

061306T4CSC
COMPUTER SCIENCE LEVEL 6
ICT/OS/CS/CC/01/6/A
APPLY BASIC ELECTRONIC SKILLS
July /August 2024



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

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

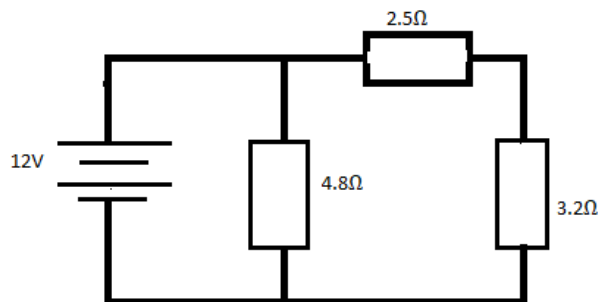
1. The paper consists of TWO sections: **A** and **B**
2. Answer ALL questions in Section **A** and any THREE from section **B**
3. Marks for each question are indicated in the brackets
4. A separate answer booklet will be provided
5. Do not write on the question paper

This paper consists of FOUR (4) 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: (40 MARKS)*Answer ALL the questions in this section*

1. Define the term 'diode' as used in basic electronics. (2 Marks)
2. Explain the meaning of the following terms as used in semiconductors.
 - a. P-N junction. (2 Marks)
 - b. Doping. (2 Marks)
3. Elaborate THREE ways in which the use of BCD representation enhances accuracy in applications. (3 Marks)
4. Sumo Company is assessing a robust power supply unit, which is rated at 1200W and operates at 220V. Determine the current drawn by the supply unit and calculate its resistance. (4 Marks)
5. Enumerate THREE terminals of a transistor. (3 Marks)
6. Explain TWO characteristics of passive electronic components. (4 Marks)
7. Describe the position of the chemical potential in an n-type semiconductor at room temperature. (3 Marks)
8. State THREE characteristics of volatile memory. (3 Marks)
9. Using the circuit depicted in *Figure 1* below, determine the current passing through it when it is powered by a 12-volt source. (4 Marks)

***Figure 1***

10. Explain the implications of adding a new resistor to a series circuit compared to a parallel circuit in terms of overall resistance. (4 Marks)
11. Perform the conversions for each of the following number system.
 - a. 720_{10} to Octal. (3 Marks)
 - b. $5BC_{16}$ to Decimal. (3 Marks)

SECTION B: (60 MARKS)

Answer any THREE questions in this section

12. As part of your interview process for a computer scientist position at a software development company, you're asked to demonstrate your foundational knowledge in electronics by performing computations in various number systems

- a. Perform the conversions for each of the following number system. (10 Marks)
- i. 01111010_2 to Decimal
 - ii. $0100\ 0011\ 0110\ 0010$ (BCD) to hexadecimal
 - iii. $EA5_{16}$ to Binary
 - iv. 617_{10} to Binary
 - v. 111110.111100 to Decimal
- b. Justify FIVE reasons why silicon is preferred over germanium for semiconductor devices. (10 Marks)

13.

- a. Describe FOUR examples of special diodes commonly used in Computer equipment. (8 Marks)
- b. With the help of a diagram, discuss the FOUR main hierarchy of the computer memory. (12 Marks)

14.

- a. John has been designated to train recently onboarded staff at the Tech Solutions firm where he is employed. As a component of the training agenda, he is obligated to delve into the fundamentals of electronics.
- i. Using well-labelled diagrams, describe how a *P-N junction* diode is biased. (10 Marks)
 - ii. Discuss FIVE applications of PNP transistors. (10 Marks)

15.

- a. An electronics technician is in the midst of crafting a new system. As the technician progresses, she recognizes the crucial considerations involved in selecting the appropriate semiconductors before defining the circuit requirements.
 - i. Discuss FIVE differences between intrinsic and extrinsic semiconductors that will guide the technician on choosing the best semiconductor to use. (10 Marks)
- b. A $10\ \Omega$ and a $4\ \Omega$ resistor are connected in series; the current is measured to be 8A .
 - i. Draw the diagram for the above circuit. (4 Marks)
 - ii. Compute the voltage drop across the $4\ \Omega$ resistor. (3 Marks)
 - iii. Calculate the total power dissipated by the circuit. (3 Marks)

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