

4.6 ELECTRICITY (448)

4.6.1 Electricity Paper 1 (448/1)



MANYAM FRANCHISE
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SECTION A (48 marks)

Answer all the questions in this section.

- 1 (a) State **four** categories of institutions that train electrical technicians in Kenya. (2 marks)
(b) List **four** key components of a business plan. (2 marks)
- 2 (a) State how each of the following electrical waste materials should be disposed:
(i) lead acid battery;
(ii) fluorescent tube. (1 mark)
- (b) State where each of the following type of fire extinguisher is suitably applied:
(i) foam;
(ii) water;
(iii) dry powder. (3 marks)
- 3 A one-watt resistor has the colour code; blue, grey and brown. Determine:
(a) the value of the resistor.
(b) the maximum value of the current that can flow through it without exceeding its power rating. (5 marks)
- 4 (a) State Lenz's law of electromagnetic induction. (1 mark)
(b) State **two** characteristics of magnetic lines of force. (2 marks)
- 5 (a) Explain the meaning of "sensitivity" as used in meter movement. (1 mark)
(b) With the aid of a circuit diagram, show how the linearity of a meter is determined. (4 marks)
- 6 (a) With the aid of a diagram, describe "armature reaction" in a dc generator. (4 marks)
(b) Outline **two** methods of reducing armature reaction. (2 marks)
- 7 (a) Distinguish between intrinsic and extrinsic semi-conductors and give **one** example of each. (3 marks)
(b) List **four** uses of an ohmmeter in trouble shooting electric circuits. (2 marks)
- 8 (a) Name **four** conductor materials used in electric circuits. (2 marks)
(b) State **two** advantages of MIMS over PVC cables. (2 marks)

9 **Figure 1** shows a series-parallel circuit connected across a 240V supply.

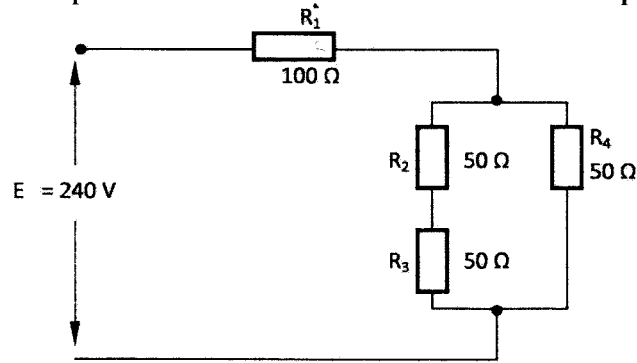


Figure 1

Calculate the:

- (a) total circuit current. (2 marks)
 - (b) voltage drop across;
 - (i) R_3 ,
 - (ii) R_4 . (4 marks)
- 10 (a) Name **four** marking out tools used in metal fabrication. (2 marks)
- (b) **Figure 2** shows the orthographic views of a bracket drawn in first angle projection.

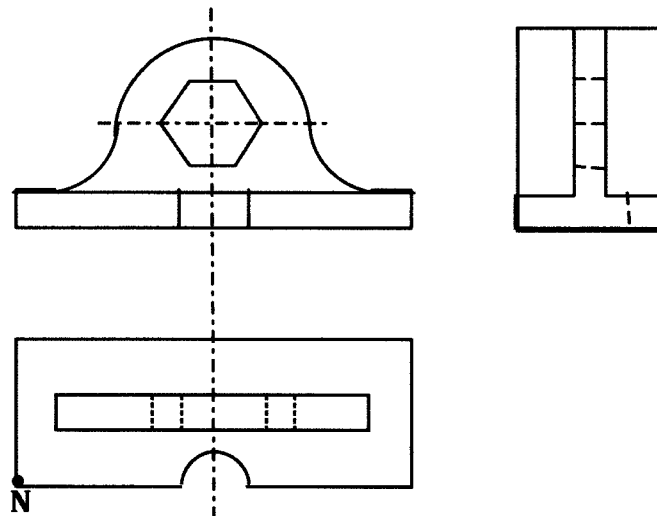


Figure 2

Taking N as the lowest point, make a free hand isometric sketch of the bracket.

(4 marks)

SECTION B (52 marks)

*Answer any **four** questions from this section, in the spaces provided after question 15.*

- 11** (a) Convert:
- (i) 41_{10} to binary;
 - (ii) 1101101_2 to decimal.
- (4 marks)
- (b) Sketch the symbol for each of the following logic gates:
- (i) AND;
 - (ii) OR;
 - (iii) NAND.
- (3 marks)
- (c) Draw a truth table for each of the following logic gates:
- (i) NAND;
 - (ii) NOR.
- (6 marks)
- 12** (a) State **three** advantages of toroidal type transformer over shell type transformer.
- (3 marks)
- (b) (i) Outline **three** assumptions made in order to consider a transformer as an ideal machine.
- (3 marks)
- (ii) A 5000/500V, 10KVA ideal single-phase transformer has 40 turns on the secondary. Calculate:
- I primary turns;
 - II primary full load current;
 - III secondary full load current.
- (7 marks)
- 13** (a) State the phase relationship between current and voltage in circuits that are purely:
- (i) resistive;
 - (ii) inductive.
- (2 marks)

- (b) **Figure 3** shows an RLC circuit.

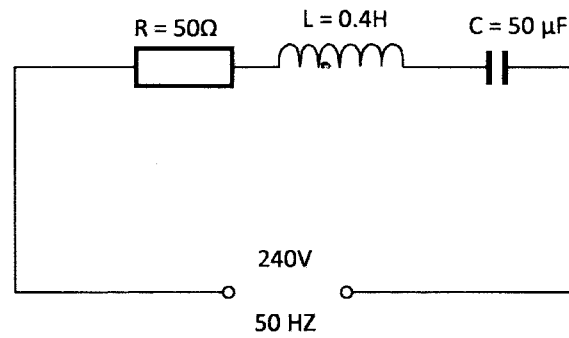


Figure 3

Calculate the:

- (i) inductive reactance;
- (ii) capacitive reactance;
- (iii) circuit impedance;
- (iv) circuit current;
- (v) power dissipated in the circuit.

(11 marks)

- 14** (a) State:

- (i) **two** IEE requirements regarding bell transformers;
- (ii) **two** advantages of MCB over cartridge fuses.

(4 marks)

- (b) Outline the procedure of carrying out an insulation resistance test on a new domestic insulation.

(9 marks)

- 15** (a) With the aid of a diagram, explain how the right hand grip rule is used to determine the direction of the magnetic field around a current carrying conductor.

(3 marks)

- (b) With the aid of a labelled diagram, explain the principle of operation of a trembler bell.

(10 marks)