THE UNITED REPUBLIC OF TANZANIA

DODOMA REGION

FORM FOUR MOCK EXAMINATION -2023

ELECTRICAL ENGINEERING

TIME: 3.00 Hours **August, 2023**

Instructions

1. This paper consists of sections A, B and C.
2. Answer all questions in section A, B and two questions in section C
3. Non programmable calculators may be used
4. Cellular phones are not allowed in the examination room
5. Write your name in every page of your answer booklet

SECTION A (16 – Marks)

1. For each of items (i) – (x), choose the most correct answer from among the given alternatives and
write its letter beside the item number. (i)

i. The function of gang in a switch is …….
A. Provide good current B. close and open the circuit
C. neutralize the effect of transient D. interrupt any value of current
E. Limit the flow of flux

ii. Voltmeter is used for measuring
A. Energy B. Mass C. Voltage D. Current E. Refrigerator

iii. Which of the following test are commonly used in electrical installation
A. Earthing, polarity and energy B. polarity, conductivity ansd resistivity
C. Energy, Continuity and conductivity. D. Conductivity, polarity and Earthing
E. Conductivity, Earthing and Energy

iv. Capacity of generator energy depends on the
A. Capacity of generators installed B. kWh generation in a month
C. Resistance of the given conductor D. Limitation of power in KVA
E. Power output of the engine

v. The voltage rating of a cable depends on the
A. Diameter of the conductor B. Thickness of the insulation
C. Strength of insulation D. Resistance of the conductor
E. Cross sectional area of the conductor

vi. The purpose of grid system is to
A. supply energy to the remote areas B. distributing of energy at low cost
C. interconnect the power stations D. make high voltage available
E. Reducing the running cost of the conductor

vii. For an adequate hand hold, a ladder should extend above the stepping off point by a minimum of
A. 1.00m B. 2.00m C. 3.00m D. 4.15m E. 5.00m

viii. If the battery acid is accidentally spilled on the skin, the affected part should immediately be
A. Washed methylated spirit B. Flooded with cold water C. seen by a doctor
D. Covered with a sterile dressing E. Covered with antiseptic cream

ix. Which of the following is the suitable wiring system for high roofed building
A. Catenary B. Cleat C. House service overhead D. Casing and Capping E. Metal sheathed

x. The factor that determines the current rating of the fuse or circuit breaker that should be installed in a lighting circuit is the
A. Wattage of the individual lamps B. Capacity of the largest wire in the circuit
C. Voltage drop of the circuit D. Capacity of the smallest wire in the circuit
E. Total resistance of the circuit

2. Match the item in list A with the responses in list B by writing the letter of the correct response beside the item number in the answer booklet provided

LIST A		LIST B
i.	Materials that can strong be magnetized	A. Para magnetic
ii.	Substance which are made up by soft iron	B. Temporary magnets
		C. Zinc and copper
iii.	Materials that can be affected by magnets	D. Permanent magnet
		E. Magnetic domains
iv.	Objects which are made up by steel	F. Earth magnetic field
v.	Group of magnetic dipoles arranged themselves in a magnetized object	G. Induced magnetism
		H. Magnetization
vi.	The process of aligning the domain of aloms	I. Demagnetization
		J. Permeable
		K. Neutral point
		L. Ferromagnetic
		M. Magnetic field

SECTION B (54 – Marks)

3. (a) Mention three measures which should be taken into consideration to ensure safety before doing any electrical maintenance job
(b) Why copper is most used in wiring in preference to other metals? (2 points)
(c) state two properties of transformers on no load

4. (a) What is meant by the term heat capacity and specific heat capacity? State how they are related?

(b) Explain briefly how heat losses have been prevented in a vacuum flask?

(c) A heater of 500W is used to raise the temperature of 50kg of material of specific heat capacity of 960J/kg K from 18℃ to 38℃. Assume that all of the heat from the heater is given to the material. Calculate the heat capacity of material

5. (a) What is the differences between inspection and testing

(b) State the aim of carrying continuity test

(c) State the procedures for carrying out earth insulation test

6. (a) (i) State Ohm's law

(ii) Explain briefly with aid of a circuit diagram, how would you verify Ohm's law in the laboratory?

(b) How would you know that when is necessary to recharge an accumulator?

(c) State briefly the variation of the potential over a pear-shaped conductor and the variation of density of charge

7. (a) (i) What is meant by solenoid and electromagnetic induction?

(ii) List down the two applications of electromagnets

(b) Describe the structure and mode of action of a simple DC motor

(c) (i) Draw a diagram of an electric bell showing the electromagnet, the direction of the current, the core, the yoke, spring and armature

(ii) Explain what will happen to the mode of action of the electric bell if the core and yoke are made of steel instead of soft iron

8. (a) Draw a diagram shows the transfer of power from TANESCO to the consumer's unit

(b) Why metal conduit is more applied in industrial installations than plastic? (4 – points)

SECTION C (30 – Marks)

Answer only three questions in this section

9. (a) State Kirchoff's voltage law of a DC Circuit

(b) show that $\rho = \frac{RA}{L}$, Where

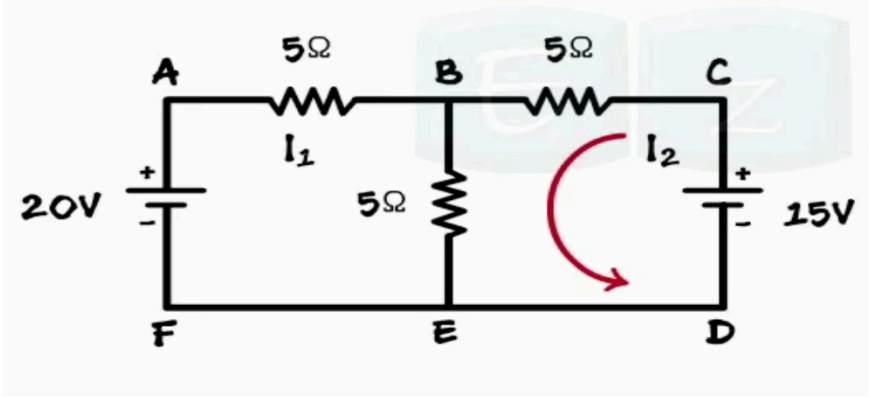
ρ = Resistivity

R = Resistance

A = Cross sectional area

L = length of a conductor

(c) Find the current passing in each resistor



10. (a) Define armature reaction in dc machines?

(b) A 220 V d.c series motor has armature and field resistances of 0.15 Ω and 0.10 Ω respectively. It takes a current of 30 A from the supply while running at 1000 rpm

(c) Draw a well labelled diagram of DC Motor

11. (a) Draw a well labelled diagram of incandescent lamp

(b) State Lambert law of illuminations

(c) A room of 25m long and 6m wide is to be lighted to a level of 20 lux while the average lumen of lamp25lumen/W, maintenance factor is 0.8 and coefficient of utilization is 0.5, calculate

(i) Total lumen

(ii) Total power

(iii) Number of lamp if power rate of one lamp is 30W