DHIRUBHAI AMBANI INTERNATIONAL SCHOOL

PRELIMINARY EXAMINATION 2018-2019

Subject: Physics
Std.: X A

Date: January 16, 2019
Time: 2 hours
(plus 15 minutes reading time)
Marks: 80

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 [ ].
This paper has 10 printed pages.

SECTION A (40 Marks)

Attempt all questions.

Question 1

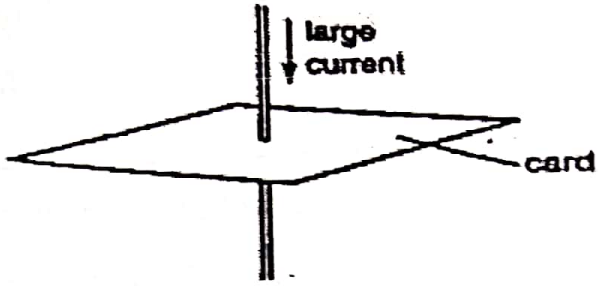
(a) A uniform meter scale is balanced at 60 cm mark, when weights of 5 gf and 40 gf are suspended at 10 cm mark and 80 cm mark respectively. Calculate the weight of the meter scale. [2]

(b) (i) A concave lens has focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? [2]

(ii) Calculate the size of the image formed.

(c) The refractive index of diamond is 2.41 and that of water is 1.33. In which of the two will the speed of light be greater. Justify your answer. [2]

(d) The figure given below shows a wire passing through a piece of card. Draw the pattern of magnetic field lines due to the current in the wire. [2]



(e) An electrical appliance is rated 5 kW, 240 V. Find the cost of running the appliance for 6 hours at ₹ 5.20 per commercial unit. [2]

Question 2

(a) i) What do you mean by background radiations? [2]

ii) Name the radiation which has the highest ionizing power.

(b) A converging lens is used to obtain an image of an object placed in front of it. The image is formed between F_2 and 2 F_2 of the lens. [2]

i) Where is the object placed?

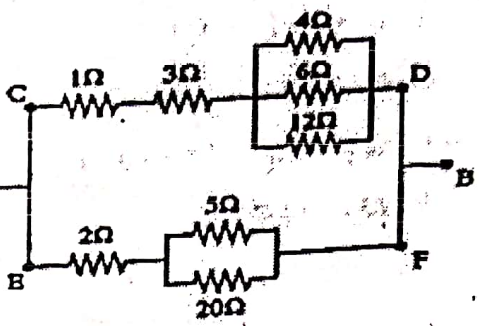
ii) Draw a ray diagram to illustrate the formation of the image obtained.

(c) The temperature of 600 g of cold water rose by 15^0 C when 300 g of hot water at 50^0 C was added to it. What was the initial temperature of cold water? [2]

(d) i) Name the device used to protect the electric circuits from overloading and short circuits. [2]

ii) On what effect of electricity does the above device work?

(e) Calculate the equivalent resistance between A and B. [2]



Question 3

(a) i) Name the high energetic, invisible electromagnetic waves which are used for studying atomic arrangement in crystals. [2]

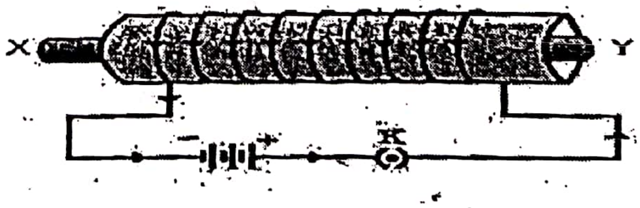
ii) State one more use of these waves.

(b) Two protons are bought close to each other. What will be the effect on the potential energy of the system and why? [2]

(c) The figure given below shows an electromagnet. [2]

i) What will be the polarity at the end 'X'?

ii) Suggest a way by which the strength of the electromagnet may be increased.



(d) i) In winter the weather forecast for a certain day was 'severe frost'. A wise farmer watered his field the night before to prevent frost damage to his crops. Why did he water his fields? [2]

ii) What is the effect of increase in pressure on the melting point of ice?

(e) i) Draw a diagram to show the wave pattern of high pitch note having the same loudness. [2]

ii) How is loudness of sound related to the intensity of wave producing it?

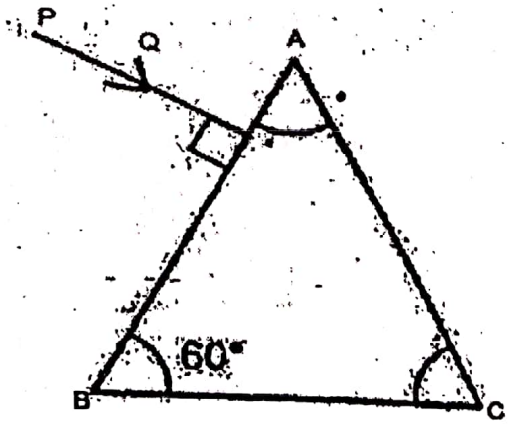
Question 4

(a) Draw a neat and labeled diagram of a single pulley that can act as a force multiplier. [2]

(b) For the same kinetic energy of a body, what should be the change in its velocity if its mass is increased four times? [2]

(c) A slab of ice at -6^0 C is constantly heated till it changes to water at 50^0 C. Draw a graph showing the change of temperature with time. Label the different parts of the graph. [2]

(d) Complete the ray diagram showing its emergence into air after passing through the prism? [2]



(e) A stone is whirled by a boy in a circular path with a constant speed [2]

i) Is the stone moving with uniform/variable velocity?

ii) Name the force acting on the stone and the hand of the boy.

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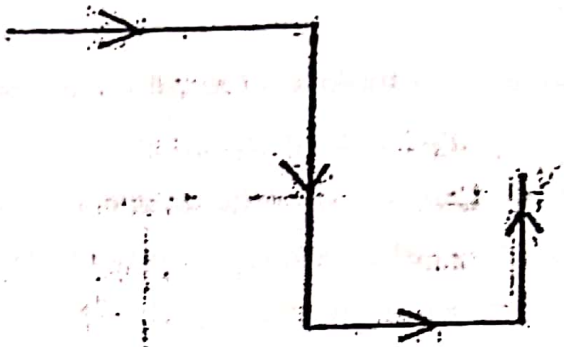
SECTION B (40 Marks)

Attempt any four out of six questions.

Question 5

(a) i) By placing isosceles right angled prisms in the diagram given below, show how a ray of light can be bent. [3]



ii) How is the critical angle of a material related to its refractive index?

(b) i) Complete the ray diagram given below to show the formation of the image of an object AB. [3]

ii) Name the lens used in the diagram.

(c) i) What is meant by scattering of light? [4]

ii) How does the intensity of scattered light depend on the wavelength of incident light?

iii) State the condition when this dependence hold.

iv) The color of the sky, in direction other than that of the sun is blue. Explain.

Question 6

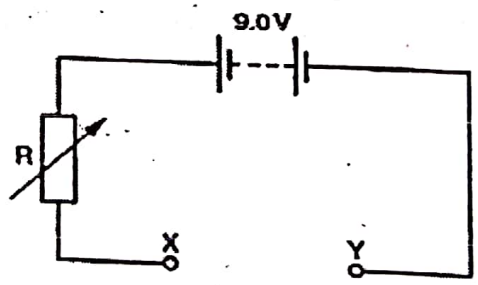
(a) The generators at a power station produce a voltage of 25,000 V. This voltage is stepped up to 400,000 V by a transformer for long-distance transmission on overhead power lines. The voltage is later stepped down to 240 V. [3]

i) State and explain why the voltage is stepped up for long-distance transmission.

ii) Calculate the ratio of the number of turns in the primary coil of the step-up transformer to the number of turns in its secondary coil.

iii) State one advantage and one disadvantage of using thicker wire in the overhead power lines.

(b) The figure given below shows part of a circuit that includes a variable resistor R and a battery of e.m.f. 9.0 V. [3]



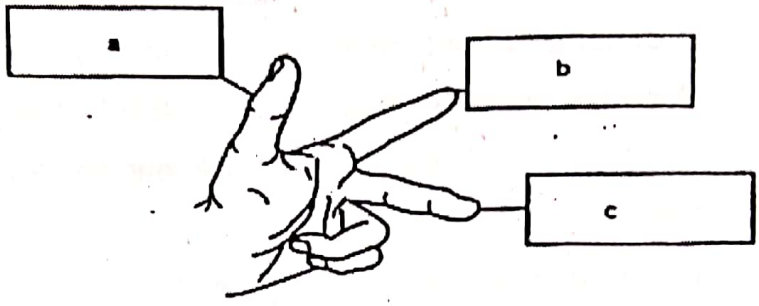
i) State one similarity and one difference between electromotive force (e.m.f.) and potential difference.

ii) A light-emitting diode (LED) is connected between points X and Y, so that it emits light. The resistance of R is increased. State what happens to the potential difference across the LED and to the current in the LED.

iii) The LED is marked "maximum current 25 mA when the potential difference is 1.7 V". Calculate the minimum value of the resistance of R.

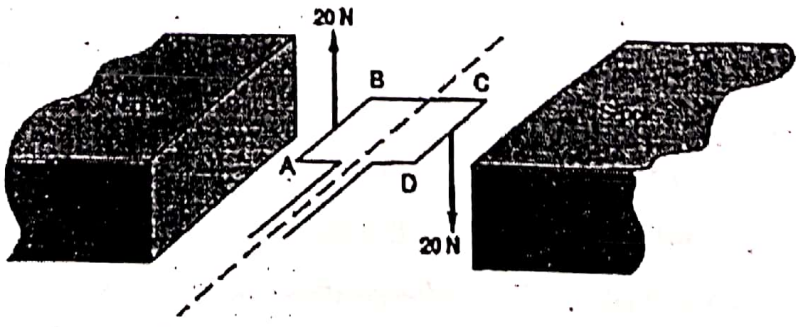
(c) 1) A wire carrying a current in a magnetic field experiences a force due to the current. [4]

In the figure given below label a, b and c to show the relative directions of the current, the magnetic field and the force.



2) The figure shows a current-carrying coil ABCD in a magnetic field. Each side of the coil is 4.0 cm in length. The force on AB is 20 N and the force on CD is 20 N.

i) Calculate the total moment caused by these forces.



ii) The moment is increased by using a stronger magnetic field. State two other ways to increase the moment.

Question 7

(a) 1) If a machine is to be used as a force multiplier and the machine available is lever; then what class of lever should be preferably used? [3]

2) Scissors and pliers belong to the same class of lever.

I) Which one amongst the above has mechanical advantage less than 1?

II) State the usefulness of such a machine whose mechanical advantage is less than 1.

(b) Draw a labelled diagram of block and tackle system of pulleys with two pulleys in each block. Indicate the directions of load, effort and tension in the string. [3]

(c) A pulley system lifts a load of 1200 N by an effort of 250 N. If the load due to movable parts of machine is 300 N, Calculate: [4]

i) Actual mechanical advantage

ii) Ideal mechanical advantage

iii) Number of pulleys

iv) Efficiency of the pulley.

Question 8

(a) i) Define thermal capacity. State its SI unit. [3]

ii) Why is the base of the cooking pan made thick?

(b) i) Materials X, Y and Z are solids at their melting temperatures. Material X requires 200 J to melt 4 kg, Y requires 300 J to melt 5 kg and Z requires 200 J to melt 8 kg. Arrange the materials according to their heat of fusion in descending order. [3]

ii) State the energy changes in an electric cell.

(c) A cube of ice of mass 30 g at 0^0 C is dropped into 200 g of water at 30^0C. Calculate the final temperature of water when the whole ice cube has melted. [4]

Question 9

(a) i) State two ways by which frequency of transverse vibrations of stretched string can be decreased? [3]

ii) What is the function of holes in a flute?

(b) A vibrating tuning fork is placed over the mouth of a burette filled with water. The tap is opened and the water level gradually falls. [3]

i) What do you observe?

ii) Name the phenomenon responsible for your observation and when does it happen?

iii) If the water level in the burette falls further, will you notice the same observation again? Explain.

(c) A cell of emf 1.5 V, internal 1 Ω is connected to the resistors of 4 Ω and 20 Ω in series. Draw the circuit diagram and calculate : [4]

i) potential difference across cell

ii) voltage drop when current is flowing.

Question 10

(a) A man stands in front of a cliff and fires a gun. He hears an echo after 4 seconds. On moving closer to the cliff by 41.25 m and again firing a gun, he hears an echo after 3.75 s. Calculate : [3]

i) speed of sound

ii) distance of the man from the cliff to his initial position.

(b) i) Why is a very high temperature required for the process of nuclear fusion? [3]

ii) State two differences between radioactive decay and nuclear fission.

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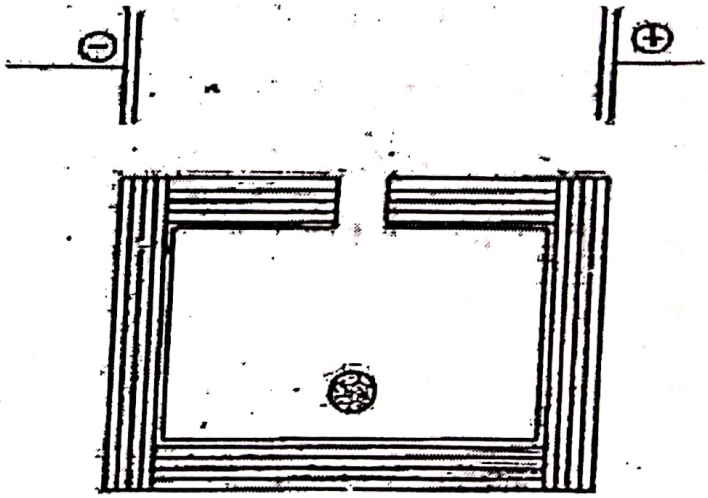
(c) i) A nucleus ${}_{z}X^{A}$ emits 2 α and 1 β particle to form a nucleus ${}_{85}R^{222}$. Find the atomic number and mass number of X. [4]

ii) Copy and complete the diagram by showing the paths of alpha, beta and gamma radiations in an electric field.



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