ICSE CLASS 10 EXAMINATION

PRACTICE QUESTION PAPER

PHYSICS

Chapter 8 : CURRENT ELECTRICITY

(Ohm's Law and Resistance · E.m.f. and Internal Resistance · Series and Parallel Combinations · Electrical Energy and Power)

Maximum Marks: 40 **Time allowed: One hour**

1. Answers to this Paper must be written on the paper provided separately.

2. You will not be allowed to write during the first 5 minutes. This time is to be spent in reading the question paper.

3. The time given at the head of this Paper is the time allowed for writing the answers.

*4. **Section A** is compulsory. Attempt **all** questions from Section A and **any two** questions from Section B.*

5. The intended marks for questions or parts of questions are given in brackets [ ].

6. Take the charge of an electron as 1.6×10^{-19} C. Ammeters have negligible resistance and voltmeters have very high resistance. Batteries have negligible internal resistance unless stated.

SECTION A (20 Marks)

(Attempt all questions from this Section.)

Question 1

Choose the correct answers to the questions from the given options. *(Do not copy the question, write the correct answers only.)* **[8]**

(i) Which of the following is a non-ohmic resistor?

(a) nichrome wire (b) copper wire

(c) junction diode (d) constantan wire

(ii) The radius of a wire is doubled, its length and material remaining the same. Its resistance becomes:

(a) R ÷ 2 (b) R ÷ 4

(c) 2R (d) 4R

(iii) One kilowatt-hour (1 kWh) is equal to:

(a) 3.6×10^6 J (b) 3.6×10^3 J

(c) 1000 J (d) 3.6×10^5 J

(iv) A cell of e.m.f. ε and internal resistance r sends a current I through an external resistance R. Its terminal voltage is:

(a) ε + Ir (b) Ir

(c) ε ÷ (R + r) (d) ε − Ir

(v) Assertion (A): The fuse wire is made of an alloy of lead and tin.

Reason (R): The alloy has a low melting point and a high specific resistance.

(a) (A) is true and (R) is false.

(b) (A) is false and (R) is true.

(c) Both (A) and (R) are true, and (R) is the correct explanation for (A).

(d) Both (A) and (R) are true, but (R) is not the correct explanation for (A).

(vi) Three resistors of 6 Ω each are joined in parallel. The equivalent resistance is:

(a) 18 Ω (b) 6 Ω

(c) 2 Ω (d) 3 Ω

(vii) The safe current for a bulb rated 100 W, 220 V is approximately:

(a) 2.2 A (b) 0.45 A

(c) 22 000 A (d) 4.5 A

(viii) When the temperature of a metallic conductor rises, its resistance:

(a) decreases (b) increases

(c) remains the same (d) becomes zero

Question 2

(a) State Ohm's law. Write the condition under which the law holds. **[2]**

(b) Fig. 1 shows the V–I graphs for two conductors A and B. **[3]**

(i) Find the resistance of the conductor A. **[1]**

(ii) Find the resistance of the conductor B. **[1]**

(iii) Find the equivalent resistance when A and B are joined in parallel. **[1]**

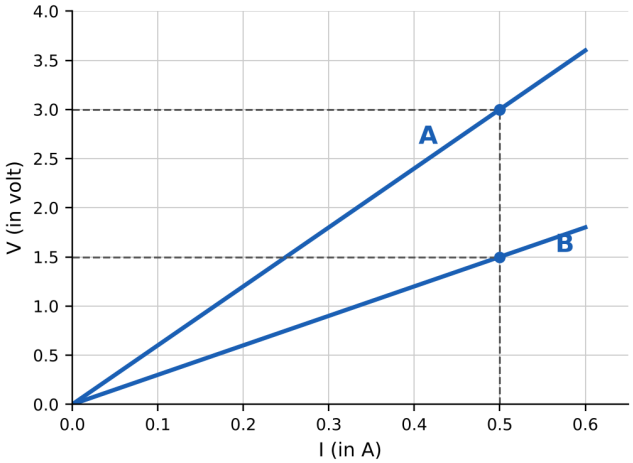


Fig. 1

(c) Name the material used for (i) the filament of an electric bulb and (ii) the heating element of an electric heater. **[1]**

Question 3

(a) A current of 0.5 A flows through a wire of resistance 10 Ω for 2 minutes. Calculate (i) the charge that flows through the wire, (ii) the number of electrons passing through a cross-section, and (iii) the potential difference across the wire. **[3]**

(b) In the circuit of Fig. 2 the 12 V battery has negligible internal resistance. **[3]**

(i) Calculate the total resistance of the circuit. **[1]**

(ii) What is the reading of the ammeter A? **[1]**

(iii) What is the reading of the voltmeter V? **[1]**

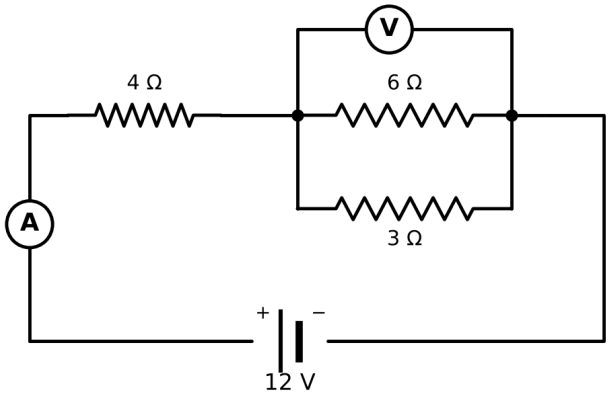


Fig. 2

SECTION B (20 Marks)

(Attempt any two questions from this Section.)

Question 4

(a) A wire has a resistance of 12 Ω. Find (i) its new resistance if it is stretched to double its length, (ii) the equivalent resistance if the original wire is cut into three equal parts which are joined in parallel, and (iii) the effect of stretching on its specific resistance. **[3]**

(b) Give a reason for each of the following: (i) Connecting wires are made of thick copper. (ii) The fuse wire is made of an alloy of lead and tin. (iii) The resistance of a bulb filament is much more when it glows than when it is cold. **[3]**

(c) Fig. 3 shows a cell of e.m.f. ε and internal resistance r connected to a resistor R = 11 Ω through an ammeter and a key K. The voltmeter V is connected across the cell. With the key K open, the voltmeter reads 6 V. When K is closed, the ammeter reads 0.5 A. **[4]**

(i) State the e.m.f. of the cell. **[1]**

(ii) Find the reading of the voltmeter when K is closed. **[1]**

(iii) Find the voltage drop inside the cell. **[1]**

(iv) Calculate the internal resistance r. **[1]**

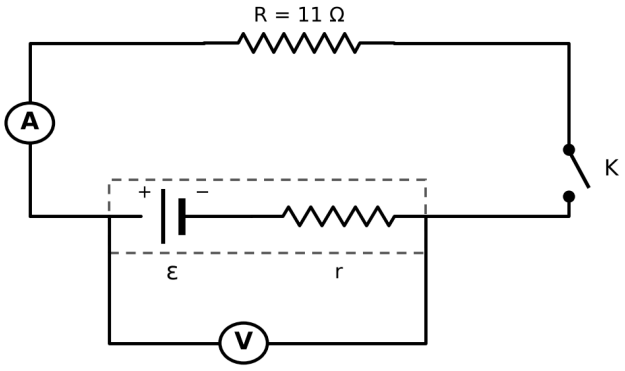


Fig. 3

Question 5

(a) State three differences between the e.m.f. and the terminal voltage of a cell. **[3]**

(b) Fig. 4(a) shows the V–I graphs of the same metal wire at two different temperatures, and Fig. 4(b) shows the V–I graph of the filament of a bulb. **[3]**

(i) Which line, X or Y, corresponds to the higher temperature? Give a reason. **[1]**

(ii) Is the filament in Fig. 4(b) an ohmic or a non-ohmic resistor? Give a reason. **[1]**

(iii) Name one more non-ohmic device. **[1]**

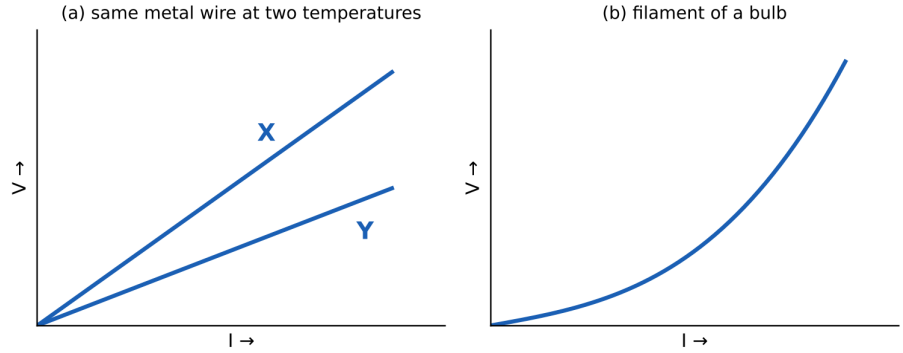


Fig. 4

(c) Fig. 5 shows a network of resistors between the points A and B. **[4]**

(i) Find the resistance of the lower branch between C and D. **[1]**

(ii) Find the equivalent resistance between C and D. **[1]**

(iii) Find the equivalent resistance between A and B. **[1]**

(iv) A 9 V battery of negligible internal resistance is connected across A and B. Find the current drawn from it. **[1]**

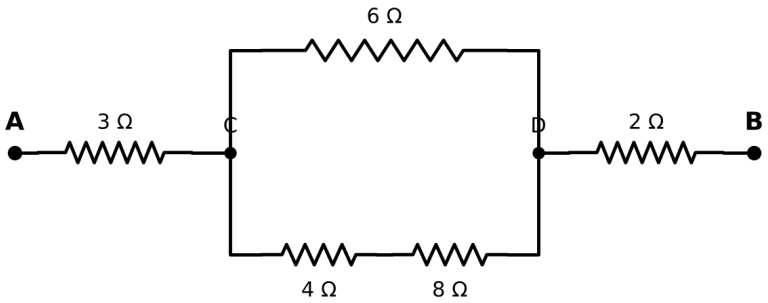


Fig. 5

Question 6

(a) An electric iron rated 750 W, 220 V is used for 2 hours every day. Calculate (i) the electrical energy consumed per day in kWh, (ii) the energy consumed in 30 days, and (iii) the cost of this energy at ₹ 7 per kWh. **[3]**

(b) A heater is rated 2 kW, 250 V. Calculate (i) the resistance of its heating element, (ii) the current drawn when it works normally, and (iii) the electrical energy consumed in 10 minutes, in joule. **[3]**

(c) Fig. 6 shows two bulbs L_1 (60 W, 120 V) and L_2 (40 W, 120 V) joined in series across a 120 V supply. **[4]**

(i) Calculate the resistance of each bulb. **[1]**

(ii) Calculate the current in the circuit. **[1]**

(iii) Calculate the power consumed by each bulb. **[1]**

(iv) Which bulb will glow more brightly? Give a reason. **[1]**

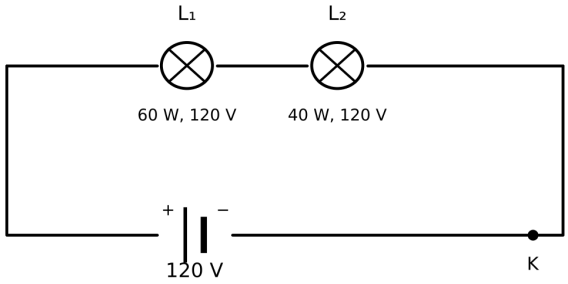


Fig. 6

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