

071606T4ABT

AUTOBODY TECHNOLOGY LEVEL 6

ENG/OS/ABT/CC/08/6/A

Apply Electrical and Electronics Principles

July/August 2024



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO THE CANDIDATE

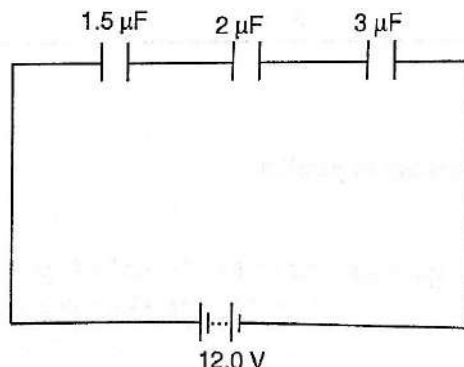
1. *This paper consists of **TWO** sections: **A** and **B**.*
2. *Attempt **ALL** the questions in Section **A** and any **THREE** questions from Section **B**.*
3. *Marks for each question are as indicated.*
4. *You are provided with a separate answer booklet.*
5. *Do not write on the question paper.*

**This paper consists of FOUR (4) printed
Candidates should check the question paper to ascertain that all pages are printed as
indicated and that no questions are missing**

Turn Over

SECTION A: (40 MARKS)***Attempt ALL the questions in this section***

1. List FOUR safety precautions to be observed when working on electronics. (4 Marks)
2. Resistors are components used in electrical circuits. Highlight FOUR applications of resistors in electrical and electronic circuits. (4 Marks)
3. Given that the resistivity of nichrome is $1.1 \times 10^{-6} \Omega\text{m}$, calculate length of nichrome wire of diameter 0.42 mm needed to make a resistance of 20Ω . (2 Marks)
4. Capacitors are essential components in electrical circuits. Highlight FIVE functions of capacitors. (5 Marks)
5. Logic gates are very key in electronic circuits. Explain THREE basic logic gates. (6 Marks)
6. Highlight TWO differences between D.C and A.C motors. (4 Marks)
7. Earthing is important in every electrical system. Highlight FOUR reasons why earthing is necessary. (4 Marks)
8. A heating coil providing 3,600 J/min is required when the p.d across it is 24 V. Calculate the length of the wire making the coil given that its cross-sectional area is $1 \times 10^{-7} \text{ m}^2$ and resistivity $1 \times 10^{-6} \Omega \text{ m}$. (2 Marks)
9. Three capacitors of capacitance $1.5\mu\text{F}$, $2\mu\text{F}$ and $3\mu\text{F}$ are connected to a potential difference of 12 V as shown. (3 Marks)



Find;

- a) The combined capacitance
 - b) The charge on each capacitor
 - c) The voltage across the $2 \mu\text{F}$ capacitor
10. For a car battery to last long it requires regular service. Highlight SIX ways in which battery can be serviced or maintained. (6 Marks)

SECTION B: (60 MARKS)

Attempt any THREE questions in this section.

11.

- a) Define the following terms as used in semi-conductors giving an example in each. (4 Marks)
- i) Donor atom
 - ii) Acceptor atom
- b) Explain the following terms as applied to a PN junction diode (14 Marks)
- i) Semiconductor Material:
 - ii) P-N Junction:
 - iii) Barrier Potential:
 - iv) Forward Bias:
 - v) Reverse Bias:
 - vi) Current Flow:
 - vii) Breakdown:
- c) State TWO power supply protection methods (2 Marks)

12.

- a) State FOUR reasons why circuit protection is important. (4 Marks)
- b) List SIX types of diodes. (6 Marks)
- c) In Power rectification, both half and full wave rectification methods are used. Explain how the TWO methods work. (10 Marks)

13.

- a) Electrolysis and Electrolyte are common terms used in electro-chemical. Differentiate the two words. (4 Marks)
- b) List SIX applications of secondary cell. (6 Marks)
- c) Explain the following types of logic gates as used in electrical principles.
 - i) AND gate
 - ii) OR gate
 - iii) NOT gate
 - iv) NOR gate
 - v) XOR gate

14.

- a) List FOUR factors that affect the resistance of a conductor. (4 Marks)
- b) Explain THREE functions of a circuit breaker. (6 Marks)
- c) Proper earthing is essential for electrical safety protecting both people and equipment from electrical shocks and fire hazard. Explain FIVE types of earthing systems. (10 Marks)
 - i) TT earthing system
 - ii) TN earthing System
 - iii)** IT earthing system
 - iv) ZIGZAG Earthing
 - v)** GROUNDING ROD/EARTH ELECTRODES