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061004T4ICT

ICT TECHNICIAN LEVEL 5

IT/OS/ICT/CC/01/5

Apply Basic Electronics

July/August 2025

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

WRITTEN ASSESSMENT

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Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

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1. The paper consists of **TWO** sections: **A** and **B**.
2. Answer all questions in section A and **ANY THREE (3)** questions in section B.
3. Marks stion are in dicated in the backes
4. Candidates are provided with a separate answer booklet.
5. **DO NOT** write on the question paper.

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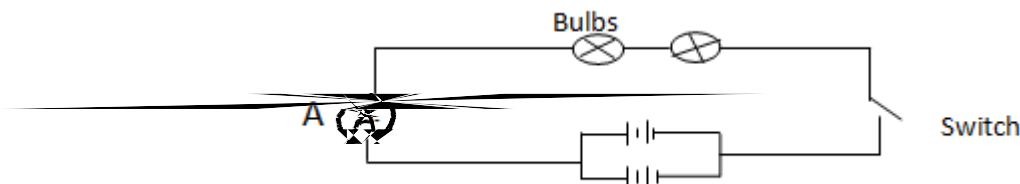
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This paper consists of FIVE (5) printed pages

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

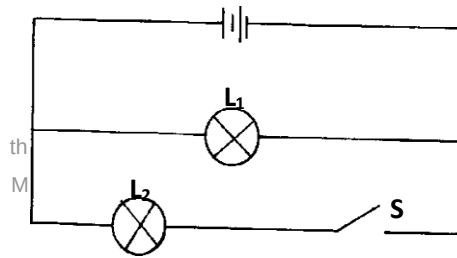
SECTION A (40 MARKS)**Answer ALL the questions in this section.**

1. A technician in a company is illustrating the difference between NPN and PNP Bipolar Transistor to an administrator. Using simple diagrams illustrate the structure of NPN and PNP Bipolar Transistor. (4 marks)
2. Give the difference between semiconductor from optical memory technologies by outlining their main properties and functions. (2 marks)
3. The figure below shows a circuit diagram with cells in parallel. Each cell has e.m.f. of 1.5V and internal resistance of 0.5Ω and the resistance of the bulb is 6Ω each. Determine the ammeter reading when the switch is closed. (3 marks)



4. Computers have various interrelated components that work together to ensure they deliver services in a timely manner. Name the function of each of the following electronic components found in computers. (2 marks)
 - a) Signal diodes
 - b) Capacitors
5. Temperature of a material plays a key role in the electrical conductivity; give the effects of temperature in extrinsic semiconductors. (2 marks)
6. Perform the following number conversions. (2 marks)
 - a) 135 (hexadecimal) to Binary
 - b) 126 (decimal) to Hexadecimal
 - c) 1001001(Binary) to Decimal
 - d) 1434 (Octal) to Binary
7. Draw a diagram to show how you would use a Zener diode in a circuit. (2 marks)
8. Junction diodes are widely used in electronic circuits due to their ability to control the direction of current flow. Based on your understanding, list TWO common uses of junction diode. (2 marks)
9. The diagram below shows two identical lamps L_1 and L_2 connected to a battery. Outline the effect if any, of closing switch S on L_1 . (2 marks)

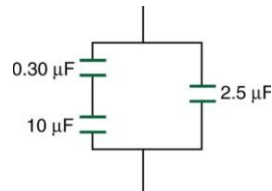
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10. With respect to atomic theory of matter, identify the difference between valence band and a conduction band. (2 marks)

11. A computer has programmable memories that are read only and are permanent as compared to RAM which is temporary. List THREE types of read only memory (ROM) (3 marks)

12. A trainee at technical institution learning about capacitors and circuits. Given the network below, determine; (4 marks)



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- Total capacitance in parallel $C_t = C_1 + C_2$
- Total charge across the circuit if it is connected to a 24V battery.

13. Highlight two limitations why digital circuits are preferred circuit design. (2 marks)

14. The graph below shows a forward bias characteristic of a p-n junction. Describe what happens to the depletion layer as relate. (2 marks)

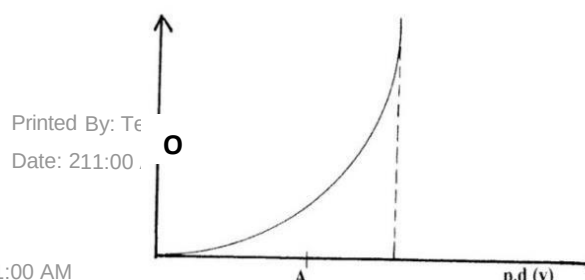


Fig. 6

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SECTION B (60 MARKS)

Answer Any THREE Questions in This Section

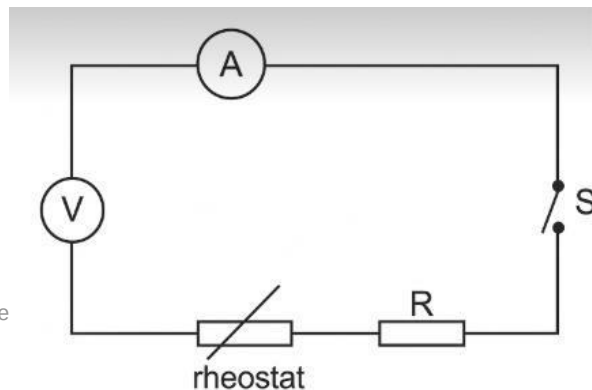
15. Modern computing systems rely on a combination of electronic components, secure data management, and binary representation to ensure reliable and secure digital operations.

Printed By: Diodes play an important role in electronic circuits, each designed for specific functions. Examine the TWO distinct types of diodes by addressing the following for each (10 marks)

- Name and describe the type of diode.
- Explain its mode of formation.
- Analyze its primary function in an electronic circuit.
- State one common real-world application.

- A newly employed IT technician in an IT company is assigned the role of a data administrator within the organization. Explain THREE ways in which he will acquire, manipulate and store data against hackers, crackers and data loss. (6 marks)
- Computers universally operate using binary rather than other number systems. As an ICT trainee, explain TWO fundamental reasons why binary representation is ideal for data processing and storage in digital systems. (4 marks)

16. You are provided with a basic electrical circuit shown in the figure below. The circuit is intended to investigate the relationship between current (I) and voltage (V) in accordance with Ohm's Law.



- Describe Ohm's law (2 Marks)
- Explain two ways in which the circuit can be used to verify Ohm's law. (4 Marks)
- Sketch a graph of V against I (4 Marks)
- Using two's complement, work out $3510 - 1710$, giving your answer in decimal notation (5 marks)
- Using one's complement subtracts 17 from 28 decimal notations. (5 mark)

17.

- With the aid of a diagram explain TWO methods of biasing bipolar junction transistors (BJTS) that he taught them. (6 marks)

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b) Explain TWO challenges an individual could experience when migrating from analogue to digital. (4 marks)

c) A consumer electronics witnessed reduced sales due to changing consumer preferences and behavior. In particular the consumers prefer more portable devices, smart and cost effective. Advise the management on steps to take to recapture market share. (10 Marks)

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18. With the convergence of mobile and computing technologies, modern electronic systems like Smartphones are now being designed with integrated computing capabilities.

a) Explain the statement; a Smartphone is basically an electronic system with similar component to a computer, by assessing FIVE similarities between the Smartphone and computer in relation their feature. (10 Marks)

b) A motherboard is an example of an electronic circuit in computers. In designing an electronic circuit, explain THREE components are likely to be put into consideration. (6 Marks)

c) The threat of cyber-attacks continues to be a growing concern for the electronics manufacturing industry. Justify how by explaining TWO major concerns. (4 Marks)

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