STD: X **DATE: 07-03-2022**

SUBJECT: Physics **MARKS: 40**

TIME: 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 the 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.)*

Question 1

Choose the correct answers to the questions from the given options. (Do not copy the questions. Write the correct answer only.)
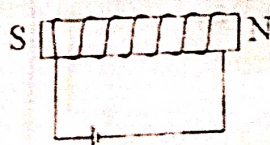
   (i)   The radiation with minimum speed is: [1]
        (a) α
        (b) β
        (c) γ
        (d) radio waves

   (ii)   The pair of isobars, in the following pairs, is: [1]
        (a) $_{11}Na^{23}$ and $_{12}Mg^{23}$
        (b) $_{11}Na^{23}$ and $_{12}Mg^{24}$
        (c) $_{11}Na^{23}$ and $_{11}Mg^{23}$
        (d) $_{12}Na^{23}$ and $_{12}Mg^{23}$

   (iii)   which one in the following shows the correct polarity?   [1]
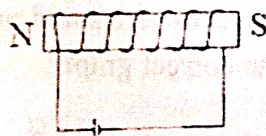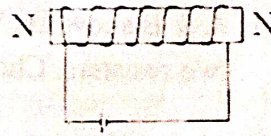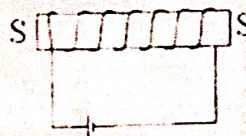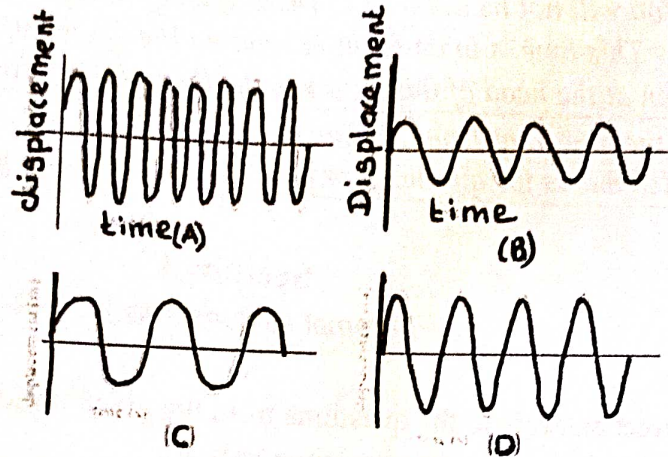
(iv) Amount of heat energy required to melt 450 g of ice would be: [1]
(Specific latent heat of ice = 336000 J/Kg)
(a) 151200 J
(b) 15.12 J
(c) 1512000 J
(d) 1.5 x 10^4 J

(v) Which of the following graphs show high frequency sound wave, [1]
while all the graphs show the same time?
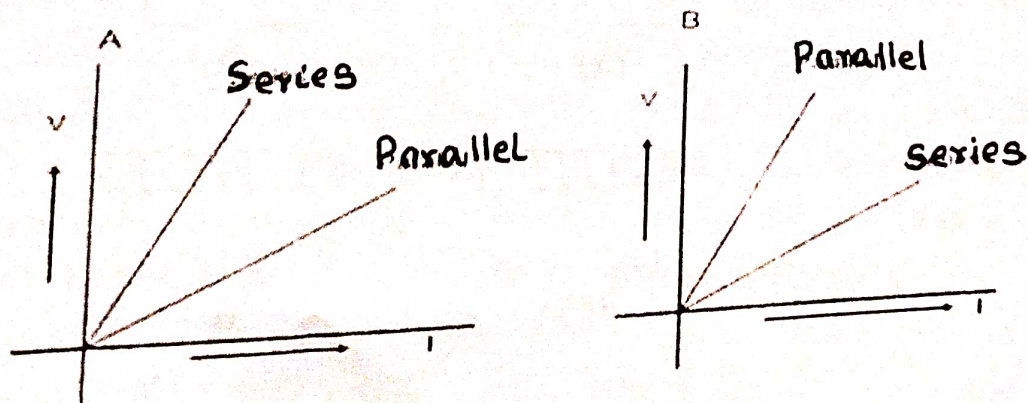

(vi) Fuse is connected in the circuit for: [1]
(a) Appliance safety.
(b) Human safety.
(c) Both a and b.
(d) None of the above.

(vii) Resonance of sound waves results in: [1]

(a) A weak sound.

(b) A loud sound.

(c) A mixed sound.

(d) A soft sound.

(viii) A & B show the V-I graphs of series and parallel combinations of [1]
two resisters. Choose the correct graph:

(a) Both are correct graphs.

(b) Graph A is correct.

(c) Graph B is correct.

(d) Data not enough.

(ix)   The energy conversion in an A C generator is: [1]

(a) Magnetic energy to electrical energy.

(b) Mechanical energy to electrical energy.

(c) Electrical energy to mechanical energy.

(d) Mechanical energy to magnetic energy.

(x) A substance is heated at a constant rate from low temperature to high   [1]
temperature. A temperature- time graph is shown below. Which part of the
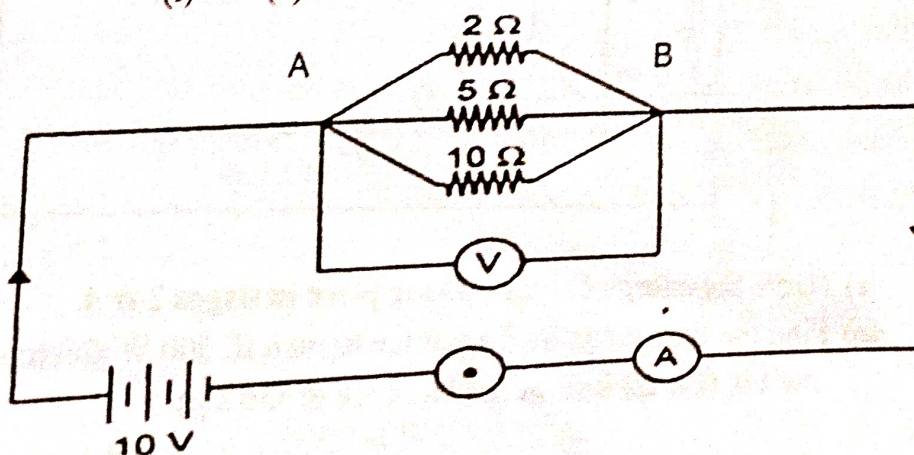graph corresponds to the substance existing in two states?
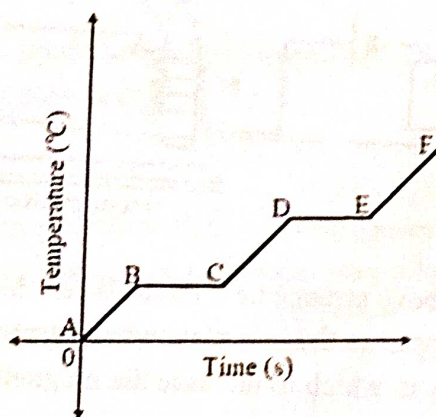
(a) AB & EF

(b) CD & EF

(c) BC & DE

(d) All of the above.

Section B

*(Attempt any three questions from this section)*

Question 2   [3]

(i)   (a) Calculate the total resistance across AB.

(b) Find the reading of the ammeter if the battery has negligible internal resistance.

(ii)   (a) Two blocks X and Y of different metals having their mass in ratio [3] are given same amount of heat. Their temperature rises by the same amount. Compare their specific heat capacities.

(b) Drinks get cooled more quickly by adding pieces of ice than ice-cold water at 0°C. Give scientific reason.

(iii)   The diagram below shows an insulated copper wire wound around a [4] U shaped soft iron core.
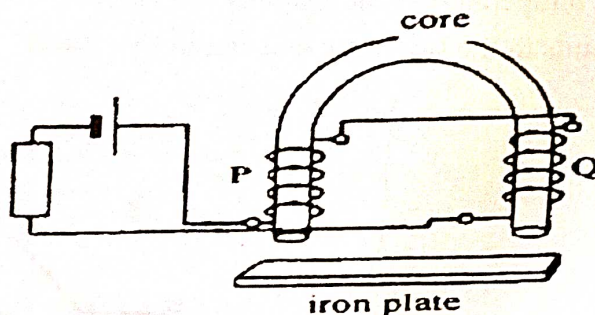
(a) What is the above arrangement called when the current is passed?

(b) What will happen to the iron plate when current is passing in the circuit?

(c) State one way in which to increase the magnetic field without changing th soft iron core.

(d) What will happen to the iron plate when the switch is off?

Question 3

(i)   Following is the heating curve of ice of 300 g. [3]
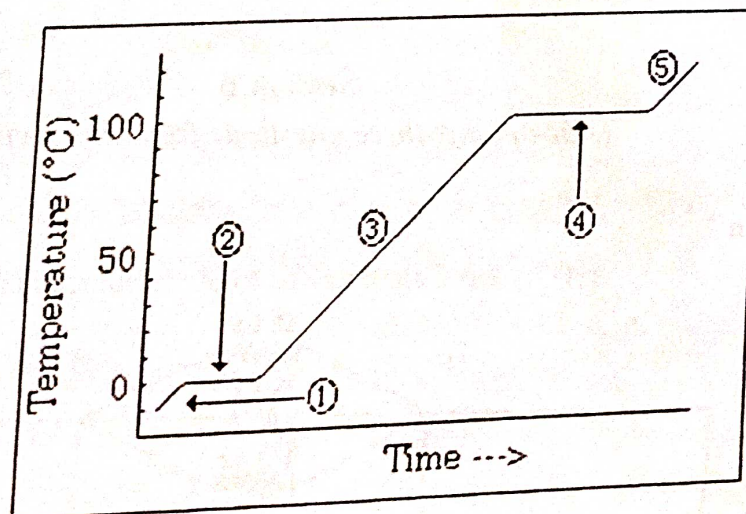
(a) Name the energy changes taking place in stages 2 & 4.

(b) Find the time taken by 2 kg of ice to melt if, 500 W electric heater is used melt it. (Latent heat of fusion of ice is 336 J/g)

(ii) A fuse used in household circuits. [3]
(a) What material is used to make a fuse wire?
(b) State the principle on which the fuse works.
(c) State two characteristics of a fuse wire.

(iii) (a) A liquid R has specific heat capacity lesser than liquid Q. Which of [4] them will be a better coolant in car radiator?

(b) Three metal sheets A, B & C of specific heat capacity 256 J/KgK, 238J/KgK and 380 J/KgK respectively. Which one is best choice to make, a calorimeter? Why?

(c) What would be the heat capacity of 250g of metal sheet selected b y you in answer (b)?

Question 4

(i) A 20 cm tube is filled with water till 14 cm and when a vibrating tuning [3] fork is placed on the mouth of the tube, a loud sound is heard.
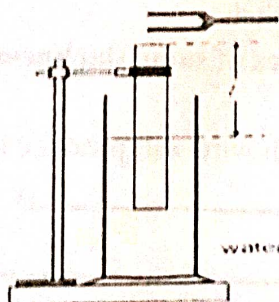
(a) Why is the loud sound heard at a particular level?
(b) Define the above phenomena.
(c) Draw a displacement time graph to show free vibrations in ideal condition

(ii) In the experiment shown below, a magnet is moved towards the solenoid [3]
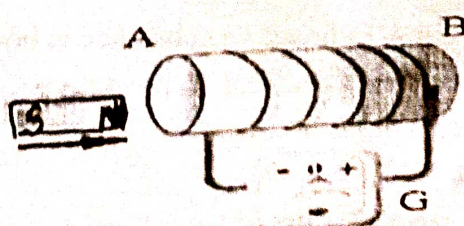
(a) State the polarity at B.

(b) Which law did you use to find the polarity?

(c) How would the galvanometer G behave when the magnet is kept stationary after some time?

(iii)   A radioactive substance $_{92}X^{235}$ emits two beta particles one after the other [4] and one alpha particle along with gamma rays afterwards.

(a) Write a nuclear reaction for the whole process.

(b) What is the mass number of the daughter nucleus after the emission of two beta particles?

(c) Identify two isotopes along with its atomic number & mass number

[3]

Question 5

(i)   (a) In a three-pin plug, why is the top pin thicker and longer than the other two pins?

(b) Why are the ends of the pins splitted?

(c) What is the function of the two smaller pins?

[3]

(ii)   (a) Define pitch.

(b) Two wires of **same thickness** but of different lengths are tied at both the ends. Which wire will produce lower pitch on plucking?

A————————B

C————————————D
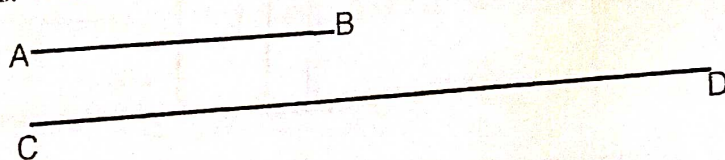
(c) Give scientific reason for your answer.

[4]

(iii)   (a) A mass of 100 g of a certain metal at 300°C is immersed in 200 g of water at 22°C. The final temperature is 40°C. Calculate the specific heat capacity of the metal. (SHC of water = 4.2Jg⁻¹K⁻¹)

(b) A radioactive substance is boiled and then immediately frozen. What will be the effect on its radioactivity? Why?

[3]

Question 6

(i)   (a) Name the radioactive substance used in treating cancer. Name the radiation which this substance emits.

          (b) Arrange α, β and γ in ascending order of the biological damage caused
             by them. [3]

(ii)   (a) Explain two factors on which the loudness of sound depends.
        (b) State the relation between the tension and frequency of a string.

[4]

(iii) (a) An electric appliance is rated 1500 W, 250 V. This appliance is connected to mains of voltage 250 V. Calculate:
      (i)   The current drawn.
      (ii)   The electrical energy consumed in 60 hours.
      (iii)   The cost of electrical energy consumed at the rate of Rs 4.50/kWh.