



ICSE 2026 EXAMINATION
SPECIMEN QUESTION PAPER
PHYSICS
(SCIENCE PAPER 1)

Maximum Marks: 80

Time allowed: Two hours

1. *Answers to this Paper must be written on the paper provided separately.*
 2. *You will not be allowed to write during first 15 minutes.*
 3. *This time is to be spent in reading the question paper.*
 4. ***The time given at the head of this Paper is the time allowed for writing the answers.***
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5. ***Section A is compulsory. Attempt any four questions from Section B.***
 6. *The intended marks for questions or parts of questions are given in brackets [].*

Instruction for the Supervising Examiner

Kindly read aloud the Instructions given above to all the candidates present in the Examination Hall.

NOTE:

The Specimen Question Paper in the subject provides a realistic format of the Board Examination Question Paper and should be used as a practice tool. The questions for the Board Examination can be set from any part of the syllabus. However, the format of the Board Examination Question Paper will remain the same as that of the Specimen Question Paper.

SECTION A (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) A moment of couple has a tendency to rotate the body in an **anticlockwise** direction. The moment of couple is taken as:

- (a) positive
- (b) negative
- (c) maximum
- (d) zero

[Recall]

- (ii) The kinetic energy of a given body depends on the:

- (a) position
- (b) centre of gravity
- (c) momentum
- (d) displacement

[Understanding]

- (iii) During power production in a coal-based thermoelectric power plant, the correct sequence of energy conversions taking place is:

- (a) heat \rightarrow mechanical \rightarrow chemical
- (b) heat \rightarrow mechanical \rightarrow electrical
- (c) chemical \rightarrow heat \rightarrow light
- (d) heat \rightarrow chemical \rightarrow electrical

[Recall]

- (iv) Anita used a single movable pulley to lift a bucket of water from a well. She lubricates the pulley.

Which of the following statements is true regarding the performance of the pulley used?

- (a) Mechanical Advantage decreases and efficiency increases.
- (b) Velocity Ratio increases and efficiency decreases.
- (c) Mechanical Advantage remains unchanged and efficiency increases.
- (d) Velocity Ratio remains unchanged and efficiency increases.

[Application]

- (v) Inside the prism, during the dispersion of white light, compared to blue, red light:

- (a) slows down less and refracts more.
- (b) slows down more and refracts less.
- (c) slows down more and refracts more.
- (d) slows down less and refracts less.

[Recall & Application]

- (vi) When objects are viewed through the rising heat of a campfire they appear to shimmer. The optical phenomenon responsible for this effect is:

- (a) refraction
- (b) reflection
- (c) scattering
- (d) total internal reflection

[Recall]

- (vii) A convex lens with a focal length of 12 cm has an object at a distance of 20 cm in front of the lens. A blurred image is obtained on the screen placed at a distance of 23 cm in front of the lens. In order to obtain a clear image, the screen has to be moved:

- (a) towards the lens.
- (b) away from the lens.
- (c) to a position very far from the lens.
- (d) either towards or away from the lens.

[Application]

(viii) **Assertion(A):** Soldiers avoid firing at a target in foggy weather conditions.

Reason(R): In foggy weather, light gets scattered by tiny water droplets, reducing visibility.

- (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).

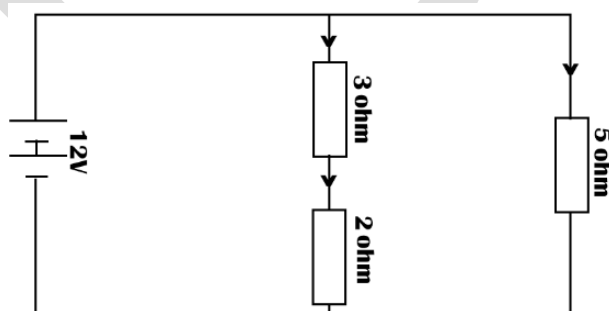
[Understanding
& Recall]

(ix) Two sound waves X and Y have the same amplitude and the same wave pattern but their frequencies are 60 Hz and 120 Hz respectively, then:

- (a) X will be shriller and Y will be grave.
- (b) X will be grave and Y will be shriller.
- (c) X will differ in quality than Y.
- (d) X is louder than Y.

[Understanding]

(x) 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 $3\ \Omega$

[Understanding
& Recall]

(xi) According to the old convention, the colour of the earth wire is:

- (a) black
- (b) green
- (c) yellow
- (d) red

[Recall]

(xii) For an ideal step up transformer:

- (a) $\frac{\text{Voltage}_{\text{primary}}}{\text{Voltage}_{\text{secondary}}} > 1$
- (b) $\frac{\text{Current}_{\text{primary}}}{\text{Current}_{\text{secondary}}} < 1$
- (c) $\frac{\text{number of turns}_{\text{primary}}}{\text{number of turns}_{\text{secondary}}} = 1$
- (d) $\frac{\text{power}_{\text{primary}}}{\text{power}_{\text{secondary}}} = 1$

[Application]

(xiii) Heat capacity of a body is the:

- (a) energy needed to melt a body without 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.

[Recall]

(xiv) The amount of heat energy required to melt a given mass of a substance at its melting point, without any rise in its temperature is called the:

- (a) specific heat capacity.
- (b) specific latent heat of fusion.
- (c) latent heat of fusion.
- (d) specific latent heat of freezing.

[Recall]

(xv) A nucleus of an atom consists of 146 neutrons and 95 protons. It decays after emitting an alpha particle. How many protons and neutrons are left in the nucleus after an alpha emission?

- (a) protons = 93, neutrons = 142
- (b) protons = 95, neutrons = 144
- (c) protons = 93, neutrons = 144
- (d) protons = 95, neutrons = 142

[Understanding]

Question 2

(i) Complete the following by choosing the correct answers from the bracket: [6]

- (a) A _____ [Class II/Class III] lever will always have M.A. > 1 .
- (b) A boy uses a GPS device to locate his missing friend in a crowded area; the system primarily uses _____ [ultraviolet waves / microwaves] to track the location.
- (c) Unit of specific heat capacity is _____. [$\text{kg}^2\text{m}^2\text{s}^{-2}\text{K}^{-1} / \text{m}^2\text{s}^{-2}\text{K}^{-1}$]
- (d) The threshold of hearing is _____. [0dB, 20Hz]
- (e) Two copper wires can have different resistivity if they have different _____. [lengths / temperatures]
- (f) The reaction responsible for the production of energy in the sun is _____. [Nuclear Fusion / Nuclear Fission]

[Recall & Understanding]

(ii) Match the movement of the body part in **Column A** to the class of lever in **Column B**. [2]

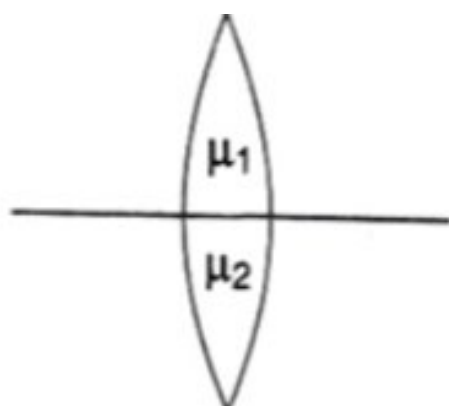
Movement of the body part Column A	Class of lever Column B
(a) Nodding head	• Class III
(b) Lifting body weight on your toes	• Class II
	• Class I

[Understanding]

- (iii) (a) Name the wave used for echo depth sounding. [2]
(b) Give one reason why the waves mentioned in (a) is used for the above purpose. [Recall]

Question 3

- (i) (a) Refer to the diagram given below. A lens is made of two materials of different refractive indices (μ_1 , μ_2) as shown. If the rays are coming from a distant object, then how many images will be seen? [2] [Understanding]



- (b) A glass lens always forms a virtual, erect, and diminished image of an object kept in front of it. Identify the lens. [Recall]
- (ii) The image given below displays kilowatt-hour meter readings recorded at two distinct points in time. [2]

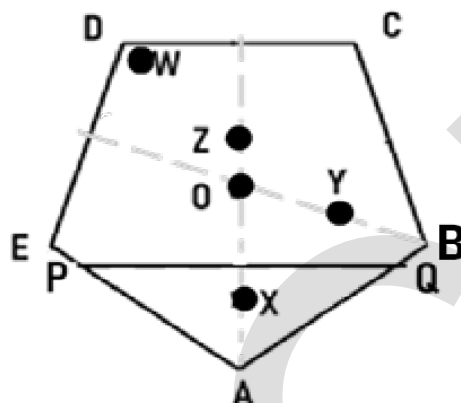


Assuming a **continuously running** 2000W air conditioner as the **sole** electrical device in use, calculate the time interval, **in hours**, between these two meter readings.

[Application]

- (iii) ABCDE is a regular pentagon with its centre of gravity at **O**. What will be the **most probable position** (*W, X, Y, Z or O*) of the new centre of gravity: [2]

- (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*)



[Understanding]

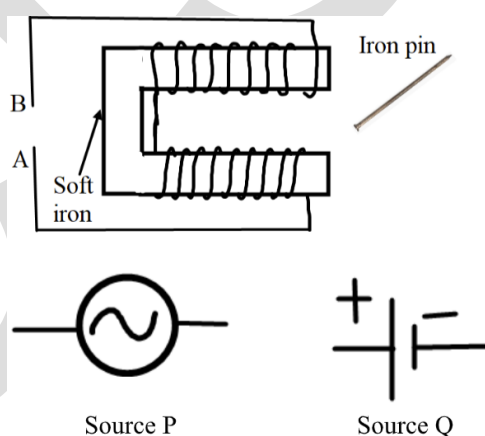
[Recall]

- (iv) A solid of mass 60 g at 100°C is placed in 150 g of water at 20°C. The final steady temperature is 25°C. Calculate the heat capacity of the solid. [2]

[sp. heat capacity of water = 4.2 J g⁻¹ K⁻¹]

[Understanding
& Evaluate]

- (v) The diagram given below 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. [2]



- (a) **State True or False:** Source P as well as Source Q, when connected across AB, can attract the iron pin.
 (b) Justify your answer to (a) with a suitable reason.

- (vi) (a) Name the radiation that is emitted during the decay of a nucleus that has the **highest** penetrating power. [2]
[Recall]

- (b) Does the emission of the above-mentioned radiation result in a change in the mass number?

[Understanding]

- (vii) Advanced optical sensors in air-to-air missiles use fiber optic cables to transmit light signals with minimal loss. This relies on a physical phenomenon that confines light within the fibers, making the system very dependable for guiding the missile precisely. [3]

- (a) Name the optical phenomenon that allows light signals to remain confined within the fiber optic cables during transmission.

- (b) Explain the two main conditions necessary for this phenomenon to occur.

[Application]

SECTION B (40 Marks)

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

Question 4

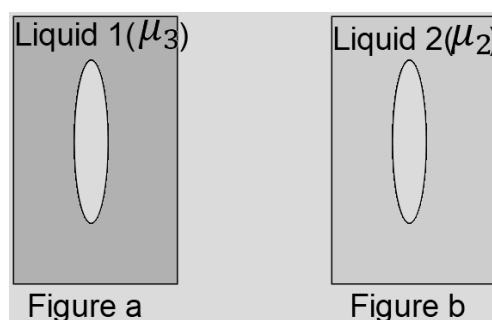
- (i) The diagram below shows a fish in the tank and its image seen on the surface of water. [3]



- (a) Name the phenomenon responsible for the formation of this image.

[Understanding
& Recall]

- (b) A double convex lens with refractive index μ_1 is placed inside two liquids of refractive indices μ_2 and μ_3 as shown in the diagrams below. The refractive indices are such that $\mu_2 > \mu_1$ and $\mu_1 > \mu_3$.



How would a parallel incident beam of light refract when it comes out of the lens in each of the cases shown above?

(1) in Figure a.

(2) in Figure b.

[Application]

- (ii) A scientist lowers a metallic ruler vertically into a transparent oil tank. The ruler touches an object placed at the bottom of the tank and gets wet up to the 25 cm mark. If the refractive index of the glycerin is 1.25:

[3]

(a) up to which mark will the ruler get wet, if the scientist lowers it up to the image of the object?

[Evaluate]

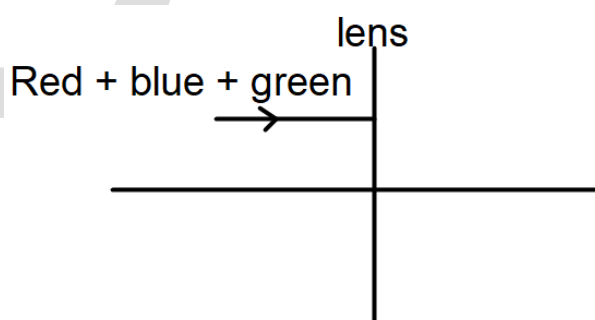
(b) how will this length in (a) change if another liquid of $\mu > 1.25$ is used?

[Understanding]

- (iii) (a) A mixture of red, blue, and green light rays is passed through a convex lens, as illustrated in the diagram below. State whether the ray passes through a single point or through different points on the principal axis after refraction.

[4]

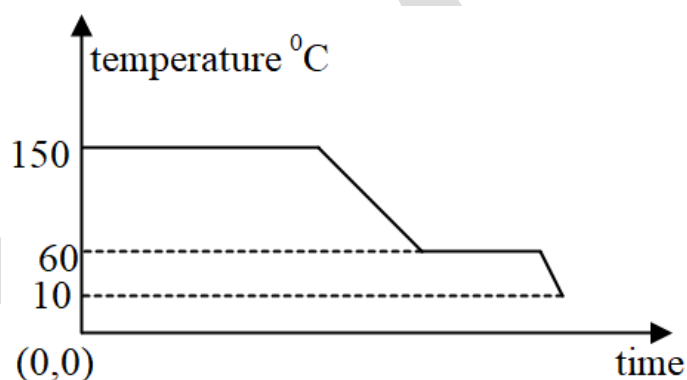
[Understanding]



- (b) Name the *invisible radiation* which is studied using the quartz prism. [Recall]
- (c) State one use of the radiation mentioned by you in (b) above. [Recall]
- (d) Name one type of radiation with a wavelength greater than that of the radiation mentioned by you in (b) above. [Recall]

Question 5

- (i) An object is placed at a distance of 24 cm in front of a convex lens of focal length 8 cm. [3]
- (a) What is the nature of the image so formed? [Understanding]
- (b) Calculate the distance of the image from the lens. [Evaluate]
- (ii) The diagram below shows a cooling curve for a substance X: [3]



- (a) State the temperatures at which the substance condenses. [Recall]
- (b) Mention the temperature range in which the substance is in its liquid state. [Understanding]
- (c) **State True or False:** The amount of heat released when a substance is cooled by 10°C in its liquid state is greater than the heat released when it is cooled by the same amount in its solid state.

- (iii) In an experiment to measure the temperature of the flame of a Bunsen burner, a lump of copper of mass 0.12 kg is heated on the flame for a long time. The copper then is quickly transferred into a beaker of negligible heat capacity containing 0.84 kg of water and the temperature of the water rose from 15 °C to 35 °C. Calculate the temperature of the flame. [4]
- [Given sp. Heat capacity of copper = $0.4 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$,
Sp. Heat capacity of water = $4.2 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$.]

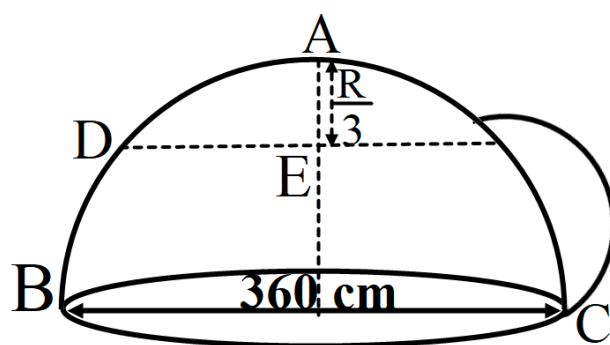
[Understanding
& Application]

Question 6

- (i)  [3]

A metal rod AB of length 80 cm is balanced at 45 cm from the end A with 100 gf weights suspended from the two ends.

- (a) If this rod is cut at the centre C, then compare the weight of AC to the weight of BC. (Use $>$, $<$ or $=$) [Understanding
& Application]
- (b) Give a reason for your answer in (a).
- (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. [Understanding
& Recall]
- (iii) A, B, C and D are four points on a hemispherical cup placed inverted on the ground. Diameter BC = 360 cm and $AE = R/3$ (R is the radius of the cup). A small spherical mass 500 g at rest at the point A, slides down along the smooth surface of the cup. Assuming that there is no loss of energy, calculate its: [4]



- (a) Potential Energy at A relative to B.
- (b) Speed at the point B (lowest point).
- (c) Kinetic Energy at D ($g = 10 \text{ ms}^{-2}$).

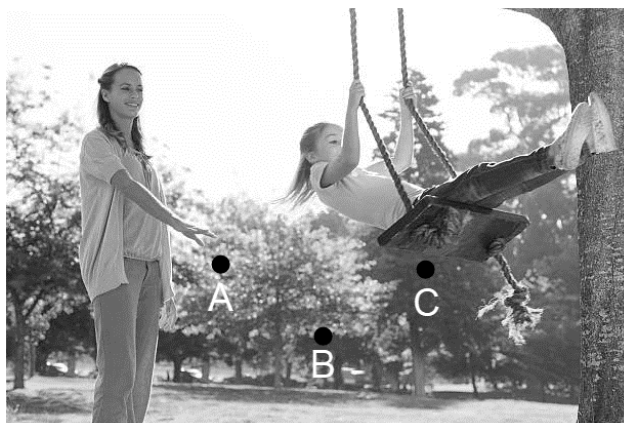
[Application & Evaluate]

Question 7

- (i) A block and tackle system of pulleys has velocity ratio 4. [3]
 - (a) Draw a labelled diagram of the system indicating clearly, the direction of the load and effort. [Recall]
 - (b) Calculate the potential energy gained by load of 100 kgf, lifted by this pulley to a height of 5 m. ($g = 10 \text{ ms}^{-2}$) [Understanding & Evaluate]
- (ii) A person standing in front of a cliff fires a gun and hears its echo after 3s. *Speed of sound in air is 336 ms^{-1} :* [3]
 - (a) Calculate the distance of the person from the cliff.
 - (b) After moving a certain distance from the cliff, he fires the gun again and this time the echo is heard 1.5 s later than the first. Calculate the distance that the person has moved. [Understanding & Evaluate]

(iii)

[4]



The above picture shows a mother pushing her daughter sitting on a swing. The swing is going through the positions A, B, C where A and C are extreme positions and B is the mean position.

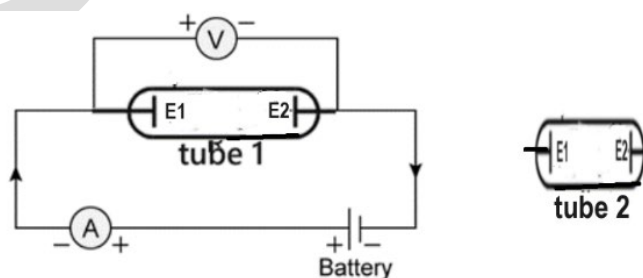
- (a) Which is the right position i.e. at A, B or C, for the mother to give a constant periodic push to the swing, every time in the forward direction, to increase the amplitude of the swing?
- (b) Name the phenomenon involved in this.
- (c) On the basis of this example, explain how this phenomenon helps to increase the amplitude of the swing.

[Application]

Question 8

[3]

- (i) The circuit depicted in the figure is employed for studying Ohm's Law. Instead of using a standard resistor, a student opts for a glass tube **filled** with mercury (**tube 1**), connected to the circuit through two electrodes E1 & E2. He records the readings of the ammeter and voltmeter, thereby calculates the resistance. The student repeats the experiment by substituting **tube 1** with **tube 2**, where the same amount of mercury **fills** the **tube 2**.

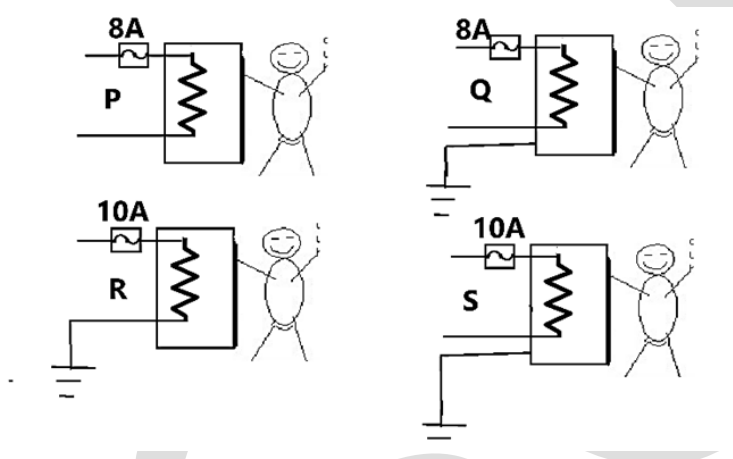


Neglecting internal resistance of the cell, use ($>$ or $<$ or $=$) to compare the following:

- Resistance in both cases.
- Voltmeter readings in both cases.
- Specific resistance in both cases.

[Understanding
& Application]

- (ii) An appliance with a metal covering, rated at 2 kW, 220 V, is to be connected in a circuit. Given below are four diagrams (P, Q, R & S) depicting different circuit configurations, [3]



- Identify the safest circuit.
- Write two reasons, supported by mathematical calculations, where applicable, to justify your choice.

[Application &
Evaluate]

- (iii) A nichrome wire **X** with length (l) & cross-sectional area (A) is connected to a 10 V source and another nichrome wire **Y** with length ($2l$) & cross-sectional area ($A/2$), is connected to a 20 V source. [4]

- Compare the resistances of wires **X** and **Y**. [Given that the resistivity of nichrome is (ρ).]
- Compare the electrical power consumed by each wire.
- Compare the masses of these wires. (Given that the density of nichrome is d .)
- State True or False:** Wire **X** and wire **Y** both show the same rise in temperature in the same time.

[Analyse &
Evaluate]

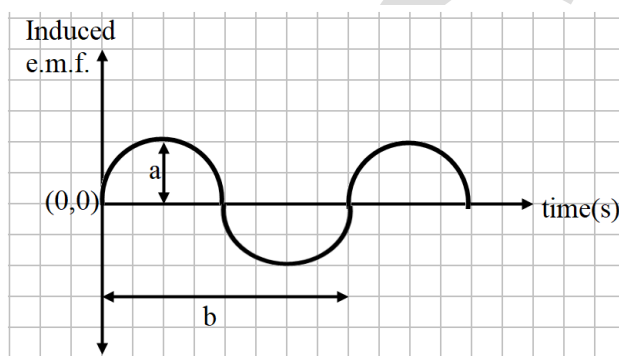
Question 9

- (i) Three bulbs of powers P_1 , P_2 and P_3 ($P_1 < P_2 < P_3$) are connected in a certain way that P_3 glows brightest. [3]

- What type of connection exists between these bulbs?
- Compare the voltage across these bulbs. (*Use $>$, $<$ or $=$*)
- Will the circuit still function if one of the bulbs is fused?

[Recall]

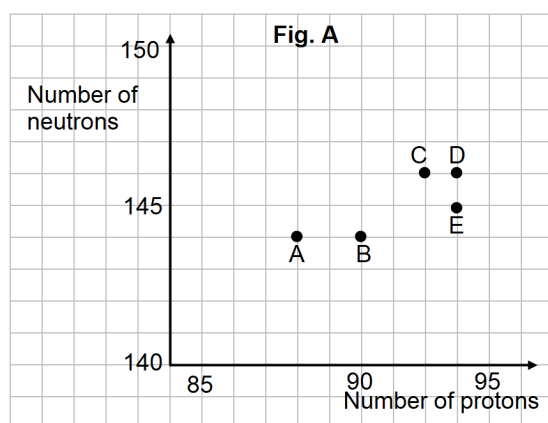
- (ii) The given diagram shows the output of an AC generator. If the speed of the generator coil is doubled, then: [3]



- what is the effect on the physical quantity indicated by 'a'?
- what is the effect on the physical quantity indicated as 'b'?
- give reason for your answer in (b).

[Understanding]

- (iii) The graph (Fig. A) illustrates the correlation between the number of protons (x -axis) and the number of neutrons (y -axis) for elements A, B, C, D, and E in the periodic table. These elements are denoted by the letters rather than their conventional symbols. [4]



[Understanding]

- Identify the radioactive radiation emitted when element C decays into element E. Represent this using a nuclear reaction.
- What is the special name given to elements D and E?
- If element C transforms into element B by emitting a radioactive ray, how will this ray behave in an electric field?

ICSE 2026 SPECIMEN

DRAFT MARKING SCHEME – PHYSICS (SCIENCE PAPER 1)

Question 1

[1x15]

- (i) (a) positive
- (ii) (c) momentum
- (iii) (b) heat → mechanical → electrical
- (iv) (d) Velocity Ratio remains unchanged and efficiency increases.
- (v) (d) slows down less and refracts less
- (vi) (a) refraction
- (vii) (b) away from the lens
- (viii) (c) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (ix) (b) X will be grave and Y will be shriller
- (x) (c) current through 2 Ω = current through 5 Ω
- (xi) (b) green
- (xii) (d) $\frac{\text{power primary}}{\text{power secondary}} = 1$
- (xiii) (b) energy needed to raise the temperature of a body by 1°C
- (xiv) (c) latent heat of fusion
- (xv) (c) protons = 93, neutrons = 144

Question 2

- (i) (a) Class II [1]
 (b) microwaves [1]
 (c) $\text{m}^2\text{s}^{-2}\text{K}^{-1}$ [1]
 (d) 0dB [1]
 (e) temperature [1+1]
 (f) Nuclear fusion
- (ii) (a) Nodding head → Class I [1]
 (b) Lifting body weight on your toes → Class II [1]
- (iii) (a) Ultrasonic waves [1]
 (b) They travel long distance without deviation / not easily absorbed by the medium [1]
 OR can be confined to a narrow beam.

Question 3

- (i) (a) 2 images will be seen. [1]
 (b) concave lens. [1]
- (ii) Energy spent = $1567 - 856 = 711 \text{ kWh}$ [1]
 Time in hours = $711/2 = 355.5$ hours [1]
- (iii) (a) X [1]
 (b) Z [1]
- (iv) By principle of mixtures [1]
 Heat lost = heat gained
 $(m \times c \times \Delta T)_{\text{metal}} = (m \times c \times \Delta T)_{\text{water}}$ [1]
 $c' \times 75 = 150 \times 4.2 \times 5$
 $c' = 42 \text{ J K}^{-1}$
- (v) (a) True [1]
 (b) Both currents AC & DC produce magnetic field around it. [1]
- (vi) (a) gamma / γ [1]
 (b) No. [1]
- (vii) (a) total internal reflection [1]
 (b) 1. Light ray should travel from denser to rarer medium [1]
 2. Angle of incidence must be greater than critical angle. [1]

Question 4

- (i) (a) Total internal reflection. [1]
 (b) 1. Converge [1]
 2. Diverge [1]
- (ii) (a) Real depth = 25 cm [1+1]
 Refractive index = 1.25
 Apparent depth = Real depth / refractive index
 $25/1.25 = 20 \text{ cm.}$
 (b) length will decrease [1]
- (iii) (a) Different points. [1]
 (b) Ultraviolet radiation [1]
 (c) Sterilization purposes / Detecting purity of gems, eggs/ in producing vitamin D [1]
 (d) Visible or infra-red or microwaves or radio waves. [1]

Question 5

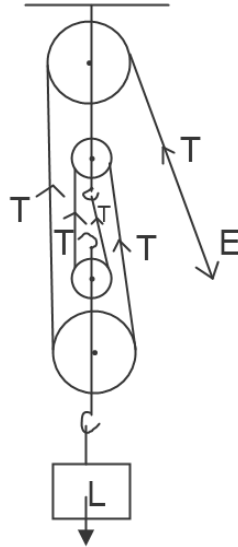
- (i) (a) Real, inverted [1]
- (b) $\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \therefore \frac{1}{v} - \frac{1}{-24} = \frac{1}{8}$ [1]
 (identifying 'U' and 'f' with correct sign convention) [1]
 $\frac{1}{v} = \frac{3-1}{24} \therefore v = 12 \text{ cm}$ [1]
- (ii) (a) 150°C - [1+1]
 (b) 150°C to 60°C
 (c) True. [1]
- (iii) Heat lost by Cu = $0.12 \times 400 \times (t - 35)$ [1x4]
 Heat gained by water = $0.84 \times 4200 \times (35 - 15)$
 $t - 35 = \frac{0.84 \times 4200 \times 20}{0.12 \times 400} = 7 \times 42 \times 5 = 1470^{\circ}\text{C}$
 $t = 1470 + 35 = 1505^{\circ}\text{C}$

Question 6

- (i) (a) Weight of AC < weight of BC [1]
 (b) Even though the weights present are the same at both ends, the torque arm of B is less than the torque arm of A. [2]
 This means the moment of the weight of the rod acts from side B and the C.G. lies beyond 40. Thus, more weight is concentrated between C to B.
- (ii) (a) No work is done. [1]
 (b) Negative work is done. [1]
 (c) Positive work is done. [1]
- (iii) (a) Potential energy at A relative to B [1]
 $\text{PE}_A = mgh$
 $= 0.5 \times 10 \times 1.8 = 9\text{J}$
 (b) Speed at point B (lowest point) [1]
 Using energy conservation
 $\text{PE at A} = \text{KE at B} \Rightarrow mgh = \frac{1}{2} mv^2$
 $v = \sqrt{2gh} = \sqrt{2 \times 10 \times 1.8}$
 $= 6\text{m/s}$
 (c) Kinetic and Potential energy at D [1+1]
 Therefore, height above B = $2R/3$
 $= 1.2\text{m}$
 $\text{P.E. at D} = mgh$
 $= 0.5 \times 10 \times 1.2 = 6\text{J}$
 $\text{K.E. at D} = \text{TE} - \text{PE at D} = 9 - 6 = 3\text{J}$

Question 7

(i)



(a) Pulleys drawn correctly with support
Correct connection of tackle, Marking load, effort with correct direction and tension [1+1]

(b) $U = mgh = 100 \times 10 \times 5$
 $U = 5000 \text{ J}$ [1]

(ii) (a) $d = (s \times t) / 2 \quad \therefore d = (336 \times 3) / 2$ [1+1]
 $d = 168 \times 3 = 504 \text{ m}$

(b) $d = (s \times t) / 2$ [1]
 $\therefore d = (336 \times 1.5) / 2 = 168 \times 1.5 = 252 \text{ m}$
 Distance moved = $504 - 252 = 252 \text{ m}$

(iii) (a) At A [1]

(b) Resonance [1]

(c) The natural frequency of the swing will match the frequency of the force applied by mother this will increase the amplitude. [1+1]

Question 8

(i) (a) Resistance of the tube2 < resistance of the tube 1 [1]

(b) The voltmeter reading for tube 1 is the same as the voltmeter reading for tube 2. [1]

(c) The specific resistance in both the cases is the same. [1]

$$(ii) \quad (a) \quad S \quad [1]$$

(b) metal body of appliance is earthed [1+1]

$$I = P/V = 2000/220 = 9.09 \text{ A} \quad 10\text{A fuse is appropriate}$$

(iii) (a) $R_{of\ X} = \frac{\rho l}{A}$ $R_{of\ Y} = \frac{\rho 2l}{\frac{A}{2}} = 4 \frac{\rho l}{A}$ $R_X : R_Y = 1:4$ [1+1]

(b) $P_X = \frac{V^2 t}{R} = \frac{10^2}{R}$ $P_Y = \frac{V^2 t}{R} = \frac{20^2}{4R}$ $\therefore P_X : P_Y = 1:1$ [1+1]

(c) $mass\ of\ X = A \times l \times d = mass\ of\ Y = \frac{A}{2} \times 2l \times d \therefore m_X : m_Y = 1:1$

(d) True

$$Q_X = mc\Delta T = Al \times c \times 8 = \frac{V^2 t}{R} = P_X \times t \rightarrow eq\ 1$$

$$Q_Y = mc\Delta T = Al \times c \times \Delta T = \frac{V^2 t}{R} = P_Y \times t \rightarrow eq\ 2$$

Eq1/eq2 =1 (rise in temperature will be same in both wires)

Question 9

(i) (a) parallel [2+1]

(b) $V_1 = V_2 = V_3$

(c) Yes

(ii) (a) It will be doubled. [1]

(b) It will be halved. [1]

(c) If speed is doubled, it means time of a cycle will be halved. [1]

(iii) (a) $\beta : {}^{238}_{92}C \rightarrow {}^{238}_{93}E + {}^0_{-1}\beta$ [1]

(b) isotopes [1]

(c) It will shift towards the negative plate [1+1]