SHREE CHANDULAL NANAVATI VINAYMANDIR

SECOND PRELIMINARY EXAMINATION

2018-2019

PHYSICS

Date: 07 | 01 | 2019

STD: 10

Marks: 80

Reading Time 15 Mins.

Writing Time 2 Hours.

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

Section I is compulsory. Attempt any four questions from Section II.
The intended marks for questions or parts of questions are given in brackets [ ].

SECTION I

(Attempt all questions from this section)

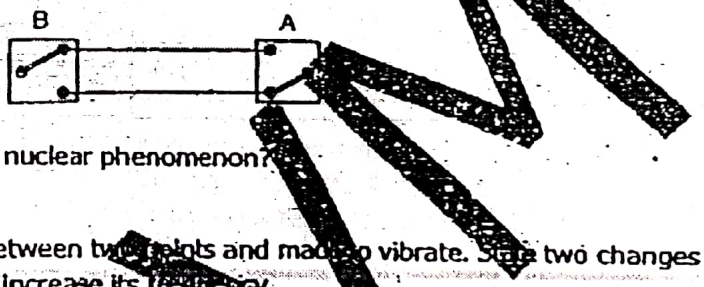
Question 1

a. Which radioactive rays (i) are most ionizing (ii) have the highest velocity. (2)

b. A 12 V electric motor takes a current of 2A for operation. The output of the motor is 18 W. Calculate its efficiency. (2)

c. A Ray of light is travelling from medium A in which velocity of light is less into a medium B where velocity of light is more. Will it bend away or towards the normal? Give reason. (2)

d. A and B shows two switches in a dual control switch used for staircase lighting. Copy the diagram and insert the staircase light in it. Is the staircase light on or off as shown in the diagram? (2)



e. Why is radioactivity a nuclear phenomenon? (2)

Question2

a. A string is stretched between two points and made to vibrate. State two changes to be made in the arrangement to increase its frequency.

b. An electromagnetic radiation of frequency 5×10^{15} Hz. Calculate its wavelength. Name the radiation. (2)

c. State two factors on which Lorentz force depends. (2)

d. A bat emits an ultrasonic sound of frequency 0.30MHz.Calculate the time in which one vibration is completed. (2)

e. Explain why a thermometer reads lower if its bulb is wrapped in wet cloth. (2)

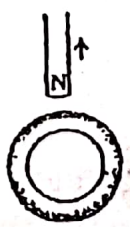
Question3

a. A person is holding a bucket by applying a vertical force of 10N.He moves a horizontal distance of 5m and then climbs up a vertical distance of 10m.Calculate the total work done by him. (2)

b. The refractive index of paraffin oil is 1.44 and that of ether is 1.36.Calculate the refractive index of paraffin oil with respective to ether. (2)

c. How can an alpha particle change into: (2)
(i) a singly ionized helium atom? (ii) a neutral helium atom ?

d. Draw the direction of current in the ring in the diagram given below. Name the law used. (2)



e. State two precautions that must be taken while handling radioactive substances. (2)

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Question4

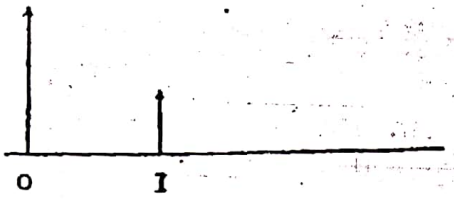
a. When a body moves in a circular path how much work is done by the body at any instant? Give reason& (2)

b. A piece of stone tied at the end of a thread is whirled in a horizontal circle with a uniform speed with the help of hand$ Answer the following questions: (2)

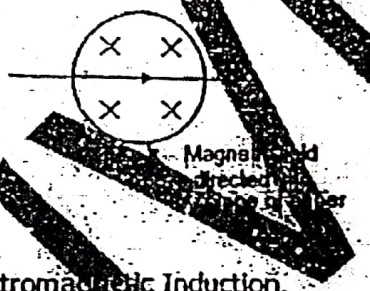
(i) What force does provide the centripetal force required for circular motion?

(ii) Give one difference between centripetal and centrifugal force.

c. The given diagram shows an object O and its image I, locate the lens and complete the diagram. (2)



d. In the given diagram find the direction in which the conductor carrying current moves. Name the rule used. (2)



e. State Faradays law of Electromagnetic Induction. (2)

SECTION II

(Attempt any four questions from this section)

Question5

a. The diagram shows two straight wires carrying equal current

(i) Draw the magnetic field lines produced by each current carrying conductor

(ii) Explain how does the magnetic field, midway between the conductors change if the current in one of the conductors is reversed? (3)

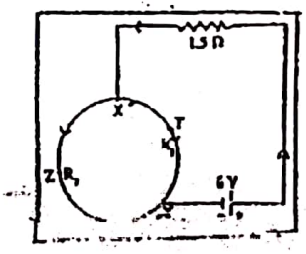
b. How long it will take to melt 2 kg of ice at 0°C to water at 0°C ,if the power of the electric heater used is 1kW?(Specific Latent heat of melting of ice = 336×10^3 J Kg^{-1}) (3)

c. The resistance in path XTY = 2 Ω and that of XZY = 6 Ω.

i. what is the equivalent resistance between X and Y?

ii. what is the current in the main circuit?

iii. find the current that flows through the paths XTY and XYZ? (4)



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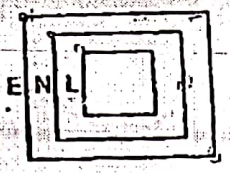
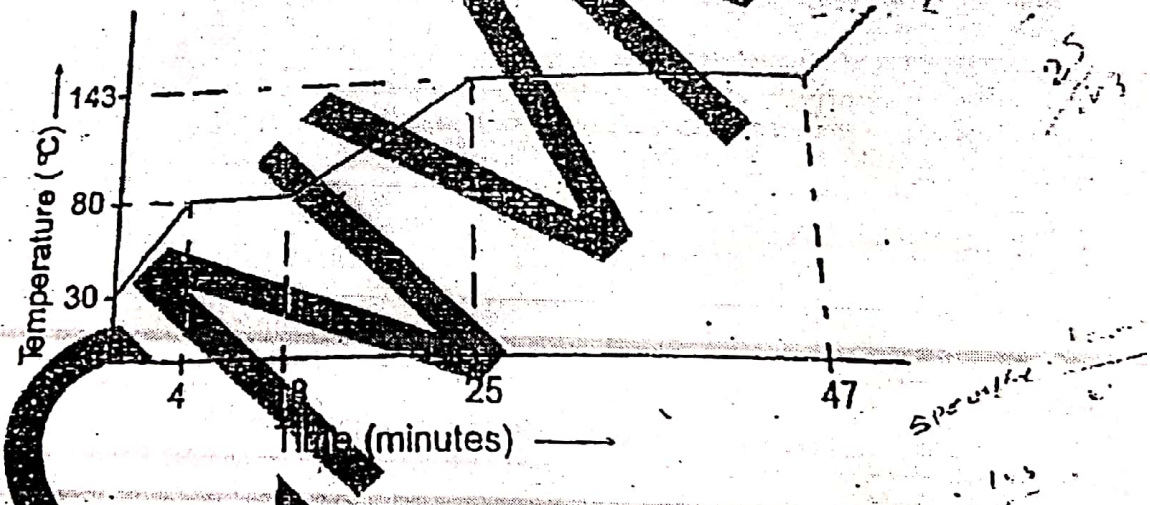
Question6

a. (i) Explain: The surrounding become pleasantly warm when water in lakes start freezing in cold countries.
(ii) Give the relation between heat capacity and specific heat capacity. (3)

b. The diagram shows part of a ring-main circuit with earth (E), neutral (N) and live (L) wires. Copy the diagram and show how you will connect a lamp and a three pin plug socket to it with proper switches and fuse. (3)



c. 40g of a substance X is heated steadily by a 15 W heater. The change of temperature of X with time is shown in the adjoining figure. From the graph find the following: (4)
(i) the melting and boiling point of X
(ii) specific heat capacity of solid X
(iii) heat absorbed during melting .



Question7

a. When a suitable detector is held near a source of radium, the average count rate is found to be 707 counts per minute. When the radium is removed the count rate falls to an average of 13 counts per minute. (i) Explain why the count rate does not fall to zero when the radium source is removed. (ii) Name the phenomenon and mention one internal and one external source of it. (3)

b. A man standing between two vertical cliffs and 640 m away from the nearest cliff shouted. He heard the first echo after four seconds and the second echo 3 seconds later. Calculate (i) the velocity of the sound in air and (ii) the distance between the cliff. (3)

c. . Give reason: (i) the photographic darkrooms are provided with infrared lamps.
(ii)Ultraviolet bulbs have a quartz envelope instead of glass. (4)

Question8

a. On what principle does a transformer work? Why a transformer cannot work on D.C. source?(3)

b. State the factor that determines
(i) The pitch of a note
(ii) The loudness of the sound heard, and
(iii) The quality of a note.

c. What is the result of mixing 100g of Ice with 55g of water at 25°C.(Specific heat capacity of water = 4200 J Kg^{-1} K^{-1} and Specific Latent heat of fusion of ice(approximate value)=330 X 10^3 J Kg^{-1}) . Mention the amount of ice and water in the final mixture. (4)

Question9

a. Complete the nuclear change by finding X, X_1 and X_2: (3)

$$X \xrightarrow{\beta} X_1 \xrightarrow{\alpha} X_2 \xrightarrow{\alpha} {}^{172}_{69}X_3$$

b. A uniform metre scale of mass 60g carries masses of 20g, 30g and 80g from points 10cm, 20cm and 90cm.Where must be the knife edge placed to balance the scale? (3)

c. Orange light of wavelength 6600Å travelling in air gets refracted in water. If the speed of light in air is 3×10^8 ms^{-1} and refractive index of water is $\frac{4}{3}$, find: (i) the frequency of light in air, (ii) the speed of light in water, and (iii) the wavelength of light in water. (4)

Question10

a. A boy lifts a load of 400 N through a vertical height of 5 m in 10s by a fixed pulley applying an effort of 480 N at the other end. Find:
(i) the velocity Ratio
(ii) Mechanical advantage
(iii) Efficiency (3)

b. Give example of each class of lever in the human body. (3)

c. (i) Write two differences between radioactive decay and nuclear fission.
(ii) The sky at noon appears white. Explain. (4)

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Question 7

(a) (i) A certain nucleus 'X' (mass number = 14, Atomic number = 6) changes to 'Y' (mass no = 14, Atomic no = 7) after the loss of a particle.

Name the particle emitted. Represent this change in the form of an equation - (2 mks)

(ii) A radioactive substance is oxydised. What change would you expect to take place in the nature of its radio activity GR. - (1 mk)