

**Electrical Installation Artisan Level 4**  
**ENG/OS/EI/CC/03/4/A**  
**Apply Electrical Principles**  
**March/April 2023**



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**

**WRITTEN ASSESSMENT TOOL**

**3 HOURS**

**INSTRUCTIONS TO CANDIDATE**

*This paper consists of **TWO** sections **A** and **B**.*

*Answer **ALL** questions in section **A** and **B** in the answer booklet provided.*

*You are required to have a non-programmable calculator.*

*Marks for each question are indicated in brackets.*

*Do not write on the question paper*

*Answer the questions in **English**.*

**This paper consists of four (4) printed pages**

**Candidate should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

**SECTION A (10 Marks)**

Answer *all* questions in this section. Each question carries one mark

1. The ampere is the unit of \_\_\_\_\_?
  - A. Charge
  - B. Resistance
  - C. Power
  - D. Current.
  
2. A current of 2 A flows for 10hrs through room heating element of  $1k\Omega$ . How much energy is consumed?
  - A. 50 kWh
  - B. 40 kWh
  - C. 40Wh
  - D. 0.02 kWh
  
3. The unit of magnetic flux is \_\_\_\_\_?
  - A. ohms
  - B. weber
  - C. ohm metre
  - D. ohm/metre
  
4. What is equivalence of 50mS?
  - A. 0.05
  - B. 0.00005 s
  - C. 1000 minutes
  - D. 0.5 s
  
5. The effect of connecting an additional parallel resistor to an electrical supply source is to increase the\_\_\_?
  - A. resistance of the load
  - B. voltage of the source
  - C. current taken from the source
  - D. p.d. across the load
  
6. Voltage drop is the\_\_\_?
  - A. maximum potential
  - B. difference in potential between two points
  - C. voltage produced by a source

- D. voltage at the end of a circuit
7. The unit of magnetic flux density is the\_\_\_\_\_?
- A. weber per unit area
  - B. Flux per unit area
  - C. flux
  - D. Force per unit area
8. Two bar magnets are placed parallel to each other and about 2 cm apart, such that the south pole of one magnet is adjacent to the south pole of the other. With this arrangement, the magnets will\_\_?
- A. attract each other
  - B. have no effect on each other
  - C. repel each other
  - D. lose their magnetism
9. When the frequency of an a.c. circuit containing resistance and capacitor is increased, the current\_\_\_\_\_.
- A. decreases
  - B. increases
  - C. stays the same
  - D. None
10. The speed of a d.c. motor may be increased by\_\_\_\_\_?
- A. increasing the armature current
  - B. decreasing the field current
  - C. decreasing the applied voltage
  - D. increasing the field current and the energy meter

**SECTION B (40 Marks)**

*Answer all questions in this section*

11. An electric choke which has a resistance of  $50\Omega$  and an inductance of  $10\text{H}$  is connected to a  $200\text{V}, 50\text{Hz}$  supply, calculate:

- a) Inductive reactance;
- b) Total impedance;
- c) Current flowing.

(3 Marks)

12. Capacitors of  $8\ \mu\text{F}$ ,  $2\ \mu\text{F}$ ,  $4\ \mu\text{F}$ ,  $6\ \mu\text{F}$  are connected in parallel to a direct voltage supply of 100V. Determine:

- a) the equivalent circuit capacitance;
- b) the total charge.

(5 Marks)

13. A 12V battery is connected in a circuit having three series-connected resistors of  $4\ \Omega$ ,  $9\ \Omega$  and  $11\ \Omega$ . Determine:

- (i) current flowing through;
- (ii) the p.d across the  $9\ \Omega$  resistor;
- (iii) the power dissipated in the  $11\ \Omega$  resistor.

(6 Marks)

14. State **three** functions of earthing in an electrical installation.

(3 Marks)

15. Differentiate between self-Inductance and mutual inductance.

(4 Marks)

16. State the following laws :

- (i) Kirchhoff's current law;
- (ii) Ohms law.

(4 Marks)

17. Two identical coils of mutual inductance of 0.2 H. If the current in one coil is changed from 10A to 4A in 10 milliseconds, calculate:

- a) the average induced e.m.f. in the second coil;
- b) the change of flux linked with the second coil if it is wound with 500 turns.

(6 Marks)

18. Briefly explain the need of power factor improvement, stating one method of correcting it.

(4 Marks)

19. Differentiate between a motor and a generator.

(2 Marks)

20. A  $5\ \mu\text{F}$  capacitor is charged so that the p.d. between its plates is 80V. Calculate how long the capacitor can provide an average discharge current of 2 mA.

(3 marks)

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