

3.21 ELECTRICITY (448)

3.21.1 Electricity Paper 1 (448/1)

SECTION A (48 marks)

Answer *all* the questions in this section in the spaces provided.

1. (a) Name **four** methods of generating electricity used in Kenya. (2 marks)
- (b) Define each of the following levels of trade qualifications. (2 marks)
 - (i) artisan
 - (ii) technician
2. (a) Outline **four** major items that must constitute a Business Plan. (2 marks)
- (b) List **four** minimum steps followed to ensure electrical safety in an electrical workshop with respect to main supplies. (2 marks)
3. (a) State **two** ways in which electric shock can be prevented in a laboratory. (2 marks)
- (b) A PN junction diode is connected to a 12 v dc supply through a series resistor of 500Ω . The current flowing is 20 mA.
 - (i) Determine the p.d. across the PN junction diode (2 marks)
 - (ii) Determine the power dissipated in the junction. (1 mark)
4. (a) **Figure 1** shows an electric circuit. Find the current through R_2 . (3 marks)

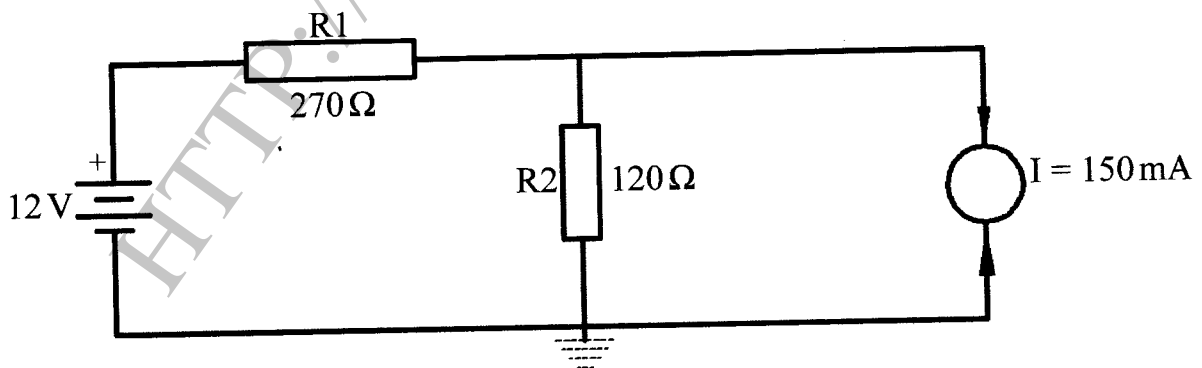


Figure 1

- (b) Define the term 'e-waste'. (1 mark)

5 (a) Name the logic gate shown in Figure 2.

(1 mark)

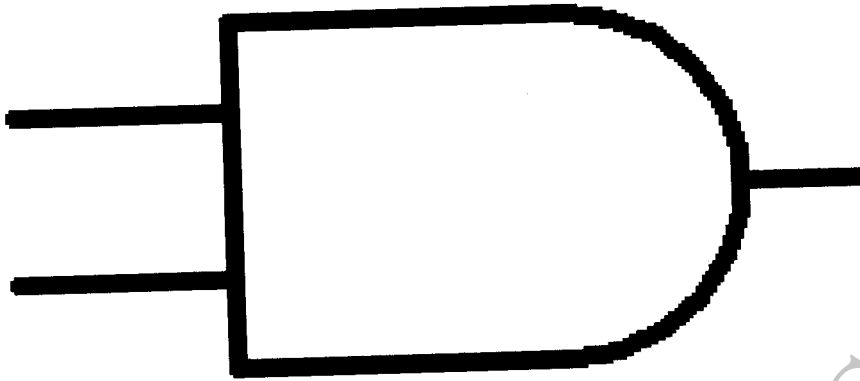


Figure 2

Name

(b) Complete the truth table of the OR gate shown in Table 1.

(2 marks)

Table 1

INPUT 1	INPUT 2	INPUT
0	0	
0	1	
1	0	
1	1	

(c) Perform each of the following number conversions.

(4 marks)

(i) 101010_2 to decimal

(ii) 23_{10} to Binary

(d) Sketch the following circuit symbols

(i) Light Emitting Diode (LED)

(ii) Incandescent lamp

(2 marks)

6 (a) Name **one** application of each of the following electrical materials.

(1 mark)

(i) Copper

(ii) Silicon

(b) An iron box sparks when connected to power and fails to function. Outline the procedure followed to trace the problem.

(2 marks)



- 7 (a) Using a schematic diagram, show how a lamp can be controlled from two different positions. (2 marks)
- (b) Determine the colour code of a carbon resistor whose value is $1500 \pm 5\%$. (2 marks)
- 8 **Figure 3** shows a cross sectional construction of a moving iron instrument. Name the parts labelled A to F. (3 marks)

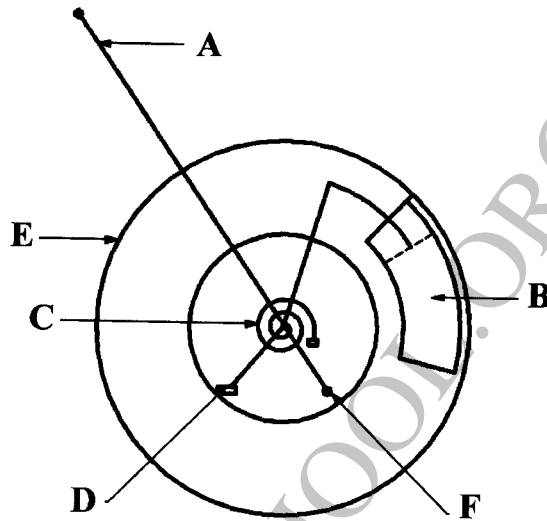


Figure 3

A
B
C
D
E
F

- 9 (a) List **four** applications for inductors. (2 marks)
- (b) Define the term inductance as used in electric circuits. (1 mark)
- (c) A single phase step down transformer has a ratio of 8:1, a primary voltage of 3.3 kV and load of 6.6 kVA. Ignoring losses, calculate; (6 marks)
- (i) secondary voltage
- (ii) secondary current



10 **Figure 4** shows a current carrying conductor.

(3 marks)

- (a) Sketch the correct magnetic flux around the conductor.
- (b) Indicate the direction of the current.

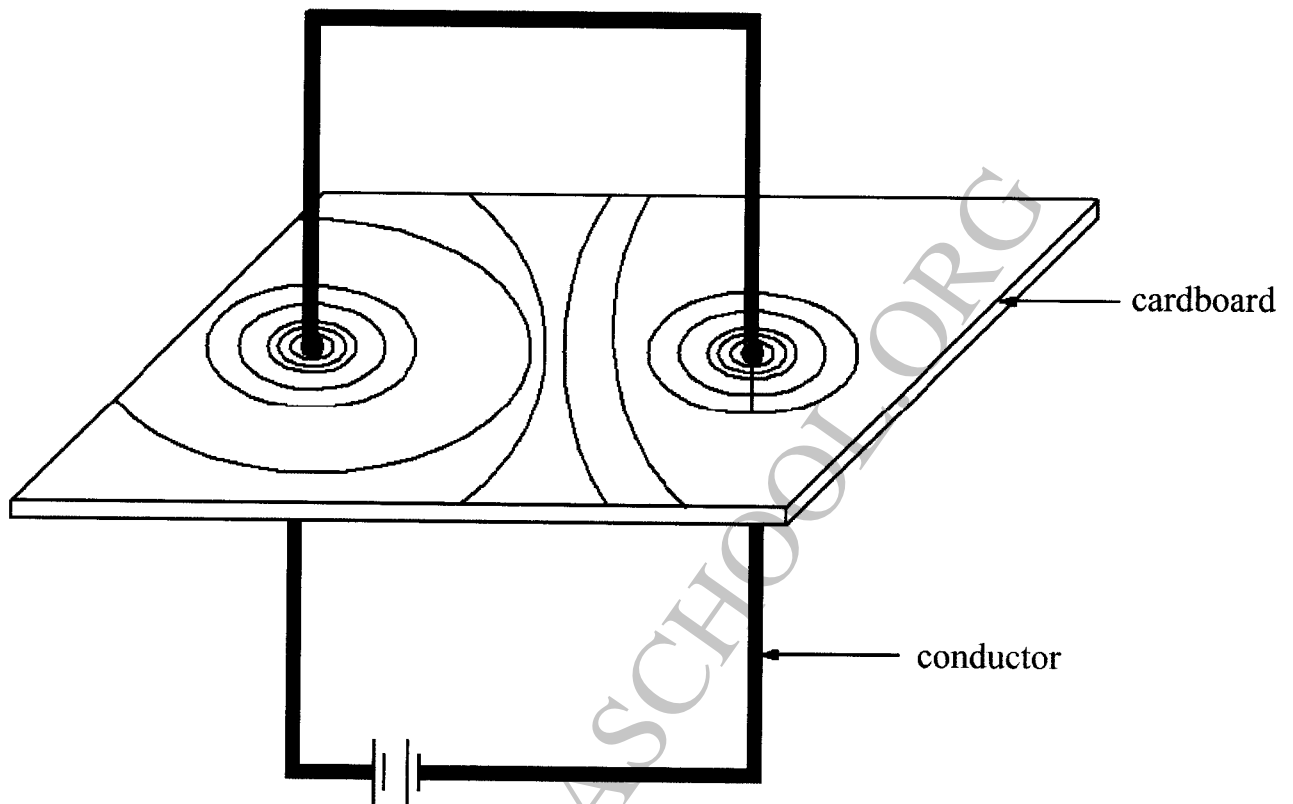


Figure 4

SECTION B (52 marks)

*Answer any **four** questions from this section in the spaces provided.*

Use the A3 paper provided:

11 **Figure 5** shows an isometric drawing of a block.

Draw **FULL SIZE** 1st angle projection the following views.

- (a) Front elevation in the direction of arrow F
- (b) End elevation

(c) Plan

(13 marks)

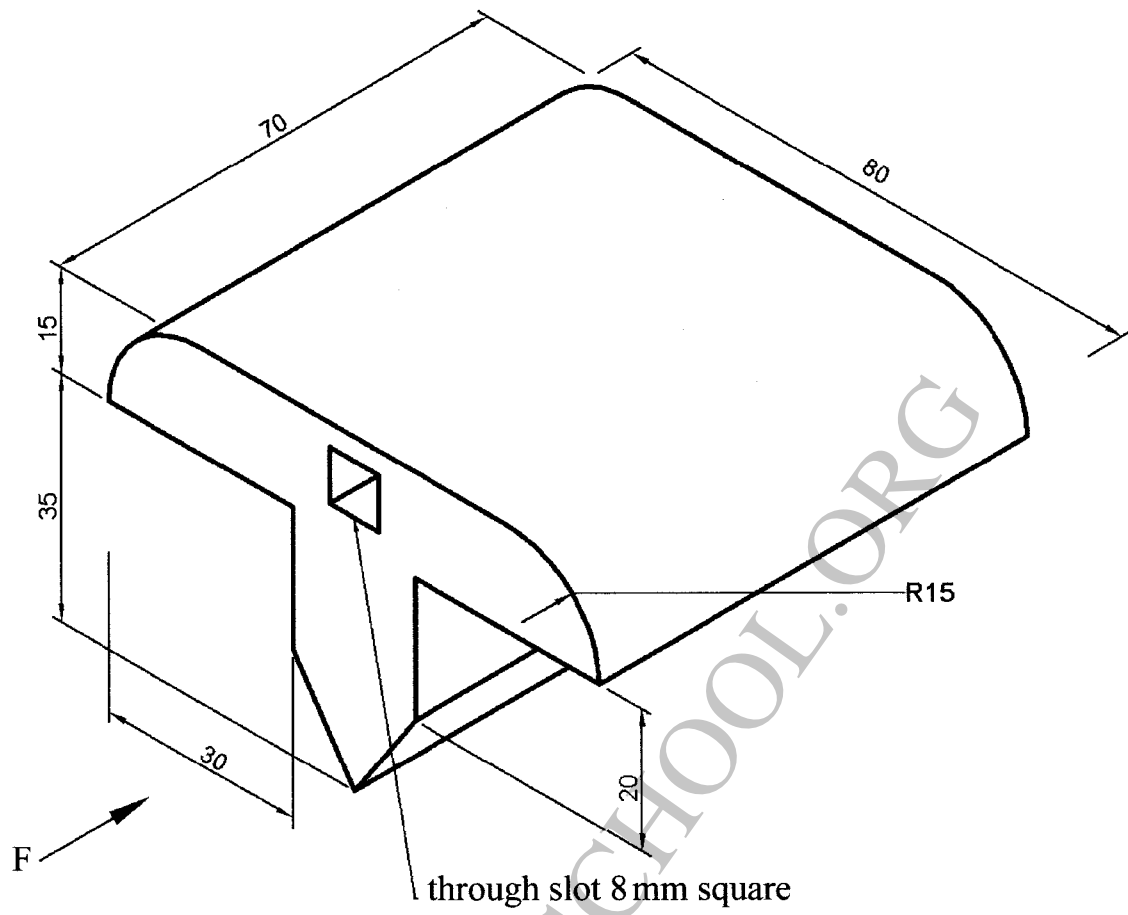


Figure 5

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12 (a) Define an a.c. generator. (2 marks)

(b) Figure 6 shows the construction features of a simple a.c. generator. (5 marks)

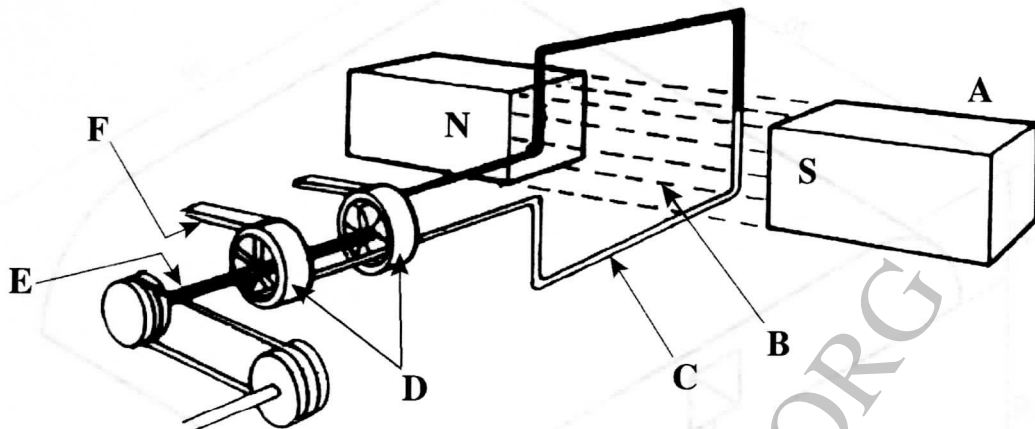


Figure 6

(i) Name the parts labelled A to F

- A
- B
- C
- D
- E
- F

(c) Figure 7 shows a moving coil instrument. Calculate the value of resistor R_m to enable it to read 0 – 100 V. (2 marks)

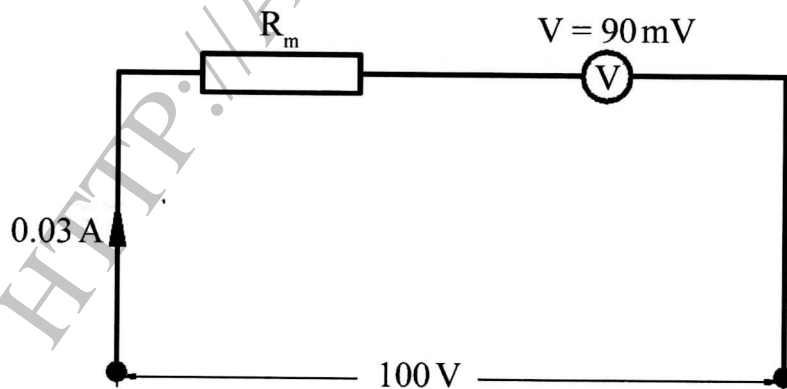


Figure 7

- (d) **Figure 8** shows a line diagram of equipment at the consumer intake point. Name the parts labelled A to F. (4 marks)

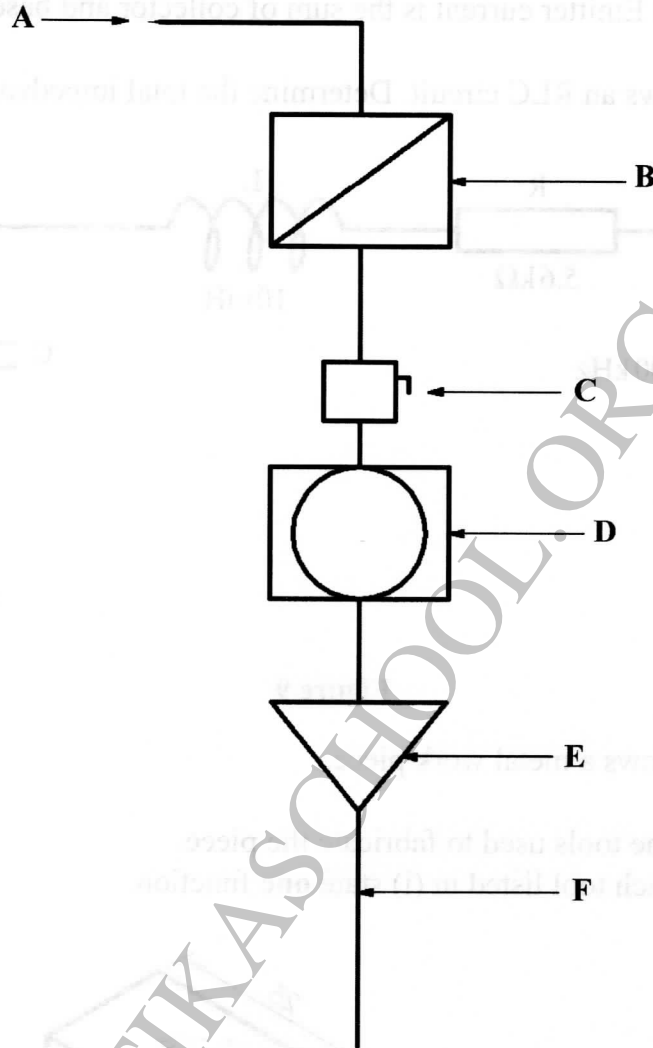


Figure 8

A
B
C
D
E
F

- 13 (a) Define the term magnet. (2 marks)
- (b) List **three** properties of a magnet. (1½ marks)
- (c) Explain the theory of magnetism. (3 marks)
- (d) List **three** methods of demagnetisation. (1½ marks)
- (e) Draw and label a diagram of a core-type transformer. (5 marks)



- 14 (a) Sketch and label a schematic diagram of a transistor in Common Emitter Configuration.
- (b) Given that _____ and _____
Show that the Emitter current is the sum of collector and base currents. (6 marks)
- 15 (a) **Figure 9** shows an RLC circuit. Determine the total impedance. (7 marks)

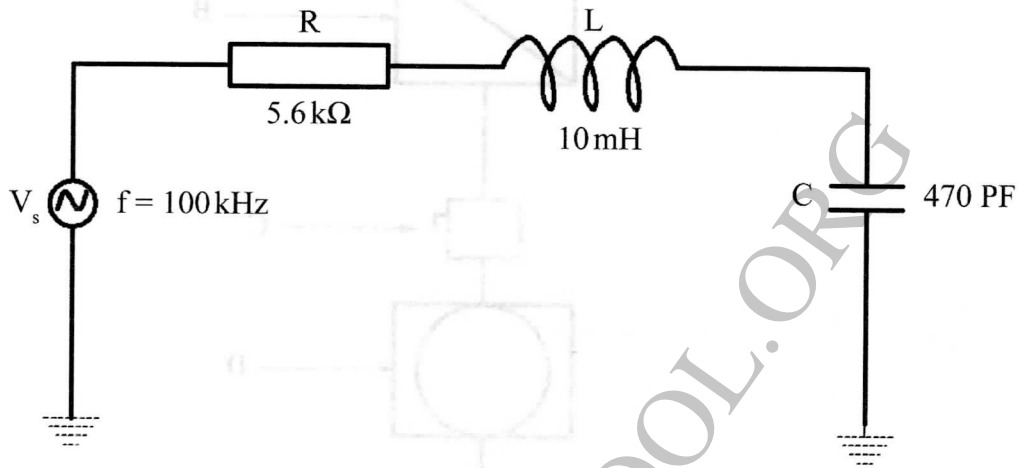


Figure 9

- (b) **Figure 10** shows a metal work piece.
- (i) List the tools used to fabricate the piece.
- (ii) For each tool listed in (i) state **one** function. (6 marks)

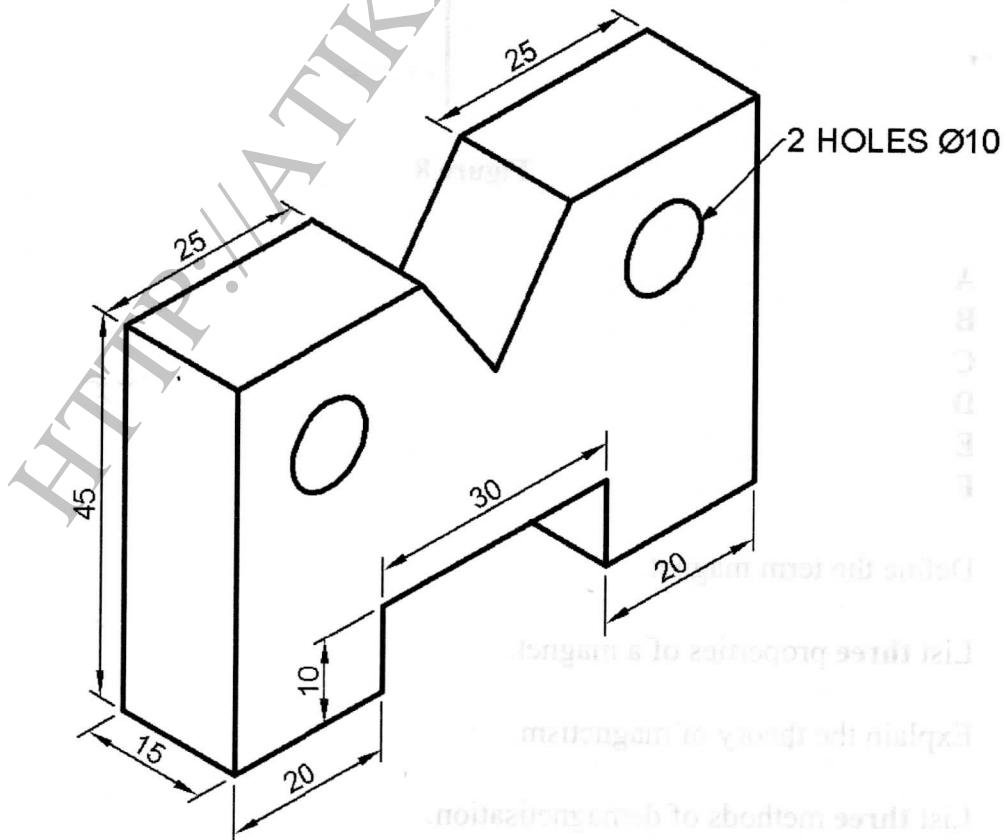


Figure 10