

Nyaraya Cluster Examination

**Kenya Certificate of Secondary Education**

# **2023 Form Four Evaluation Programme**

**448/1 ELECTRICITY Paper 1**

**JULY/AUGUST 2023**

**Name……………………………………………………..…Index no………………… Candidate’s signature……………**

**ELECTRICITY**

**PAPER 1**

**(THEORY)**

**2 ½ hour**

**Kenya certificate of secondary education**

**ELECTRICITY**

**PAPER 1**

**(THEORY)**

Instructions to candidates

1. This paper consists of two sections: A and B
2. Answer all the questions in section A and any four questions from section B in the spaces provided
3. All dimensions are in millimeters unless otherwise stated

**SECTION A (48 marks)**

1 a) State four categories of institutions that train electrical technicians in Kenya (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b) List four key components of a business plan (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

2a) State how each of the following electrical wates materials should be disposed. (1mks)

i) Lead

……………………………………………………………………………………………………………………………………………………………………………………

ii) Florescent tube

……………………………………………………………………………………………………………………………………………………………………………………

b). State how each of the following type of fire extinguisher is suitably applied (3mks)

1. Foam

……………………………………………………………………………………………………………………………………………………………………………………

1. Water

……………………………………………………………………………………………………………………………………………………………………………………

1. Dry powder

……………………………………………………………………………………………………………………………………………………………………………………

3 A one –watt resistor has the colour code blue, grey, and brown. Determine

1. The value of the resistor (1mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. The maximum value of the current that can flow through it without exceeding its power rating (4mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

4a) State lenz’s law of electromagnetic induction (1mk)

…………………………………………………………………………………………………………………………………………………………………………........................................................

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

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………5 a) Explain the meaning of sensitivity as used in meter movement (1mk)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b). With the aid of a diagram, show how the linearity of a meter is determined (4mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

6 a) With the aid of a diagram, describe armature reaction in d.c. generator (4mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

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

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7a) Distinguish between intrinsic and extrinsic semi –conductors and give one example of each. (3mks)

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

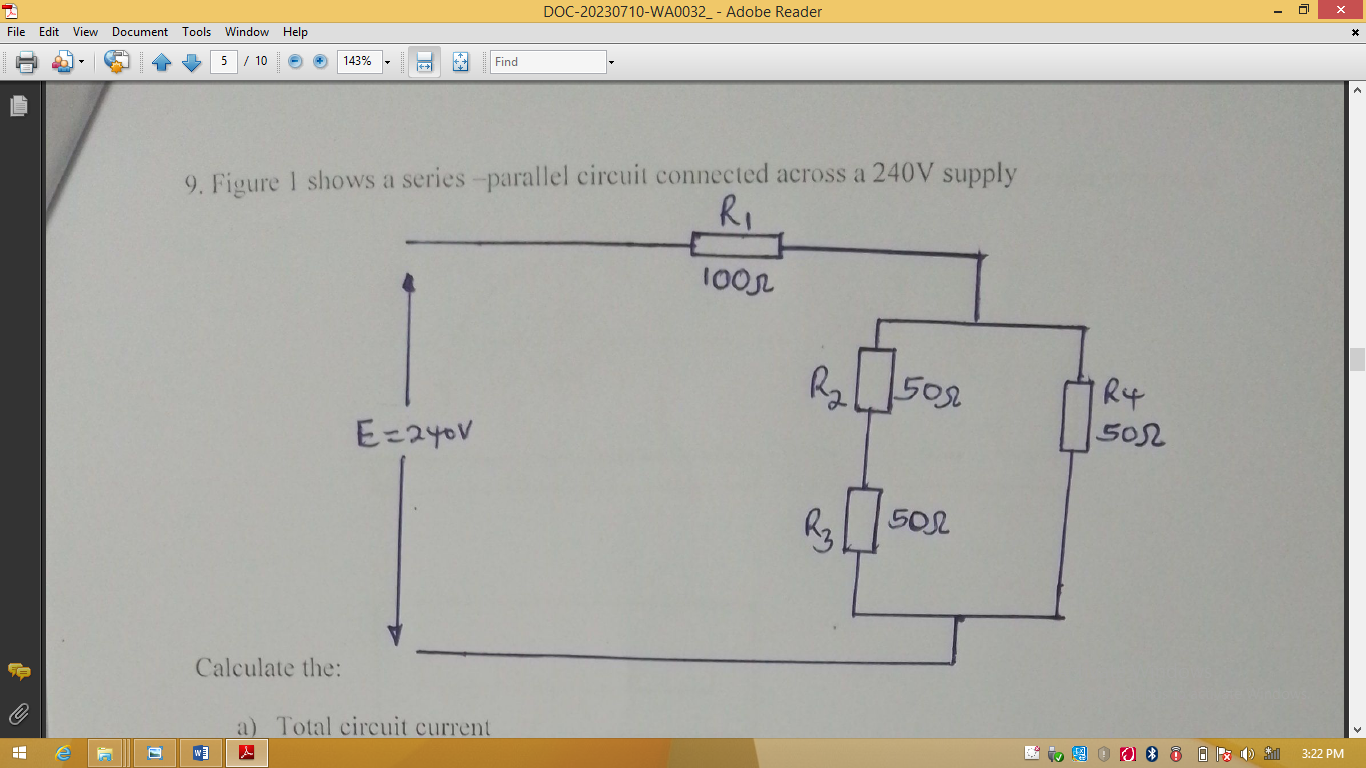
………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

8 a) Name four conductor materials used in electric circuits (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b). State two advantages of MIMS over PVC cables (2mks) ………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….......................................................

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



Calculate the:

1. Total circuit current (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Voltage drop across (4mks)
2. R3

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

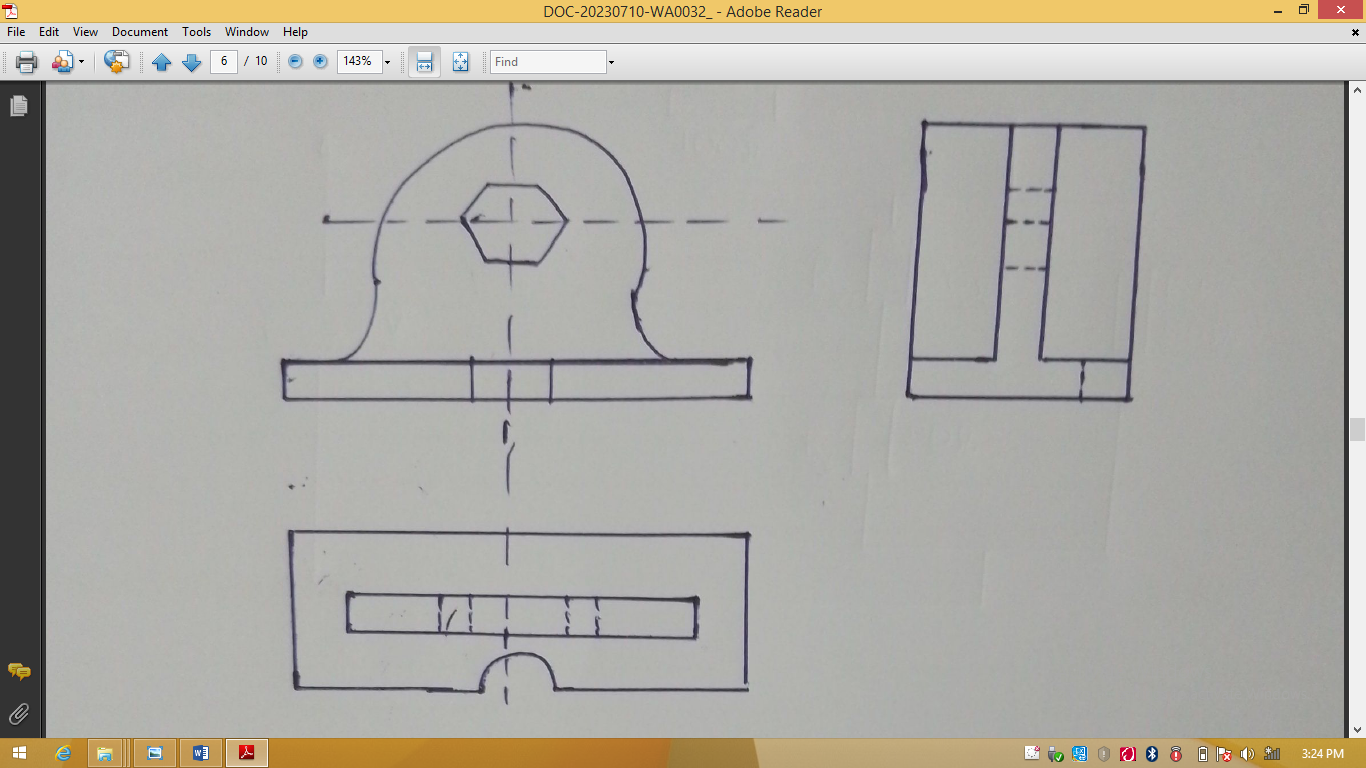
1. R4

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

10 a) Name four marking out tools used in metal fabrication (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

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



Taking N as the lowest point,make a free hand isometric sketch of the bracket (4mks)

**SECTION B (52 marks)**

11.a) Convert (4mks)

i) 4110 to binary

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii) 11011012 to decimal

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b). Sketch the symbol for each of the following logic gates (3mks)

i) AND

1. OR

iii). NAND

12. a) State three advantages of toroidal type transformer over shell type transformer (3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b). i) Outline three assumptions made in order to consider a transformer as an ideal machine.

(3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii). A 500/500V,10KVA ideal single –phase transformer has 40 turns on the secondary. Calculate

i) Primary turns (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii) Primary full load current (2mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

iii) Secondary full load current (2mks)

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13. a) State the phase relationship between current and voltage in circuits that are purely. (2mks)

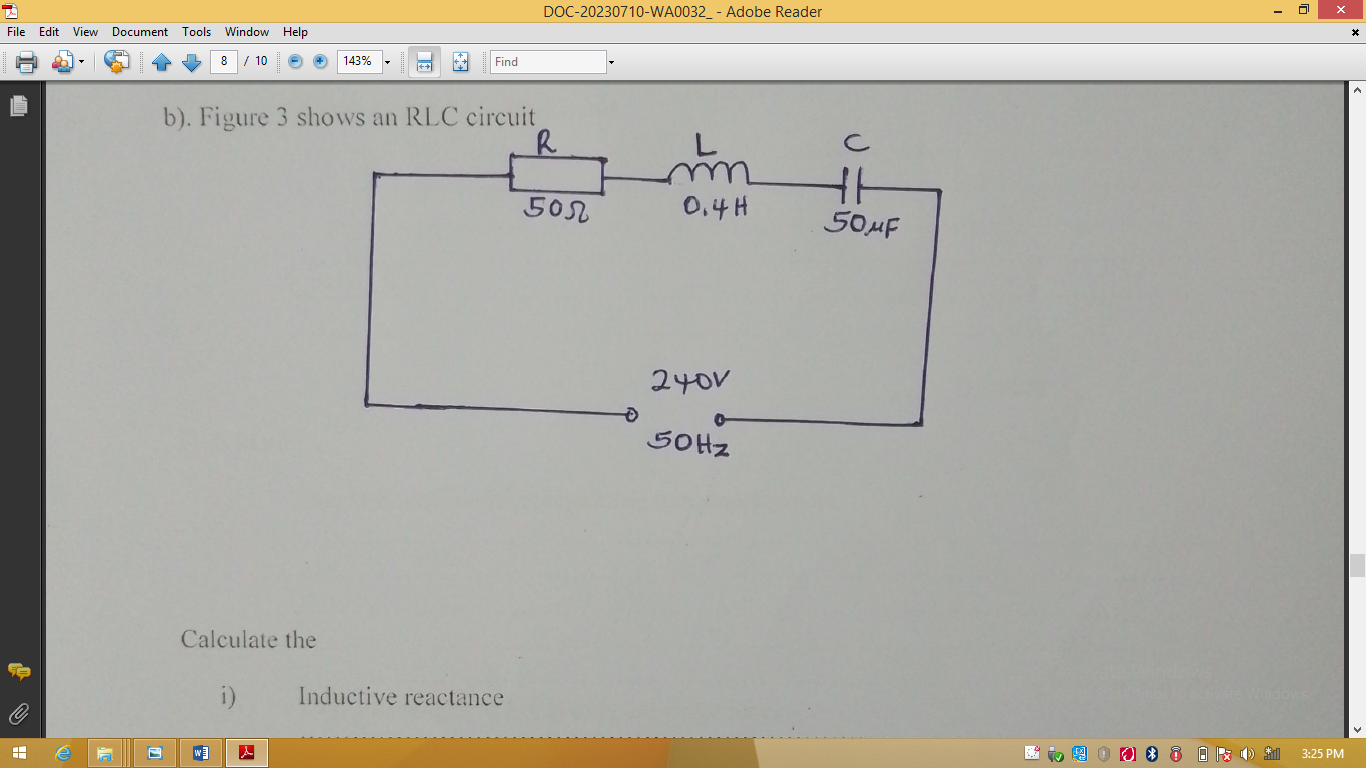
i) Resistive

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

ii). Inductive

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b). Figure 3 shows an RLC circuit



Calculate the (11mks)

1. Inductive reactance

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Capacitive reactance

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….............................................................................

1. Circuit impedance

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Circuit current

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Power dissipated in the circuit

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

14 a) State (4mks)

1. Two IEE requirements regarding bell transformers

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Two advantages of MCB over cartridge fuses

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b). Outline the procedure of carrying out an insulation resistance test on a new domestic insulation (9mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

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 (3mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

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

(10mks)