ICSE SEMESTER 2 EXAMINATION

SAMPLE PAPER - 1

PHYSICS

(SCIENCE 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.

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

SECTION A

*(Attempt **all** questions.)*

Section-A (Attempt all questions)

Question 1.

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

(i) Which particle can be stopped by a led box?

(a) α (b) β (c) γ (d) All of these

(ii) What is the boiling point of liquid hydrogen on the Fahrenheit scale if the boiling point of water on the Celsius scale is 5 °C?

(a) –11 F (b) 27 F (c) –27 F (d) 41 F

(iii) In our houses, electrical appliances are connected in _____ with the mains.

(a) Series
(b) Parallel
(c) Any of the Series and Parallel.
(d) It only depends upon the voltage supply at the mains.

(iv) Which of the following substance has highest specific heat capacity?

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

(v) Heat produced in a transmission wire is independent of _____.

(a) The material of the wire
(b) The amount of current that flows through it
(c) The direction of current flow
(d) The resistance of the wire

(vi) Which of the following statement is correct?

(a) During absorption of latent heat by a body, the temperature of the body changes
(b) During absorption of sensible heat by a body, the temperature of the body do not change
(c) During absorption of latent heat by a body, the temperature of the body remain constant
(d) In an isothermal process pressure is constant everywhere

(vii) Emission of alpha (α) particle is alternatively referred as the emission of _____.

(a) Helium
(b) Hydrogen
(c) Sodium
(d) Radium

(viii) What is the energy required to raise the temperature of 5 kg of water from 10 K to 50 K? [Specific heat capacity of water is 4184 $J \cdot kg^{-1} \cdot K^{-1}$.]

(a) 836.8 J
(b) 836.8 kJ
(c) 242.4 kJ
(d) 242.4 J

(ix) Why are hot water bottles used for fomentation?

(a) Internal energy of water is very low.
(b) Specific heat capacity of water is very low.
(c) Specific heat capacity of water is very high.
(d) Density of the water is maximum at 4 degree centigrade.

(x) Why are the radiators in the car and generator filled with water?

(a) Water can extract more heat without raising its temperature significantly.
(b) Water can lower its temperature without taking much heat from outside.
(c) Specific heat capacity of water and radiators of cars are nearly same.
(d) None of the above.

Section-B (Attempt any three questions from this section)

Question 2.

(i) A nucleus of an atom X has a mass number 48 and atomic number 18.

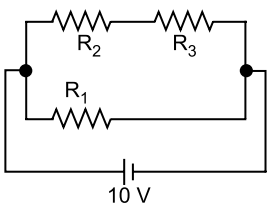
(a) What is the number of neutrons in the nucleus? Write the symbol of atom X.
(b) If four proton are lost from the atom X, what will be the symbol of the daughter nucleus Y?

(ii) (a) In 30 seconds, a 5 kilowatt electric geyser elevates the temperature of 1 kg of water from 278 K to 328 K. What is the amount of energy supplied by the heater?

(b) Is it safe to connect this electric geyser with the live wire?

(iii) Consider the given figure:

Given: $R_3 = R_2 = 4$ Ohm and $R_1 = 8$ Ohm



(a) What is the equivalent resistance of the circuit?
(b) What is the current flowing through the battery?
(c) If all the resistors are connected in series, then current flowing through the battery is?

Question 3.

(i) (a) State Lenz's law.

(b) Can we find the direction of induced current using this law?
(c) Write the name of the device shown below?

(ii) An electric bulb is rated as 100 W-220 V.

(a) What is the resistance of the filament?

(b) What is the safe current which can flow through the bulb?

(c) Is it safe to use 1 A current flow to this bulb?

(iii) (a) Define Latent heat.

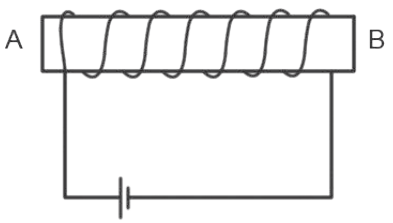
(b) How Sensible heat is different from latent heat?

(c) When ice in a frozen lake start melting, its surrounding becomes very cold. Why?

Question 4.

(i) You have been provided with a solenoid AB.

(a) What is the polarity at end A?



(b) Give one advantage of an electromagnet over a permanent magnet.

(ii) (a) What is isotope?

(b) Write any two isotopes of Carbon. Is there a radioactive isotope of carbon?

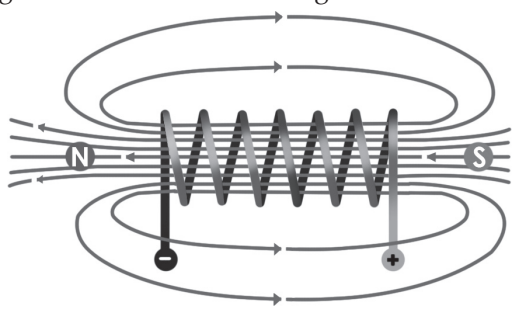
(iii) (a) Define Quality of a sound.

(b) Present two differences between Music and Noise.

(c) When a tuning fork is allowed to vibrate in the air, what type of vibration does it produce?

Question 5.

(i) Consider the following figure of a solenoid with magnetic lines:

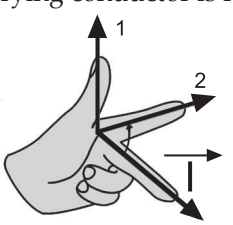


(a) Can a soft iron increase the magnetic line density? How?

(b) If the number of turns per unit length of the solenoid is increased what will be the effect on magnetic line density?

(c) Resistance of the wire has no effect on the magnetic field line density. Correct or wrong?

(ii) Fleming's left hand rule of current carrying conductor is represented in the figure below:

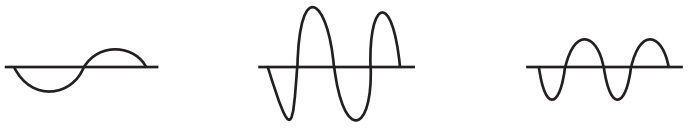


(a) What the direction 1 indicates?

(b) What the direction 2 indicates?

(c) What is the angle between direction 1 and direction 2?

(iii) Consider the following figure:



(a) What is amplitude of a wave? Which one in the figure has the highest amplitude?

(b) Which one has the lowest frequency?

Answers

Section-A

Answer 1.

(i) (d) all of these

Explanation :

All alpha, beta, gamma (γ) particles can be stopped by a lead box. Whereas, Alpha (α) and Beta (α) particles can easily be stopped by a paper and an aluminium sheet, respectively. But gamma rays are more penetrating and can be stopped only by lead box.

(ii) (d) 41 F

Explanation :

We know, C/5 = (F-32)/9.

Here C = 5.

So, 5/5 = (F-32)/9.

Solving we get, F = 41° F.

(iii) (b) Parallel

Explanation :

In our household, electrical appliances are connected in a parallel. It is done so as to ensure that all appliances operate at the same voltage. Because the resistance in a parallel arrangement is minimal, thus each appliance receives full voltage. When one appliance fuses, it has no effect on the operation of the other appliances.

(iv) (a) Hydrogen

Explanation :

Among the given substance, hydrogen has the highest specific heat capacity of 14630 J Kg^{-1} K^{-1}. Where is for water, Lead and oxygen it is, 4180, 130, and 300 J kg^{-1} K^{-1}.

(v) (c) The direction of current flow

Explanation :

Regardless of the direction of current flow, the amount of heat produced in the transmission wire (in general, a current carrying conductor) is determined by the amount of current flowing through it and the resistance of the conductor.

(vi) (c) During absorption of latent heat by a body, the temperature of the body remains constant

Explanation :

During absorption of sensible heat by a body, the temperature of the body changes. During absorption of latent heat by a body, the temperature of the body remains constant. In an isothermal process, temperature is constant everywhere.

(vii) (a) Helium

Explanation :

Emission of alpha (α) particle is alternatively referred as the emission of helium. Both alpha (α) particle and helium has mass number of 4 and atomic number of 2.

(viii) (b) 836.8 kJ

Explanation :

Given: m = 5 kg; C_p = 4184 J·kg^{-1}·K^{-1}; Δt = (50 – 10) = 40 K.

Thus, required Energy (Q) = $m \times C_p \times \Delta t$ = 5 × 4184 × 40 = 836.8 kJ.

(ix) (c) Specific heat capacity of water is very high.

Explanation :

The reason for using hot water bottles for fomentation is that water does not cool quickly due to high specific heat capacity, so a hot water bottle provides more heat energy for fomentation over a longer period of time.

(x) (a) Water can extract more that heat without raising its temperature significantly.

Explanation :

When water passes through a pipe surrounded by a hot part of the engine, heat energy is removed from those parts. Because water has high specific heat capacity, water in pipes may extract more heat from the environment without significantly raising its temperature. As a result, the car's radiator and generator are both filled with water.

Section-B

Answer 2.

(i) (a) Mass number A = number of protons + number of neutrons

Atomic number Z = number of protons.

Number of neutrons = mass number A-atomic number Z = 48 – 18 = 30.

The nucleus X can be written as, $^{44}_{18}X$.

(b) After the loss of 4 protons, the mass number and the atomic number of the nucleus $^{48}_{18}X$ will decrease by 4. Thus the new nucleus will be $^{44}_{14}Y$.

(ii) (a) Time t = 30 sec

Temperature ΔT = 328 – 278 = 50 K

Mass of water (m) = 1 kg

So, energy supplied by the geyser (Q) = power × time = 5000 × 30 = 150000 = 1.5 × 10^5 J.

(b) No, it is not safe to connect this electric geyser with the live wire. Because even if the switch is off, still the geyser will have access to current. Thus, it is dangerous to the users.

(iii) (a) The equivalent resistance is $(1/R) = \frac{1}{4+4} + \frac{1}{8}$. Or, R = 4 ohm.

(b) Current flowing through the battery is = 10/4 = 2.5 A.

(c) If they are connected in series, then the equivalent resistance (R) = 4 + 4 + 8 = 16 ohm.

Current flowing through the battery will be = 10/16 = 0.625 A.

Answer 3.

(i) (a) According to Lenz's law, the direction of induced e.m.f is such that it opposes the cause which produces it.

(b) Yes, we can find the direction of induced current using Lenz's law.

(c) The device shown in the figure is called 'Toroid.'

(ii) (a) Resistance of the filament (R) = $V^2/P = (220)^2/100$ = 484 Ohm.

(b) Safe current (I) = Power rating/Voltage rating = 100/220 = 0.45 A.

(c) As the safe current is 0.45 A, thus using current more than 0.45 A is unsafe to use.

(iii) (a) During a constant-temperature process, latent heat is the energy emitted or absorbed by a body or a thermodynamic system. Changes in phase between liquids, gases, and solids are associated to latent heat.

(b) The term "sensible heat" refers to energy that is transferred as heat and results in a temperature change in a body.

(c) When the ice in a frozen lake begins to melt, the area around it gets extremely chilly. This is due to the fact that melting the frozen lake requires a significant quantity of heat energy, which is absorbed from the surrounding environment. As a result, the ambient temperature drops and becomes very cold.

Answer 4.

(i) (a) North pole.

(b) Electromagnet is a very strong magnet as compared to a permanent magnet.

(ii) (a) Isotopes are atoms of the same element with the same atomic number but different mass numbers.

(b) Carbon has three isotopes, viz. ${}^{12}_{6}C$, ${}^{13}_{6}C$, and ${}^{14}_{6}C$. Among them ${}^{14}_{6}C$ is a radio isotope and can be used to determine age of fossils.

(iii) (a) A sound's quality is the characteristic that distinguishes two sounds of equal loudness and pitch, but produced by two distinct instruments.

(b) Difference between music and noise.

1. Music is produced by periodic vibrations, noise is produced by an irregular succession of disturbances.
2. In music the waveform is regular, whereas in noise the waveform is irregular.
3. Music is pleasant to ears, whereas Noise is unpleasant to ears.

(c) When the tuning fork is allowed to vibrate in the air, produces damped vibration.

Answer 5.

(i) (a) Yes, soft iron is an excellent material for increasing the density of magnetic lines. The magnetic field lines will be significantly increased if the soft iron rod is placed within the solenoid core.

(b) If the number of turns per unit length of the solenoid is increased, magnetic field lines will be significantly increased. By that it can have stronger magnetic field.

(c) This is a wrong statement. Because, if resistance of the wire of the solenoid is reduced, it will have positive effect on the magnetic field line density.

(ii) (a) As per Fleming's left hand rule, the force on a current carrying conductor in a magnetic field is indicated by direction 1.

(b) As per Fleming's left hand rule, the direction of magnetic field for a current carrying conductor is indicated by direction 2.

(c) All the directions of force, magnetic field, and current are perpendicular to one another. As a result, the angle formed by the direction of force and the direction of magnetic field is 90 degrees.

(iii) (a) The amplitude of a wave is referred as the height of a wave, which is measured from the highest point on the wave to the lowest point on the wave.

Among the given figure, figure (b) has highest amplitude.

(b) As the number of waves that pass a fixed point in a given amount of time for figure (a) is the lowest, thus figure (a) has the lowest frequency.

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