



4.8 ELECTRICITY

4.8.1 Electricity Paper 1 (448/I)

SECTION A (52 marks)

- 1 (a) State **three** safety precautions to prevent accidents from overhead power lines. (3 marks)
- (b) Name **four** areas of specialization in electrical engineering at diploma level. (2 marks)
- 2 (a) List **four** layout tools used in metal fabrication. (2 marks)
- (b) Describe **three** characteristics of magnetic lines of force. (3 marks)
- 3 (a) Name **two** types of inductor cores. (1 mark)
- (b) State **two** reasons why silver is not used to manufacture electrical conductors. (2 marks)
- 4 (a) Determine the resistance of each of the following carbon resistors if their colour code are:
- (i) Blue Orange Brown Silver
- (ii) Grey Red Yellow
- (iii) Green White Black Gold (3 marks)
- (b) State **two** factors that determine the inductance of a coil. (2 mark)
- 5 (a) State **two** ways of identifying the polarity of an electrolytic capacitor. (2 marks)
- (b) An electric shaver supplied from a 12V source takes a current of 800mA. Calculate:
- (i) its power rating;
- (ii) its equivalent circuit resistance. (3 marks)
- 6 (a) With the aid of circuit diagrams distinguish between a centre-tapped isolation transformer and an autotransformer. (3 marks)
- (b) Explain how eddy currents are minimized in a transformer. (2 marks)

- 7 (a) List **four** equipment that belong to the supply authority at the consumer's intake point. (2 marks)
- (b) State **three** reasons why protective switchgear is installed in a domestic installation. (3 marks)
- 8 (a) State **three** functions of light emitting diodes. (3 marks)
- (b) Distinguish between a rectifier diode and a zener diode. (2 marks)
- 9 (a) Name **two** types of electrical indicating instruments and for each state one method of damping. (3 marks)
- (b) List **three** visual inspections carried out when trouble shooting a faulty circuit in a printed circuit board. (3 marks)
- 10 (a) Name the materials used to make the parts of each of the cells shown in the following table:

CELL	POSITIVE ELECTRODE	NEGATIVE ELECTRODE	ELECTROLYTE
Lead Acid			
Leclanche			

(3 marks)

- (b) Figure 1 shows a layout of an electrical installation in which lamps L_1 and L_2 are controlled by switches S_1 and S_2 . Draw the wiring diagram of the circuit.

(5 marks)

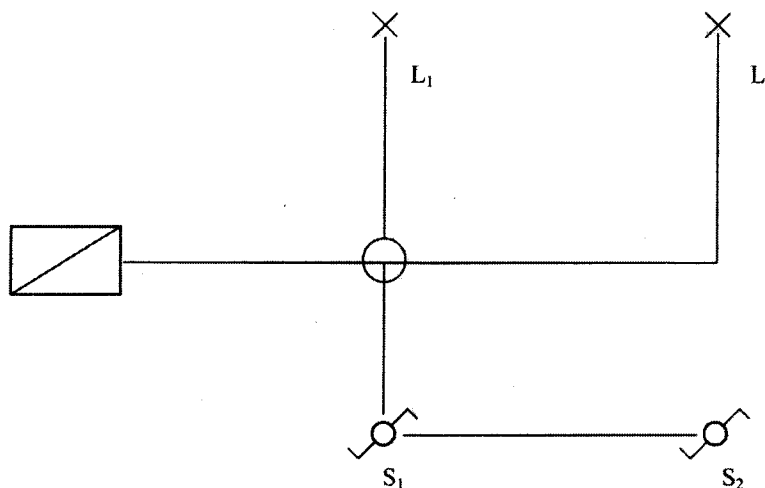


Figure 1

SECTION B (48 marks)

Answer any four questions from this section.

- 11** Figure 2 shows two views of a block drawn in first angle projection. On the grid paper provided, draw an isometric view of the block taking point X as the lowest point. (12 marks)

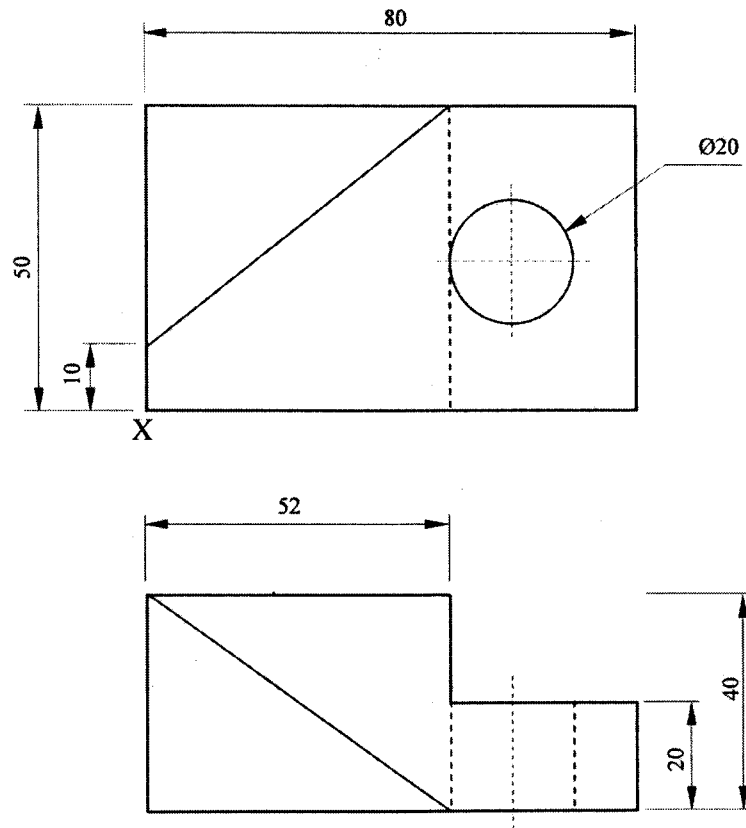


Figure 2

- 12** Figure 3 shows an R - L circuit.

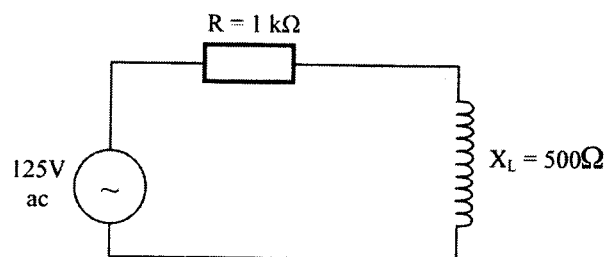


Figure 3

Calculate:

- (a) circuit impedance;
- (b) circuit current;
- (c) voltage drop across the inductor;
- (d) apparent voltage;
- (e) true power;
- (f) power factor. (12 marks)

13 (a) Name **two** types of controlling devices used in measuring instruments. (2 marks)

(b) State **three** advantages of permanent magnet moving coil instrument over moving iron instrument. (3 marks)

(c) A meter movement has resistance of a 2Ω full scale deflection current of 200mA .

(i) Calculate the value of the resistor to enable it to measure:

- I voltage upto 10 volts
- II current upto 10 amperes

(ii) Draw the circuit diagram in each case. (7 marks)

14 (a) Draw a labelled circuit diagram of a capacitor-start induction motor. (3 marks)

(b) With the aid of a labelled circuit diagram, explain the operation of a buzzer. (9 marks)

15 Figure 4 shows a resistive circuit.

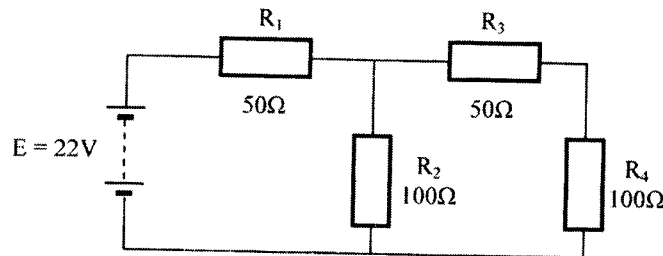


Figure 4

- Calculate:
- (a) the total resistance of the circuit.
 - (b) the voltage drop across R_4 . (12 marks)

4.8.2 Electricity Paper 2 (448/2)

EXERCISE 1

- (a) Using the materials and equipment provided, connect the circuit as shown in Figure 1. (3 marks)

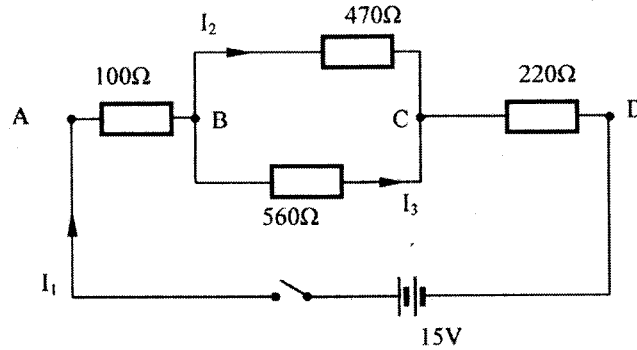


Figure 1

Let the examiner check your work.

- (b) Close switch S, measure and record the values of the following quantities in table 1. (15 marks)

Table 1

	MEASURED VALUES	CALCULATED VALUES
Current: - I_1		26mA
- I_2		14mA
- I_3		12mA
Voltage Drop Across - AB		2.6v
- BC		6.6v
- CD		5.6v

- (c) Give reasons for the differences between the measured values and the calculated values given in the table. (2 marks)

EXERCISE 2

Using the tools, materials and equipment provided, fabricate the cell holder shown in figure 2.
(20 marks)

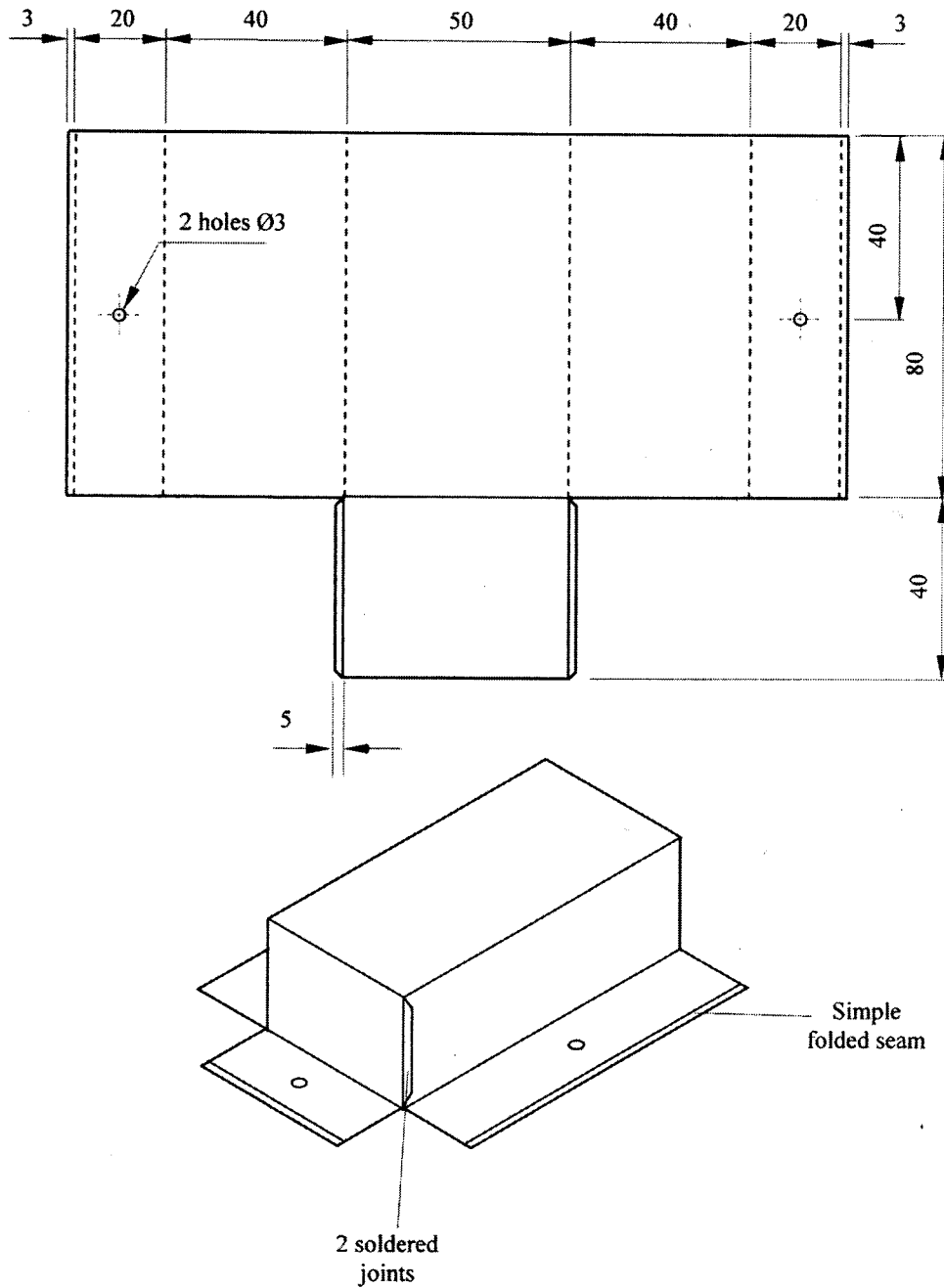
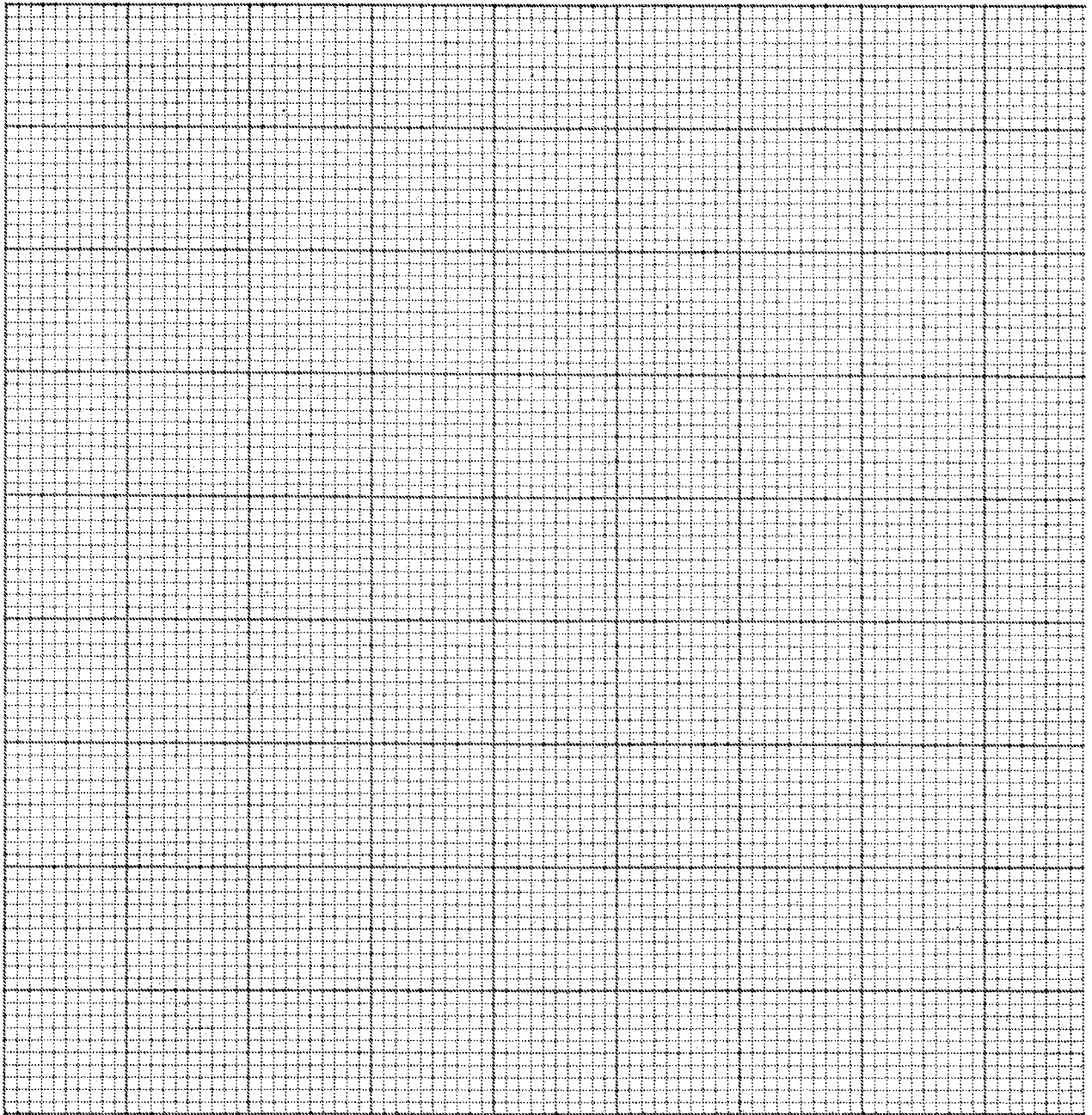


Figure 2

EXERCISE 3

Using the tools, materials and equipment provided, carry out the following tasks:

- (a) terminate the three-core flexible cable to the top plug and the iron box. (15 marks)
- (b) turn the thermostat switch to open position. (1 mark)
- (c) measure and record the values of the resistance between:
 - (i) live and neutral at plug
 - (ii) live and earth at plug
 - (iii) earth at plug and at iron box body
 - (iv) neutral at plug and at iron box. (4 marks)
- (d) Draw a graph of current I on horizontal axis against voltage V_2 on vertical axis. (5 marks)
- (e) From the curve obtained in the graph, state the application of the circuit. (1 mark)
- (f) Name the active device in the circuit. (1 mark)



EXERCISE 4

Figure 3 shows the block diagram of a prefabricated circuit Q. Carry out the following tasks.

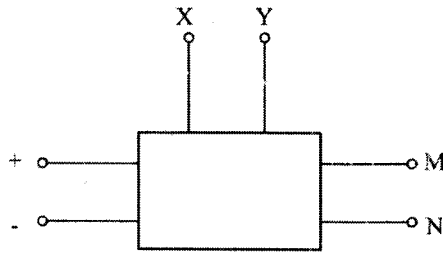


Figure 3

- (a) (i) Adjust the power supply to zero volt.
 (ii) connect the circuit to the power supply through the switch provided. (1 mark)
- (b) Connect (i) the milliammeter provided between points X and Y of the circuit.
 (ii) the voltmeter provided between points M and N of the circuit. (2 marks)
- (c) Close the switch. Adjust the power supply to obtain the voltage values shown in table 2. In each case, measure and record the corresponding values of current I and voltage V_2 . (10 marks)

Table 2

SUPPLY VOLTAGE V_1	0	2.5	5	6	8
CURRENT I					
VOLTAGE V_2					

EXERCISE 5

Figure 4 shows the layout of a bell circuit. Using the tools and materials provided, install the circuit such that the two push buttons operate the bell independently.

(20 marks)

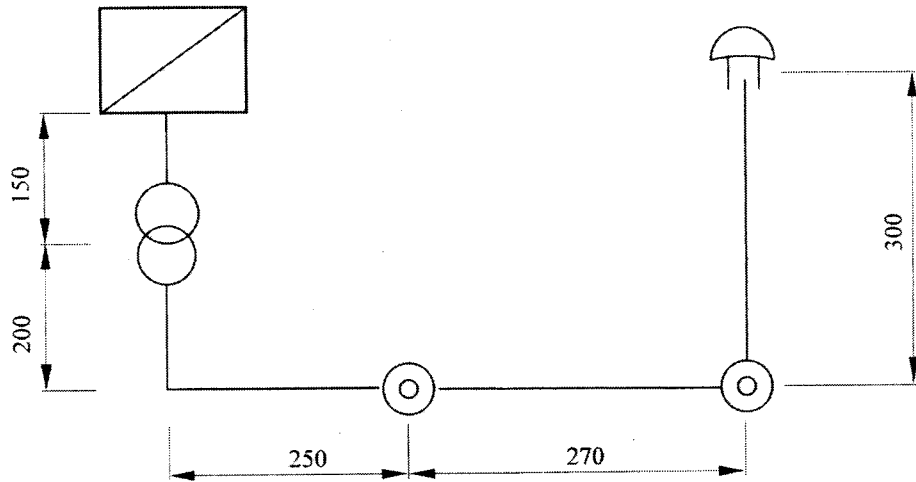


Figure 4