STD: X   **Marks: 60**
Date: 29/09/2020   **Time: 2hrs**

Question 1
a.   An electric bulb is rated '100 W, 250 V'. What information does this convey?   **[2]**
b.   An electrical appliance has a rating 100 W, 120 V. Find the resistance of element of
         appliance when in use.   **[2]**
c.   Name the S.I. unit of electrical energy. How is it related to Watt hour?   **[2]**
d.   A man standing in front of a vertical cliff fires a gun. He hears the echo after 3 seconds. On
         moving closer to the cliff by 82.5 m, he fires again. This time, he hears the echo after 2.5
         seconds. Calculate: (i)   The distance of the cliff from the initial position of the man.
                            (ii)   The velocity of sound.   **[3]**
e.   Write an expression for the electrical energy spent in flow of current through an electrical
         appliance in terms of current, resistance and time.   **[1]**
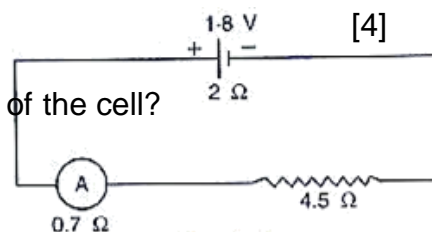
Question 2
a.   Explain the cause of dispersion of white light through a prism.   **[2]**
b.   State two factors on which moment of force about a point depends.   **[2]**
c.   Name three factors on which the deviation produces by a prism depends and state how
         does it depend on the factors stated by you.   **[3]**
d.   i.   Give a list of at least five radiations, in order of their increasing frequencies, which
                 make up the complete electromagnetic spectrum.

         ii.   Which of the radiation mentioned in answer to part (a) has the highest penetrating
                 power?   **[3]**

Question3

a.   Draw a neat labelled diagram for a particle moving in a circular path with a constant speed.
         In your diagram show the direction of velocity at any instant.   **[2]**
b.   i.   with reference to the direction of action, how does a centripetal force differ from a
                 centrifugal force?
         ii.   Is centrifugal force the force of reaction of centripetal force?   **[2]**
c.   A uniform metre rule of weight 10gf is pivoted at its 0 mark.
         (i)   What moment of force depresses the rule?
         (ii)   How can it be made horizontal by applying a least force?   **[3]**
d.   A bucket kept under a running tap is getting filled with water. A person sitting at
         distance is able to get an idea when the bucket is about to be filled.
         (i)   What change takes place in the sound to give this idea?
         (ii)   What causes the change in the sound?   **[3]**

Question 4
a.   Explain the statement 'the potential difference between two points is 1 volt'.   **[2]**
b.   How does the resistance of a wire depend on its radius? Explain your answer.   **[2]**
c.   Draw a I – V graph for a linear resistor. What does its slope represent?   **[2]**
d.   A cell of e.m.f. 1.8V and internal resistance 2Ω is connected in series with an ammeter of
         resistance 0.7Ω and a resistor of 4.5Ω as shown in Fig.   **[4]**
         i.   What would be the reading of the ammeter?
   ii.   What is the potential difference across the terminals of the cell?   **[4]**

Question 5

a. A force F acts on a body and displaces it by a distance S in a direction at an angle θ with the direction of force. (1) Write the expression for the work done by the force. (2) What should be the angle between the force and displacement to get the (i) zero work (ii) maximum work? **[2]**

b. State two factors on which power spent by a source depends. Explain your answer with examples. **[2]**

c. A boy weighing 350 N runs up a flight of 30 steps, each 20 cm high in 1 minute, Calculate:
   (i)   The work done and   (ii)   power spent.   **[3]**

d. A cannon ball of mass 500 g is fired with a speed of 15 m s-1. Find: (i) its kinetic energy and (ii) its momentum. **[3]**

Question 6

a. Why is a machine not 100% efficient? **[2]**

b. The diagram below shows an object AB placed on the principal axis of a lens L. The two foci of the lens are F_1 and F_2. The image formed by the lens is erect, virtual and diminished. Copy the diagram and answer the following questions:
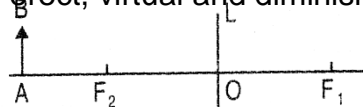
   (i)   Draw the outline of the lens (L) used.
   (ii)   Draw a ray of light starting from B and passing through O. Show the same ray after refraction by the lens.
   (iii)   Draw another ray from B, which after passing parallel to the   principal axis, is incident on the lens and emerges after refraction from it.
   (iv)   Locate the final image formed. **[4]**

c. The diagram below shows a pulley arrangement.
   (a) In the diagram, mark the direction of the forces
    due to tension, acting on the pulley A.
   (b) What is the purpose of the pulley B?
   (c) If the tension is T newton, deduce the relation between T and E.
   (d) What is the velocity ratio of the arrangement.
   (e) Assuming that the efficiency of the system is 100%, what is the mechanical advantage?
    (f) Calculate the value of E. **[4]**

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