061006T4ICT

ICT TECHNICIAN LEVEL 6

IT/OS/ICT/CC/01/6

APPLY BASIC ELECTRONIC

July /August 2024

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

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. The paper consists of TWO sections; A & B
2. You are provided with a separate answer booklet
3. Marks for each question are as indicated
4. Do not write on the question paper

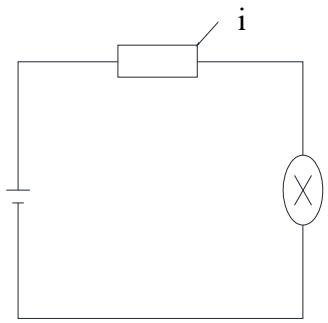
This paper consists of FOUR (4) printed pages

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. Semiconductor materials are crucial components in electronic devices, forming the backbone of modern technology. Name FOUR semi-conductor materials. (4 marks)
2. So many concepts have emerged in the field of basic electronics due to ongoing research and innovation. Nanotechnology is one such concept that has revolutionized the design and manufacturing of electronic devices.
    a. Define the term nanotechnology. (2 marks)
    b. State TWO challenges that it has. (2 marks)
3. In basic electronics, memories typically refer to electronic components or systems used for storing digital data. Outline FOUR uses of computer cache memory. (4 marks)
4. An electrical circuit is a network of electrical components that are interconnected by conductive wires to form a closed loop, allowing electric current to flow. The drawing below represents a simple DC circuit. Use it to Explain TWO uses of the part labelled (i) (4 marks)



5. Binary codes are fundamental to digital computing and are widely used in various applications. Outline FOUR ways in which you can represent numbers using Binary Coded Decimal (BCD) (4 marks)
6. While troubleshooting a computer, Peter noticed that it had issues with some electronic components. Identify FOUR electronic components that he might test on the computer motherboard. (4 marks)

7. Resistors are one of the most fundamental components in electronic circuits and are used for various purposes. Explain TWO circumstances under which fixed resistors are most applicable in the construction of electrical components (4 marks)
8. Kevin has been hired to perform computer and mobile phone repair by Sian electronics, an electronics shop based in Lurambi. Outline FOUR electrical quantities that Kelvin is likely to test during the course of his work (4 marks)
9. While working on a laptop, Eric noticed that a diode was missing. Outline FOUR types of diodes that he is likely to encounter when trying to replace the missing diode. (4 marks)
10. With the aid of a well labeled diagram, outline the circuit symbol for an PNP transistor showing the flow of current. (4 marks)

SECTION B: 60 MARKS

Answer any THREE questions from this section.

11.

a. Alex was working with a circuit that has a conductance of 4.2×10^{-2} Siemens and voltage of 10 Volts. Determine;

i. Current in the circuit. (5 marks)

ii. Power output in the circuit (3 marks)

b. Describe conductors, semiconductors and insulators with the aid of well labeled energy band diagrams. 12 marks

12.

a. Describe how P-type and N-type semiconductor materials are formed explaining the majority of the charge carriers in each type of material. (8 marks)

b. While working with computers, Stanley noticed that different devices were used for storage.

i. Explain FOUR types of memories used in a computer system. (8 marks)

ii. Explain TWO characteristics of ROM as used in computers (4 marks)

13.

a. Perform the following operations:

i. $81_{10}+77_{10}$ using BCD (4 marks)

ii. 10011001_2-11001110_2 using 1's complement (4 marks)

iii. $215_{10}+1001_8$ give answer in excess-3 (4 marks)

b. A circuit has been running for one hour with a voltage of 20V, power dissipation of 10watts and conductivity of 1.8×10^{-2} Siemens. Determine the:

i. Resistivity (2 marks)

ii. Charge (6 marks)

14.

a. Differentiate between forward biasing and reverse biasing of a diode. (4 marks)

b. Using a well labeled diagram, explain the structure of a silicon square lattice. (6 marks)

c. Describe the behavior of resistor and capacitor when connected in:

i. Series (5 marks)

ii. Parallel (5 marks)

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