ICSE Board
Class X Physics
Gold Series
Sample Paper-2

Time: - 1½   Marks: - 80 Marks

Section 1 (40 Marks)
(Attempt *all* Questions from this Section)

Question 1   **[10]**
  (a) Why does the speed of a falling body continuously increase?
  (b) Two bodies of equal mass are dropped from a cliff. At any instant which physical
      quantity (momentum, acceleration, kinetic energy, and potential energy) will be the
      same?
  (c) Name a machine which is used to (i) Multiply speed (ii) multiply force (iii) changing
      the direction of effort to a convenient direction (iv) changing the point of application
      of effort to a convenient point.
  (d) Calculate the length of arm of a couple, if a force of 13 N produces a moment of
      couple of 14.3 N m.
  (e) A ray of light travels from one medium to another, it bends. State the condition
      when the angle of deviation of the ray is (i) positive (ii) negative.

Question 2   **[10]**
  (a) A ray of light is passed from a transparent medium A to transparent medium B. It
      (i) speeds up
      (ii) slows down. State in each case, the relation between refractive index (> = <) of
      both media.
  (b) Five immiscible transparent liquids (I, II, III, IV and V) are placed in a rectangular
      container of glass with the liquids making layers in the increasing order of their
      refractive indices 1.51, 1.53, 1.61, 1.62 and 1.63 respectively from top of the level in
      the container to the bottom. The container is illuminated from the side and a small
      glass piece (μ= 1.61) is gently dropped into the container. In which liquid,
      descending glass piece will not be visible?
  (c) A convex lens forms a real image of a point object placed on its principal axis. If the
      upper half of the lens is painted black, will the image be shifted? Will the intensity of
      the image increase or decrease?
  (d) Which material prism is used for obtaining the spectrum of ultraviolet radiation and
      why?
  (e) A waiter uses a sound pipe to communicate with the chef in the kitchen. Name the
      principle on which sound pipe works. Give the suitable diagram also.

Question 3 **[10]**

(a) Name the waves which are used in,
  (i) Sound navigation and ranging to find the depth of sea
  (ii) Radio detection and ranging to detect the presence of an enemy's aeroplane in its path

(b) Three equal resistors of resistance r are first connected in series and then connected in parallel. What will be the ratio of the maximum to the minimum resistance?

(c) A negative charge released from a point P moves along the line PQ. The potential at P is 10 V and varies uniformly along PQ. What will be the potential at Q (less than, equal to or greater than 10 V)?

(d) The resistance of two lamps is in the ratio 4: 5. What will be the ratio of their wattage?

(e) Name the three wires of the cable which are used to supply power to a house from the city sub-station.

Question 4 **[10]**

(a) Name two rules to determine the direction of induced current in a closed circuit of the coil.

(b) If the temperature of a solid body is observed to be constant during a period. Give two inferences for this period.

(c) When a solid melts or a liquid boils, the temperature does not increase even when heat is supplied, where does the energy go?

(d) What is the use of control grid in an electron gun?

(e) Which reaction is the source of solar energy?

Section 2 (40 Marks)
(Attempt *any four* Questions from this Section)

Question 5   **[10]**

(a) A meter scale of mass 0.2 kg is suspended by two strings at each end as shown in the figure.
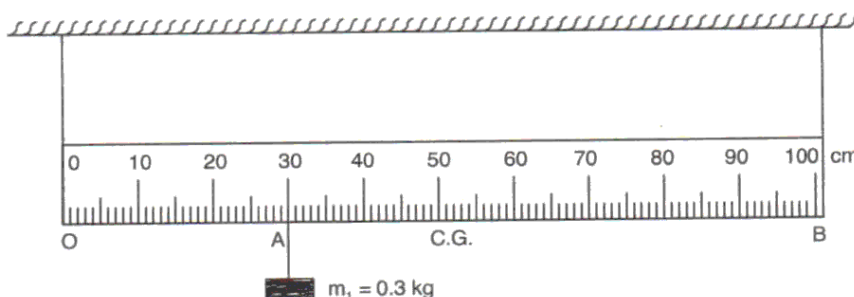
A body of mass 0.3 kg is suspended by a weightless string at 0.3 m mark. Calculate the tensions in the string by which the meter scale is suspended. (Take g = 10 m/s^2)

(b) Determine the nature of work (positive, negative or zero) done on the body in following cases:

(i) When a body is displaced along a horizontal surface, work done by its weight.
(ii) A ball falling freely under the action of gravity.
(iii) When two similar charges approach each other, they repel each other.

(c) Following table shows some Highway code data of stopping distances for cars on applying brake at different initial speeds.

Initial speed (m/s)	10	15	20	25	20
Braking distance (m)	6	13.5	?	37.5	54

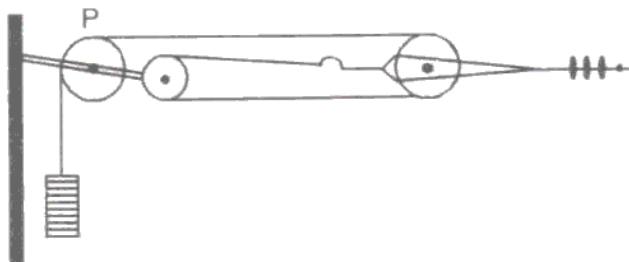Plot a graph of the braking distance against (initial speed)^2.
How does the kinetic energy of the car.

(i) depends on square of the speed?
(ii) affect the braking distance?

**Question 6** [10]

(a) Figure given below shows a wire of Rail's electrification system being held taut by pulleys.

     (i) By what factor is the force multiplied?
     (ii) What is the purpose of pulley P?
     (iii)Why are pulleys used at all?

(b) A ray parallel to the principal axis is incident on the convex lens L_1. The ray after refraction through the lens L_1 is intercepted by the concave lens L_2. After refraction it appears to meet at point F which serves as focus for both the lenses. Draw the ray diagram. If distance of F from optical centre of lens L_1 is 30 cm and lens L_2 is 20 cm, give the focal length of both the lenses.

(c)
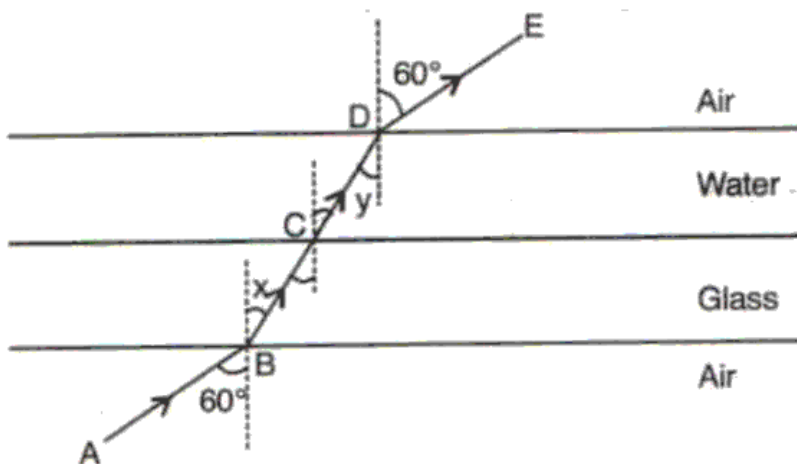
Define refractive index. Figure shows a glass slab of uniform thickness lying horizontally. Above it is a layer of water. A ray of light AB is incident on the lower surface of glass which is refracted successively at B, C and D, the points where it crosses the interfaces. Calculate:

    (i) $\angle x$
    (ii) $\angle y$ and
   (iii)refractive index for light passing from the water to glass.
       Refractive indices of glass and water are 3/2 and 4/3 respectively.

Question 7 **[10]**

(a) Name three consequences of total internal reflection.

(b)

(i) Match the properties of sound viz pitch, quality and loudness with the quantities waveform, frequency and intensity.

(ii) A pitcher is placed below a running tap of water. As the pitcher is getting filled up, sound becomes more and more shrill, why is it so?

(c) Define echo. Two men 0.68 km apart stand at the same distance from a vertical hillock. One of them fires a shot and other hears the echo 3 s after hearing the direct sound. Find the distance of the man from the hillock assuming the velocity of sound to be 340 m/s.

Question 8 **[10]**

(a) What is meant by the electromotive force of a cell? A cell B of 6 V and negligible internal resistance is connected to the combination of resistors shown in the figure. What is the effective value of the resistance connected across the terminals of the cell? What are the values of the current i_1 and i_3?
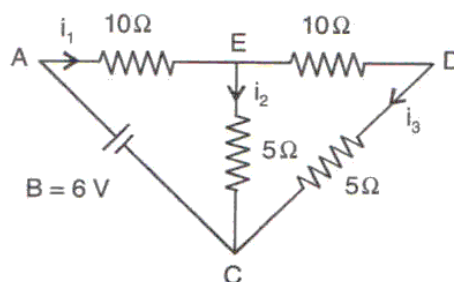
(b) What is a fuse? Name the material of the fuse. State any two characteristics of the fuse wire. How is fuse put in an electric circuit?

(c) Draw a labeled diagram of a d.c. Motor. State two ways to increase the speed of rotation of coil.

**Question 9**   **[10]**

(a) The temperature of a brass cylinder of mass 100 g was raised to 100 $^{\circ}$C and transferred to a thin aluminium can of negligible heat capacity containing 150 g of paraffin at 11 $^{\circ}$C. If the final steady temperature after stirring was 20 $^{\circ}$C, calculate the specific heat capacity of paraffin. Neglect heat losses.
Specific heat capacity of brass = 380 J g^{-1} $^{\circ}$C^{-1}.

(b) 160 g of molten silver at its melting point 960 $^{\circ}$C is allowed to solidify at the same temperature and gives out 16800 J of heat. What is the specific latent heat of silver in SI unit? If the mean specific heat capacity of silver is 230 J/kg $^{\circ}$C, how much additional heat does it give out in cooling to - 40 $^{\circ}$C?

(c)

    (i) Why hydrogen is considered very efficient cooling gas for enclosed electric generators?

    (ii) Why is steam used for running trains?

Question 10   **[10]**

(a) In the figure given below a beam of electrons is moving in the plane form left to right. How would the beam be deflected relative to the paper if

(i) P and Q are North Pole and South Pole respectively?
(ii) P and Q are respectively positively and negatively charged plates?
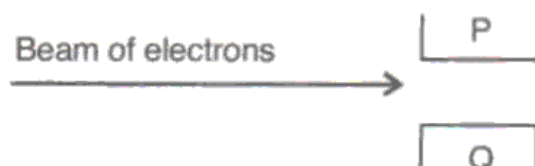
(iii)State two requisites of a metal to be used as an electron emitter.
(b) In the labeled diagram answer the following:
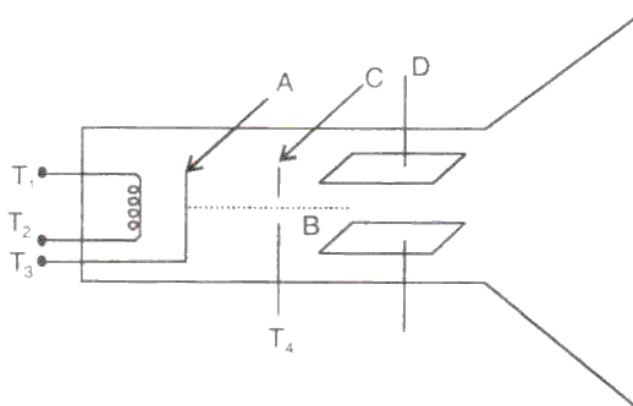
(i) What is represented by symbols A, B, C and D?
(ii) State their purpose.
(iii)If you are given two batteries of 6 V and 1000 V connect them appropriately.

(c) What is the difference between α - particle and a helium atom? Name two origins of background radiation.