ICSE CLASS 10 EXAMINATION

PRACTICE QUESTION PAPER

PHYSICS

Chapter 9 : HOUSEHOLD CIRCUITS

(Transmission of Power · House Wiring · Fuse and Switches · Staircase Wiring · Earthing · Three-Pin Plug and Socket · Safety Precautions)

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 mains voltage as 220 V. Use the new international colour code for wires. Figures are for completion and labelling on the answer sheet.

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) Electric power is transmitted over long distances at a very high voltage in order to:

(a) increase the current in the line wires (b) reduce the loss of energy in the line wires

(c) increase the frequency of the supply (d) convert a.c. into d.c.

(ii) The fuse wire is made of an alloy of:

(a) copper and zinc (b) iron and carbon

(c) lead and tin (d) copper and nickel

(iii) In a household circuit, the switch should be connected in the:

(a) neutral wire (b) earth wire

(c) live wire (d) both neutral and earth wires

(iv) According to the new international colour code, the insulation of the neutral wire is:

(a) brown (b) light blue

(c) green or yellow (d) red

(v) Assertion (A): The earth pin of a three-pin plug is made thicker and longer than the other two pins.

Reason (R): The earth connection must be made first, and the pin must not fit into the live or neutral hole of the socket.

(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) A heater is rated 1000 W, 220 V. The most suitable fuse for it is of rating:

(a) 1 A (b) 5 A

(c) 13 A (d) 30 A

(vii) The a.c. supplied to our houses has a voltage and frequency of:

(a) 110 V, 50 Hz (b) 220 V, 60 Hz

(c) 220 V, 50 Hz (d) 11 kV, 50 Hz

(viii) The main switch in a house disconnects:

(a) only the live wire (b) only the neutral wire

(c) both the live and the neutral wires (d) only the earth wire

Question 2

(a) What is a fuse? State the principle on which it works. **[2]**

(b) Fig. 1 shows the transmission of electric power from a generating station to the consumers. P, Q, R and S are transformers; X and Y are voltages. **[3]**

(i) State the type of transformer at P and at S. **[1]**

(ii) Find the voltages X and Y. **[1]**

(iii) Give one reason for stepping up the voltage at P before transmission. **[1]**

Transformers are marked P, Q, R and S

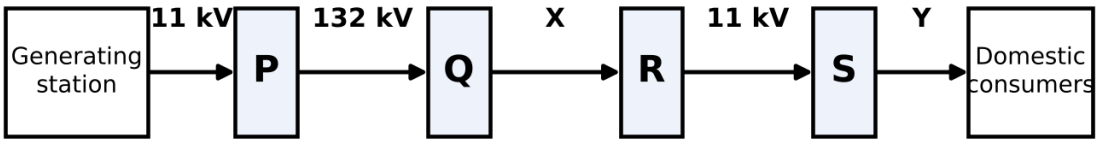


Fig. 1

(c) State the voltage and the frequency of the a.c. supplied to our houses. **[1]**

Question 3

(a) A house has a main fuse of rating 10 A. The following appliances are used at the same time: 6 bulbs of 60 W each and 2 fans of 80 W each, on a 220 V supply. Calculate (i) the current drawn from the mains, (ii) the excess current that can still be drawn safely, and (iii) the number of additional 100 W bulbs that can be lighted without blowing the main fuse. **[3]**

(b) Fig. 2 shows a staircase circuit using two dual control switches S_1 and S_2 and a bulb. Each switch has three terminals a, b and c. **[3]**

(i) Complete the connections between S_1 and S_2 so that the bulb can be switched on or off from either switch. **[2]**

(ii) Give a reason why the fuse is connected in the live wire. **[1]**

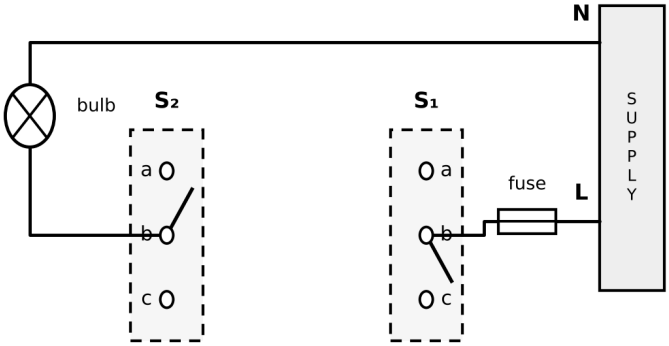


Fig. 2

SECTION B (20 Marks)

(Attempt any two questions from this Section.)

Question 4

(a) An electric oven is rated 3 kW, 220 V. Calculate (i) the current drawn by it, (ii) the current rating of the fuse to be used from 10 A, 15 A and 20 A, and (iii) state why the fuse is never connected in the neutral wire. **[3]**

(b) Give a reason for each of the following: (i) The fuse wire is made of a lead–tin alloy and not of copper. (ii) A switch should never be touched with wet hands. (iii) The switch of an appliance is never connected in the neutral wire. **[3]**

(c) Fig. 3 shows a three-pin plug with its pins marked 1, 2 and 3. **[4]**

(i) Name the pins 1, 2 and 3. **[1]**

(ii) Why is pin 1 made thicker and longer than the other two? **[1]**

(iii) State the colour of the insulation of the wire connected to pin 3 and to pin 2 (new colour code). **[1]**

(iv) Name the pin to which the fuse of the appliance is connected through the live wire, and state the purpose of the pin 1 connection. **[1]**

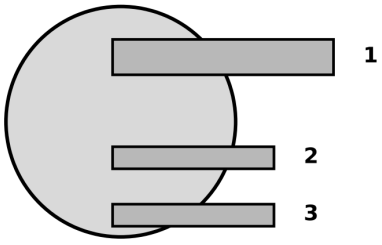


Fig. 3

Question 5

(a) State three reasons why household appliances are not connected in series. **[3]**

(b) Fig. 4 shows two circuits P and Q, each with a fuse F and an appliance, connected to the mains. **[3]**

(i) In which circuit is the fuse correctly connected? **[1]**

(ii) What is the danger in the other circuit when the fuse blows? Explain. **[1]**

(iii) Name the material used for the fuse wire. **[1]**

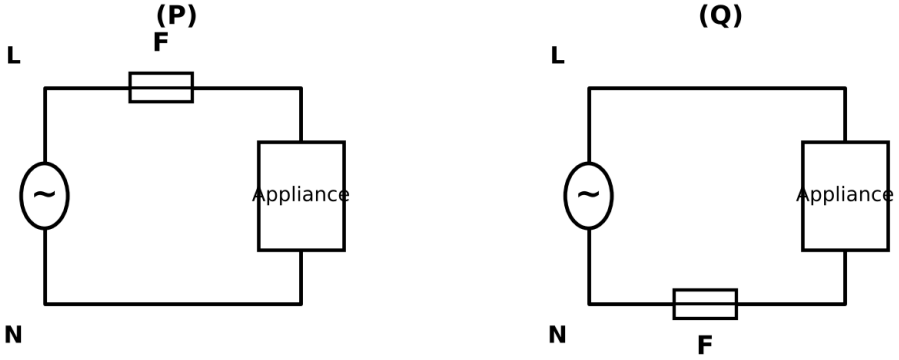


Fig. 4

(c) Fig. 5 shows an electric geyser rated 1500 W, 220 V, with a switch S, a fuse F and its metal case earthed. Because of damaged insulation the live wire touches the metal case at X. **[4]**

(i) To which wire is the metal case connected and where does that wire end? **[1]**

(ii) Explain how earthing protects a person who touches the geyser. **[2]**

(iii) Calculate the current drawn by the geyser and select the fuse rating from 5 A, 8 A and 13 A. **[1]**

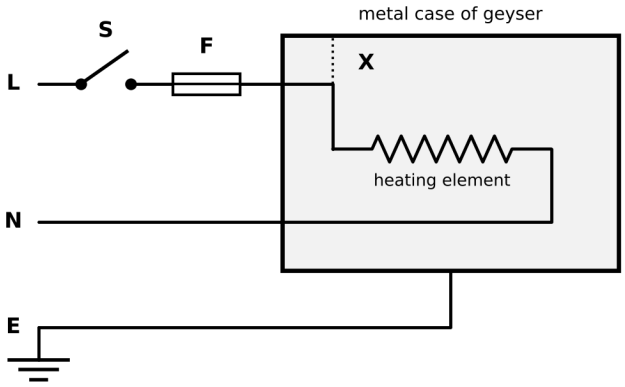


Fig. 5

Question 6

(a) (i) Name the three wires of a household cable and state the colour of each (new colour code). (ii) Which two of these wires are at the same potential? **[3]**

(b) Describe briefly how local earthing is done near the kWh meter of a house. State one safety advantage of local earthing. **[3]**

(c) Fig. 6(a) and Fig. 6(b) show two identical bulbs, each marked 100 W, 220 V, connected to the 220 V mains in two different ways. **[4]**

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

(ii) Find the power consumed by each bulb in Fig. 6(a). **[1]**

(iii) Find the total power consumed in Fig. 6(b). **[1]**

(iv) Which arrangement is used in houses? Give a reason. **[1]**

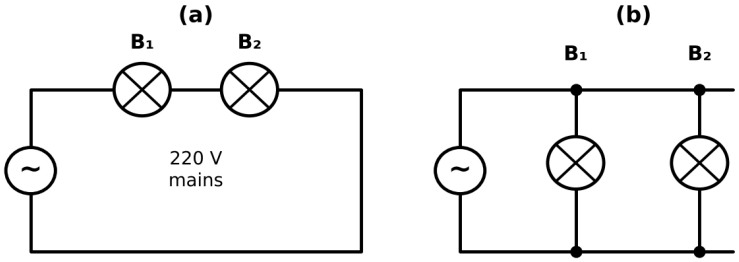


Fig. 6

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