

**071305T4RAC**

**Refrigeration and Air Conditioning Craftsperson Level 5**

**ENG/OS/RAC/CC/04/5/A**

**Apply Electrical Principles**

**July/August 2023**



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION  
COUNCIL**

**WRITTEN  
TEST**

**INSTRUCTIONS TO CANDIDATE**

1. This paper consists of **THREE** sections: **A**, **B** and **C**
2. Marks for each question are indicated in brackets ( ).
3. You are required to provide your responses in the provided answer booklet.
4. Do not write on the question paper.

**This paper consists of EIGHT (8) printed pages**

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

**SECTION A (20 MARKS)**

*Attempt ALL the questions from this section*

1. The SI Units means the \_\_\_\_\_.
  - A. Simple International unit
  - B. Standard international unit
  - C. Self-international unit
  - D. None of the above
2. A resistance of  $50\text{ k}\Omega$  has a conductance of \_\_\_\_\_.
  - A.  $0.2\text{Ms}$
  - B.  $20\text{S}$
  - C.  $0.02\text{ mS}$
  - D.  $20\text{ k S}$
3. The unit of work or energy is known as the \_\_\_\_\_.
  - A. Joule
  - B. Watt
  - C. Ampere
  - D. Meter per seconds
4. A mass of  $5000\text{g}$  is accelerated at  $2\text{m/s}^2$  by a force. Determine the force needed.
  - A.  $10\text{N}$
  - B.  $1.962\text{N}$
  - C.  $600\text{N}$
  - D.  $100\text{N}$
5.  $60\text{ }\mu\text{S}$  is equivalent to \_\_\_\_\_.
  - A.  $0.06\text{S}$
  - B.  $0.00006\text{S}$
  - C.  $1000\text{ minutes}$
  - D.  $0.6\text{S}$
6. An \_\_\_\_\_ is any device that does the conversion of electrical energy to mechanical energy and vice versa
  - A. Ammeter
  - B. Accelerator
  - C. Electrical machine
  - D. Static Machine

7. A 240V, 60 W has a working resistance of:
- A.  $1400\Omega$
  - B.  $600\Omega$
  - C.  $960\Omega$
  - D.  $325\Omega$
8. In a \_\_\_\_\_ circuit, the current I is the same in all parts of the circuit and hence the same reading is found on each of the ammeters
- A. Parallel
  - B. Series
  - C. Short
  - D. Open
9. The value of force required to accelerate a mass of 1200g at  $200\text{ cm/s}^2$  is \_\_\_\_\_.
- A. 2.4 N
  - B. 2400 N
  - C. 240N
  - D. 0.24N
10. \_\_\_\_\_ is not a type of lightning
- A. Direct strike
  - B. Conduction
  - C. Ground current
  - D. Radiation
11. Earthing is done through the embedding of a metallic rod into the \_\_\_\_\_.
- A. Atmosphere
  - B. Ground
  - C. Equipment
  - D. Water surface
12. The purpose of earth continuity conductor is\_\_\_\_\_.
- A. To conduct leakage current to the general mass of earth
  - B. To avoid short circuit in a circuit Megger
  - C. To reduce current in the phase conduction
  - D. To control current in the neutral conductor

13. Given four  $1\Omega$  resistors, they must be connected \_\_\_\_\_ to give an overall resistance of  $\frac{1}{4}\Omega$ .
- A. Three in parallel, in series with one
  - B. Two in series, in parallel with another two in series
  - C. All in parallel
  - D. All in series
14. The following are electrical safety precautions that should be handling refrigeration and air conditioning equipment except \_\_\_\_\_.
- A. Know the wire code of your country
  - B. Always use insulated tools while working
  - C. Install properly and tidy electrical cords
  - D. Always repair energized equipment
15. The lightning protection system comprises of the following components except \_\_\_\_\_.
- A. Copper Cable
  - B. Surge suppressors
  - C. Metal Cap
  - D. Copper clad ground rods
16. Transformers can be classified in terms of the following except \_\_\_\_\_.
- A. Construction
  - B. Type of power supply
  - C. Type of cooling
  - D. Type of model
17. In \_\_\_\_\_ power factor, current leads voltage and occurs in a capacitive load circuit.
- A. Lagging
  - B. Leading
  - C. Inductive
  - D. None of the above
18. Materials that convert sunlight to electrical energy are known as \_\_\_\_\_.
- A. Alternators
  - B. Radiators
  - C. Photovoltaic
  - D. Sunlight convertors

19. \_\_\_\_\_ is a motor starting method.
- A. Star-Delta starting
  - B. Hard starting
  - C. Automatic starting
  - D. Indirect starting
20. The unit name for inductance is \_\_\_\_\_.
- A. Tesla
  - B. Weber
  - C. Decibel
  - D. Henry

**SECTION A**  
**Answer A**

**KS)**  
**n this section**

21. Name TWO examples of derived SI (2 marks)
22. Complete the table below. (4 marks)

| Quantity         | Unit    |
|------------------|---------|
|                  | Kelvin  |
|                  | Candela |
| Electric current |         |
|                  | Mole    |

23. The unit of charge is \_\_\_\_\_. (1 mark)
24. A current of 5A flows for 3 minutes, find the quantity of electricity transferred. (4 marks)
25. Define Joule. (2 marks)
26. A mass of 1000kg is raised through a height of 10m in 20seconds. What is work done and the power developed? (4 marks)

27. Find the conductance of a conductor of resistance. (4 marks)  
 (a)  $10\Omega$   
 (b)  $5k\Omega$
28. Ohms law states that? (2 marks)
29. Determine the p.d which must be applied to a  $2k\Omega$  resistor in order that a current of 10mA may flow (3 marks)
30. The current flowing through a resistor is 0.8A when a pd of 20V is applied. Determine the value of the resistance. (4 marks)
31. List FOUR basic electrical measuring instruments (4 marks)
32. Distinguish between Electrical potential and electromotive force. (4 marks)
33. Define electrical power (2 marks)

### SECTION C (40 MARKS)

*Answer any TWO questions in this section*

34. (a) Define earthing. (2 marks)  
 (b) State THREE main types of earthing. (3 marks)  
 (c) Briefly outline the importance of earthing. (6 marks)  
 (d) An electric heater consumes 1.8 MJ when connected to a 250V supply for 30 minutes.  
 (i) Find the power rating of the heater  
 (ii) Find the current taken from the supply (9 marks)
35. (a) A source E.M.F of 5v supplies a current of 3A for 10 minutes. How much energy is provided in this time? (5 marks)  
 (b) A 100V battery is connected across a resistor and causes a current of 5 mA to flow.  
 (i) Determine the resistance of the resistor.

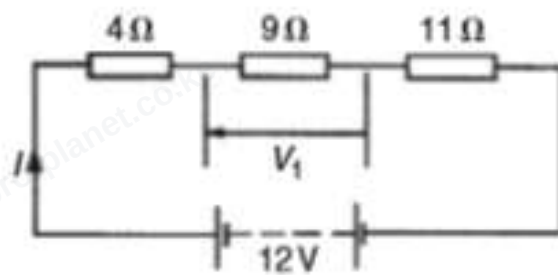
- (ii) If the voltage is now reduced to 25v, what will be the new value of the current flowing

(8 marks)

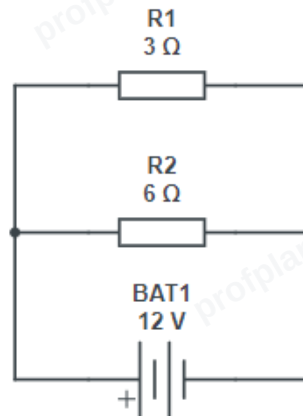
- (c) A 12v battery is connected in a circuit having three series -connected resistors having resistances of  $4\Omega$ ,  $9\Omega$  and  $11\Omega$

- (i) Determine the current flowing through and the potential difference across the  $9\Omega$  resistor.
- (ii) Find the power dissipated in the  $11\Omega$  resistor

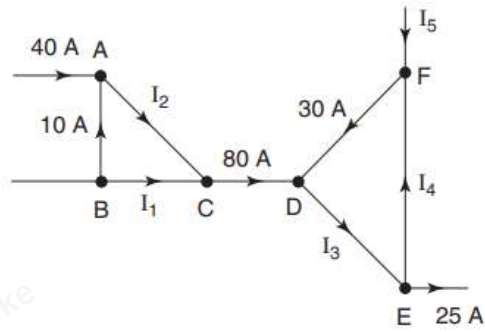
(7 marks)



36. (a) Two resistors of resistances 3 and 6  $\Omega$  connected in parallel having a voltage of 12v. Determine;



- (i) The total circuit resistance
- (ii) The current flowing in the  $3\Omega$  resistor (10 marks)
- (b) For the network shown calculate the values of the marked currents. (10 marks)



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