ICSE SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER — 1
PHYSICS
(PAPER 1)

Maximum Marks: 40
Time allowed: One and a half hours
Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 10 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.
Attempt all questions from Section A and any three questions from Section B.

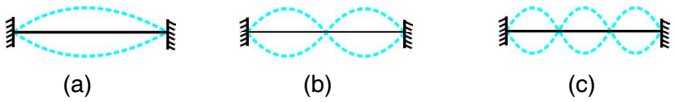
The intended marks for questions or parts of questions are given in brackets [ ].

Section A

*(Attempt **all** questions)*

1. Choose the correct answer from the options given below : [10]

(i) If l is the length of the string stretched between its ends, the wavelength of different modes in figures (a), (b) and (c) will be :



(a) $2l/2$, $2l$, $2l/3$ (b) $2l/3$, $2l/2$, $2l$ (c) $2l$, $2l/2$, $2l/3$ (d) $2l$, $2l/3$, $2l/2$

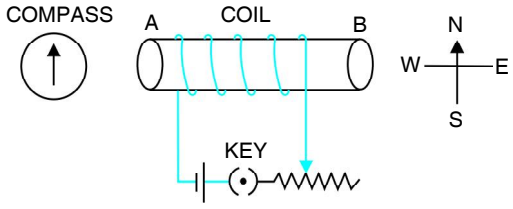
(ii) The specific resistance does not depend on the :

(a) Temperature (b) Shape of the conductor
(c) Size of the conductor (d) Both (a) and (c)

(iii) A fuse works on the principle of :

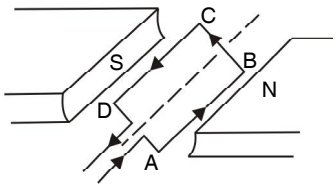
(a) Electric effect of current (b) Heating effect of current
(c) Both (a) and (b) (d) None of the above

(iv) The figure shows a spiral coil wound on a hollow cardboard tube AB. A magnetic compass is placed close to it. Current is switched on by closing the key. The polarity at the ends A and B will be :



(a) A-south pole, B-north pole
(b) A-north pole, B-north pole
(c) A-south pole, B-south pole
(d) A-north pole, B-south pole

(v) A coil ABCD mounted on an axle is placed between the poles N and S of a permanent magnet as shown in the figure given below. 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 ?



(a) Clockwise (b) Anticlockwise
(c) Both (a) and (b) (d) None of the above

(vi) The vessel used for measurement of heat (i.e. calorimeter) is made of a thin sheet of copper because :

(a) copper is a good conductor of heat (b) specific heat capacity of copper is low

(c) specific heat capacity of copper is high (d) both (a) and (b)

(vii) If amount of heat energy Q is absorbed (or liberated) by the mass *m* of a substance during its change of phase at a constant temperature, then specific latent heat is given by :

(a) L = Q/m (b) L = Qm (c) L = m/Q (d) None of the above

(viii) The least penetrating radiation is :

(a) α-particles (b) β-particles (c) X-rays (d) γ-radiation

(ix) Two sounds A and B are of the same amplitudes, same wave forms but of frequencies *f* and 2*f* respectively. Then :

(a) B differs in quality from A (b) B is grave, A is shrill

(c) B is shrill, A is grave (d) B is louder than A

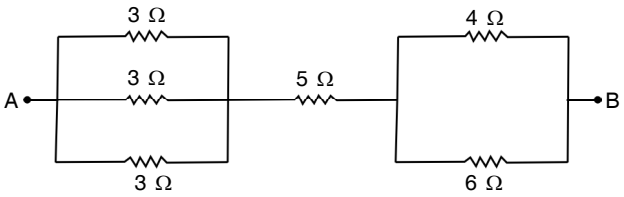
(x) Arrange the α, β and γ radiations in ascending order of their biological damage.

(a) $\alpha > \beta > \gamma$ (b) $\alpha > \gamma > \beta$ (c) $\alpha < \beta > \gamma$ (d) $\alpha < \beta < \gamma$

Section B

*(Attempt **any three** questions)*

2. (i) (a) In the circuit shown in the given figure, calculate the equivalent resistance between the points A and B. [3]

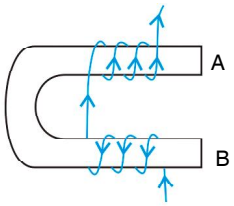


(b) What do you mean by power rating of an electrical appliance ? How do you use it to calculate (i) the resistance of the appliance, (ii) the safe limit of current in it, while in use ?

(ii) (a) Name the three factors on which the heat energy absorbed by a body depends and state how does it depend on them. [3]

(b) A liquid X has specific heat capacity higher than the liquid Y. Which liquid is useful as (i) a coolant in car radiators, and (ii) a heat reservoir to keep juice bottles without freezing ?

(iii) The given figure shows the current flowing in the coil of wire wound around the soft iron horse shoe core. [4]

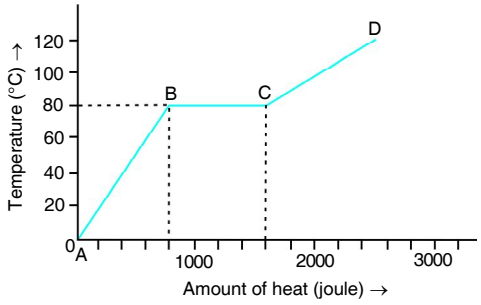


(a) State the polarities developed at the ends A and B.

(b) How will the polarity at the ends A and B change on reversing the direction of current ?

(c) Suggest one way to increase the strength of magnetic field produced.

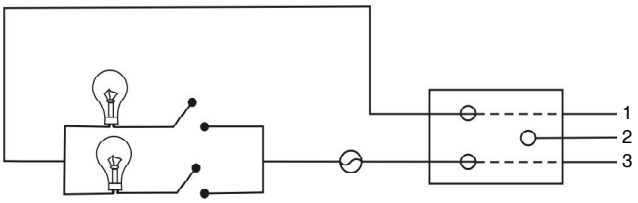
3. (i) A substance initally in solid state at 0°C is heated. The graph showing the variation in temperature with the amount of heat supplied is shown alongside. If the specific heat capacity of the solid substance is 500 J kg^{-1} $°C^{-1}$, use the graph to find : [3]



(a) the mass of the substance, and

(b) the specific latent heat of fustion of the substance in the liquid state.

(ii) The figure given below shows two bulbs with switches and fuse connected to the mains through a three pin socket by means of a three wires cables. [3]



(a) Label each component – bulb, switch, fuse and socket.

(c) Name and state the colour of insulation of each wire 1, 2 and 3.

(d) How are the two bulbs joined : in series or in parallel ?

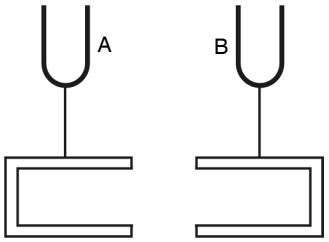
(iii) (a) What is a calorimeter ? [4]

(b) Name the material of which it is made of. Give two reasons for using the material stated by you.

(c) Out of the three metals A, B and C of specific heat capacity 900 J kg^{-1} $°C^{-1}$, 380 J kg^{-1} $°C^{-1}$ and 460 J kg^{-1} $°C^{-1}$ respectively, which will you prefer for calorimeter ? Give reason.

(d) How is the loss of heat due to radiation minimised in a calorimeter ?

4. (i) The given figure shows two tuning forks A and B of the same frequency mounted on two separate sound boxes with their open ends facing each other. The fork A is set into vibration. [3]



(a) Describe your observation.

(b) State the principle illustrated by this experiment.

(ii) (a) What is lenz's law ? [3]

(b) Explain how does the lenz's law shows the conservation of energy in the phenomenon of electromagnetic induction.

(iii) (a) An atomic nucleus A is composed of 84 protons and 128 neutrons. The nucleus A emits an α-particle and is transformed into a nucleus B. What is the composition of B ? [4]

(b) The nucleus B emits a β-particle and is transformed into a nucleus C. What is the composition of C ?

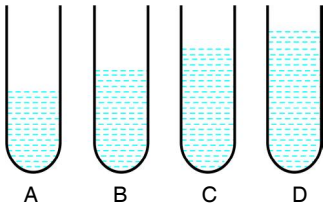
(c) What is the mass number of the nucleus A ?

(d) Does the composition of nucleus C change if it emits γ-radiation ?

5. (i) State the function of each of the following in a house circuiting : [3]

(a) kWh meter (b) main fuse, and (c) main switch.

(ii) Figures A, B, C and D represent the test tubes each of height 20 cm which are filled with water up to heights of 12 cm, 14 cm, 16 cm and 18 cm respectively. If a vibrating tuning fork is placed over the mouth of test tube D, a loud sound is heard. [3]



(a) Describe the observations with the tubes A, B and C when the vibrating tuning fork is placed over the mouth of each of these tubes.

(b) Give reason for your observation in each tube.

(c) State the principle illustrated by the above experiment.

(iii) (a) Why do the farmers fill their fields with water on a cold winter night ? [4]

(b) Why are the alpha particles not used in radio therapy ?

ICSE SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER — 2
PHYSICS
(PAPER 1)

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

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

Section A

*(Attempt **all** questions)*

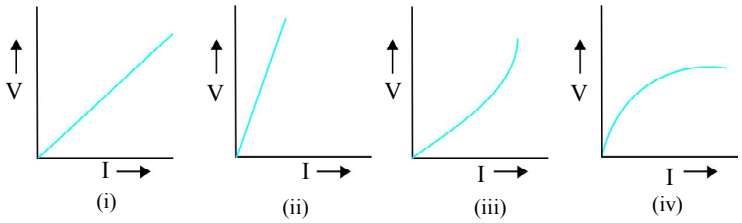
1. Choose the correct answer from the options given below : [10]

(i) The frequency f of the note produced by a string can be increased by :

(a) decreasing the length *l* of the string
(b) decreasing the radius *r* of the string
(c) increasing the tension T in the string
(d) All of these

(ii) Figure shows V-I graphs. Select the graphs for ohmic resistors.

(a) Only (i)
(b) Only (iii)
(c) Both (i) and (ii)
(d) Both (i) and (iii)



(iii) An alloy of lead and tin is used as the material of a fuse wire because its melting point is ..... and specific resistance is .....

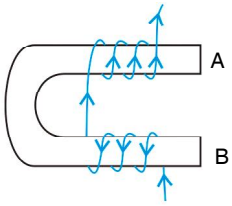
(a) low, low (b) high, low (c) high, high (d) low, high

(iv) Magnitude of induced e.m.f. depends on :

(a) the rate of change of magnetic flux linked with each turn
(b) the number of turns in the coil
(c) Both (a) and (b)
(d) none of the above

(v) The given figure shows the current flowing in the coil of wire wound around a soft iron horse shoe core. The polarities developed at the ends A and B are :

(a) A-north, B-south
(b) A-north, B-north
(c) A-south, B-north
(d) A-south, B-south



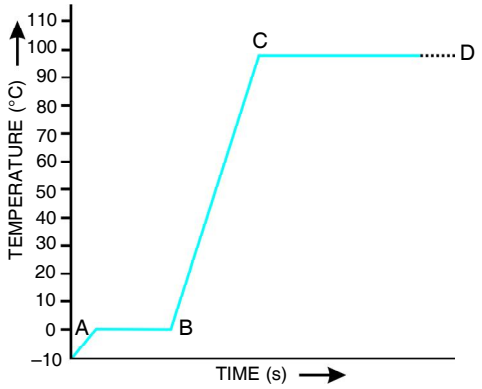
(vi) A piece of ice is heated at a constant rate. The variation in temperature with time of heating is shown in the graph. What does the part CD represent ?

(a) melting of ice

(b) boiling of water

(c) freezing of ice

(d) none of the above



(vii) The specific heat capacity is maximum for :

(a) Copper (b) Zinc (c) Hydrogen (d) Water

(viii) A certain nucleus P has a mass number 15 and atomic number 7. The number of neutrons is :

(a) 7 (b) 8 (c) 9 (d) 6

(ix) When a tuning fork is sounded in air, the sound given by it is feeble, but when it placed on a table top, the sound becomes much louder. The reason is :

(a) Amplitude of the wave (b) Density of the medium

(c) Presence of resonant bodies (d) Large surface area of the vibrating body

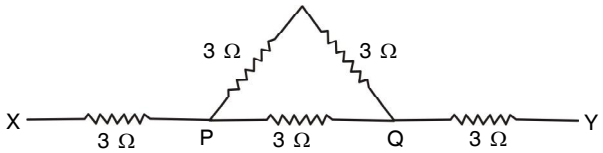
(x) Complete the following reaction : $^{238}_{92}U \longrightarrow$ ..... + $^{4}_{2}He$

(a) $^{237}_{91}U$ (b) $^{234}_{90}U$ (c) $^{232}_{92}U$ (d) $^{234}_{91}U$

Section B

*(Attempt **any three** questions)*

2. (i) (a) Five resistors, each of 3Ω are connected as shown in figure. Calculate the resistance between the points P and Q. [3]

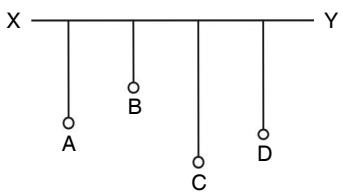


(b) Two resistors R_1 and R_2 of resistance 3Ω and 6Ω respectively are connected in parallel across a battery of p.d. 12V. Calculate the electrical energy consumed in 1 minute in each resistor.

(ii) (a) The soft drink bottles are cooled by (i) ice cubes at 0°C and (ii) ice-water at 0°C. Which will cool the drink quickly ? Give reason. [3]

(b) Same amount of heat is supplied to two liquids A and B. The liquid A shows a greater rise in temperature. What can you say about the heat capacity of A as compared to that of B ?

(iii) In figure A, B, C and D are four pendulums suspended from the same elastic string XY. The length of pendulum A and D are equal, while the length of pendulum B is shorter and of the pendulum C is longer. Pendulum A is set into vibrations. [4]



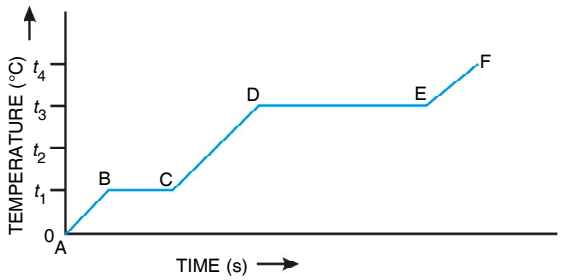
(a) What is your observation about the vibrations of pendulum D ?

(b) Give reason for your observation in part (a).

(c) What type of vibrations take place in pendulums B and C ?

(d) Give reason for your answer in part (c).

3. (i) The diagram in the adjoining figure shows the change of phases of a substance on a temperature-time graph on heating the substances at a constant rate. [3]



(a) What do the parts AB, BC, CD and DE represent ?

(b) What is the melting point of the substance ?

(c) What is the boiling point of the substance ?

(ii) The diagram in the adjoining figure shows a three-pin socket marked as 1, 2 and 3. [3]

(a) Identify and write live (L), neutral (N) and earth (E) against the correct number.

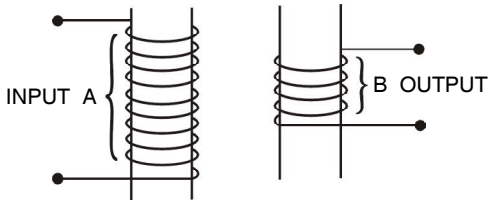
(b) To which part of the appliance is the terminal 1 connected ?

(c) To which wire joined to 2 or 3, is the fuse connected ?

(iii) (a) Calculate the heat capacity of a copper vessel of mass 150 g if the specific heat capacity of copper is 410 J kg^{-1} K^{-1}. [4]

(b) How much heat energy will be required to increase the temperature of the vessel in part (a) from 25°C to 35°C ?

4. (i) (a) Complete the following diagram of a transformer and name the parts labelled A and B. [3]



(b) Name the part you have drawn to complete the diagram in part (a). What is the material of this part ?

(c) Is this transformer a step up or step down ? Give reason.

(ii) (a) State Faraday's law of electromagnetic induction. [3]

(b) State two factors on which the magnitude of induced e.m.f. in a coil depends.

(iii) (a) What changes occur in the nucleus of a radioactive element when it emits : (i) An alpha particle, (ii) a beta particle, (iii) gamma radiation ? Give one example in each case (i) and (ii) in support of your answer. [4]

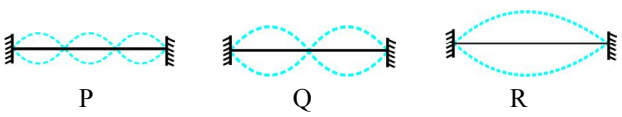
(b) State two similarities and two dissimilarities between γ-rays and X-rays.

5. (i) (a) What do you mean by the term 'local earthing' ? Explain how it is done. [3]

(b) The earthing of an electric appliance is useful only if the fuse is in the live wire. Give reason.

(c) Name the part of the appliance which is earthed.

(ii) The diagram below shows three different modes of vibrations P, Q and R of the same string of a given length. [3]



(a) Which vibration will produce a louder sound and why ?

(b) Which vibration will produce a sound of maximum shrillness (or pitch) and why ?

(c) What is the ratio of the wavelength of vibrations P and R ?

(iii) (a) It is generally cold after a hail-storm than during and before the hail-storm. Give reason. [4]

(b) What do you mean by the chain reaction in nuclear fission ? How is it controlled ?

ICSE SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER — 3
PHYSICS
(PAPER 1)

Maximum Marks: 40
Time allowed: One and a half hours
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Attempt all questions from Section A and any three questions from Section B.

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

Section A

*(Attempt **all** questions)*

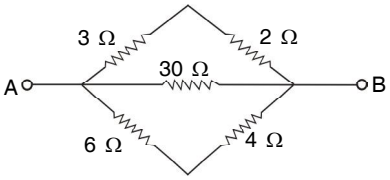
1. Choose the correct answer from the options given below : [10]

(i) The intensity of a sound wave in air is proportional to :

(a) the square of the amplitude of vibrations (b) the square of the frequency of vibrations

(c) the density of air (d) all of these

(ii) The equivalent resistance between the points A and B in the figure given alongside is :



(a) 4 Ω

(b) 2 Ω

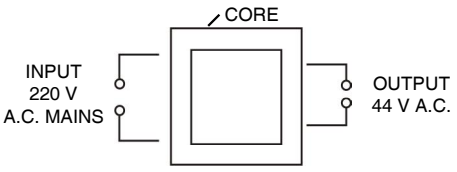
(c) 3 Ω

(d) 1 Ω

(iii) Colour coding of live wire in new international convention is :

(a) Red (b) Brown (c) Black (d) Green

(iv) The diagram given alongside shows the core of a transformer and its input and output connections. Name the transformer.



(a) Step up

(b) Step down

(c) Both (a) and (b)

(d) None of the above

(v) Electromagnetic induction is the phenomenon in which e.m.f. is induced in the coil if there is a change in the ..... linked with the coil.

(a) Magnetic force (b) Magnetic flux (c) Electric flux (d) None of the above

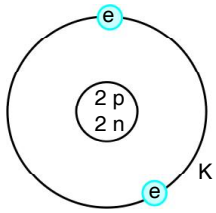
(vi) Two blocks P and Q of different metals having their mass in the ratio 3 : 2 are given the same amount of heat. Their temperatures rises by the same amount. Ratio of their specific heat capacities is :

(a) 2 : 1 (b) 1 : 2 (c) 2 : 3 (d) 3 : 2

(vii) 10 g of ice at 0°C absorbs 5460 J g heat energy to melt and change to water at 50°C. The specific latent heat of fusion of ice is ..... [specific heat capacity of water is 4200 J kg^{-1} K^{-1}]

(a) 336 J g^{-1} (b) 336 J kg^{-1} (c) 330 J g^{-1} (d) 330 J kg^{-1}

(viii) Identify the atom shown in the given figure :



(a) $^{4}_{2}$He Helium

(b) $^{2}_{2}$He Helium

(c) $^{1}_{1}$H Hydrogen

(d) None of the above

(ix) If the amplitude of a sound is halved, its loudness becomes :

(a) four times (b) halved (c) one-fourth (d) twice

(x) Relation between mass number A and atomic number Z is :

(a) Mass number A = Atomic number Z + Number of neutrons

(b) Mass number A = Atomic number Z – Number of neutrons

(c) Atomic number Z = Mass number A – Number of neutrons

(d) Both (a) and (c)

Section B

*(Attempt **any three** questions)*

2. (i) In an experiment of verification of Ohm's law, the following observations are obtained. [3]

Potential difference V (in volt)	0·5	1·0	1·5	2·0	2·5
Current I (in ampere)	0·2	0·4	0·6	0·8	1·0

Draw a V-I graph and use this graph to find :

(b) the potential difference V when the current I is 0·5 A,

(b) the current I when the potential difference V is 0·75 V,

(c) the resistance in the circuit.

(ii) (a) State three differences between heat capacity and specific heat capacity. [3]

(b) How is heat capacity of a body related to specific heat capacity of its substance ?

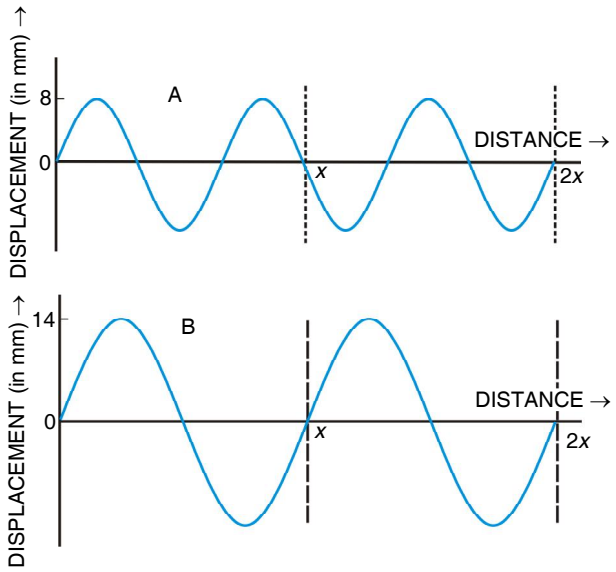
(iii) In the given figure, A and B represent the displacement-distance graphs for two sound waves when they pass through air. [4]

(a) What is the relation between their

(i) velocities, (ii) wavelengths,

(iii) pitch, and (iv) loudness ?

(b) How do they differ in quality ?



3. (i) An electric heater of power 1000 W raises the temperature of 5 kg of a liquid from 25°C to 31°C in 2 minutes. Calculate : [3]

(a) the heat capacity, and (b) the specific heat capacity of the liquid.

(ii) (a) What do you understand by the change of phase of a substance ? Is there any change in temperature during the change of phase ? [3]

(b) Does the substance absorb or liberate any heat energy during the change of phase ?

(c) What is the name given to the energy absorbed during a phase change ?

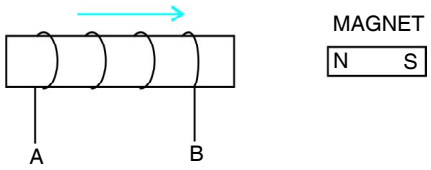
(iii) An electric bulb rated '220 V, 60 W' glows when connected with 220 V mains. [4]

(a) Find the resistance of the filament of the bulb.

(b) Another identical bulb is connected in series with the first one and the system is connected across the 220 V mains. Find : (i) the rate of consumption of energy in each bulb, and (ii) the total power consumed.

(c) If two bulbs are connected in parallel, what will then be the total power consumed ?

4. (i) The diagram in the given figure shows a coil of several turns of copper wire near a magnet NS. The coil is moved in the direction of arrow shown in the diagram. [3]



(a) In what direction does the induced current flow in the coil ?

(b) Name the law used to arrive at the conclusion in part (a).

(c) How would the current in coil be altered if (i) the coil has twice the number of turns, (ii) the coil was made to move three times fast ?

(ii) (a) In an a.c. generator, the speed at which the coil rotates is doubled. How would this affect (i) the frequency of the output voltage, (ii) the maximum output voltage. [3]

(b) State one advantage of using an a.c. over d.c.

(ii) A nucleus $^{24}_{11}Na$ is β-radioactive. [4]

(a) What are the numbers 24 and 11 called ? (b) Write the equation representing β-decay.

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

5. (i) (a) Where is the main fuse connected in a house circuit ? [3]

(b) State one advantage of using the main switch in house wiring ?

(c) A house has main fuse of 5 A rating, 5 bulbs each of 60 W and 2 tubelights each of 40 W are used simultaneously, find the current drawn from the mains of 220 V.

(ii) (a) Which quantity among wavelength, frequency and amplitude determines the loudness of a sound wave ? Define it. [3]

(b) How is loudness related to the quantity mentioned above in part (a) ?

(c) Name the unit in which the loudness of a sound is measured.

(iii) (a) Explain the terms boiling and boiling point. How is the volume of water affected when it boils at 100°C ? [4]

(b) Why is a very high temperature required for the process of nuclear fusion ? State the approximate temperature required.

ICSE SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER — 4
PHYSICS
(PAPER 1)

Maximum Marks: 40
Time allowed: One and a half hours
Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 10 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.
Attempt all questions from Section A and any three questions from Section B.

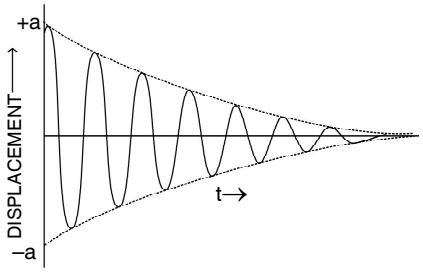
The intended marks for questions or parts of questions are given in brackets [ ].

Section A

*(Attempt **all** questions)*

1. Choose the correct answer from the options given below : [10]

(i) The diagram in the figure given alongside shows the displacement-time graph of a vibrating body. Name the kind of vibrations.



(a) resonant vibration (b) natural vibrations (c) damped vibrations (d) forced vibrations

(ii) In a parallel combination of resistors, which statement is not true ?

(a) Total resistance increases

(b) $\frac{1}{R_P} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + ... \frac{1}{R_n}$

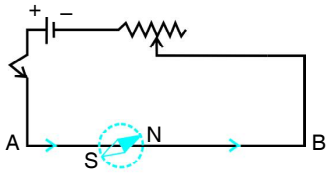
(c) $R_P = R_1R_2 / R_1 + R_2$

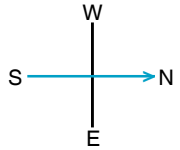
(d) $R_P = \frac{1}{n}$

(iii) The symbol ⏚ represents :

(a) fuse wire
(b) earthing of an appliance
(c) phase wire
(d) none of the above

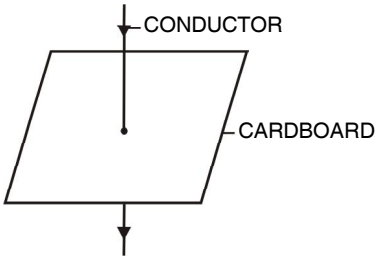
(iv) In the given figure when the key is pressed, a current passes in the wire in the direction from A to B (i.e. from south to north). The direction in which the north pole of the compass needle will deflect is :





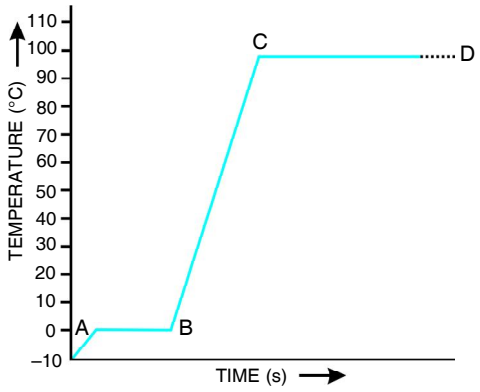
(a) East (b) North (c) South (d) West

(v) In the given figure, the current is passed in the downward direction through a cardboard. The magnetic field lines will be :



(a) Straight lines
(b) Concentric circles
(c) Elliptical lines
(d) Parallel lines

(vi) A piece of ice is heated at a constant rate. The variation in temperature with time of heating is shown in the graph in figure. What is represented by the part CD ?

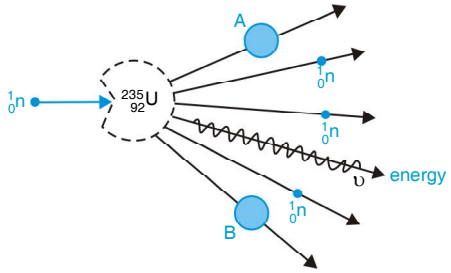


(a) melting of ice
(b) boiling of water
(c) freezing of ice
(d) none of the above

(vii) The relation between Kelvin (K) and degree Celcsius (°C) is :

(a) $T_K = 273 - t°C$ (b) $T_K = 273 + t°C$ (c) $T_K = 293 + t°C$ (d) $T_K = 293 - t°C$

(viii) In the figure, identify the element A and B.



(a) $^{144}_{56}Ba$, $^{89}_{36}Kr$
(b) $^{140}_{56}Ba$, $^{89}_{36}Kr$
(c) $^{144}_{56}Ba$, $^{86}_{36}Kr$
(d) $^{140}_{56}Ba$ $^{86}_{36}Kr$

(ix) The tuning of a radio and TV receivers is based on :

(a) forced vibrations (b) natural vibrations (c) resonance (d) damped vibrations

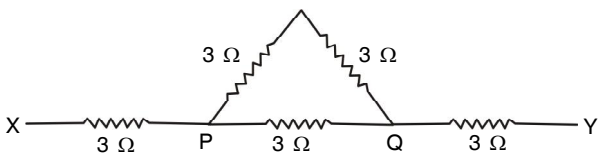
(x) The particle used in nuclear fission for bombardment is :

(a) Alpha particle (b) Proton (c) Beta particle (d) Neutron

Section B

*(Attempt **any three** questions)*

2. (i) (a) Five resistors, each of 3Ω are connected as shown in figure. Calculate the resistance between the points X and Y. [3]



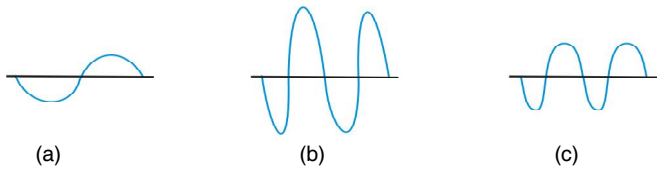
(b) Name the factors on which the heat produced in a wire depends when current is passed in it, and state how does it depend on the factors stated by you.

(ii) Explain the following : [3]

(a) The surrounding become pleasantly warm when water in a lake starts freezing in cold countries.

(b) The heat supplied to a substance during its change of state, does not cause any rise in its temperature.

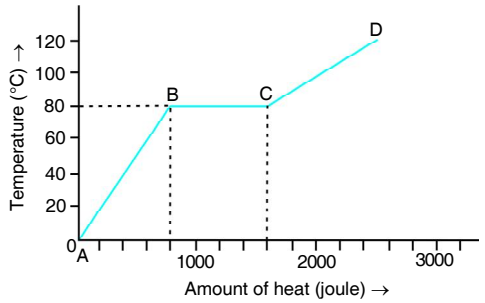
(iii) A microphone is connected to the Y-input of a C.R.O. Three different sounds are made in turn in front of the microphone. Their traces (a), (b) and (c) produced on the screen are shown below. [4]



(a) Which trace is due to the loudest sound ? Give reason for your answer.

(b) Which trace is due to the sound with the lowest pitch ? Explain your answer.

3. (i) A substance initially in solid state at 0°C is heated. The graph showing the variation in temperature with the amount of heat supplied is shown below. If the specific heat capacity of the solid substance is 500 J kg^{-1} $°C^{-1}$, use the graph to find : [3]



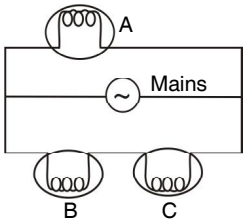
(a) the mass of the substance, and

(b) the specific latent heat of fusion of the substance in the liquid state.

(ii) The amount of heat energy required to convert 1 kg of ice at –10°C to water at 100°C is 377,000 J. Calculate the specific latent heat of ice.

[Specific heat capacity of ice = 2100 J kg^{-1} k^{-1}; Specific heat capacity of water = 4200 J kg^{-1} K^{-1}]. [3]

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



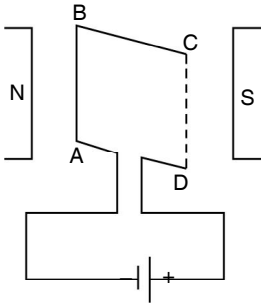
(a) How is the bulb A connected with the mains? At what voltage does it glow ?

(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 ?

4. (i) The following figure shows a rectangular coil ABCD placed in between the pole pieces of a horse-shoe magnet with its plane perpendicular to the magnetic field. A battery is connected between the ends A and D of the coil. [3]



(a) What is the direction of current in the coil ?

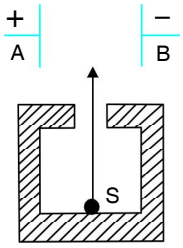
(b) What is the direction of force on each arm of the coil ?

(c) Will the coil rotate due to the forces on its arms ?

(ii) (a) Draw simple labelled diagrams of an a.c. generator and a d.c. motor. [3]

(b) State (i) two similarities and (ii) two dissimilarities between a.c. generator and d.c. motor.

(iii) The given figure shows a radioactive sources in a thick lead walled container having a narrow opening. The radiations pass through an electric field between the plates A and B. [4]



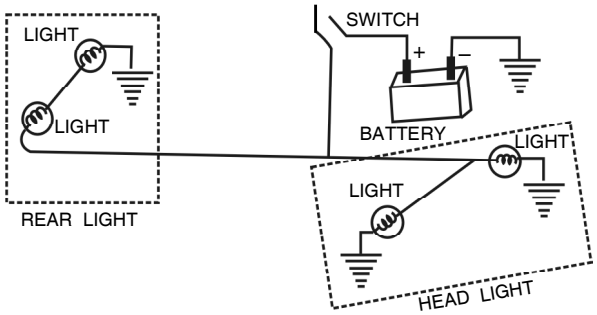
(a) Complete the diagram to show the paths of α, β and γ radiations.

(b) Why is the source S kept in a thick walled lead container with a narrow opening ?

(c) Name the radiation with is unaffected by the electrostatic field.

(d) Which radiation is defleced the most. Give reason.

5. (i) The given diagram shows the electrical system of a car to operate the two head lights and two rear lights by a switch. ⩢ shows a connection to the body of the car. [3]

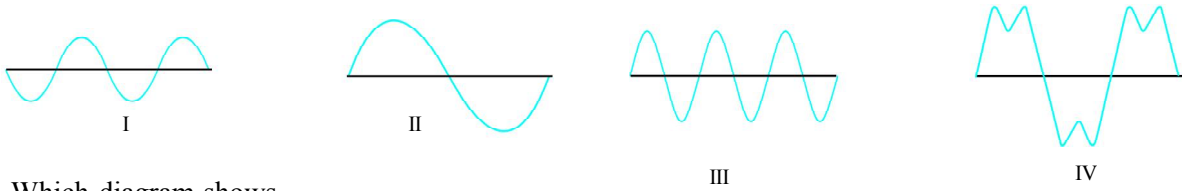


(a) The diagram shows only one lead from the battery to each bulb, but a complete circuit must have two leads. How does the current get back to the battery ?

(b) The two rear lights as connected in diagram glow faintly. Why do they glow faintly ? How should they be connected to glow brightly ? Show by a separate diagram.

(c) If the lights are on, they become dim when the car is started. Give a reason.

(ii) Sketches I to IV given below show sound waves, all formed in the same time interval. [2]



Which diagram shows

(a) a note from a musical instrument ?

(b) a soft (or feeble) note ?

(c) a bass (or low frequency) note ?

(iii) (a) State the effect of presence of impurity on the melting point of ice. Give *one* use of it. [3]

(b) Why do we usually use isotopes emitting gamma radiations as radioactive tracers in medical science ?

ICSE SEMESTER 2 EXAMINATION
SPECIMEN QUESTION PAPER — 5
PHYSICS
(PAPER 1)

Maximum Marks: 40
Time allowed: One and a half hours
Answers to this Paper must be written on the paper provided separately.
You will not be allowed to write during the first 10 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.
Attempt all questions from Section A and any three questions from Section B.

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

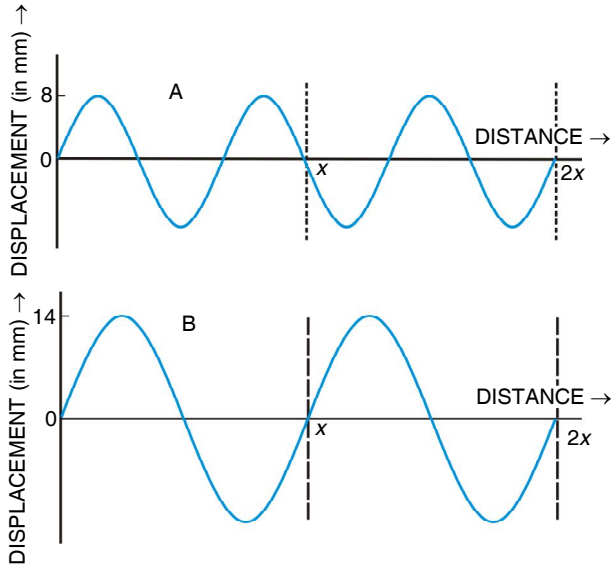
Section A

*(Attempt **all** questions)*

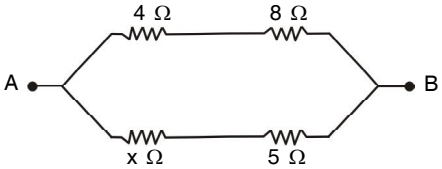
1. Choose the correct answer from the options given below : [10]

(i) In the given figures, A and B represent the displacement-distance graphs for two sound waves when they pass through air. What is the relation between their velocities ?

(a) $V_A = V_B$
(b) $V_A > V_B$
(c) $V_A < V_B$
(d) None of the above

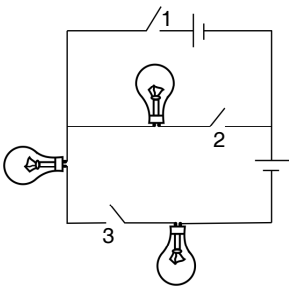


(ii) In the circuit shown alongside, the equivalent resistance between the points A and B is 4 Ω. The value of *x* will be :



(a) 2 Ω (b) 3 Ω
(c) 1 Ω (d) 1·5 Ω

(iii) The given figure shows three lamps and three switches 1, 2 and 3 connected with two cells. The switches that are to be closed in order to light all three lamps are :

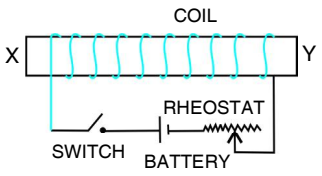


(a) 1 and 2
(b) 2 and 3
(c) 3 and 1
(d) 1, 2 and 3

(iv) In an a.c. generator, the speed at which the coil rotates is doubled. Then the frequency of the output voltage will :

(a) Remain the same (b) Gets doubled (c) Gets halved (d) Becomes four times

(v) The diagram in the figure shows a coil wound around a soft iron bar XY. State the polarity at the ends X and Y as the switch is pressed.



(a) X-north pole ; Y-south pole

(b) X-south pole ; Y-north pole

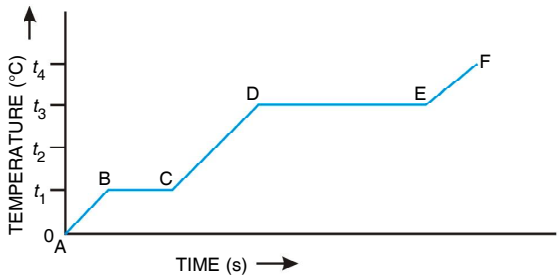
(c) X-south pole ; Y-south pole

(d) X-north pole ; Y-north pole

(vi) Thermal (or Heat) capcity is given by :

(a) $Q = \frac{cm}{\Delta t}$ (b) $Q = mc\,\Delta t$ (c) $Q = \frac{c}{m\,\Delta t}$ (d) $Q = \frac{1}{cm\,\Delta t}$

(vii) The figure given alongside shows the change of phases of a substance on a temperature-time graph on heating the substances at a constant rate. What does the part CD represent ?



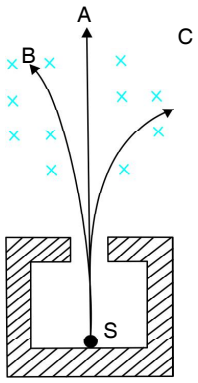
(a) rise in temperature of solid

(b) rise in temperature of liquid

(c) boiling at t_3°C

(d) none of the above

(viii) In the figure shows a radioactive source S placed in a thick lead walled container. The radiations given out are allowed to pass through a magnetic field. The magnetic field (shown as ×) acts perpendicular to the plane of paper inwards. Arrows show the paths of the radiations A, B and C. The radiations labelled A, B and C are :



(a) $A \rightarrow \alpha$ $B \rightarrow \beta$ $C \rightarrow \gamma$

(b) $A \rightarrow \beta$ $B \rightarrow \gamma$ $C \rightarrow \alpha$

(c) $A \rightarrow \gamma$ $B \rightarrow \alpha$ $C \rightarrow \beta$

(d) $A \rightarrow \gamma$ $B \rightarrow \beta$ $C \rightarrow \alpha$

(ix) Resonance is a special case of …….. vibrations, when frequency of the driving force is ..... natural frequency of the driven body.

(a) resonant, greater than the (b) damped, less than the

(c) forced, equal to the (d) none of the above

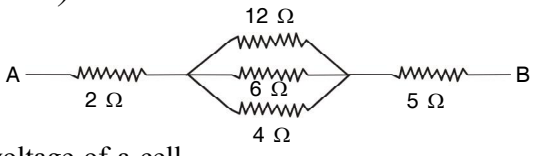
(x) α, β and γ radiations in ascending order of their biological damage are :

(a) $\alpha > \beta > \gamma$ (b) $\alpha > \gamma > \beta$ (c) $\alpha < \beta > \gamma$ (d) $\alpha < \beta < \gamma$

Section B

*(Attempt **any three** questions)*

2. (i) (a) Calculate the effective resistance between the points A and B in the network shown alongside. [3]



(b) State *two* differences between the e.m.f. and terminal voltage of a cell.

(ii) (a) Water is used in hot water bottles for fomentation. Give a reason. [3]

(b) State the effect of increase of pressure on the melting point of ice.

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

(b) What is the function of a step up transformer?

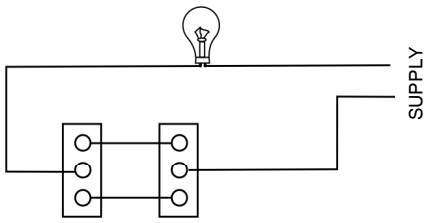
(c) Draw simple labelled diagrams of step up and step down transformers.

(d) Can a transformer work when it is connected to a d.c. source ? Give a reason.

3. (i) (a) Specific heat capacity of a substance A is 3·8 J g^{-1} K^{-1} and of the substance B is 0·4 J g^{-1} K^{-1}. Which substance is a good conductor of heat ? How did you arrive at your conclusion ? [3]

(b) A substance on heating, undergoes (i) a rise in its temperature, (ii) a change in its phase without a change in its temperature. In each case, state the change in energy of molecules of the substance.

(ii) The figure given below shows a dual control switch circuit used to light a bulb. [3]



(a) Complete the circuit so that the bulb is switched on.

(b) Mark the supply terminals with L and N to indicate live and neutral wires.

(iii) A vessel of negligible heat capacity contains 5·0 kg of water at 50°C. If 5·0 kg of ice at 0°C is added to it, find : [4]

(a) Heat energy imparted by water in fall of its temperature from 50°C to 0°C

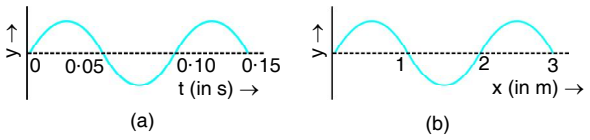
(b) Mass of ice melted

(c) Final temperature of mixture, and

(d) Mass of water at 0°C in mixture. Given : specific heat capacity of water = 4200 J kg^{-1} K^{-1}, specific latent heat of ice = 336 kJ kg^{-1}.

4. (i) The diagram alongside shows : [3]

(a) Displacement-time (b) Displacement-distance, graph of a wave travelling in a string with velocity 20 m s^{-1}. In each case, use the graph to calculate the frequency and wavelength of the wave.



(ii) (a) Why does it become more difficult to move a magnet towards a coil when the number of turns in the coil has been increased ? [3]

(b) Explain why an induced current must flow in such a direction so as to oppose the change producing it.

(iii) A radioactive source emits *three* type of radiations. [4]

(a) Name the radiation which has the lowest ionising power.

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

(c) Give the charge and mass of particles composing the radiation in part (c).

(d) When the particle referred to in part (c) becomes neutral, it is found to be the atom of a rare gas. Name this rare gas.

5. (i) A power circuit uses a cable having *three* different wires. [3]

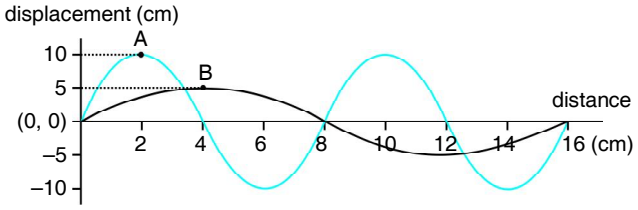
(a) Name the *three* wires of the cable.

(b) Between which of the *two* wires should the heating element of an electric geyser be connected and to which wire should the metallic case of the geyser be connected ?

(c) To which wire should the switch and fuse be connected ?

(ii) (a) State *two* factors on which the speed of a wave travelling in a medium depends. [3]

(b) Figure below shows the distance-displacement graph of two waves A and B. Compare (i) the amplitude, (ii) the wavelength of the two waves.



(iii) (a) Why is the base of a cooking pan made thick and heavy ? [4]

(b) Give *two* differences between the radioactive decay and nuclear fission.