QUEST CLASSES

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ICSE Board
Class X Physics

Sample Paper - 8

Time: 1½ hrs **Total Marks: 80**

General Instructions:
1. *Answers to this paper must be written on the paper provided separately.*
2. *You will **not** be allowed to write during the first **15** minutes. This time is to be spent in reading the question paper.*
3. *The time given at the head of paper is the time allotted for writing the answers.*
4. *Attempt **all** questions from **Section I** and **any four** questions from **Section II**.*
5. *The intended marks of questions or parts of questions are given in brackets [ ].*

Section I (40 Marks)
Attempt *all* questions from this section

Question 1 **[10]**
   (a) What is the effect on the kinetic energy of a moving car if
      i. Its mass is doubled
      ii. Its velocity is halved
   (b)
      i. In a storm, air exerts force on us. Is it a contact force or a gravitational force?
      ii. In what conditions does a spring exert force on objects attached to its ends?
   (c) State the principle of a machine.
   (d) To which order do levers that have a mechanical advantage necessarily greater than one belong? Give an example of such kind of lever.
   (e) A pendulum is suspended from Point O and oscillates about its mean position OA. At which points do the bob have maximum potential energy and maximum kinetic energy?
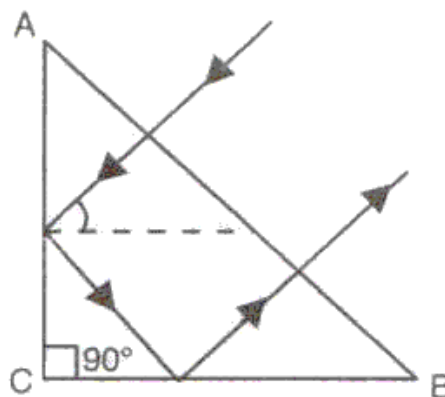
Question 2   **[10]**

    (a) Look at the figure drawn below and calculate the magnitude of effort E and the value of the tensions T_1 and T_2 in the strings.
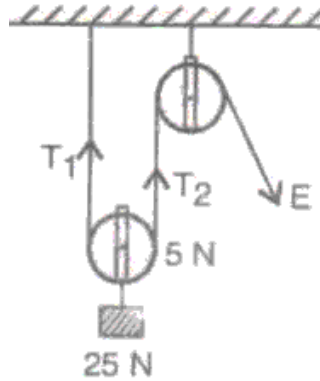
    (b) The figure given below represents the object AB and the image A′B′. Complete the ray diagram to show the formation of the image. Also, write the nature of the lens.


    (c) Differentiate between polychromatic and monochromatic light.

    (d) A ray of light incident normally on face AB of an isosceles prism travels as shown in the figure given below. What will be the value of the refractive index of the material of the prism?


    (e) Why is infrared radiation used for photography in fog?

Question 3 [10]

(a) Each box (shown below) has a lens kept inside it. Draw the lens and complete the path of the rays.
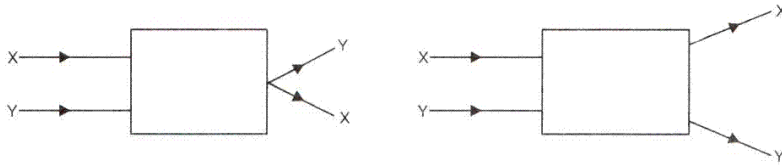
(b) Why are stringed instruments provided with a sound box?

(c) A source supplies heat at a constant rate to a solid cube. The variation of the temperature of the cube with the heat supplied is shown in the figure given below.
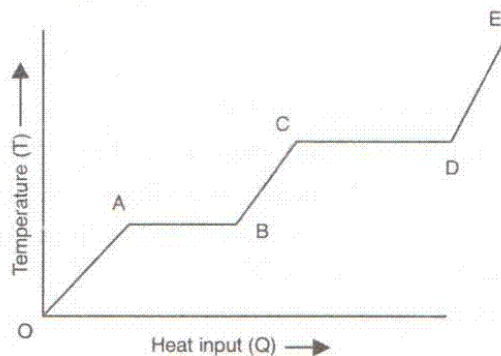
  i.   What does the slope of the part DE represent?

  ii. If CD = 2.5 AB, what does it mean?

(d) The specific latent heat of fusion of water is 3.36×10^5 J kg^{-1}. What information does this convey?

(e) Wires leading the current to an electric bulb are thick, while the wire inside a bulb is very fine. Explain why.

Question 4 [10]

(a) In the figure given below, Point D divides the resistance of part BC into two equal halves. Calculate the resistance between point P and point Q.
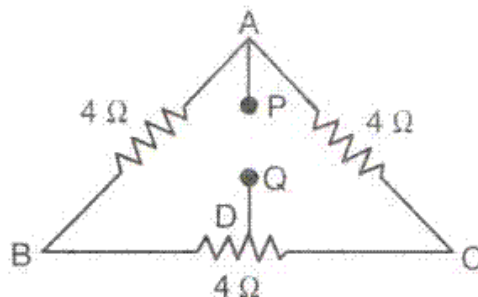
(b) State the factors on which the internal resistance of a cell depends.

(c) What is the function of a split ring in a DC motor?

(d) What properties of metal are necessary for thermionic emission?

(e) Write the nuclear equations for

  i. The $\alpha-$decay of $^{226}_{88}$Ra   ii. The $\beta-$decay of $^{228}_{88}$Ra

Section II (40 Marks)
Attempt *any four* questions from this section

Question 5 [10]

(a) A block and tackle system of 5 pulleys is used to raise a load of 500 N steadily through a height of 20 m. The work done against friction is 2000 J. Calculate:

    i.   Efficiency of the system

    ii. Displacement of the effort applied

    iii. MA

    iv. VR

(b) State the energy conversions in the following:

    i.   Electroplating

    ii. Photosynthesis

    iii. Endothermic chemical reaction

(c) In the following two cases, the mass of the boy is equal to the mass of the girl. What will be the ratio of the work done if the

    i.   Boy climbs the stairs

    ii. Girl climbs a hill which is of the same height as the stairs

        Give reasons to support your answers.

Question 6 [10]

(a) Find by the construction method, the position of a lens and its main foci on the optic axis OO' if S and S' are the object and image points, respectively.

(b)
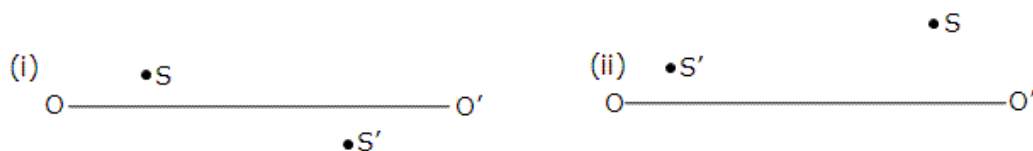
    i.   For which spectral colours of light is the speed maximum and minimum in glass?

    ii. What is angular deviation with respect to a glass block?

(c) The Sun seems to rise before it actually rises and seems to set long after it actually sets. Explain.

Question 7 **[10]**

(a)
  i. Write the factors on which the frequency of a vibrating string depends.
  ii. A bucket is placed below a tap. We can estimate the height of the water level in the bucket from a distance simply by hearing the sound. Explain.

(b) Relate the following quantities to the mass of the body:
  i. Heat capacity
  ii. Latent heat
  iii. Specific latent heat
  iv. Specific heat capacity

(c) Some water at 0°C is placed in a large insulated enclosure. The water vapour formed is pumped out continuously. What fraction of water will ultimately freeze if the latent heat of vaporisation is seven times the latent heat of fusion?
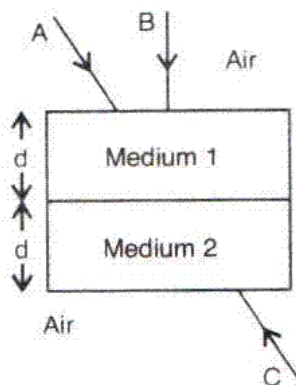
Question 8 **[10]**

(a) Jacob is performing an experiment on refraction. He places two pins P_1 and P_2 at an angle of 45°, and then on the other side he places pins P_3 and P_4.
  i. Show the correct ray diagram.
  ii. What is the perpendicular distance between the incident ray and the emergent ray called?
  iii. If he places a red filter in the path of light, what will be the colour of the ray of light?
  iv. If the emergent ray is allowed to fall normally on a plane mirror, what will be the effect on the path of light?

(b) An aluminium vessel of mass 200 g contains half litre of water at 298 K. Calculate the amount of heat required to raise the temperature of water to 75°C. Specific heat capacity of aluminium = 0.21 cal/g°C, specific heat capacity of water = 1 cal/g°C, density of water = 1 g/cm^3.

(c) In the figure given below, two slabs of equal thickness are shown. The speed of light in medium '1' is less than the speed of light in medium '2'. Trace the path of the rays A, B and C incident from air on this composite slab in the manner shown.
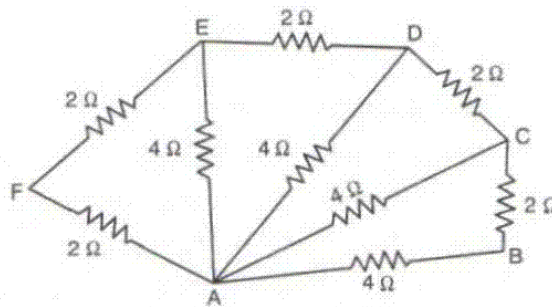
Question 9 [10]

(a) A 1.5 V cell of internal resistance 1Ω is connected to the resistors of 4Ω and 20Ω in series. Calculate:

   i. Current in the circuit

  ii. PD across each resistor

 iii. PD across the cell

 iv. Voltage drop when the current is flowing

(b) What is the total resistance between A and B in the given circuit?

(c) State any three advantages of an electromagnet over a permanent magnet. State three factors on which the strength of an electromagnet depends.

Question 10 [10]

(a) In fission of one uranium-235 nucleus, the loss in mass is 0.5 a.m.u. What amount of energy is released?

(b) Write three safety precautions for handling radioactive materials.

(c) Draw a labelled diagram of fission of the $^{235}_{92}U$ nucleus.