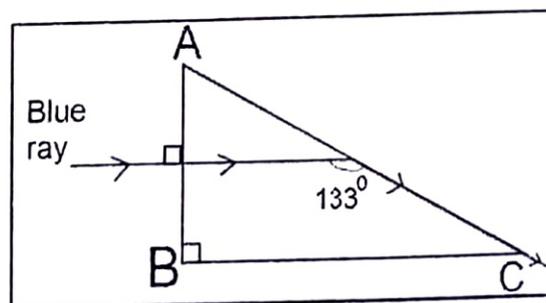
- (a) Calculate the weight of the meter scale.
- (b) Where will F shifted to keep the ruler in equilibrium when 40 gf is shifted to 0 cm mark?

Section II

Attempt any **four** questions from this Section

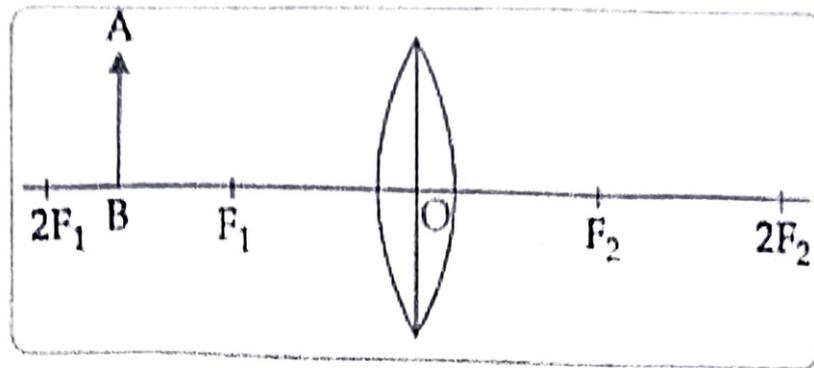
Question 4

- (i) The diagram below shows the path of a blue ray through the prism: [10]



- (a) Calculate the critical angle of the material of the prism for blue colour.
- (b) What is the measure of the angle of this prism (A)?
- (c) Which colour should replace the blue ray, for the ray to undergo total internal Reflection?

- (ii) An object AB is placed between $2F_1$ and F_1 on the principal axis of a converging lens as shown in the diagram. [3]

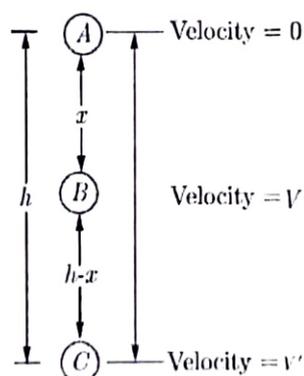


- (a) Copy the diagram and by using two standard rays starting from point A, obtain an image of the object AB
- (b) What will happen to the size and position of image formed when the lens is taken in water?
- (iii) (a) Can a beam of white light when passed through a hollow prism give spectrum? Explain. [4]
- (b) Briefly tell:
- I. How do the sky appear when seen from the moon (or outer space)?
 - II. Give reason in support of your answer.

Question 5

[10]

- (i) Rahul and Priya are playing on a multistory building. Suddenly Rahul [3]
throws a toy of mass 1 kg. The toy is falling under the effect of gravity and
after sometimes, it reaches on the ground. [Diagram showing a toy falling
from point A to point C with velocities at each point]



- (a) What is the momentum of the toy after 5 s?
- (b) What is the height of the freely falling body?
- (ii) (a) State the class of levers and the relative positions of load L, effort E [3]
and fulcrum F in each of the following cases:

- I. A bottle opener
- II. Sugar tongs.

(b) Why is less effort needed to lift a load over an inclined plane as compared to lifting the load directly?

(iii) Draw a diagram of a block and tackle system of pulleys having a velocity ratio of 5. [4]

(a) In your diagram indicate clearly the points of application and the directions of the load L and effort E . Also mark the tension T in each strand.

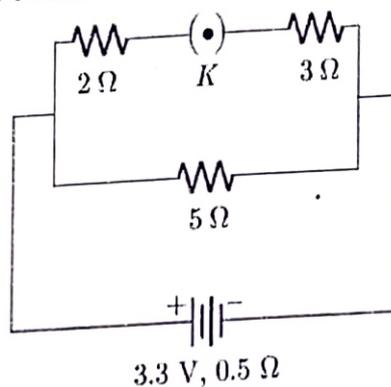
(b) If it is used to lift a body of weight 80 kgf using an effort of 20 kgf, find its mechanical advantage and efficiency.

[10]

[3]

Question 6

(i) The diagram shows a circuit with the key K .

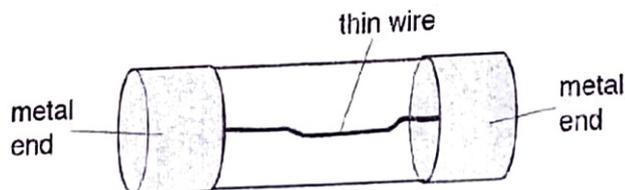


Calculate:

- (a) the current drawn from the cell when the key k is open.
- (b) the resistance of the circuit when the key k is closed.
- (c) the current drawn from the cell when the key k is closed.

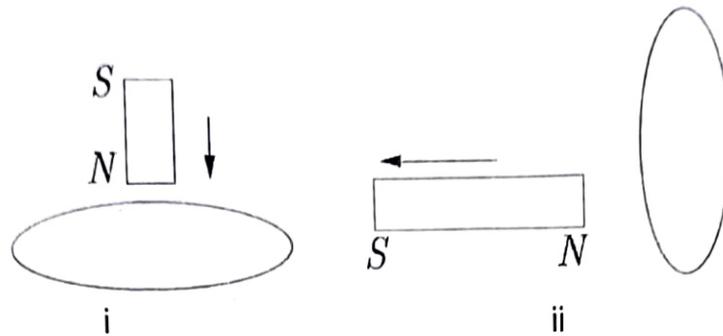
(ii) The fuse inside the plug of a hairdryer is shown below.

[3]



- (a) State how the fuse protects the wires in the hairdryer.
- (b) The hairdryer is rated at 240V, 1500W. It is switched on.
 - i. Calculate the current in the hairdryer.
 - ii. Suggest a suitable current rating for the fuse.

(iii) (a) State the direction of induced current in the following figures i and ii. [4]



(b) State one point of similarity and one point of difference between an a.c. generator and a d.c. motor.

Question 7

[10]

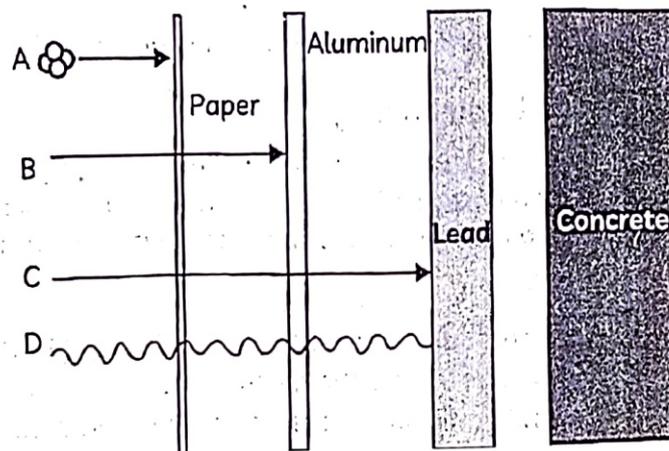
(i) A man standing in front of a vertical cliff fires a gun. He hears an echo after 3 s. On moving close to the cliff by 82.5 m, he fires again. This time he hears the echo after 2.5 s.

[3]

(a) Calculate the distance of the cliff from the original position of the man
(b) and the speed of sound.

(ii) Alpha, beta and gamma emissions have different abilities to penetrate matter. Answer the following questions based on the diagram shown below:

[3]



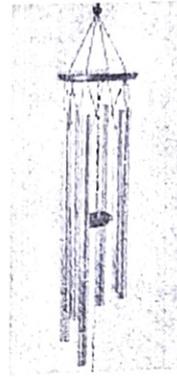
(a) Identify radiation B in the diagram.
(b) Write down one use of radiation D.
(c) Write one differentiate between A and C radiations in terms of their energy.

(iii) (a)

[4]

i. Name the waves used for echo depth sounding.
ii. Give a reason why such waves are used for this purpose.

- (b) Sound produced by church bells is greater than sound produced by bells of wind chimes. Give reason.

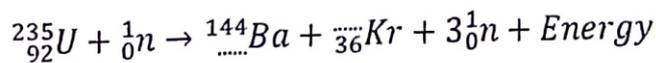


Question 8

[10]

- (i) (a) Which radiation produces maximum biological damage?
 (b) What happens inside the nucleus, that causes the emission of β -particle?
 (c) Rewrite and complete the following nuclear reaction by filling in the atomic number of Ba and mass number of Kr.

[3]



- (ii) A machine is driven by a 100 kg mass that falls 8 m on 4 s. It lifts the mass 500 kg vertically upwards.
 (a) What is the power input to the machine ?
 (b) If the efficiency of the machine is 75%, what is the power output?
 (c) What is the work done by machine in 4 seconds ? (Take $g = 10 \text{ ms}^{-2}$)
- (iii) (a) The sky appears dark instead of blue to the passengers at very high altitudes. Give reason.
 (b) Red light of wavelength 6600\AA travelling in the air gets refracted in water. If the speed of light in air is $3 \times 10^8 \text{ ms}^{-1}$ and refractive index of water is $4/3$:
 i. The frequency of light in water
 ii. Speed of light in water.

[3]

[4]

Question 9

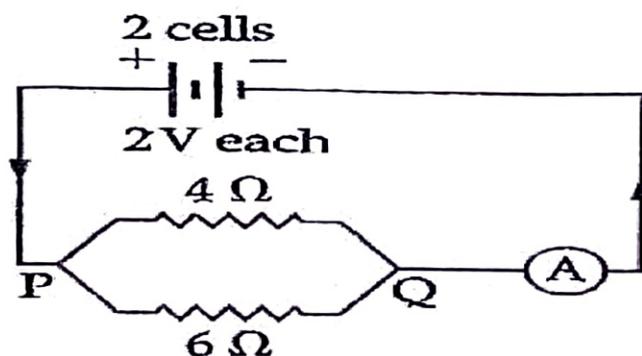
[10]

- (i) A heating coil is immersed in a calorimeter of heat capacity $50 \text{ J } ^\circ\text{C}^{-1}$ containing 1.0 kg of a liquid of specific heat capacity $450 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$

[3]

The temperature of liquid rises by 10°C when 2.0 A current is passed for 10 minutes. Find:

- (a) the resistance of the coil
 (b) the potential difference across the coil. State the assumption used in your calculations.
- (ii) (a) Which property of water makes it an effective coolant? [3]
 (b) Which material is the calorimeter commonly made of?
 (c) Give one reason for using this material.
- (iii) (a) With reference to the given diagram calculate: [4]



- I. The equivalent resistance between P and Q
 - II. The reading in ammeter
 - III. The electrical power between P and Q.
- (b) The student passes a current through a wire wrapped around an iron nail and uses this to pick up paperclips. Name two variables the student controls in the experiment.

Question Paper 3

SMT. SULOCHANADEVI SINGHANIA SCHOOL, THANE

CLASS	SUBJECT	EXAMINATION	DATE	MAXIMUM MARKS	TIME	NO. OF PRINTED SIDES
10	PHYSICS	PRELIM EXAMINATION	5-1-2026	80	2 hrs	10

SECTION A (40 Marks)

(Attempt all questions from this Section.)

Question 1

Choose the correct answer for each question from the given options.

(Do not copy the questions; write only the correct answers.)

[15]

- For a particle performing uniform circular motion, the direction of displacement of the particle is:
 - Along the radius towards the centre
 - Away from the centre
 - Along the tangent to the circular path
 - Radially outwards
- The work done by the Earth's gravitational force on the moon in half its revolution is:
 - Dependent on the gravitational force of the Earth
 - Dependent on the Mass of the moon
 - Depends on both the Earth's gravitational force and the displacement of the moon
 - zero
- The energy conversion in a thermal power plant is:
 - Chemical energy \rightarrow heat energy \rightarrow mechanical energy \rightarrow electrical energy
 - Heat \rightarrow chemical energy \rightarrow electrical energy
 - Electrical energy \rightarrow heat energy \rightarrow chemical energy
 - Chemical energy \rightarrow heat energy \rightarrow electrical energy
- A pulley has a velocity ratio of 1 and a mechanical advantage of 0.85; then the pulley must be:
 - A single fixed pulley with no friction.
 - A single fixed pulley with some friction.
 - A single movable pulley with no friction.
 - A single movable pulley with some friction.
- The refractive index of water is $\frac{4}{3}$, and that of diamond is $\frac{12}{5}$. The refractive index of diamond with respect to water will be:
 - $\frac{5}{4}$
 - $\frac{4}{3}$
 - $\frac{5}{9}$
 - $\frac{9}{5}$
- An object is placed at a distance of 20 cm from a convex lens of focal length 10 cm. Which is the correct description of the image?

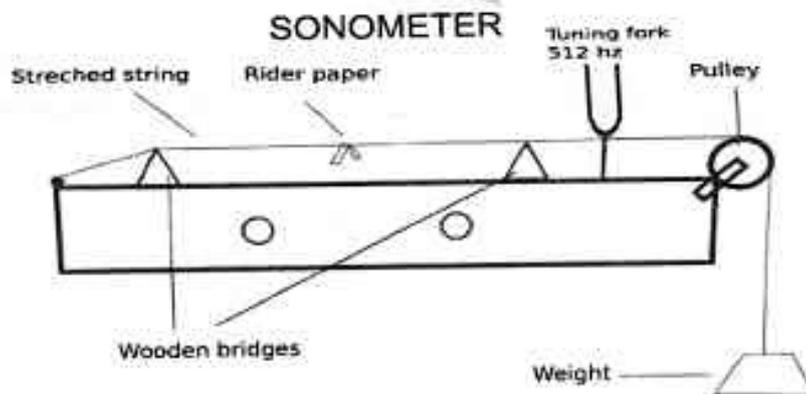
- a. A real image of the same size at a distance of 20 cm from the lens.
- b. A real magnified image distance of 6.67 cm from the lens.
- c. A virtual diminished image at a distance of 20 cm from the lens.
- d. A virtual diminished image at a distance of 6.67 cm from the lens.

7. An empty test tube immersed in a beaker full of water appears shiny due to:
- a. Refraction of light.
 - b. Dispersion of light.
 - c. Scattering of light
 - d. Total internal reflection of light

8. **Assertion (A):** The Tail-lights of the vehicles are red

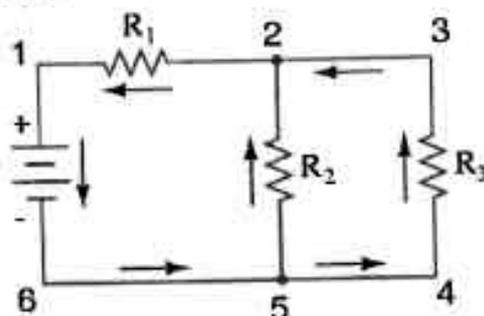
Reason (R): Red scatters the most in foggy weather conditions

- a. (A) is true, but (R) is false.
 - b. (A) is false, but (R) is true.
 - c. Both (A) and (R) are true, and (R) is the correct explanation of (A).
 - d. Both (A) and (R) are true, but (R) is not the correct explanation of (A).
9. A string stretched between two fixed supports is made to vibrate by touching a vibrating tuning fork to the hollow wooden body of the sonometer. The paper rider falls off the string due to its large amplitude of vibration. The wooden body of the sonometer performs:



- a. Free vibrations
- b. Damped vibrations
- c. Forced vibrations
- d. Resonant vibrations

10. In the following circuit diagram, the values of resistances R_1 , R_2 and R_3 are 1Ω , 2Ω and 2Ω , respectively. Which of the following statements is true? (The arrows show the direction of flow of electrons)



- a. Potential difference across all the resistances is the same, and also the current through all of them is the same.
- b. Potential difference across all the resistances is the same, but the current through all of them is not the same.
- c. Potential difference across all the resistances is not the same, but the current through all of them is the same.
- d. Both potential differences across the resistances and the currents through them are different.
11. For the wires that are connected to an electrical appliance running on A.C. mains, which of the following statements are **incorrect**?
- a. Neutral wire is at the same potential as the live wire
- b. The live wire has a potential difference of 220 V with respect to the neutral wire.
- c. Neutral wire and earthing wire both are at 0 V potential
- d. The earthing wire is connected to the metallic body of the electrical appliance.
12. For an ideal transformer with the turns ratio (n) greater than one:
- a. Input voltage is greater than the output voltage.
- b. Input voltage is less than the output voltage
- c. Input voltage is the same as output voltage
- d. Input current is less than the output current
13. Heat capacity of a body is the:
- a. energy needed to melt a body without a change in its temperature.
- b. energy needed to raise the temperature of a body by 1°C .
- c. increase in volume of the body when its temperature increases by 1°C .
- d. total amount of internal energy that is constant.
14. For an ideal calorimeter, which of the following statements is **incorrect**?
- a. Conduction is prevented using an insulating material stuffed between the wooden case and the copper vessel
- b. Convection is prevented by making the calorimeter vessel out of a thin-gauge copper wire.
- c. Radiation is prevented by polishing the calorimeter to a high degree.
- d. The bakelite/ wooden lid prevents the exchange of heat between the vapours of the contents and the surrounding air
15. A uranium nucleus $^{238}\text{U}_{92}$ emits some particles and gets converted into $^{234}\text{U}_{92}$. The particles emitted are:
- a. 1 alpha and 1 beta particle
- b. 1 alpha and 2 beta particles
- c. 2 alpha and 1 beta particles
- d. 2 alpha and 2 beta particles

Question 2

(i) Complete the following by choosing the correct answers from the brackets: [4]

1. Class III lever always acts as a _____ [force multiplier/ speed multiplier]
2. Heat radiations emitted by any hot object have a wavelength _____ [longer / shorter] than the visible red light waves.

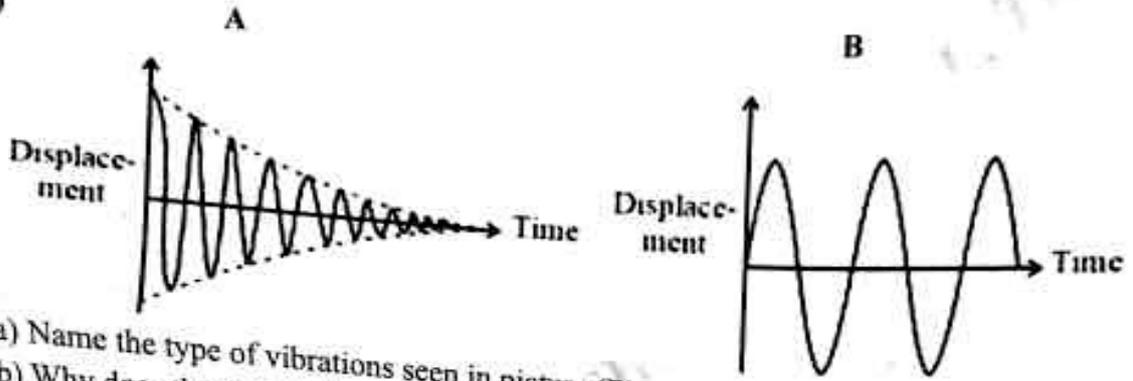
3. The amount heat absorbed by 25 grams of ice to completely melt into water will be termed as its _____ [latent heat / specific latent heat]
4. Dolphins communicate with each other using _____ waves. [ultraviolet / ultrasonic]

(ii) The object seen below is made up of two parts, A and B, that act as levers: [2]



To which class of lever does each part belong?

(iii)



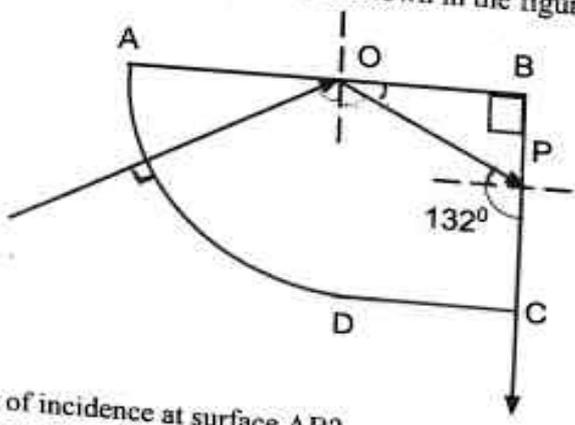
- (a) Name the type of vibrations seen in picture (B)
- (b) Why does the amplitude of the vibration (A) decrease with time? [2]

(iv) Calculate the load that a single movable pulley can lift with the effort of 100 kgf if it is 75% efficient [2]

Question 3

(15)

- (i) A glass block ABCD whose two sides AB and BC are at right angles to each other. A ray of light is incident normally on the cylindrical side AD, suffers total internal reflection at the side AB, and emerges along the side BC, as shown in the figure.



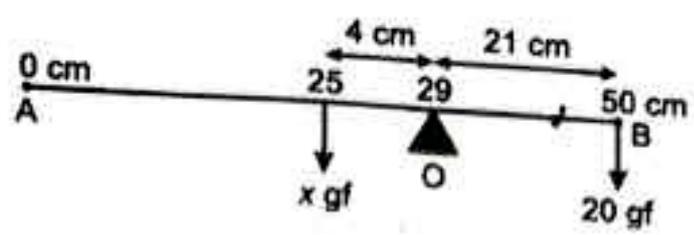
- (a) What is the angle of incidence at surface AB?
- (b) What is the critical angle of the glass block in the above figure?

(2)

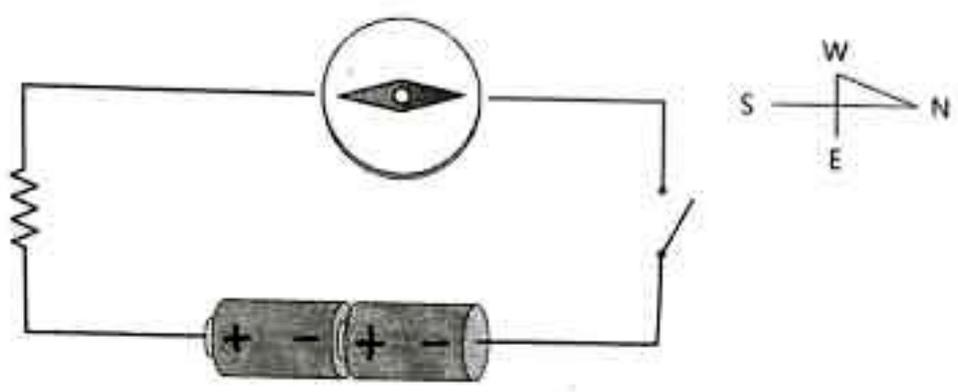
(ii)

- (a) Write the relation between the commercial unit and the SI unit of electrical energy.

- (b) A certain wire in a household electrical circuit is at a higher potential with respect to the earth wire. State its colour code as per the new convention. [2]
 For the diagram given below. Calculate the weight of the meter scale x , so that the scale is in equilibrium. [2]



- (iv) If 20 g of ice at 0°C is used to lower the temperature of 320 g of water (specific heat capacity = $4.2 \text{ J g}^{-1} \text{ K}^{-1}$), what will be the change in temperature of the water when all the ice just melts? (specific latent heat of ice is 336 J g^{-1}) [2]
- (v) The diagram below shows a magnetic compass placed over a conductor aligned along the N-S direction.



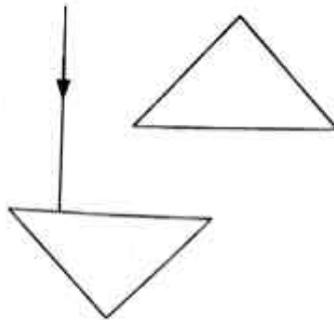
- (a) How does the needle of the compass deflect when the key is closed?
 (b) What will be your observation if the battery in the circuit is replaced with a single cell before closing the key? [2]
- (vi) Name any two uses of radio isotopes and state their specific uses. [2]
- (vii) Advanced optical sensors in air-to-air missiles use fibre optic cables to transmit light signals with minimal loss. This relies on a physical phenomenon that confines light within the fibres, making the system very dependable for guiding the missile precisely.
 (a) Name the optical phenomenon that allows light signals to remain confined within the fibre optic cables during transmission.
 (b) Explain the two main conditions necessary for this phenomenon to occur. [3]

SECTION B (40 Marks)

(Attempt any four questions from this Section. Each question in this section carries 10 marks, ie $10 = 3+3+4$)

Question 4

- (i) Draw the following prisms and complete the path of the ray till it emerges from the prisms:



[3]

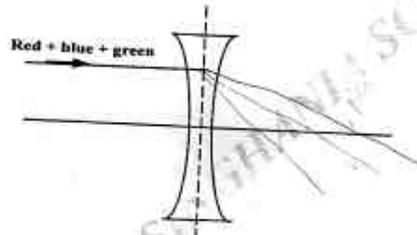
(ii)

(a) A coin placed in a glass in which the water is filled up to a height of 12 cm appears to be raised by 3 cm. What is the refractive index of water?

(b) How will the vertical shift be affected if the glass were filled with hot water? [3]

(iii)

(a) A mixture of red, blue, and green light rays is passed through a concave lens, as illustrated in the diagram below. Which of the three coloured rays will have a focal point closest to the lens?



(b) Name the electromagnetic radiation that is detected using a blackened-bulb thermometer

(c) A prism made of which material should be used to study the spectrum of the above radiation?

(d) State one use of the radiation named in (b).

[4]

Question 5

(i) An object is placed at a distance of 10 cm in front of a convex lens of focal length 15 cm.

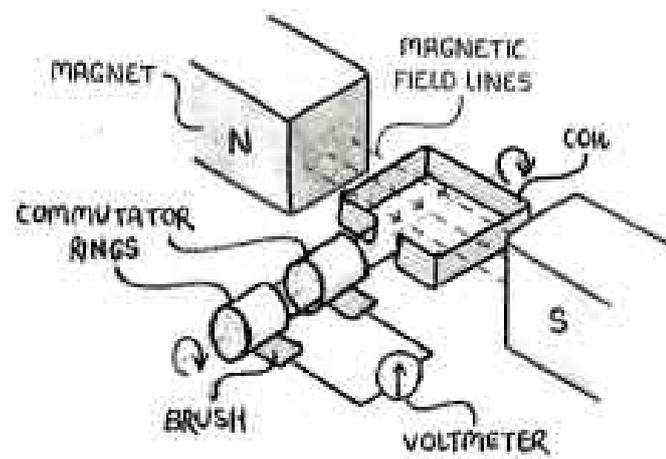
(a) What is the nature of the image so formed?

(b) Calculate the position of the image formed.

[3]

(ii) The given diagram shows the construction of an AC generator

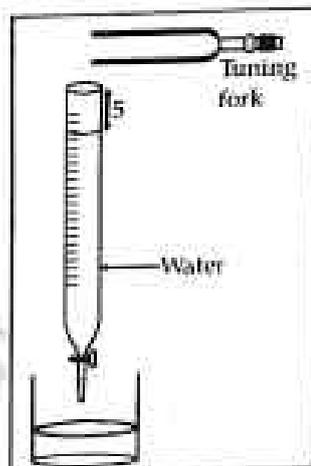
[3]



- (a) At what position of the coil (with respect to the direction of the magnetic field) is the induced emf maximum?
- (b) If the speed of the generator coil is doubled, then what is the effect on the maximum value of emf induced in the coil?

(c) Give a reason for your answer in (b)

(iii) In the given diagram, a vibrating tuning fork is kept near the mouth of a burette filled with water. The length of the air column is adjusted by opening the tap of the burette. At a length of 5 cm of the air column, a loud sound is heard. [4]



- (a) Name the phenomenon illustrated by the above experiment.
- (b) State the condition to observe the above phenomenon.
- (c) If the present tuning fork is replaced with a tuning fork of a lower frequency, should the length of the air column increase or decrease to produce a loud sound? Give a reason.

• **Question 6**

(i)

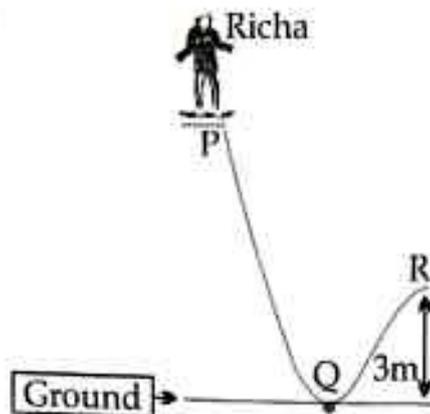
A uniform meter rule is balanced by placing a pivot at the 60 mark and connecting a weight of 90 g at one end

- (a) Draw a neat labelled diagram of the above arrangement
- (b) Find the weight of the meter rule. [3]

(ii) State the energy conversions in the following applications:

- (a) Electric bulb
- (b) Photosynthesis
- (c) Thermocouple [3]

(iii)

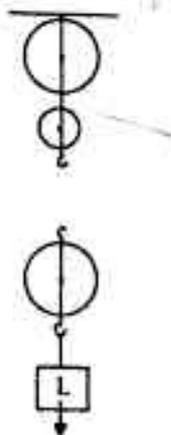


Richa, weighing 40 kgf, leaves point P on her skateboard and reaches point Q on the ground with velocity 10 ms^{-1} . Calculate.

- The kinetic energy of Richa at point Q
 - The vertical height of point P above the ground. (use g as 10 m/s^2 and neglect friction)
 - The kinetic energy of Richa at point R. (While moving from Q to R, she loses 500 J of energy against friction.)
- [4]

Question 7

(i) The diagram below shows a block and tackle system.



- Copy and complete the labelled diagram showing the correct connection of the tackle, the direction of the forces involved to obtain maximum V.R. with the convenient direction.
 - Calculate the M.A. of this pulley system if its efficiency is 80%
- (3)

(ii) A change in the amplitude of a sound wave is noticed.

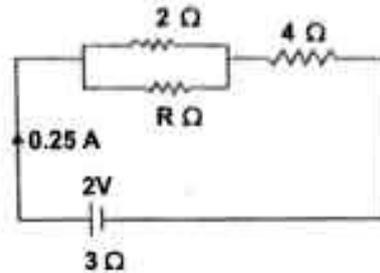
- Which characteristic of sound is affected due to the above change?
 - How is amplitude related to your answer to part (a) above?
 - What happens to the quality of the sound?
- (3)

(iii) A piece of metal of 50 g is heated to a temperature 90°C and is immersed in 50 g of water at 20°C . The final temperature of the mixture is 26°C . Find the specific heat capacity of the metal. (Specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ K}^{-1}$).

[4]

Question 8

(i) The circuit diagram in the figure shows three resistors, $2\ \Omega$, $4\ \Omega$ and $R\ \Omega$, connected to a battery of e.m.f. 2V and an internal resistance of $3\ \Omega$. If the main current of 0.25 A flows through the circuit, find: [3]

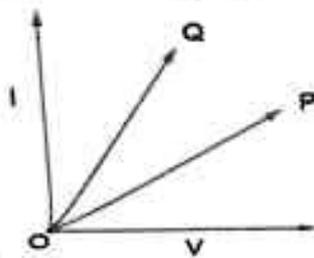


- Calculate the internal voltage drop of a cell
- Calculate the value of R

(ii) An electrical appliance is rated $1.5\text{ kW} - 200\text{ V}$.

- Will it be safe to connect a fuse rated 5 A in series with it? Explain with suitable calculations.
- Will the circuit work if the fuse is connected in the neutral wire? [3]

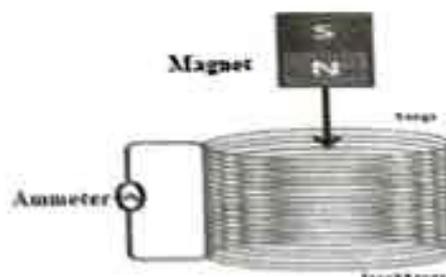
(iii) The following graph shows I - V characteristics of two resistance wires of the same metal.



- Which of the two resistance wires will have greater thickness if both of the resistors have the same length?
- Which of the two resistance wires will have greater length if both of the resistors are of the same area of cross-section?
- Which of the above wires exhibits ohmic behaviour?
- What will happen to the resistance of each of the wires if both the wires are heated to the same high temperature? [4]

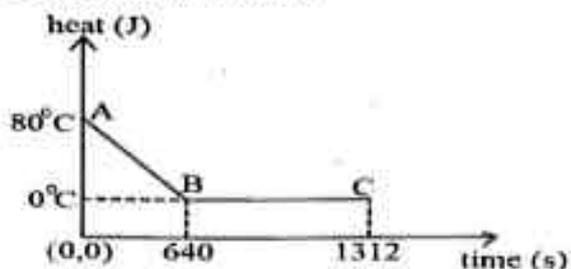
Question 9

(i) Study the diagram shown below: [3]



- What will you observe when the magnet is dropped into the coil?
- State the law which explains this observation.
- What will be the direction of the current at the top of the coil when the magnet is dropped?

(ii) The diagram below shows a cooling curve for 200 g of water. The heat is extracted at the rate of 100 Js^{-1} . Answer the questions that follow: [3]



- Calculate the specific heat capacity of water.
- Heat released in the region BC.

(iii) A nuclear process is carried out in a nuclear reactor for the generation of electrical energy using a Uranium salt.

- Name the process
- Write a balanced nuclear equation to represent the process
- Write any two precautions while disposing off the nuclear waste.

[4]

NGHANTA SCHOOL, THANE

Question Paper 4

SMT. SULOCHANADEVI SINGHANIA SCHOOL, THANE

Class	Subject	Exam	Date	Marks	Time	No. of pages
10	Physics	Prelim	9.01.26	80	2h	8

SECTION 1

ALL QUESTIONS IN THIS SECTION ARE COMPULSORY

Each section carries 40 marks.

Question 1

15

Choose the correct alternative :

1. The factors affecting the frequency of vibrations of a violin are -
 - a. Length of the string
 - b. Radius of the cross section
 - c. Tension of the string
 - d. All of the above.

2. Rama is doing a research on V-I characteristics of different materials. The observation table for two different materials is given below. The material A and B could be

S no	Material A	Material A	Material B	Material B
	$V(V)$	$I(A)$	$V(V)$	$I(A)$
1.	0.4	0.02	4	0.1
2.	0.5	0.04	5	0.2
3	0.6	0.06	6	0.3
4	0.7	0.08	7	0.5
5	0.8	0.10	8	0.8
6	0.9	0.12	9	1.2

- (a) Copper and LED /
- (b) Junction diode and nichrome
- (c) Iron and copper
- (d) Junction diode and LED.

3. When a metallic wire is stretched to double its length

- a. Its resistivity changes
- b. Its resistance changes
- c. Its area of cross section changes
- d. Both b and c.

9. For a real image formed by a convex lens the ratio of height of image to the height of object is 2:5, then the object is

- a. Between O and F
- b. Beyond 2F
- c. At F
- d. Between F and 2F.

10. For a lever, a graph is plotted with displacement of load on the Y axis to the displacement of effort on the X axis. Which of the following represents slope -

- a. Mechanical advantage
- b. Velocity ratio
- c. 1/ Velocity ratio
- d. 1/ Mechanical advantage

11. The line joining the centre of gravity of the cuboid and the centre of the earth will fall within the base of the body even after being disturbed by an external force, then the body is said to be in-

- a. Neutral equilibrium
- b. Stable equilibrium
- c. Unstable equilibrium
- d. Dynamic equilibrium.

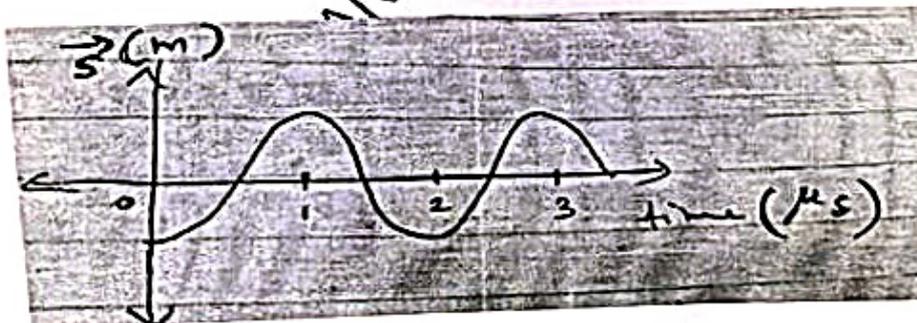
12. The energy conversion in a washing machine is from-

- a. Magnetic energy to electrical energy
- b. Electrical energy to mechanical energy
- c. Electrical energy to magnetic energy
- d. Mechanical energy to electrical energy

13. A light ray enters from medium A to medium B such that the ray does not bend in the second medium but the ray is not along the normal. The refractive index medium B relative to medium A will be -

- a. Greater than unity
- b. Less than unity
- c. equal to unity
- d. Zero.

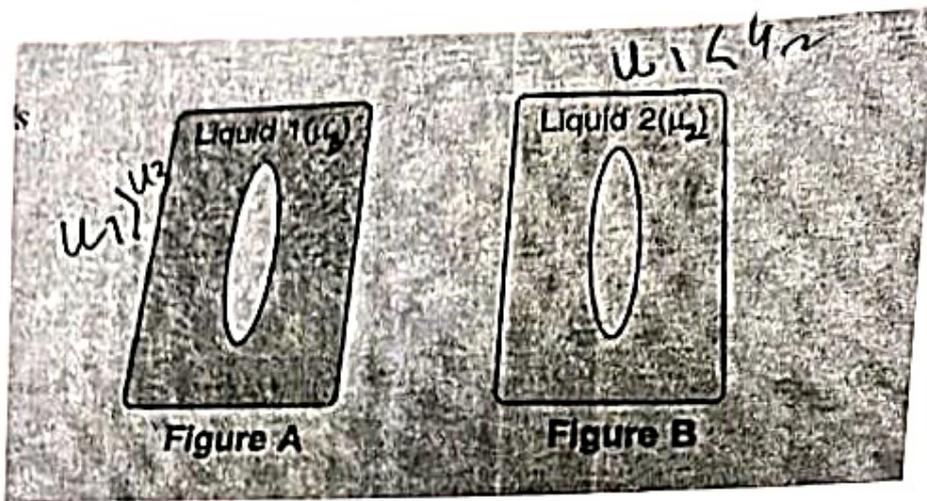
14. Observe the graph and choose the correct option with the correct values



- a. Time period = 1.5 μ s
- b. Time period = 2 μ s
- c. Time period = 2.5 μ s
- d. Time period = 3 μ s

15. A double convex lens with refractive index μ_1 is placed inside two different liquids of refractive index μ_2 and μ_3 as shown in the diagram alongside. The refractive indices are such that

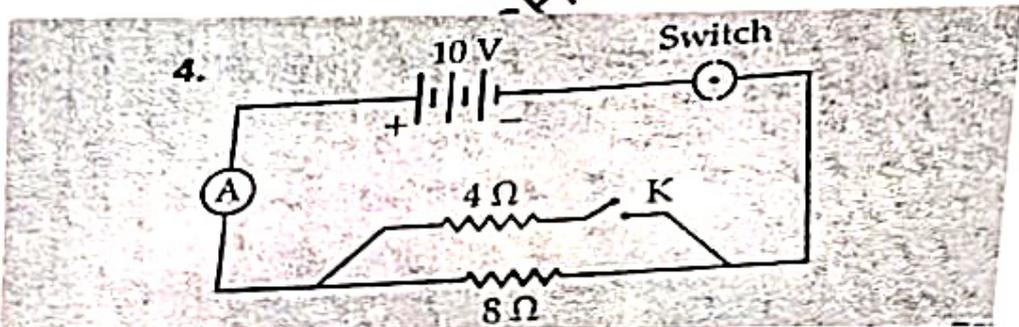
μ_2 is greater than μ_1 and μ_1 is greater than μ_3 . How would a parallel incident beam of light refract when it comes out of the lens in each of the cases shown alongside in figure A and figure B.



- A is plane and B is converging
- A is converging and B is diverging
- A is diverging and B is converging.
- None of the above

Question 2

- A. A loudspeaker produces a frequency of 930 Hz. On producing this sound, one of the four glasses kept on the table, one glass cracks.
- What is the reason for the cracking of that one glass? Explain
 - What are the vibrations of the remaining glasses? (3)



Refer to the circuit diagram,

Calculate the reading of A when (i) K is closed (ii) K is open

C. State the colour code of wires in a cable

D. State the principle of A.C generator. Also state the energy change that takes place in it.

E. Rishi is surprised when he sees water boiling at 115 degree celsius in a container. Give reasons as to why water boils at the above temperature

F. What are background radiations? State the cause of the presence of these radiations.

G. The power of a motor is 40 kW. At what speed can the motor raise a load of 10,000kgf.

Question 3

10=2x5

- A uniform half meter rule is pivoted at one end. The weight of the rule is 60gf. How much force is required to be applied at the other end of the rule to keep it in equilibrium? Draw the diagram to show the direction of the force.

- B. State the energy conversion in the following:
- Thermopile $h-c$
 - Respiration
- C. Name a single pulley system with a velocity ratio =2. If the effort is applied through a distance of 50cm, What will be the distance through which the load is lifted using the above pulley system?
- D. The bottom of a swimming pool appears raised by 0.5m, if the refractive index of water is $\frac{4}{3}$, find the depth of the pool. What is the shift in this case?
- E. A lens forms an image of an object such that the lens is equidistant from the object and the image.
- Identify the lens
 - How is the focal length related to the image distance in this case?

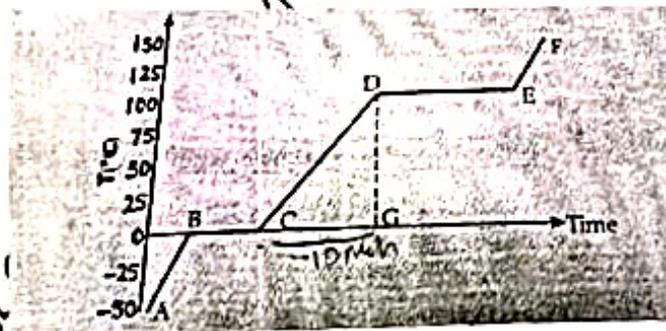
Section 2

Answer any four questions of the following.

(Each question carries 10 marks . (10=3+3+4))

Question 4

- A.(i) How do we detect infra red radiations?
(ii) Give one use of -
- ultraviolet radiations
 - Gamma radiations
- B. What is a superconductor? Give two examples of superconductors.
- C.(i) Give two points of difference between alpha and beta radiations.



Study the following heating curve for water and answer the following-

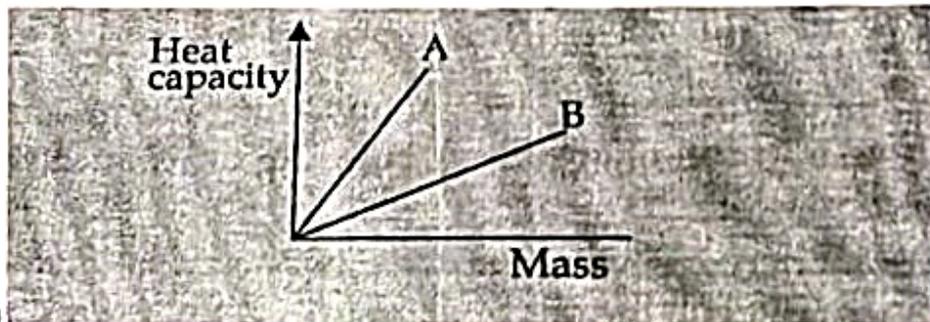
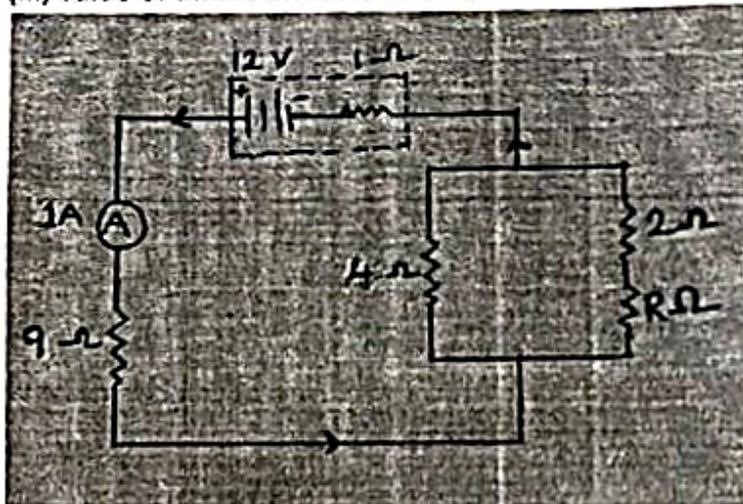
- If $CG = 10$ minutes, then heat required by 5g of water to reach from point C to point D is how much? (specific heat capacity of water is 4.2 J/gK .)
- How much heat is required to melt 5g of ice in portion BC. (specific latent heat of fusion of ice is 336000 J/kg)

Question 5

- A. 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 a cliff after 6 vibrations of the pendulum. If the velocity of sound in air is 340 m/s , find the distance between the cliff and the observer.
- B. Study the circuit diagram given below. An ammeter of negligible resistance shows 1 A current. Calculate
- voltage drop across the internal resistance

(ii) current through unknown resistance R

(iii) value of unknown resistance R



C.(i)

In the lab various blocks of materials labelled A and B each with masses ranging from 10g to 50g are utilised to determine their respective heat capacities. The above graph depicts the relationship between the heat capacity and the mass of the materials.

- Plot a graph between the mass and specific heat capacity of materials A and B.
- Which material is relatively a better conductor of heat? Justify.

(ii) What will be the direction of the movement of an alpha particle passing through a magnetic field directed into the plane of your paper? Show it with the help of a diagram. Which rule was used by you?

Question 6

A (i) Define optical centre of a lens

(ii) State the conditions for equilibrium of a body

B. (i) State the direction of anticlockwise moment of a force.

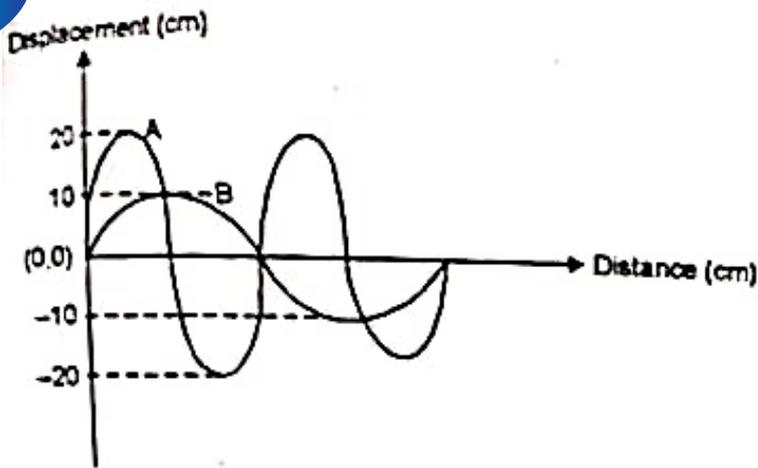
(ii) Give two points of difference between nuclear fission and nuclear fusion.

C. (i) Displacement distance graph of the two sound waves A and B, travelling in a medium, are as shown in the diagram below.

Study the two sound waves and compare their:

(i) Amplitudes

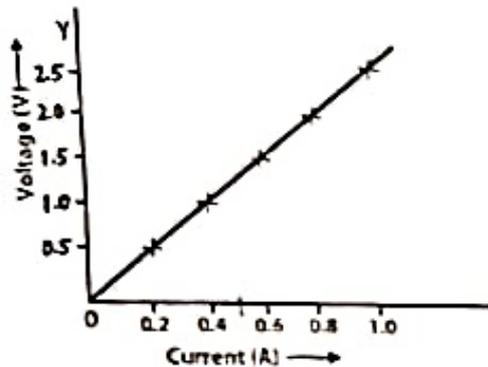
(ii) Wavelengths



(II) Why is the earth pin in a plug thicker and longer?

Question 7

A.



Find -

(a) potential difference V when the current I is 0.5 A.

(b) current I when the potential difference V is 0.75 V.

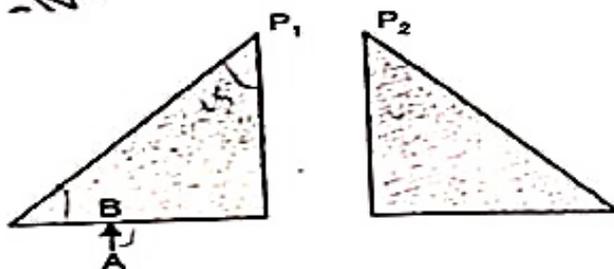
(c) Calculate the resistance from the graph provided.

B. An Object is placed in front of a lens between its optical centre and the principal focus of the lens. It forms a virtual, erect and diminished image.

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

C. Draw the schematic diagram of a step down transformer. Will it's turns ratio be less than Or more than 1. Give reason for your answer. Give one use of this transformer.

Question 8



A. Complete the above ray diagram.

P_1 and P_2 are isosceles right glass prisms.

AB is normal to the surface of the prism as shown in the diagram.

What is the deviation produced in the above case?

B.(f) Why does the sky appear red during sunrise?

(II) How do people identify the sound of a guitar in an orchestra?

(III) How is the radioactivity of an element affected when it undergoes a chemical change to form a compound?

C. 40g of ice at 0 degree celsius is used to bring down the temperature of a certain mass of water at 60 degree celsius to 10 degree celsius. Find the mass of water used.

(specific heat capacity of water = 4200 J/kg. K

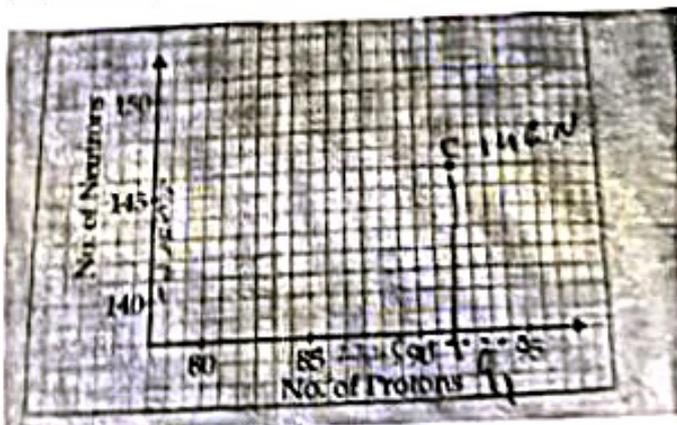
Specific latent heat of fusion of ice = 336×10^3 J/kg) 72g

Question 9

A. A convex lens forms a real image 4 times magnified when the candle is placed at a distance of 6 cm from the lens. Calculate the focal length of the lens.

B. Draw the labelled diagram of the ring system of distribution of power in a household.

C. (i) An element P, whose atomic mass number is A and atomic number is Z emits one alpha particle and then two beta particles consecutively to form element X. Show all the transformations by means of equations. What are P and X called?



(ii)

The graph illustrates the correlation between the number of protons and the number of neutrons for element C in the periodic table. Draw this graph and show the position of daughter element E after the emission of beta radiation by element C. Explain how you could arrive at the answer.

SMT SULOCHANDEVI

SCHOOL NAME 3



HIRANANDANI FOUNDATION SCHOOL - POWAI.
SECOND PRELIMINARY EXAMINATION-JAN.-2026

PHYSICS (Std: X)
(SCIENCE PAPER – 1)

Maximum Marks: 80

Time allowed: Two hours

Date:09.01.2026

Answers to this Paper must be written on the paper provided separately.

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

This time is to be spent in reading the Question Paper.

The time given at the 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 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.)

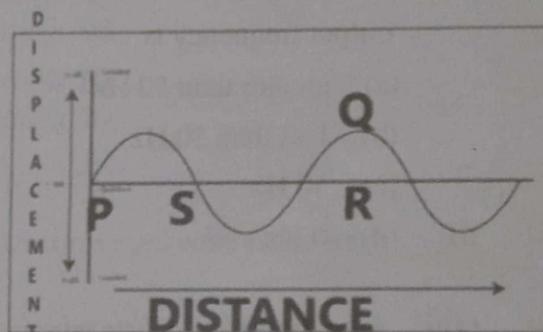
- (i) When a stone tied at the end of a string is whirled in a circular path, the tension in the string provides
- (a) centrifugal force
 - (b) centripetal force
 - (c) gravitational force
 - (d) electrostatic force

This Paper consists of 12 printed pages.

- (ii) Two bodies of equal weight are kept at heights of h and $1.5 h$ respectively. The ratio of their P.E. is
- (a) 1 : 1
 - (b) 3 : 2
 - (c) 2 : 3
 - (d) 4 : 3
- (iii) The energy conversion in an electric cell when in use is
- (a) electrical energy to mechanical energy
 - (b) electrical energy to chemical energy
 - (c) chemical energy to mechanical energy
 - (d) chemical energy to electrical energy
- (iv) An example of a lever in which the M.A. and V.R. is always less than 1 is
- (a) a nut cracker
 - (b) a paper cutter
 - (c) a knife
 - (d) a lemon crusher
- (v) Inside the prism, during the dispersion of white light, compared to blue, red light:
- (a) slows down less and refracts less.
 - (b) slows down more and refracts less.
 - (c) slows down more and refracts more.
 - (d) slows down less and refracts more.
- (vi) An object is placed at a distance $2f$ from a convex lens of focal length f . The size of the image compared to the object is
- (a) same
 - (b) diminished
 - (c) magnified
 - (d) diminished to a point.

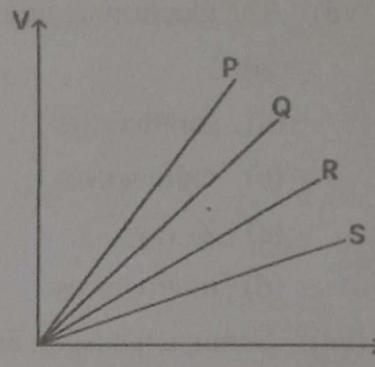
- (vii) The electromagnetic waves which can be detected by a photographic film are
- gamma rays
 - radio waves
 - X- rays
 - microwaves
- (viii) Sumit, a teenager, enjoys playing his music loudly. However, his grandmother consistently lowers the volume of the music player. Analyse the wave to identify which characteristic of the wave has been altered when the grandmother reduces the volume.

- The length PS becomes more.
- The length QR becomes less.
- The length SR becomes less.
- The length PR becomes less.



- (ix) Four objects A, B, C and D are given the same amount of heat energy. The rise in temperature for them are 8°C , 15°C , 10°C and 16°C respectively. The maximum value of specific heat capacity is for
- A
 - B
 - C
 - D
- (x) A radioactive element is placed in an evacuated chamber. Then the rate of radioactive decay will
- decrease
 - increase
 - remain unchanged
 - depend on the surrounding temperature

- (xi) The graph of voltage vs current for four different materials is shown in the figure. Out of these four materials, the material used for making the filament of a bulb is



- (a) P
- (b) Q
- (c) R
- (d) S

- (xii) For a step-up transformer, if frequency of input voltage is 50 Hz, then the output frequency is

- (a) greater than 50 Hz
- (b) less than 50 Hz
- (c) 50 Hz
- (d) 0 Hz

- (xiii) **Assertion (A):** A fuse wire is always connected with the live wire and in parallel.

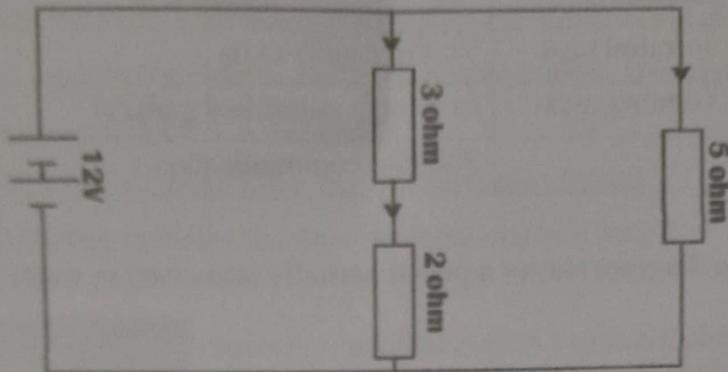
Reason (R): If the current exceeds the safe limit, fuse wire melts and breaks the circuit.

- (a) A and R are true, and R is the reason for A.
- (b) A and R are true, and R is not the reason for A.
- (c) A is true, but R is false.
- (d) A is false, but R is true.

- (xiv) Diamonds glitter in the dark because

- (a) they emit light
- (b) they have a very small critical angle due to very high refractive index
- (c) due to fluorescence
- (d) chemical reaction in the diamond produces light energy

- (xv) In the circuit given below, identify the correct relation between the currents flowing through the $2\ \Omega$, $3\ \Omega$, and $5\ \Omega$ resistors:



- (a) current through $2\ \Omega >$ current through $3\ \Omega$
 (b) current through $5\ \Omega <$ current through $3\ \Omega$
 (c) current through $2\ \Omega =$ current through $5\ \Omega$
 (d) current through $5\ \Omega >$ current through $3\ \Omega$

Question 2

- (i) Complete the following by choosing the correct answers from the bracket: [6]
- Complete the following by choosing the correct answers from the bracket:
- (a) For work done to be maximum, the angle between force and displacement should be _____ [0° , 45° , 90°] .
- (b) The nuclear radiation with **lowest** ionizing power is _____. [α / β / γ].
- (c) For a concave lens, magnification is always _____ [*less*, *more*] than 1 .
- (d) For an echo, the reflected sound must reach the person atleast _____ [*0.1 second*, *1 second*, *10 seconds*] after the original sound is heard.
- (e) In a three-pin plug, the longest pin is _____ [*live*, *earth*, *neutral*].
- (f) Lenz's law is based on conservation of _____. [*energy*, *force*]
- (ii) Draw a graph showing the variation of angle of deviation with the angle of incidence at a prism surface. [2]

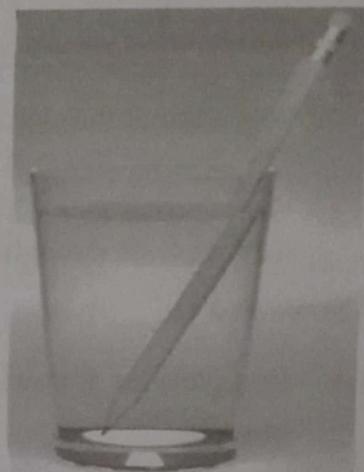
- (iii) Match the electromagnetic waves in **Column A** to their application in **Column B**. [2]

Column A	Column B
(a) Infrared rays	To kill cancer cells
(b) Gamma rays	In remote controlled gadgets
	Satellite communication

Question 3

- (i) The given diagram shows a pencil partially immersed in water in a Glass. [2]

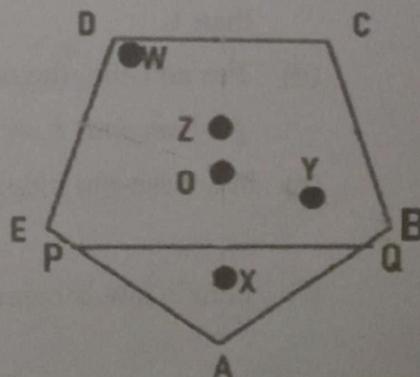
- (a) Why does the pencil in water appear thicker as compared to the pencil outside water?
- (b) Why does the pencil appear discontinuous in water?



- (ii) A fuse is rated 5A. Can it be used with a geyser rated 1540 W, 220 V? [2] Write **Yes** or **No**. Give supporting calculations to justify your answer.
- (iii) ABCDE is a regular pentagon with its centre of gravity at O. [2] What will be the **most probable position** (W, X, Y, Z or O) of the new centre of gravity:

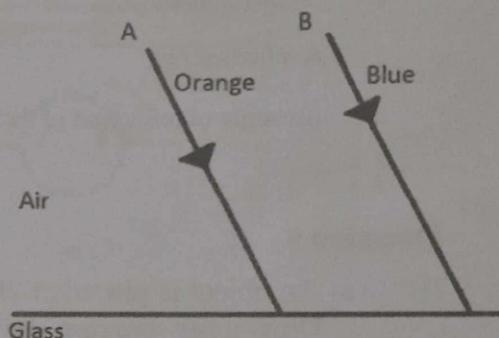
- (a) if a piece of clay is attached at point A?
- (b) if the pentagon is cut along the line PQ?

(Of the remaining part DCBQPE)



- (iv) 50 g of a metal piece at 27 °C requires 2400 J of heat energy to attain a [2] temperature of 327 °C. Calculate the specific heat capacity of the metal?

- (v) State two advantages of an electromagnet over a permanent magnet. [2]
- (vi) A certain beam of α particles, β particles and γ radiations travel [2]
through a region of electric field produced between two oppositely
charged parallel plates A (+) and B (-).
(a) Which of the above three has the maximum speed?
(b) Which one deviates the most from its original path?
- (vii) The given diagram shows two parallel rays A [orange] and B [blue] [3]
incident from air, on air-glass
boundary.



- (a) Copy and complete the path of the rays A and B.
(b) How do the speeds of these rays differ in glass?
(b) Are the two refracted rays in the glass parallel?
Give a reason for your answer.

Section B (40 Marks)

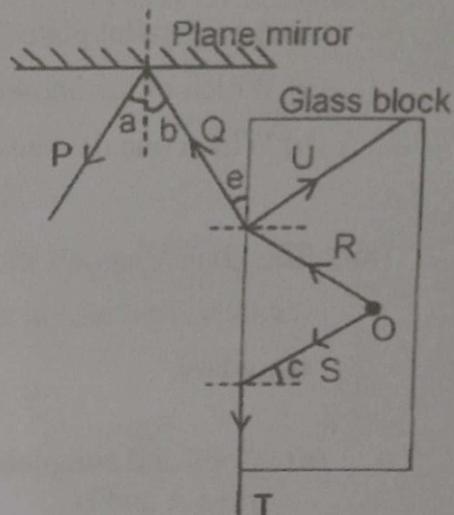
(Attempt any four questions from this section.)

Question 4

- (i) The image of a **candle flame** placed at a distance of 36 cm from a [3]
spherical lens, is formed on a screen placed at a distance of 72 cm
from the lens. Calculate the focal length of the lens and its power.
- (ii) An electromagnetic radiation is used for photography in fog. [3]
(a) Identify the radiation.
(b) Why is this radiation mentioned by you, ideal for this purpose?
(c) How do we detect these radiations?

(iii) O is a luminescent particle trapped inside a glass block. A student traces [4] the path of rays coming out of it and reflecting over a plane mirror as shown in the given diagram. Complete the table, using the labels from the figure. The first label is done for you.

Sr. No.	Description	Label
a.	An angle of reflection on the mirror	a
b.	A partially reflected ray in the glass slab	
c.	A critical angle	
d.	A refracted ray	
e.	An angle of refraction of the ray R	

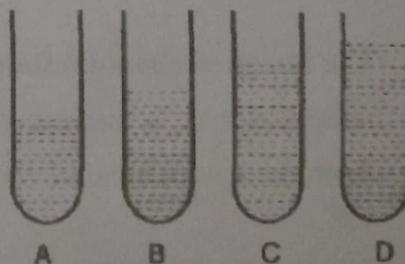


Question 5

- (i) (a) An object is placed at $2F$ position of a convex lens. [3]
Draw a ray diagram showing the formation of the image.
- (b) How will the size of the image change if we, **ONLY** replace the lens in the above arrangement with another lens of a **greater focal length**?

- (ii) (a) Raj is trying to create musical notes using water filled test tubes as shown in the figure. [3]

Which test tube is likely to produce a musical note with a lowest pitch?
Give a reason for your answer.



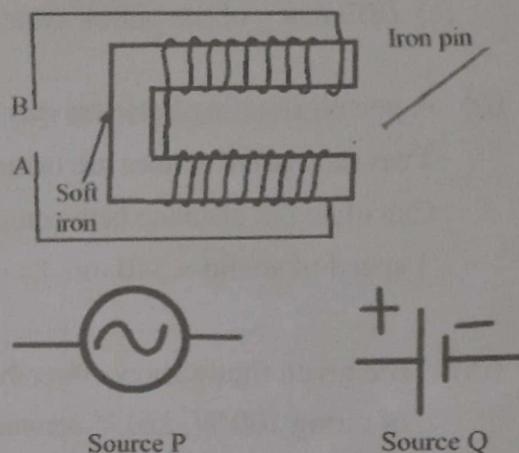
- (b) How is the frequency of a stretched string related to its
(1) length (2) tension

(iii) (a) Name the principle on which a transformer works. [4]

(b) A wire, bent into a circle carries a current in an anti-clockwise direction. What polarity does this face of the coil exhibit?

(c) The given diagram shows a copper wire wound around a U-shape soft iron bar. An iron pin is brought near the arrangement.

First Source P and then Source Q are connected across AB, each operating independently.



(1) **State True or False:**
Source P as well as Source Q, when connected across AB, can attract the iron pin.

(2) Justify your answer to (1) with a suitable reason.

Question 6

(i) A **uniform half metre ruler** is balanced horizontally on a knife edge [3] placed at 29 cm mark when a mass of **20 gf** is suspended from one end.

(a) Draw the diagram of the arrangement.

(b) What is the weight of the half metre ruler?

(ii) For each of the following scenarios, state whether the work done by gravity is *positive, negative, or zero*. [3]

(a) A person walks on a levelled road.

(b) A person climbs a ladder.

(c) A car in a neutral gear is coming down the slope.

(iii) A vessel of mass 100 g contains 150 g of water at 30 °C. [4]
How much ice is needed to cool it to 5 °C?

[Given : Specific heat capacity of material of vessel = $0.4 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$

Specific heat capacity of water = $4.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$

Specific latent heat of fusion of ice = 336 J g^{-1}]

Question 7

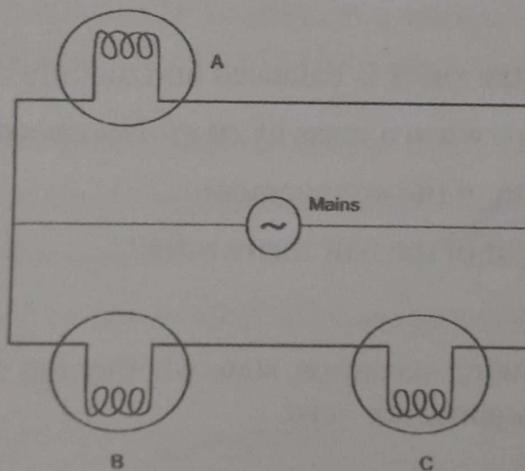
(i) A pulley system with V.R.= 4 is used to lift a load of 150 kgf through a [3]
a vertical height of 20 m. The effort required is 50 kgf in the downward
direction. Calculate:

- (a) Distance moved by the effort.
- (b) Work done by the effort.
- (c) Efficiency of the pulley system. ($g = 10 \text{ N kg}^{-1}$)

(ii) A person standing between two vertical cliffs produces a sound. [3]
Two successive echoes are heard after 2 seconds and 6 seconds.
Calculate the distance between the cliffs.

[speed of sound = 340 m/s]

(iii) The given figure shows three bulbs A, B and C each [4]
of rating 100 W, 220 V connected to the mains of 220 V.



Answer the following:

(a) How is the bulb A connected with the mains?

At what voltage does it glow?

(b) How are the bulbs B and C connected with the mains?

At what voltage does the bulb B glow?

(c) How is the glow of bulbs A and C affected if bulb B gets fused?

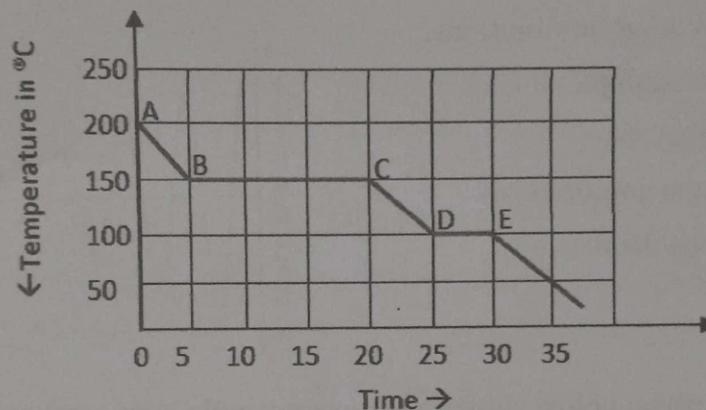
(d) How is the glow of bulbs B and C affected if bulb A gets fused?

Question 8

(i) The current through a 12 V tungsten filament lamp connected to a 12 V accumulator of negligible resistance is 3.0 A. Calculate: [3]

- (a) Resistance of the filament
- (b) Power of the lamp
- (c) Electrical energy in KWh consumed in 5 hours.

(ii) The cooling curve of a substance is shown in the given figure. [3]



- (a) Find the boiling point of the substance.
- (b) What does DE indicate?
- (c) What is the melting point of the substance?

(iii) (a) Name the process, nuclear fission or nuclear fusion [4]

- (1) in which energy released per unit mass is more.
- (2) which is possible at ordinary temperature.

(b) A radioactive nuclide P has a mass number 15 and atomic number 7.

Write the symbol of the new nucleus in **each case** and express each change by a reaction when this nucleus P loses

- (1) one proton,
- (2) one beta particle
- (3) one alpha particle.

Question 9

(i) (a) A nucleus ${}_{11}^{24}\text{Na}$ is β -radioactive. [3]

(1) Write the equation representing β -decay.

(2) What general name is given to the product nucleus with respect to ${}_{11}^{24}\text{Na}$?

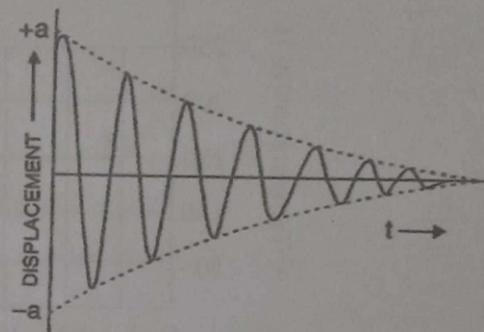
(b) Name the element that has the largest number of isotopes.

(ii) Study the given displacement-time graph of a vibrating body. [3]

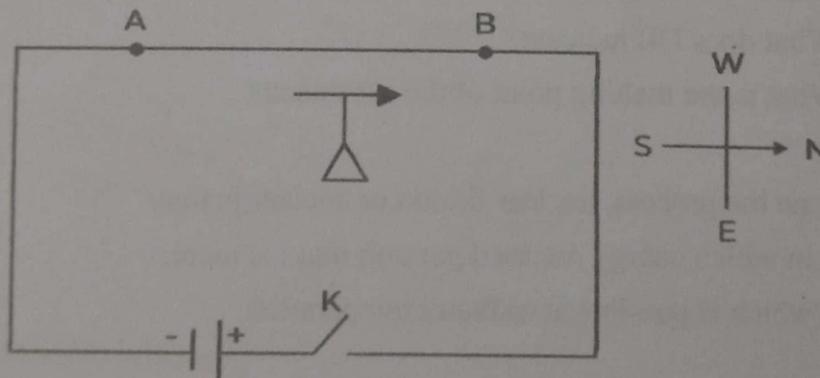
(a) Name the kind of vibrations.

(b) Give one example of such vibrations.

(c) Why is the amplitude of vibrations decreasing?



(iii) The diagram given below shows a magnetic needle kept just below the conductor AB which is kept in the North South direction. [4]



(a) In which direction does the needle deflect when the key is closed?

(b) Why is the deflection produced?

(c) What will be the change in the deflection if the magnetic needle is taken just above the conductor AB ?

(d) Name one device which works on this principle.

Answers to this paper must be written on the paper provided separately

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

This time is to be spent reading the question paper.

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

Section I is compulsory. Attempt **any four** questions from **Section II**.

The intended marks for questions or parts of questions are given in brackets [].

This paper consists of 10 printed pages

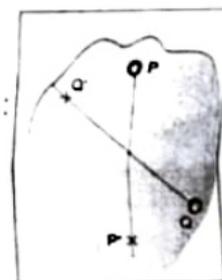
SECTION I (40 marks)

(Attempt all questions from this Section)

Question 1: Choose the correct alternative from the options given:

[15]

- (i) A flat, irregular wooden lamina is suspended freely from two different points on its edge. The vertical lines drawn from these suspension points intersect at a specific location. This intersection point marks the:
- (a) Geometric center
 - (b) Center of Gravity
 - (c) Point of suspension
 - (d) Center of mass only if the body is symmetrical



- (ii) A rubber ball is dropped from a height and allowed to bounce on the floor. Which of the following correctly represents the main energy conversions involved during its fall and impact with the floor?
- (a) Potential energy → Kinetic energy
 - (b) Kinetic energy → Potential energy
 - (c) Potential energy → Kinetic energy → Heat and sound energy
 - (d) Kinetic energy → Heat → Light energy
- (iii) Which of the following fields does not typically utilize the properties of radioisotopes?
- (a) Sterilization of medical equipment
 - (b) Optical fiber communication
 - (c) Carbon dating of fossils
 - (d) Treatment of cancer

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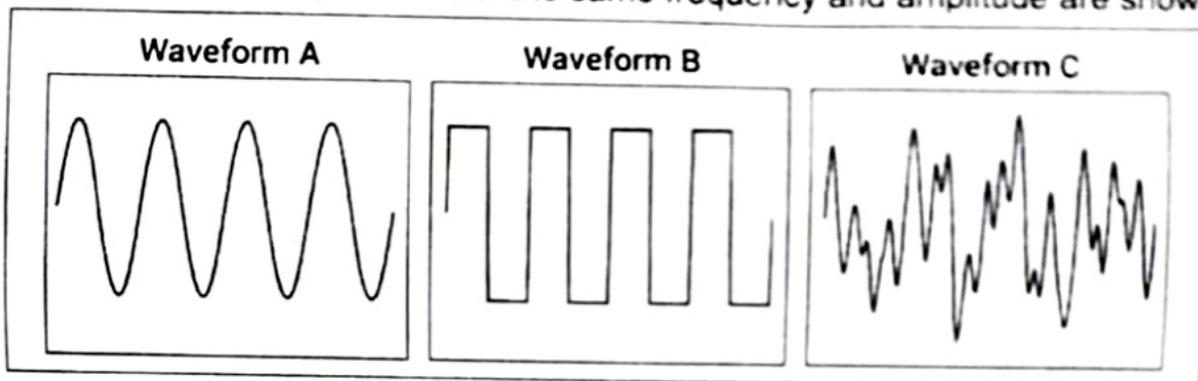
- (iv) A motor lifts a load of mass 50 kg vertically to a height of 4 m in 5 seconds
If $g = 10 \text{ ms}^{-2}$, what is the power developed by the motor?
(a) 400 W
(b) 500 W
(c) 200 W
(d) 2000 W
- (v) In a specific pulley system, the Mechanical Advantage is calculated to be 2. This implies that:
(a) The effort applied is twice the load.
(b) The load moves twice the distance of the effort.
(c) The effort required is half the magnitude of the load.
(d) The efficiency is 200%.
- (vi) A convex lens converges light because:
(a) It is made of transparent material
(b) It behaves as a series of diverging prisms
(c) It behaves as a series of converging prisms
(d) Light travels slower through glass
- (vii) The main cause of radioactivity in unstable nuclei is:
(a) Presence of excess electrons
(b) Imbalance between number of protons and number of neutrons
(c) High temperature of the nucleus
(d) Chemical bonding between atoms
- (viii) A ray of light passes through the optical centre of a thin convex lens. After refraction, the ray will:
(a) Pass through the principal focus
(b) Emerge parallel to the principal axis
(c) Pass undeviated through the lens
(d) Deviate away from the principal axis
- (ix) A 50 g sample of a substance at its melting point absorbs 400 J of heat to change state completely without a rise in temperature. The specific latent heat of fusion is:
(a) 80 Jg^{-1}
(b) 8 Jg^{-1}
(c) 20 Jg^{-1}
(d) 400 Jg^{-1}

Assertion (A): When resistors are connected in series, the same current flows through each resistor.

Reason (R): In a series circuit, there is only one path available for the flow of electric current.

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true and R is not the correct explanation of A
- (c) A is true but R is false.
- (d) A is false but R is true.

(xi) Three waveforms A, B and C of the same frequency and amplitude are shown.



All three waveforms share the same height and complete the same number of cycles across the screen.

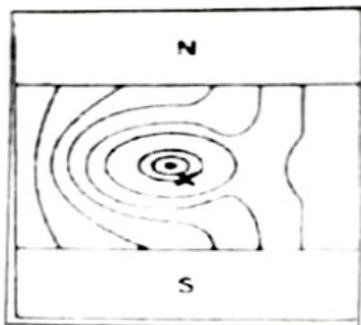
Which statement correctly describes these sounds?

- (a) A has the greatest loudness
 - (b) B has the highest pitch
 - (c) C has different quality compared to A and B
 - (d) C represents silence
- (xii) A pearl lies at the bottom of a swimming pool at a depth of 1.8 m. If the refractive index of water is 1.33, the apparent depth is _____.
- (a) 1.15 m
 - (b) 1.25 m
 - (c) 1.35 m
 - (d) 1.45 m
- (xiii) A main fuse in a house is rated at 50A. How many maximum 100 W / 220 V heaters can be used simultaneously?
- (a) 50
 - (b) 100
 - (c) 110
 - (d) 220

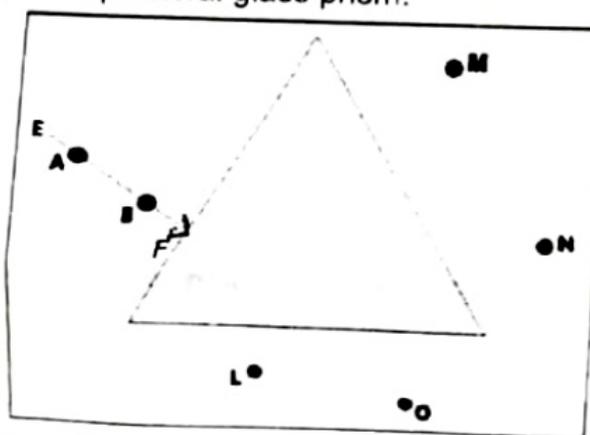
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Contd...Std X Science paper-1 (Physics) Preliminary Review January 2026

- (vi) The diagram shows a conductor positioned between the north and south poles of a magnet. The conductor carries a current emerging out of the page, and the combined magnetic field pattern around it is illustrated in the figure.



- (a) Indicate the direction in which the conductor experiences a mechanical force due to the interaction of the two magnetic fields.
 (b) Name the standard rule applied to obtain the direction stated in part (a).
- (vii) The diagram below shows a light ray EF passing through points A and B, incident normally on one face of an equilateral glass prism. [2]



- (i) Complete the ray diagram to show the path of the ray EF through and out of the prism.
 (ii) Identify the eye position (L, M, N, or O) from which the images of points A and B appear in a straight line.

SECTION II (40 marks)

(Attempt any four questions from this Section)

Question 4

- (i) A block of ice at -10°C is heated at a constant rate until it turns into steam at 100°C [3]
 (a) Draw a labeled Temperature vs. Time graph representing this process.
 (b) Mark the latent heat of vaporisation in the graph drawn by you in (a).

Name the following:

- (a) The defect of vision in which distant objects are seen clearly but nearby objects are not. [2]
- (b) siemen metre⁻¹ is the S.I unit of which physical quantity. [2]

Match column 'A' with column 'B':

Column A	Column B
(a) ${}_{20}\text{Ca}^{40}$ and ${}_{18}\text{Ar}^{40}$	(i) Isotone
(b) ${}_{17}\text{Na}^{35}$ and ${}_{17}\text{Na}^{37}$	(ii) Isotope
	(iii) Isobar

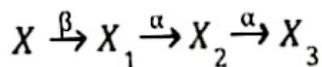
Question 3

Two bulbs, 40W and 60W (both rated for 220V), are connected in series across a 220V supply. Which bulb glows brighter and justify your answer. [3]

i) "The Sun appears red at sunset than at noon." Justify this statement by giving the specific reason for this observation. [2]

(iii) Piya is performing an experiment using a lens. She fails to obtain the image on screen at any position she holds the object in front of the lens. Name the lens she is using for her experiment with supporting reason. [2]

(iv) A radioactive nucleus undergoes series of decays according to sequence: [2]



If the mass number and atomic number of X_3 are 160 and 63 respectively, determine the mass number and atomic number of X .

(v) Harsha lives in a small apartment where there are limited power sockets in the kitchen. During summer, she plugs a **heavy-duty air conditioner** into a wall socket using a **two-way adapter**. To save time while cooking, she also connects a **microwave oven** to the same socket through the adapter. [2]

Is it safe to connect a heavy-duty air conditioner and a microwave oven to the same socket using a two-way adapter? Justify your answer scientifically.

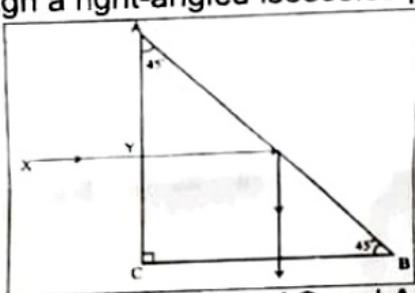
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- (a) The smoke from a fire appears white. Justify. [3]
- (b) For night-vision photography, which part of the electromagnetic spectrum is utilized? Give one reason why this radiation is suitable. [4]
- (iii) An object is placed 20 cm in front of a convex lens. A real image is formed 80 cm on the other side. Calculate the following:
- the focal length of the lens.
 - the magnification of the image obtained.
 - the power of the lens.

Question 5

- (i) (a) The audible range for a human is 20 Hz to 20 kHz. If the speed of sound in air is 340 ms^{-1} , calculate the shortest wavelength of sound a human can hear in cm. [3]
- (b) A television receiver circuit is set into vibration by electromagnetic waves coming from various broadcasting stations. Name and define the type of vibration produced in the circuit when it starts to vibrate due to the incoming signal.
- (ii) A ray of light XY passes through a right-angled isosceles prism as shown below. [3]



- Write the value of angle of incidence on face AC and AB by copying and completing the required values of all the angles formed in the above given diagram.
 - Which phenomenon is observed on the side AB in the prism?
- (iii) A pulley system has a Velocity Ratio (VR) of 4. It is used to lift a load of 180 kgf to a height of 10 m. The effort applied is 60 kgf. [4]
- Draw a schematic diagram of this pulley system.
 - Calculate the efficiency of the system.

Question 6

- Mention the unit in which energy released by a nucleus is measured. [3]
 - Radioactivity is a spontaneous process. Justify.
 - A radioactive substance is oxidized. What change do you expect to take place in the nature of radioactivity?

....4....

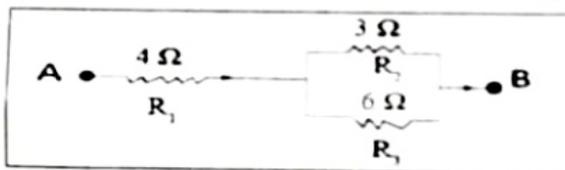
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- (xiv) Meera switches on a mixer grinder and a refrigerator at the same time in her house. Both appliances continue to work even if one is switched off. This is because household appliances are connected:
- In series, so current remains the same
 - In parallel, so each appliance gets the same voltage
 - In series, to reduce power consumption
 - Through a common fuse only
- (xv) In Oersted's experiment, a magnetic compass needle is placed near a straight current-carrying conductor. When current flows through the conductor, the compass needle deflects. This observation proves that:
- Electric current produces a magnetic field
 - Magnetic field produces electric current
 - Electric current heats the conductor
 - A compass needle works only in air

Question 2

- (i) Fill in the blanks by choosing the correct answer from the options given in brackets:
- (a) The equivalent resistance between points A and B in the given circuit is _____.

[6]



(2 Ω / 4 Ω / 6 Ω / 8 Ω)

- (b) When a nucleus of ${}_{11}\text{Na}^{24}$, emits a beta particle, the atomic number of the daughter nucleus _____ by one.

(increases / decreases / remains same / becomes zero)

- (c) A sound of frequency 512 Hz is perceived to be of _____ pitch compared to a sound of 256 Hz. (lower / higher / same).

- (d) The energy released in nuclear reactions is due to the conversion of _____ into energy.

(mass / charge / volume / momentum)

- (e) In a block-and-tackle system with efficiency less than 100%, the velocity ratio _____.

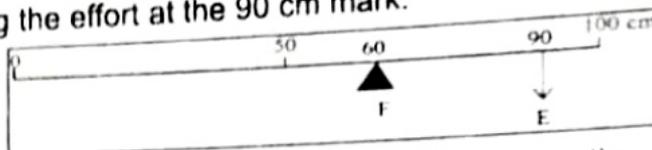
(increases / decreases / remains unchanged / becomes zero)

- (f) For work done to be maximum, the angle between the force and displacement should be _____. (0°, 30°, 45°, 90°)

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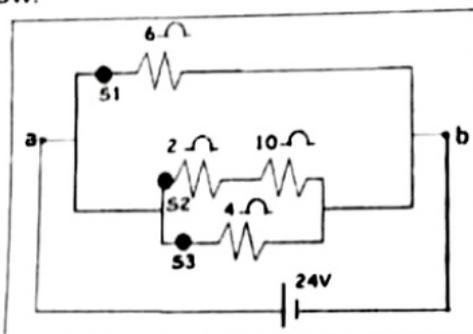
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- (ii) Figure given below shows a uniform metre rule of weight supported on a fulcrum at 60 cm mark by applying the effort at the 90 cm mark.



- (a) State with reason whether the weight of the rule is greater than, less than or equal to the effort.
 (b) What is the value of net moment of force on the metre rule?

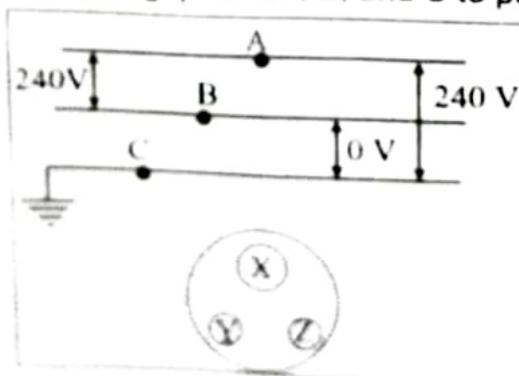
- (iii) Study the circuit given below.



- (a) Calculate the potential difference/voltage between a and b when all three switches S1, S2 and S3 are open.
 (b) Calculate the current drawn from the cell with internal resistance 2 ohm, when all three switches S1, S2 and S3 are closed.

Question 7

- (i) (a) Define Turn Ratio.
 (b) Can a transformer be used with a DC source?
 (c) Name the principle on which the transformer works?
- (ii) Redraw the diagram by connecting points A, B, and C to points X, Y, and Z on the socket



[4]

[3]

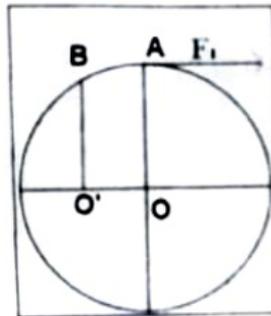
[3]

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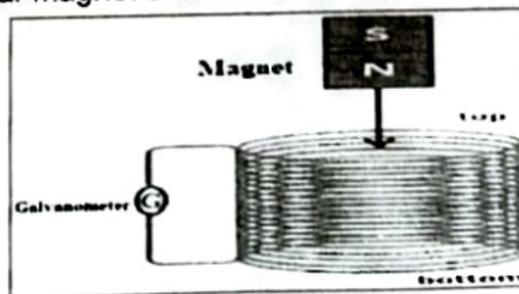
- (a) Distinguish between Heat Capacity and Specific Heat Capacity on the basis of their definition. [4]
- (b) 300g of hot water at 70°C is added to 100g of cold water at 20°C. Calculate the final temperature of the mixture. Also state the assumption made by you.
(Specific Heat Capacity of Water = $4.2 \text{ Jg}^{-1}\text{K}^{-1}$)

Question 8

- (i) The circular wheel shown below is fixed about point O. The wheel is kept stationary under action of two forces, F_1 at A and vertical force F_2 at B. [3]



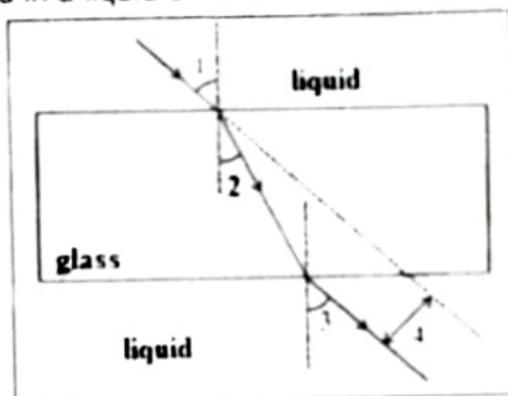
- (a) Show the direction of F_2 in the diagram and also state whether it will be clockwise or anticlockwise.
- (b) Mention one point of difference between Uniform Circular motion and Uniform Linear Motion. [3]
- (ii) A person standing between two vertical cliffs produces a sound. Two successive echoes are heard at 3.5s and 7s. Calculate the distance between the cliffs.
(The speed of sound in the air is 320 ms^{-1}) [3]
- (iii) A coil is placed near a bar magnet shown below. [4]



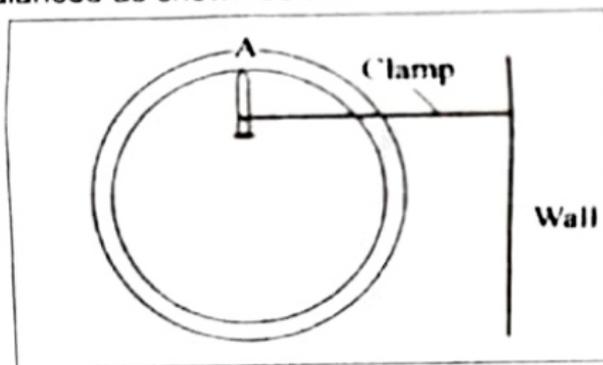
- (a) Give your observation when the magnet is dropped into the coil and state the law which explains this observation.
- (b) State the direction of current in the top coil when the magnet is dropped.
- (c) If the magnet is moved away from the coil instead, state the direction of the induced current.

Question 9

- (i) The given diagram shows the path of a ray of light through a rectangular glass block of refractive index 1.5 placed in a liquid of refractive index 1.4. [3]



- (a) Compare angle 1 and angle 3.
 (b) List one factor on which 4 depends.
 (c) Calculate the ratio of the sine of angle 1 to the sine of angle 2. [3]
- (ii) (a) State the principle of moments.
 (b) A uniform ring is balanced as shown below. [3]



Copy the diagram, mark and state the position of centre of gravity by letter G. Justify your answer.

- (iii) A porter lifts a luggage of 20 kg from the ground to his head, 1.5 m high. Then he walks 10 m on a level road. [4]
- (a) Calculate the work done by the porter in lifting the luggage ($g = 10 \text{ ms}^{-2}$).
 (b) State the work done by gravity while he is walking on the level road. Justify.
 (c) Mention the form of energy gained by the luggage when lifted.

-----THE END-----

G. D. SOMANI MEMORIAL SCHOOL
PRELIM EXAMINATIONS
STD : X

SUB: PHYSICS

MARKS: 80

DATE: 14/1/2026

TIME: 2HRS.

Answers to this Paper must be written on the paper provided separately. You will not be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper. The time given at the head of this Paper is the time allowed for writing the answers. **No. of Printed Sides : 9**

Section A is compulsory.

Attempt all questions from Section A and any four questions from Section B.

The intended marks for questions or parts of questions are given in brackets []

Question1.

Choose the correct answers to the questions from the given options. (Do not copy the questions, write the correct answer only.)

[15]

i) A book kept on a table is an example of,

- (a) Dynamic equilibrium.
- (b) Static equilibrium.
- (c) Both.
- (d) None.

ii) An object of mass 200 g moving with velocity 50 cm/s. What is its kinetic energy?

- (a) 2.1×10^5 erg
- (b) 2.0×10^5 erg
- (c) 2.5×10^7 erg
- (d) 2.5×10^5 erg

iii) A machine in which the displacement of load is more than the displacement of effort will have:

- (a) V.R < 1
- (b) V.R > 1
- (c) V.R = 1
- (d) M.A < 1

iv) A Ray of light falls on the surface of a rectangular slab of plastic material whose refractive index is 1.6, if the incident ray makes an angle of 53 degree with the normal. The angle made by the refracted ray with the normal ($\sin 53 \text{ degree} = 4/5$) is _____

- (a) 35 degree.
- (b) 30 degree.
- (c) 20 degree.
- (d) 25 degree.

- v) A plane to the principal axis, passing through the focus, is called the focal plane of a lens.
- (a) Parallel
 - (b) Normal
 - (c) Slanting
 - (d) At 60 degree

- vi) How does the power of a lens change if its focal length is doubled?
- (a) It becomes double.
 - (b) It becomes half.
 - (c) It does not change.
 - (d) It is reduced depending upon colour of light.

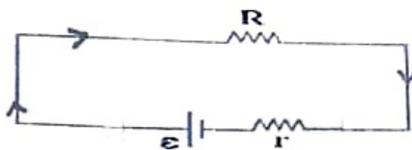
- vii) Which colours in the visible spectrum has wavelength more than the wavelength corresponding to yellow colour?
- (a) Violet
 - (b) Blue
 - (c) Green
 - (d) Orange

- viii) Distance between the resting position and the maximum displacement of the wave is known as _____.
- (a) Frequency
 - (b) Amplitude
 - (c) Wavelength
 - (d) Wave velocity

- ix) **Assertion (A):** In the process of total internal reflection 100 % of light energy is reflected back as it happens in a plane mirror.
Reason (R): During TIR, there is no absorption of light taking place, as light passes from a denser to a rarer medium.
- (a) Both A and R are true, R is the correct explanation of A
 - (b) Both A and R are true, R is not the correct explanation of A
 - (c) A is true and R is false
 - (d) A is false and R is true

: 3 :

- x) For a given cell, if e.m.f. is twice its terminal voltage, then which of the following relation is true?



- (a) $R = r$
 (b) $R > r$
 (c) $R < r$
 (d) $R = 2r$

- xi) If 200 V is applied to the primary coil of an ideal step-up transformer with turns ratio 5, then the voltage in the secondary coil is:

- (a) 200 V
 (b) 40 V
 (c) 400 V
 (d) 1000 V

- xii) A good conductor of heat has a specific heat capacity, while a bad conductor has a specific heat capacity.

- (a) low, high
 (b) low, low
 (c) high, low
 (d) high, high

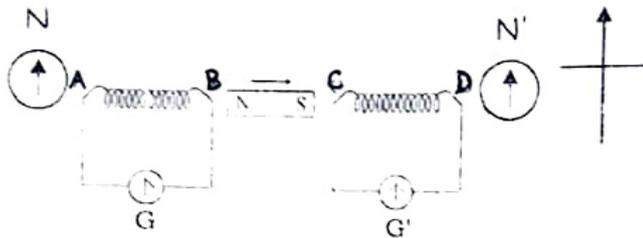
- xiii) By total number of nucleons, we mean :

- (a) the number of protons + number of electrons
 (b) the number of electrons + number of neutrons
 (c) the number of electrons + number of protons + number of neutrons
 (d) the number of neutron + number of protons

- xiv) The source of energy of the sun and stars is obtained from the nuclear fusion of :

- (a) uranium
 (b) thorium
 (c) hydrogen
 (d) ${}_{92}^{235}\text{U}$

- xv) If a bar magnet is kept between two coils AB and CD. Two magnetic needles N and N' are kept near the ends A and D of two coils respectively. If the magnet is moved towards right side, then identify the correct positions of the magnetic needles.



- (a) N - N' -
- (b) N - N' -
- (c) N - N' -
- (d) N - N' -

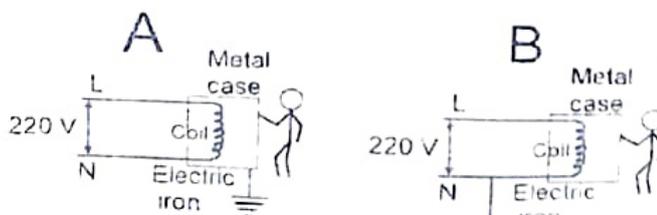
Question2

- (i) Complete the following by choosing the correct answers from the bracket:

[6]

- (a) The centrifugal force is (a real force, the force of reaction of centripetal force, a fictitious force)
- (b) If the amplitude of a sound wave is halved, its intensity becomes (four times, one – fourth, 2 times)
- (c) For a pure substance, the specific latent heat of fusion is (same, less, more) as the specific latent heat of freezing.
- (d) Foot treadle is an example of class (I, II, III) lever.
- (e) If a ray of light incident at an angle of incidence 48° on a prism of refracting angle 60° suffers minimum deviation, then the angle of minimum deviation is (30° , 36° , 40°)
- (f) The focal length of a thick convex lens is (more than, less than, same as) that of a thin convex lens, if placed in the same medium.

- (ii) If live wire makes an accidental contact with the metal case, which circuit (A or B) in the diagram, illustrating an electric iron, is considered safe for the user (Assuming the fuse is present in the live wire in both circuits)? Justify your answer.



- (iii) A transformer is used to change a high alternating e.m.f. to a low alternating e.m.f. of the same frequency. [2]
- (a) Identify the type of transformer used for the above purpose.
- (b) State whether the turns ratio of the above transformer is =1 or >1 or <1.

Question3

- (i) Match the following column and choose the correct option [2]

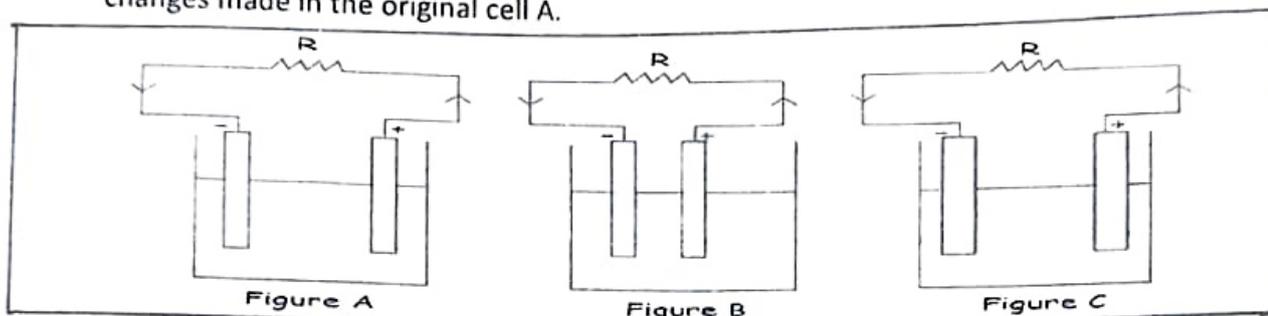
Column I	Column II
1. Torque (turning effect)	a. Shortest distance from pivot to line of action
2. SI unit of torque	b. Product of force and perpendicular arm
3. Clockwise moment	c. Rotation in the direction of clock hands
4. Perpendicular distance	d. Newton-metre (N m)

- (ii) 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
- (iii) In fission of one uranium-235 nucleus, the loss in mass is 0.2 a.m.u. Calculate the energy released. [2]
- (iv) A piece of ice of mass 40 g is dropped into 200 g of water at 50°C. Calculate the final temperature of water after all the ice has melted. (specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ K}^{-1}$, specific latent heat of fusion of ice $336 \times 10^3 \text{ J kg}^{-1}$) [2]
- (v) How are β -rays emitted from a nucleus while it does not contain electrons ? [2]
- (vi) 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.
- (vii) An object is placed in front of a lens between its optical centre and the focus and forms a virtual, erect and diminished image. [3]
- (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.

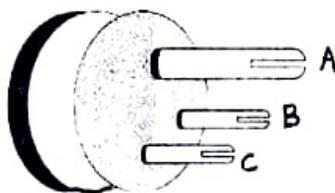
SECTION B
[ATTEMPT ANY 4 QUESTIONS]

Question 4

- (i) Figure A shows electric cell and figures B and C shows the some changes made in the original cell A. [3]



- (a) Which factor will be **affected** by the changes made in a cell?
 (b) How the factor stated by you in (a) above affected due to the changes made in the pictures B and C respectively.
- (ii) Explain the following: [3]
 (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?
- (iii) The diagram in figure shows a three pin plug. Label the three pins. [4]



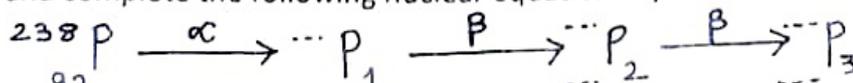
- (a) Why is top pin thicker and longer than the other two?
 (b) Why are the pins splitted at the ends?

Question 5

- (i) A molten metal of mass 150 g is kept at it's melting point 800°C . When it is allowed to freeze at the same temperature, it gives out 75,000 J of heat energy. [3]
 (a) What is the specific latent heat of the metal?
 (b) If the specific heat capacity of metal is $200\text{ J kg}^{-1}\text{ K}^{-1}$, how much additional heat energy will the metal give out in cooling to -50°C ?

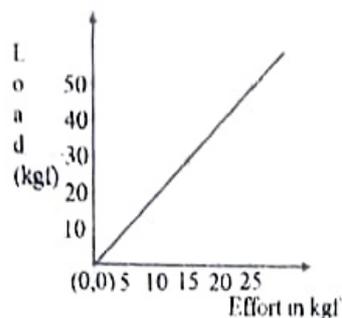
- (ii) (a) Give one difference between a chemical change and a nuclear change. [3]

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



The graph shows load against effort for a lever with load and effort on the same side of the fulcrum

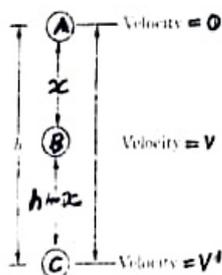
[4]



- (1) Which feature of the load and effort graph must be calculated to determine mechanical advantage?
 - (2) Which class does this lever belong to?
- (b) A 50 kg mass is being lifted by using a 1 metre long lever. If the length of the lever is reduced by 20%, how much more or less force is to be applied to achieve the same torque?

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 total height covered by freely falling body?

(ii) Figure 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.

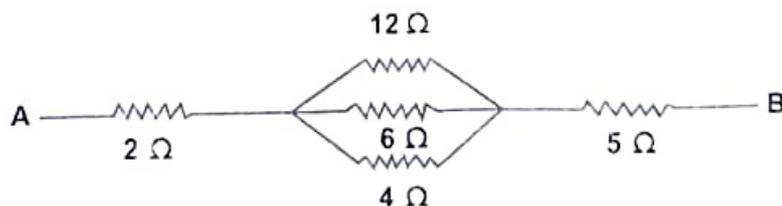
- (b) If the load is raised by 1m, through what distance will effort move?
- (iii) A vibrating tuning fork is placed over the mouth of a burette filled with water. The tap is opened and the water level gradually falls. It is observed that sound becomes the loudest for a particular length of the air column. [4]
- (a) What is the name of the phenomenon taking place when this happens?
- (b) Why does the sound become the loudest?
- (c) What is the name of the phenomenon taking place when sound is produced for another length of air column and is not the loudest?
- (d) If the water level in the burette falls further, is it possible that will you notice the same observation again?

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 an echo from the cliff after 8 vibrations of the pendulum. If the velocity of sound in air is 340 ms^{-1} , find the distance between the cliff and the observer. [3]
- (ii) A wave has a wavelength 10^{-3} nm . [3]
- (a) Name the wave.
- (b) State its one property different from other electromagnetic waves.
- (c) State its one use.
- (iii) Rohit playing a flute and Anita playing a piano emit sounds of same pitch and loudness. [4]
- (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 $AF : AP$ (where, $AF =$ amplitude of sound wave from flute, $AP =$ amplitude of sound wave from piano)
- (c) Define pitch of a sound.

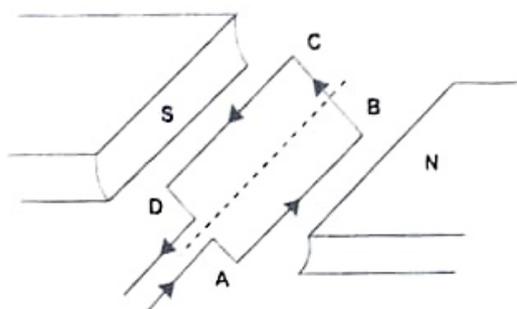
Question 8

- (i) Calculate the effective resistance between the points A and B in the network shown below in figure. [3]



- (ii) How will you connect a bulb and a socket in a room to the mains? Draw a labelled diagram in support of your answer. [3]

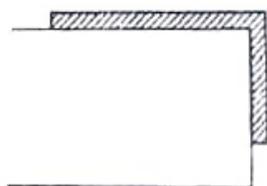
(iii) [4]



- (a) In which direction will the coil begin to rotate when current is passed through the coil in direction ABCD by connecting a battery between the ends A and D of the coil?
- (b) Why is a commutator necessary for the continuous rotation of coil?
- (c) Complete the diagram with commutator, etc. for the flow of current in the coil.

Question9

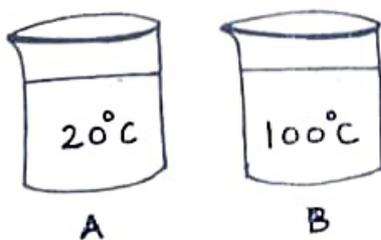
- (i) The temperature of 600 g of cold water rose by 15°C when 300 g of hot water at 50°C was added to it. What was the initial temperature of cold water ?
Given : specific heat capacity of water is 4.2 J/g °C. [3]
- (ii) Why is a very high temperature required for the process of nuclear fusion? State the approximate temperature required. [3]
- (iii) (a) A uniform chain of length 30 m has a mass of 0.3 kg. Two third part of the chain is on a frictionless table and one third part is vertically suspended as shown in the figure. [2]



Then calculate:

- (1) the work done to bring the C.G of the present hanging part of the chain, just on the table.
 - (2) the amount of force applied on the chain to pull the chain just completely on the table.
- Take $g = 10 \text{ m s}^{-2}$

(a) The diagram below shows two beakers A and B containing same liquid, are being heated to two different temperatures. The ray of light is entered from air to the liquid in both the beakers, then in which beaker the light ray bends more? Justify your answer. [2]





Green Mary School (ICSE)

V. P. Road, Mumbai 400 004

Preliminary Examination 2025-26

PHYSICS



MM:80

WT: 2 hr.

Form: 10

Date:12/01/2026

Section A (40 marks)

Attempt all questions

Question 1

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

[15]

- i. In a beam balance, when the beam is balanced in a horizontal position it is in :
 - a. static equilibrium
 - b. dynamic equilibrium
 - c. neither in dynamic equilibrium nor in static equilibrium
 - d. unstable equilibrium

- ii. If work is done on an object, then :
 - a. it loses energy
 - b. it gains energy
 - c. its energy remains constant
 - d. none of the above

- iii. A light body A and a heavy body B have the same momentum.
Choose a correct statement from the given options.
 - a. Kinetic energy of body A and body B will be the same.
 - b. Kinetic energy of body A is greater than kinetic energy of body B.
 - c. Kinetic energy of body B is greater than kinetic energy of body A.
 - d. Unless we know the velocity, we cannot find which body has greater kinetic energy.

- iv. When a body falls freely towards the earth, then its total energy:
 - a. increases.
 - b. decreases.
 - c. remains constant.
 - d. first increases and then decreases.

v **Assertion (A):** When a ray of light is refracted through a rectangular glass slab, there is no dispersion of light.

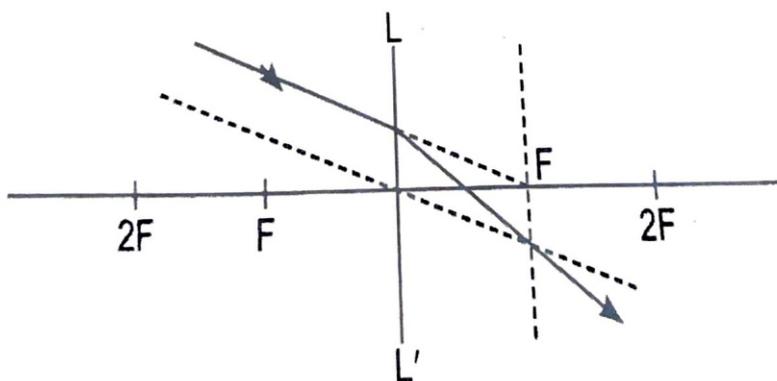
Reason (R): Dispersion of light is the phenomenon of splitting of white light into its constituent colours.

- a. Both A and R are true
- b. Both A and R are false
- c. A is false but R is true.
- d. A is true but R is false.

vi The refractive index of a glass slab is $\frac{3}{2}$. When seen from above its thickness will appear as :

- a. $\frac{1}{3}$ times its real thickness
- b. $\frac{2}{3}$ times its real thickness
- c. $\frac{3}{2}$ times its real thickness
- d. none of these

vii Observe the diagram which shows the path of an incident ray through an optical plane LL' of a lens. The focal length of the lens is 20 cm.

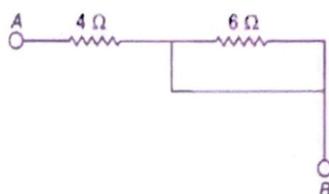


If an object is placed at a distance of 30 cm in front of this lens, then:

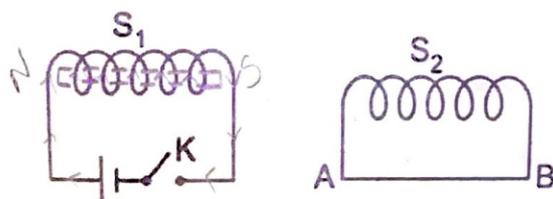
- a. the image will be virtual and diminished.
- b. the image will be diminished and inverted.
- c. the image will be virtual and magnified.
- d. the image will be real and magnified.

Select the option in which listed electromagnetic waves are in order of increasing frequency.

- visible light, X-rays, y-rays
 - visible light, y-rays, X-rays
 - X-rays, y-rays, visible light
 - y-rays, X-rays, visible light
- ix Amplitude and frequency of the natural vibration is found to be constant only in :
- solids
 - liquids
 - gases
 - vacuum
- x. The effective resistance between A and B is :



- 4 Ω
 - 6 Ω
 - 10 Ω
 - 2.4 Ω
- xi. The graph plotted for potential difference (V) against current (I) for ohmic resistors is :
- A curve passing through the origin.
 - A straight line not passing through origin.
 - A straight line passing through the origin.
 - A circle centred at the origin.
- xii. In the figure given below, the key K is depressed to close the circuit of the solenoid S_1 . Choose the correct statement from the following.

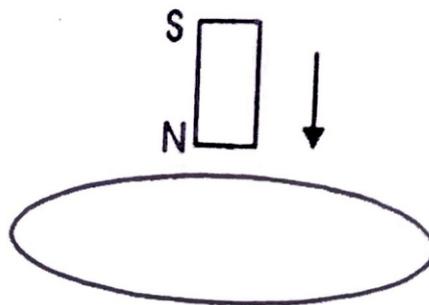


- No current flows along AB
- A momentary current flows in the solenoid S_2 circuit from B to A
- A momentary current flows in the solenoid S_2 circuit from A to B
- The coil S_2 is attracted to the coil S_1

- xiii. The effect of current on which the use of a fuse is based on :
 a. chemical effect b. magnetic effect c. heating effect d. induction effect.
- xiv. Bulb 'P' marked as 100 W, 220 V and bulb 'Q' marked as 60 W, 110 V. The ratio of the resistance of 'P' and 'Q' is
 a. 12:7 b. 5:7 c. 5:12 d. 12:5
- xv. Two atoms are said to be isobars if:
 a. They have same atomic number but different mass number
 b. They have same number of protons but different number of neutrons
 c. They have same number of neutrons but different number of protons and electrons
 d. Sum of number of protons and neutrons are same but number of protons is different

Question 2

- i. a. The type of the energy possessed by the bob of a simple pendulum when it is at the extreme position is _____ (potential energy / kinetic energy) [6]
 b. Scissor is a _____ multiplier. (force / speed)
 c. Clockwise moment produced by a force about a fulcrum is considered to be _____ (positive / negative)
 d. The direction of induced current in the following figure is _____ direction. (anti clockwise / clockwise)



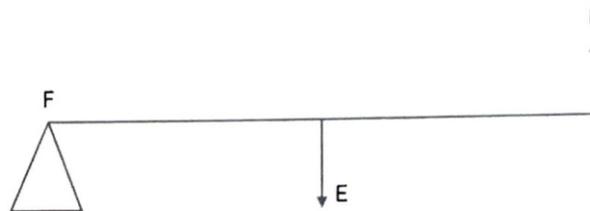
- e. The melting point of ice _____ with an increase in pressure. (increases/ decreases)
 f. Fission of Uranium 238 is possible by _____ (fast neutrons / slow neutrons)

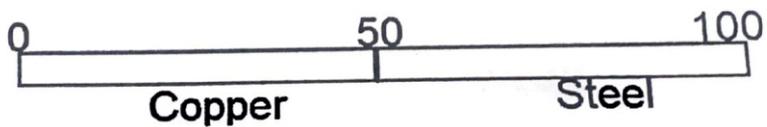
You have just paid the electricity bill for your house. [2]

- a. What was it that your family consumed for which you had to pay?
 - b. In what unit was it measured?
- iii. a. State the safe limit of sound level in terms of decibel for human hearing. [2]
- b. Name the characteristic of sound in relation to its waveform

Question 3

- (i) a. Identify the class of the lever shown in the diagram below. [2]
- b. How is it possible to increase the M.A. of the above lever without increasing its length?

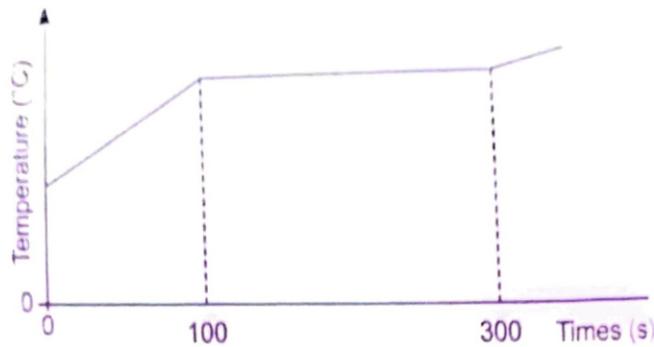


- (ii) [2]
- 

A meter rod made of copper and steel as shown in the diagram. Weights of copper and steel are 10 N and 8 N respectively.

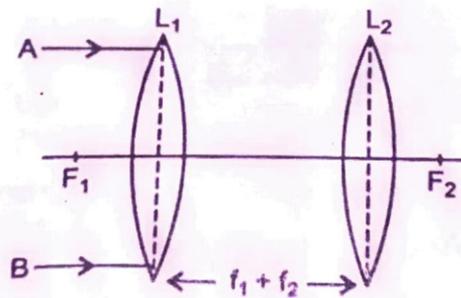
- a. On which part does the centre of gravity lie (0 to 50 or 50 to 100)
 - b. Justify your answer
- (iii) An observer stands at a distance of 1050 m from a cliff and fires a gun. After what time-gap will he hear the echo if sound travels at a speed of 350 m/s in air? [2]
- (iv) On oxidizing a radioactive substance, what changes would you expect to take place in the nature of radioactivity and why? [2]
- (v) An electrical gadget can give an electric shock to its user under certain circumstances. [2]
Mention any two of these circumstances.

i) A mass of 0.20 kg of a substance is initially solid. It is heated at a steady rate of 500 J/s [2]
The graph shows how the temperature of the substance changes with time. Calculate the specific latent heat of fusion of the substance.



(vii) In the following diagram L_1 and L_2 are the two convex lenses placed at separation equal to the sum of the focal lengths of the two lenses. A and B are the two rays of light incident on the lens L_1 . Complete the path of rays till they emerge out of the lens L_2 . [3]

What principles have you used in completing the diagram?



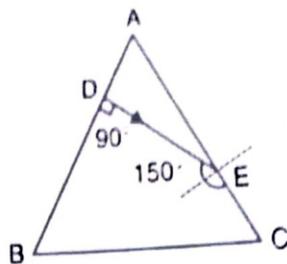
Section B (40 marks)

Attempt four questions from this section

Question 4

- 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.

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.

- Draw the path of the ray incident on the side AB. (which travels along DE.)
- Show the path along which the ray DE travels from the point E onwards and through the side BC.

iii. Jatin puts a pencil into a glass container having water and is surprised to see the pencil in a different state.

[4]

- What change is observed in the appearance of the pencil?
- Name the phenomenon responsible for the change.
- Draw a ray diagram showing how the eye sees the pencil.

• Question 5

- A particular type of high energy invisible electromagnetic rays help us to study the structure of crystals. Name these rays and give another important use of these rays.
 - How does the speed of light in glass change on increasing the wavelength of light?

[3]

- How is the focal length of a convex lens of glass affected if
 - Lens is placed in water
 - Lens is placed in a liquid of a larger refractive index than glass
 - Lens becomes thicker at middle

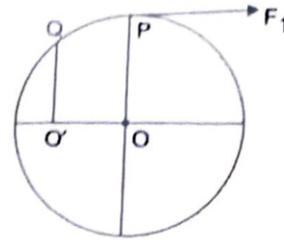
[3]

- An object is placed at a distance 24 cm in front of a convex lens of a focal length 8 cm.
 - What is the nature of the image so formed?
 - Calculate the distance of the image from the lens.
 - Calculate the magnification of the image.

[4]

- (i) In the given diagram wheel shown has a fixed axle passing through O. The wheel is kept stationary under the action of two forces F_1 and F_2 such that, a horizontal force F_1 at P and a vertical force F_2 at Q. [3]

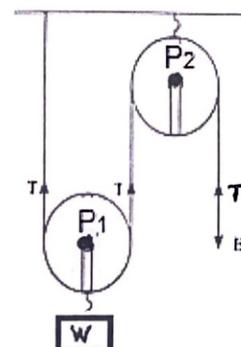
Given: $PO = 2.5$ cm, $QO' = 1.5$ cm and $OO' = 2.0$ cm.



- Show the direction of F_2 in the diagram.
 - Which is the greater force?
 - Find the ratio between the forces.
- (ii) A stone of mass 'm' is rotated in a circular path with a uniform speed by tying a strong string with the help of your hand. Answer the following questions: [3]
- Is the stone moving with a uniform or variable speed?
 - Is the stone moving with a uniform acceleration? In which direction does the acceleration act?
 - What kind of force acts on the hand and state its direction?
- (iii) An elephant (mass= 5 tons) takes tourists to a hill resort 0.4 km above the ground level. The elephant carries a 2000 kg load of tourists and luggage and takes 60 minutes. [4]
- Calculate:
- the work done by an elephant
 - potential energy gained by tourist and luggage
 - efficiency of the operation
 - power of the elephant in-horse power.

Question 7

- (i) The given figure shows the combination of a movable pulley P_1 with a fixed pulley P_2 used for lifting up a load w . [3]
- State the function of the fixed pulley P_2 .
 - If the free end of the string moves through a distance x , find the distance by which the load w is raised.
 - Calculate the force to be applied to just raise the load of 20 kg f, neglecting the weight of the pulley P_1 and friction.



- (ii) a. Name the type of waves which are used for sound ranging. [3]
b. Why are these waves mentioned in (a) above, not audible to us?
c. Give one use of sound ranging.
- (iii) The rear-view mirror of motorbike starts vibrating violently at some particular speed of [4]
motorbike
a. Why does this happen?
b. What is the name of the phenomenon taking place?
c. What could be done to stop the violent vibrations?
d. Define the phenomenon named by you in a part (b) above

Question 8

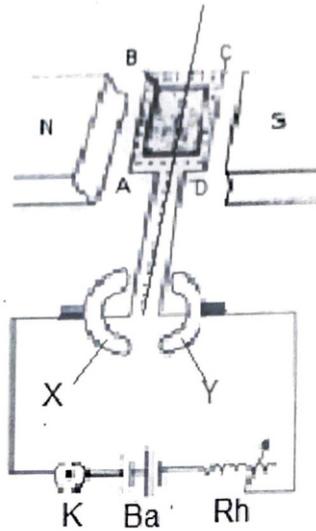
- (i) A high resistance voltmeter is connected to a dry cell battery. The voltmeter reads 12 V. [3]
When a 24Ω resistance is connected across the battery-terminals, the voltmeter reads 7.2 V. Calculate :
a. current in the circuit
b. the internal resistance of the battery.
- (ii) a. Draw a labelled diagram of the device you would use to transform 200 V A.C. to [3]
15 V A.C.
b. What is the name of this device?
- (iii) A refrigerator converts 100 g of water at 20°C into ice at -10°C in one hour. [4]
Determine the quantity of heat extracted per second.

[Given: specific latent heat of ice = 336 J/g and specific heat capacity of ice = $2.1\text{ J/g }^\circ\text{C}$,
specific heat capacity of water = $4.2\text{ J/g }^\circ\text{C}$.]

Question 9

- (i) A straight wire lying in a horizontal plane carries a current from north to south. [2]
a. What will be the direction of the magnetic field at a point just underneath it?
b. Name the law used to arrive at the answer in part (a).

- (ii) a. Identify the device given in the diagram [4]
 b. State the principle on which it works
 c. State the energy change that takes place in the device stated by you in (a)
 d. State the function of the parts X and Y.



- (iii) a. State one difference between electron and beta particle. [4]
 b. A nucleus Pu emits an α -particle and changes to U which emits a β -particle and then a γ -radiation and changes into ${}^{235}_{93}\text{Np}$
 Write the above nuclear changes in the form of an equation giving the atomic number and mass number of each nucleus.



SRI SRI RAVISHANKAR VIDYA MANDIR, MULUND
SECOND PRELIMINARY EXAMINATION (2025-26)
SUBJECT: PHYSICS

CLASS: X
DATE: 05/01/2026

MARKS: 80
TIME: 2 Hours

*Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 15 minutes.
This time is to be spent in reading the question paper.
The time given at the head of this Paper is the time allowed for writing the answers.*

*This Paper is divided into two Sections.
Attempt all questions from Section A and any four questions from Section B.
The intended marks for questions or parts of questions are given in brackets [].
This Question Paper consists of 6 printed pages*

SECTION A

(Attempt all questions from this Section.)

Question 1

Choose the correct answer to the questions from the given options. [15]

(Do not copy the question, Write the correct answer only.)

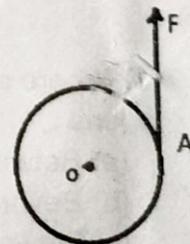
(i) Assertion(A): Ultraviolet radiations are scattered more as compared to the microwave radiations.

Reason(R): Wavelength of ultraviolet radiation is more than the wavelength of microwave radiation.

- (a) Both assertion and reason are true.
- (b) Both assertion and reason are false.
- (c) Assertion is false but reason is true.
- (d) Assertion is true but reason is false.

(ii) The diagram alongside shows a force $F = 5 \text{ N}$ acting at point A produces a moment of force of 6 Nm about point O. What is the diameter of the wheel?

- (a) 3.4 m
- (b) 2.4 m
- (c) 4.6 m
- (d) 1.0 m

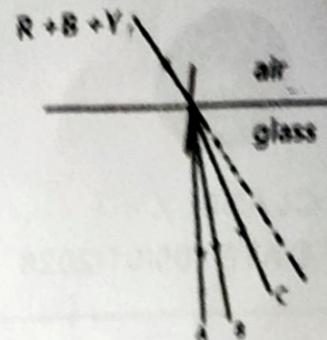


(iii) Two unequal resistances are connected in parallel by a student. Which of the following is true?

- (a) Current is same in both
- (b) Voltage drop is lower in lower resistance
- (c) Current is larger in higher resistance
- (d) Voltage is same across both

(iv) If red, blue and yellow colours are allowed to enter the same glass block at the same angle of incidence, then identify the correct order of the colours.

- (a) A – red , B – blue , C- yellow
- (b) A – yellow , B – red , C- blue
- (c) A – blue , B – yellow , C- red
- (d) A – blue , B – red , C- yellow



(v) Which of the following statements is not true for an actual machine?

- (a) M.A. < V.R. (b) Efficiency < 1 (c) M.A. > V.R. (d) $W_{out} < W_{in}$

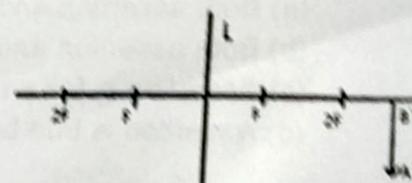
(vi) An energy of 4 kJ causes a displacement of 64 m in 6.5 s . Calculate force and power.

- (a) 62.5 N and 1600 W
- (b) 625 N and 1600 W
- (c) 6.25 N and 150 W
- (d) 62.5 N and 160 W

(vii) A musician plays two notes on a guitar. Note X has a frequency of 256 Hz and note Y has a frequency of 512 Hz. Which of the following statements is correct?

- (a) Note X is louder than note Y.
- (b) Note Y has a higher pitch than note X
- (c) Note X has a higher pitch than note Y
- (d) Note Y is louder than note X.

(viii) The diagram below shows an image formed at a distance 36 cm from the lens L of focal length 12 cm . Use this information to answer the questions that follow.



(1) Where should the object be placed on the left hand side of the lens L?

- (a) Between 12 cm to 30 cm from the lens
- (b) Beyond 24 cm from the lens
- (c) Between 12 cm to 24 cm from the lens
- (d) Within 12 cm from the lens

(2) Calculate the power of a lens.

- (a) - 8.33 D (b) +9.4 D (c) + 8.33 D (d) - 8.4 D

(ix) State the reason why a paper would burn when placed at a particular distance from a spherical lens.

- (a) Due to converging power of lens
- (b) Paper is placed at the focal plane of lens
- (c) Due to reflection
- (d) Both (a) and (b)



(x) Name the quantity which is measured in eV.

- (a) Force
- (b) Momentum
- (c) Power
- (d) Energy

(xi) What are the factors that affect the critical angle?

- (i) Colour of light
- (ii) Angle of incidence
- (iii) Temperature
- (iv) Refractive index

- (a) Only (i)
- (c) Both (ii) and (iv)

- (b) Both (i) and (iii)
- (d) Only (iii)

(xii) Which one of the following statements is correct?

- (a) Live wire has zero potential
- (b) Potential of live and earth wire is always the same.
- (c) Fuse is connected in a neutral wire
- (d) Earth wire is used to prevent electric shocks.

(xiii) An electric bulb is marked 220 V , 10 W . What is the resistance of the filament?

- (a) 484 Ω
- (b) 4840 Ω
- (c) 4.84 Ω
- (d) 48.4 Ω

(xiv) One gram of ice at 0° C absorbs 336 joule of heat. Which of the following properties does not change? (Given specific latent heat of ice = 336J g⁻¹).

- (a) Phase
- (b) Mass
- (c) Specific heat
- (d) Density

Question 2

(i) In a hospital, doctor uses a transparent gel with refractive index 1.4 for ultrasound scanning. [2]

- (a) Compare the speed of light in the gel with its speed in air.
- (b) If a gel with refractive index 2 is used instead, how will the speed change?

(ii) A teacher while explaining current electricity to class 10 stated, once a current starts flowing through certain substances , it continues to flow even when no potential difference is applied. [2]

- (a) What are these substances commonly called?
- (b) Give any two examples of these substances?

(iii) A girl of mass m climbs up the stairs of vertical height h.

- (a) What is the work done by the girl against the force of gravity? [2]
- (b) What would have been the work done if she uses a lift in climbing the same vertical height?

- (iv) Two bodies A and B have masses of 100 g and 500 g respectively. If both the bodies possess the same momentum, Which body will have greater kinetic energy and why? [2]
- (v) A substance X has specific heat capacity higher than the substance Y. Which of it is useful as: [2]
- (a) Coolant in car radiators
- (b) Calorimeter
- (v) A battery of 6 V, having a negligible internal resistance is connected to four resistors of magnitude 5Ω , 4Ω , 3Ω and $X\Omega$ in series. If the current flowing in the circuit is 0.4 A. Calculate the unknown resistance. [2]
- (vi) In a dam, water falls at a rate of 1000 kg s^{-1} from a height of 100 m. Calculate the initial potential energy of the water. Assuming that 60% of the energy of the falling water is converted to electrical energy, calculate the power generated. ($g=9.8\text{ ms}^{-2}$). [3]

Question 3

- (i) In a hospital, an ultrasonic scanner is used to locate tumours in a tissue. What is the wavelength of sound in a tissue in which the speed of sound is 1.7 kms^{-1} ? The operating frequency of the scanner is 4.2 MHz. [2]
- (ii) In the figure given below why are the soldiers advised not to march while crossing the suspension bridge? [2]



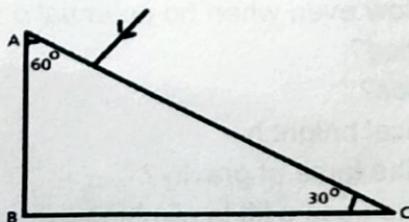
- (iii) To raise the temperature of a substance by 15°C , the amount of heat energy required is 3500J. Calculate the heat capacity of the substance. [2]
- (iv) Is it feasible to replace the heating element of a toaster, typically made of nichrome with copper. Justify it. [2]
- (v) A swimming pool of water is 3 m deep. What would its depth appear to a person looking from above? (refractive index of water as $4/3$) [2]

SECTION -B

(Attempt *any four* questions from this section)

Question 4

- (i) The critical angle of the material of the given prism below is 42° . Copy and complete the path of the incident ray till the light ray emerges out. [3]



- (ii) The lengths of the two copper wires A and B are in the ratio 1:1 and wire A is thicker than wire B. [4]
- Which wire is expected to offer more specific resistance?
 - Which wire will conduct better?
 - If wire A has an initial resistance of 20Ω . What will be the change in resistance, if it is stretched uniformly and area is decreased to $1/4^{\text{th}}$ of its original area? [3]
- (iii) (a) State two ways by which the speed of rotation of an electric motor can be increased, [3]
- State one similarity between A.C. generator and D.C. motor.

Question 5

- (i) Complete the following by choosing the correct answers from the bracket: [3]
- Nut cracker is an example of _____ (class I/class II/class III) lever.
 - If the coil is viewed from one end, and the current flows in clockwise direction, then the end is a _____ pole. (north/south).
 - The unit of loudness is _____. (phon/decibel/tesla)
- (ii) An object 4 cm high is placed 20 cm in front of a convex lens of focal length 10 cm. Calculate: [4]
- Position of the image
 - Size of the image
 - Nature of the image
- (iii) A uniform metre scale is balanced at a 40 cm mark when weights of 20 gf and 5 gf are suspended at 5 cm and 75 cm mark respectively. Calculate the weight of metre scale. [3]

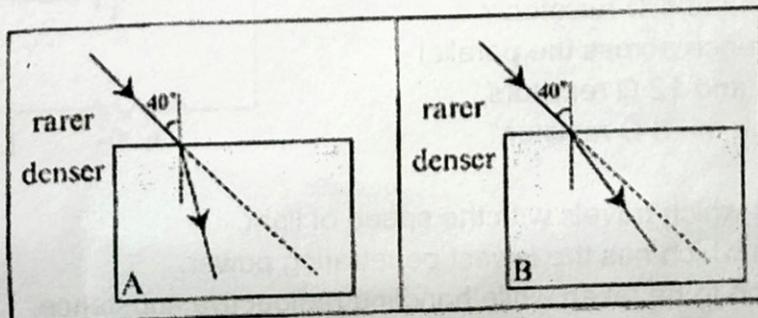
Question 6

- (i) Out of three fuses available with current rating 5A, 10 A and 13 A, which one should be used in a circuit connecting a kettle which is rated 2kW, 200 V? [3]
- (ii)(a) Name one safety devices which is connected to the live wire of a household electric circuit. [3]
- State two characteristics of the material of fuse wire which makes it suitable for use.
- (iii) A solid of mass 80 g and at 75°C is dropped into 150 g of water at 15°C , which is contained in a copper calorimeter of mass 50 g. The final temperature attained by mixture is 25°C . If the specific heat capacity of copper = $400 \text{ J kg}^{-1} \text{K}^{-1}$, specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{K}^{-1}$. Calculate the specific heat capacity of the solid in S.I. system. [4]

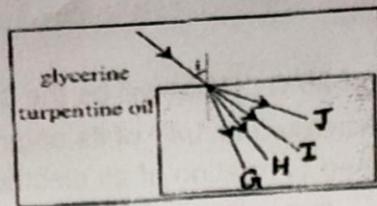
Question 7

(i) Choose the correct option in each case: [3]

- (a) In the diagram given below, one of the denser media has a temperature of 30°C and the other has a temperature of 50°C . Which among the two denser media (A or B) has the temperature 50°C . Explain the reason. (1 point)



- (b) A ray of light enters turpentine oil ($\mu = 1.47$) from glycerine ($\mu = 1.47$), which ray (G, H, I, J) correctly represents the ray when it passes through turpentine oil.



(ii)(a) The clouds are seen white. Explain [4]

(b) Ice cream appears colder to the mouth than water at 0°C . Explain.

(iii) A boy has three pulleys and a single string. He wishes to arrange them so that the system works as a force multiplier for lifting a heavy load. [3]

(a) How should he set up the pulleys? Illustrate the arrangement with a neat labelled diagram.

(b) After using this system, he observes that the output is lower than expected. What modifications should he make to improve the efficiency of the pulley system?

Question 8

(i) A man stands between two cliffs 'P' and 'Q' such that he is at a distance of 46 m from the nearer cliff 'P'. He fires a gun and hears first echo after 0.3 s and second echo after 0.3 s. Calculate: [4]

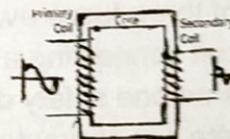
(a) Speed of sound

(b) Distance between cliff 'Q' and man.

(ii)(a) State two conditions for TIR to take place. [3]

(b) Define scattering.

(iii) The diagram given below shows a transformer: [3]



(a) Name the type of transformer.

(b) A transformer cannot work when connected to D.C. source.

Justify.

Question 9

(i) Vimala has gone for fishing with her father. While sitting near the river, they observe that a fish appears to be nearer to the surface of water than its actual depth. The father tries to aim at the fish using a fishing spear, but every time he misses the fish. [3]

(a) Name the phenomenon involved in this situation.

(b) Why should the father have to throw the spear deeper into the water to catch the fish?

(c) Give one more example showing the effect of the phenomenon involved in the above situation.

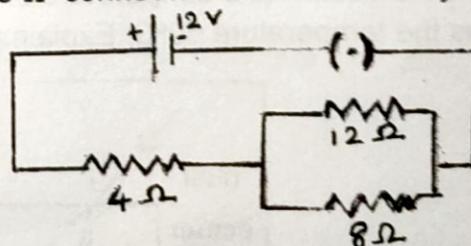
(ii) The diagram below shows three resistors $4\ \Omega$, $12\ \Omega$ and $8\ \Omega$ connected to a 12 V battery. [4]

Calculate:

(a) The current through the $4\ \Omega$ resistor.

(b) The potential difference across the parallel combination of $8\ \Omega$ and $12\ \Omega$ resistors.

(c) The current through the $8\ \Omega$ resistor.



(iii) (a) Name the radiation which travels with the speed of light. [3]

(b) Name the radiation which has the lowest penetrating power.

(c) State one precaution to be taken while handling radioactive substance.

7

RYAN GROUP OF SCHOOLS
ACADEMIC YEAR 2025-26
ICSE, PRE BOARD I EXAMINATION



STD: X
SUB: PHYSICS

MARKS:
DURATION:

80

Section A is compulsory.

All questions from Part I are to be attempted.

A total of four questions are to be attempted from Section B.

The intended marks for questions or parts of questions are given in brackets [].

SECTION A [40 MARKS]

(Attempt all questions from this section)

1. Choose one correct answer to the questions given from the given options. [15]

1. A current-carrying circular loop is held in a uniform magnetic field such that its plane is parallel to the field lines. Which of the following is true?

- a. The loop experiences a maximum net force but zero net torque.
- b. The loop experiences a minimum net force but maximum net torque.
- c. The loop experiences a zero net force and minimum net torque.
- d. The loop experiences a zero net force but maximum net torque.

2. The specific latent heat of vaporization of steam is 2260 J/g. If 10 g of steam at 100°C causes a temperature rise of 2°C in 100 g of water at 30°C, the specific heat capacity of water is approximately:

- a. 4.2 J/g°C
- b. 3.5 J/g°C
- c. 2.8 J/g°C
- d. Insufficient data.

3. A body is in rotational equilibrium. This implies that:

- a. The net force acting on the body is zero.
- b. The net torque about any pivot is zero.
- c. The body must be at rest.
- d. The body is translating with a constant velocity.

4. In a convex lens, if a real, inverted image is formed, and the image size is n times the object size (where $n > 1$), the object must be placed:

- a. At $2F$
- b. Between F and $2F$
- c. Beyond $2F$
- d. At F

5. Maximum scattering of white light by atmospheric dust particles is for:

- a. Red colour
- b. Yellow colour
- c. Green colour
- d. Blue colour

6. The device that converts low voltage alternating current (AC) to high voltage AC is:

- a. DC Motor
- b. AC Generator
- c. Step-up Transformer
- d. Step-down Transformer

7. A loudspeaker converts electrical energy into sound energy. Its working principle is similar to that of a:

- a. Microphone (transducer)
- b. AC Generator (induction)
- c. DC Motor (force on current carrying conductor)
- d. Transformer (mutual induction)

8. Which factor is responsible for the increase in the speed of sound when air becomes humid?

- a. Decrease in temperature of air.
- b. Increase in the density of air.
- c. Decrease in the density of the medium.
- d. Increase in the frequency of sound waves.

9. A wire of resistance R is cut into three equal pieces, which are then connected in parallel. The new equivalent resistance will be:

- a. $\frac{R}{3}$
- b. $3R$
- c. $\frac{R}{9}$
- d. $9R$

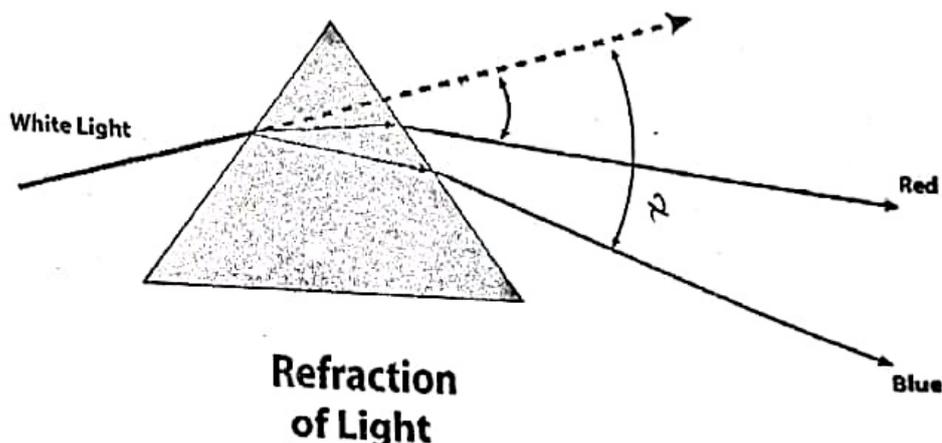
10. If the main fuse is rated at 10 A and the supply voltage is 220 V , the maximum power that can be safely drawn in the house is:

- a. 22 W
- b. 220 W
- c. 2200 W
- d. 22 kW

11. Which of the following is an example of an involuntary simple machine?

- a. Crowbar
- b. Wheelbarrow
- c. Nutcracker
- d. Fishing rod

12. The diagram shows the path of a light ray passing through a glass prism. The angle $\angle X$ represents the:



- a. Angle of incidence
- b. Angle of Emergence
- c. Angle of Prism
- d. Angle of deviation

13. Which of the following pairs of radiation is ionizing in nature and is deflected by a magnetic field?

- a. α -rays and X-rays
- b. γ -rays and β -rays
- c. α -rays and β -rays
- d. γ -rays and X-rays

14. The momentum of a body is doubled. Its kinetic energy will be:

- a. Doubled
- b. Halved
- c. four times
- d. Unchanged

15. If the potential difference across a resistor is suddenly doubled, the heat produced in it per unit time will:

- a. Double
- b. Halve

- c. Quadruple (four times)
- d. Become one-fourth

Q2. Answer the following questions.

[10]

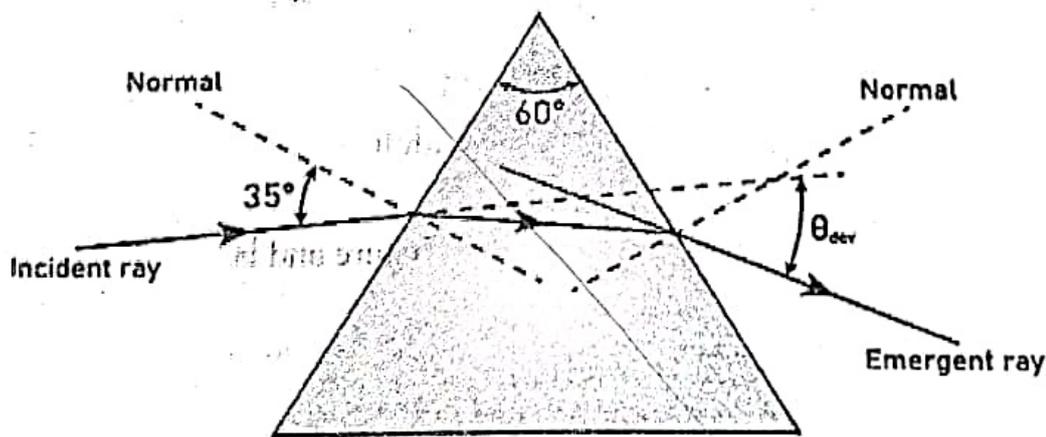
1. A boy shouts near a cliff and hears the echo after t_1 seconds. If he moves 10 m closer to the cliff, he hears the echo after t_2 seconds. If $t_1 - t_2 = 0.5$ s, calculate the speed of sound in air.

2. Define Moment of Force and state the two practical ways in which the effect of a force can be increased by a driver while turning a steering wheel.

3. Differentiate between an ideal machine and a practical machine based on their efficiency and work output.

4. Why is the use of a miniature circuit breaker (MCB) preferred over a traditional fuse wire in modern household circuits? State two reasons.

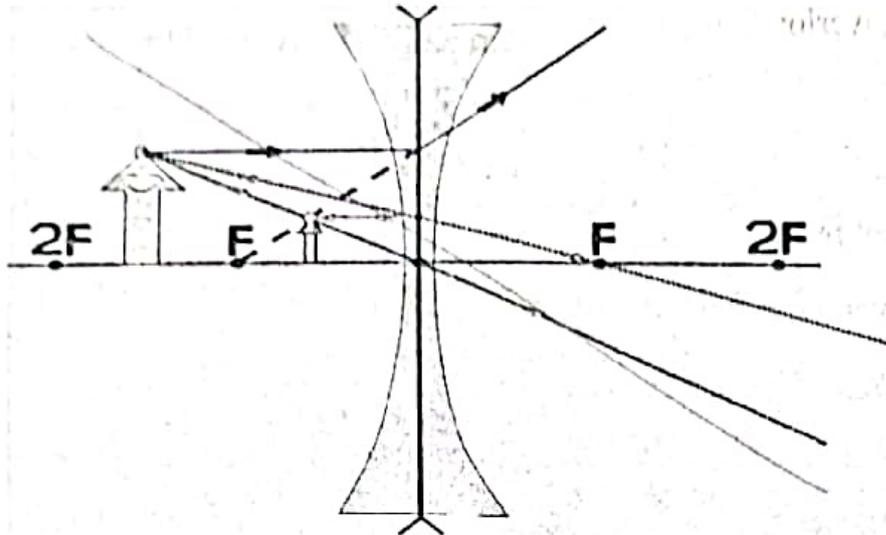
5. A ray of light is incident normally on one face of an equilateral glass prism. Draw a ray diagram showing its path through the prism and the emergent ray.



Q3. Answer the following questions.

1. How much energy is stored in a 100 W electric bulb when it is switched on for 10 minutes? Give your answer in the commercial unit of electrical energy. [2]

2. An object is placed in front of a ^{convex} concave lens. Draw a ray diagram to show the formation of the image when the object is ~~anywhere~~ on the principal axis. State the nature of the image. [2]



3. Name two electromagnetic radiations that have wavelengths (i) shorter than visible light, and (ii) longer than visible light. [2]
4. Why are the high-tension transmission wires for AC power usually made of aluminum or copper? Give two reasons based on their properties. [2]
5. State two safety precautions to be strictly followed while handling radioactive substances. [2]
6. Distinguish between the terms Critical Angle and Angle of Deviation with respect to light. [2]
7. What is the main function of the dynamo in a bicycle? State the principle on which it works. [3]

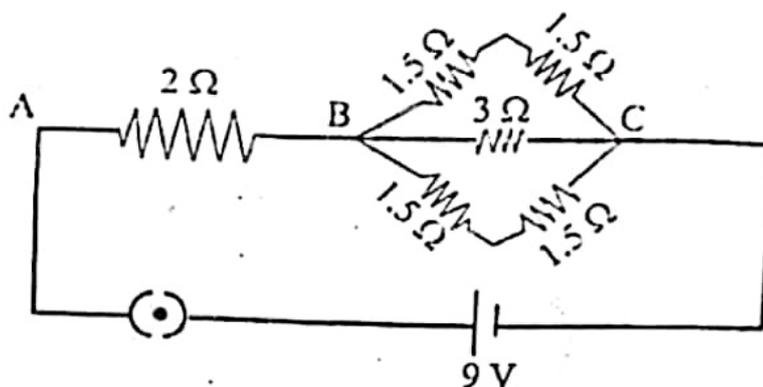
SECTION B [40 MARKS]

(Attempt any four questions from this section)

Q5. Answer the following questions.

- ✓ A student wants to design a device to connect a bulb rated 10 W, 22 V, to the mains 220 V, so that the bulb operates at its rated voltage. [4]
 - a. Name the device he uses.
 - b. State the principle involved in the working of this device.
 - c. When the bulb is connected to the output of the device, calculate:
 1. Current drawn
 2. Resistance of the bulb

2. Distinguish between overloading and short-circuiting in household wiring, and state the common protective device used for both. [3]
3. From the diagram given below (internal resistance = 0) [3]
- Calculate the total resistance in the circuit
 - Calculate the potential difference between A and B
 - Calculate potential difference between B and C.



- Q6. Answer the following questions.
- State the Principle of Calorimetry. Why is water used as an effective coolant in car radiators? [3]
 - Derive the relationship between kinetic energy (E_k) and linear momentum (p). If a body of mass m is moving with a velocity v , what must be its velocity to have twice the kinetic energy? [3]
 - 40 g of water at 60°C is mixed with 10 g of ice at 0°C . Calculate the final temperature of the mixture. (Specific latent heat of fusion of ice = 336 J/g ; Specific heat capacity of water = $4.2 \text{ J/g}^\circ\text{C}$). [4]

- Q7. Answer the following questions.
- Differentiate between Natural (Free) Vibrations and Forced Vibrations, giving one example of each. [3]
 - Explain why a high-pitch sound has less energy than a low-pitch sound of the same loudness. State the characteristics that enable us to distinguish between two sounds of the same loudness and pitch. [3]
 - You are doing an experiment on the refraction of light in your Physics laboratory. ABCD is a rectangular block. A ray of light is incident obliquely on the surface AB. [4]

- Draw the path of the ray of light through the glass block and also show how it emerges from the block. [The diagram should show the lateral displacement suffered by the ray.]
- Which two pairs of angles remain the same during the experiment?
- If the same experiment is performed first with red and then with blue light, which colour will suffer greater lateral displacement?

Q8. Answer the following questions.

1. What is the Centre of Gravity (C.G.) of a body? State two ways in which the C.G. of a body can be determined experimentally. [3]

2. Explain why the handle of a hand flour-grinder is situated near the rim. Which principle of equilibrium is this based on? [3]

3. A block and tackle system of 5 pulleys is used to lift a load of 1000 N. The efficiency of the system is 80%. [4]

a. Draw a labelled diagram showing the arrangement of the pulleys and the string.

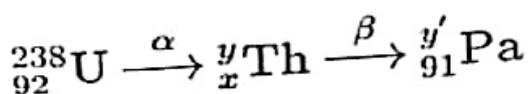
b. Calculate the effort required to lift the load.

Q9. Answer the following questions.

1. State two distinct differences between a temporary electromagnet and a permanent magnet. [3]

2. Explain the main advantage of alternating current (AC) over direct current (DC) for long-distance power transmission. [3]

3. In the following nuclear decay sequence, determine the value of x and y: [4]
State the law of conservation applied to solve this problem.



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