Name ..... Index Number ...../.....

448/1
ELECTRICITY
Paper 1
Oct./Nov. 2012
2½ hours

Candidate's Signature .....

Date .....

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education
ELECTRICITY
Paper 1
THEORY
2½ hours

448/1 - Electricity - P1
Monday 11.15 am - 1.45 pm
22/10/12 (2nd session)

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) Candidates should have the following materials for this examination:
Drawing instruments;
Mathematical tables;
*(d) This paper has **two** sections: **A** and **B**.*
*(e) Answer **all** the questions in section **A** in the spaces provided and any **four** questions from section **B** in the spaces provided after question 15.*
(f) All dimensions are in millimetres unless otherwise stated.
*(g) **This paper consists of 17 printed pages.***
*(h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***

For Examiner's Use Only

Section	Questions	Maximum Score	Candidate's Score
A	1- 10	48	
B	11	13	
	12	13	
	13	13	
	14	13	
	15	13	
	Total Score	**100**	

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)

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(b) List **four** key components of a business plan. (2 marks)

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2 (a) State how each of the following electrical waste materials should be disposed:
(i) lead acid battery;
(ii) fluorescent tube. (1 mark)

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(b) State where each of the following type of fire extinguisher is suitably applied:
(i) foam;
(ii) water;
(iii) dry powder. (3 marks)

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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)

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4 (a) State Lenz's law of electromagnetic induction. (1 mark)

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(b) State **two** characteristics of magnetic lines of force. (2 marks)

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5 (a) Explain the meaning of "sensitivity" as used in meter movement. (1 mark)

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(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)

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(b) Outline **two** methods of reducing armature reaction. (2 marks)

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7 (a) Distinguish between intrinsic and extrinsic semi-conductors and give **one** example of each. (3 marks)

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(b) List **four** uses of an ohmmeter in trouble shooting electric circuits. (2 marks)

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8 (a) Name **four** conductor materials used in electric circuits. (2 marks)

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(b) State **two** advantages of MIMS over PVC cables. (2 marks)

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

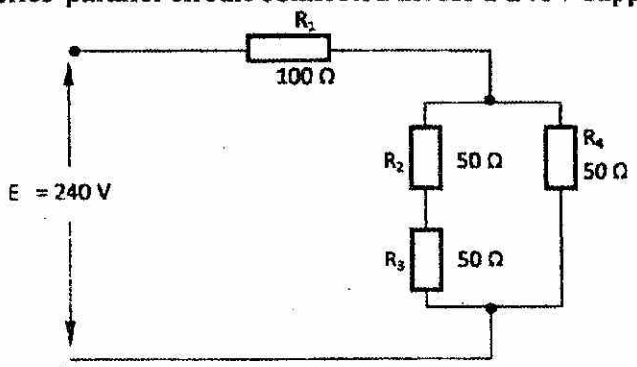

Figure 1

Calculate the:

(a) total circuit current. (2 marks)

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(b) voltage drop across;

(i) R_3,

(ii) R_4. (4 marks)

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10 (a) Name **four** marking out tools used in metal fabrication. (2 marks)

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(b) **Figure 2** shows the orthographic views of a bracket drawn in first angle projection.

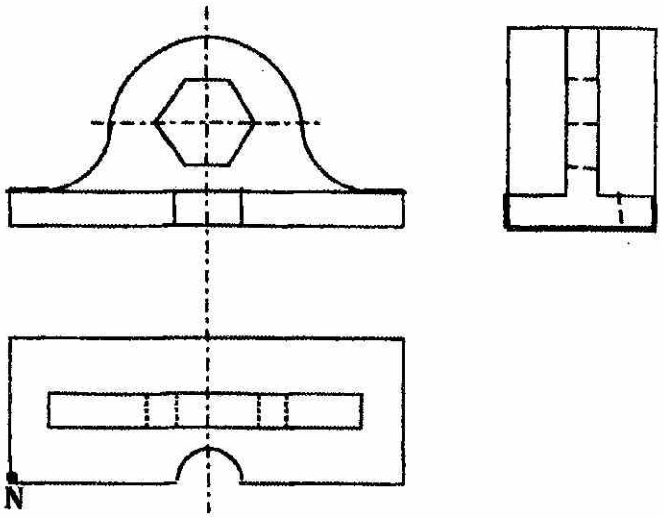

Figure 2

Taking N as the lowest point, make a free hand isometric sketch of the bracket.
(use the isometric grid paper provided on page 17)

(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 torroidal 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.

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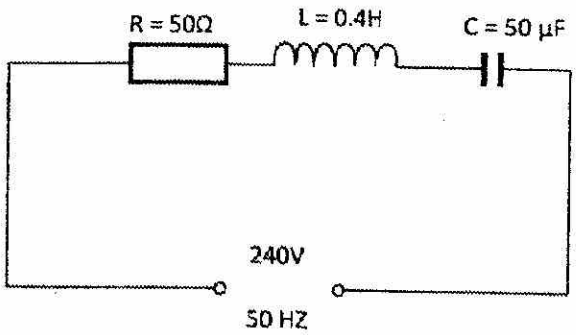

Figure 3

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)