

061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CC/01/6

Apply Basic Electronic Skills

March/April 2026



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

WRITTEN ASSESSMENT

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATE

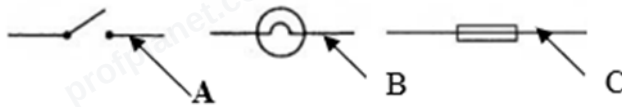
1. This paper consists of **TWO** sections: **A** and **B**.
2. Answer question **FIFTEEN (15)** and any other **TWO (2)** questions in section B.
3. Marks for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet
5. Do not write on the question paper.

This paper consists of FIVE (5) printed pages

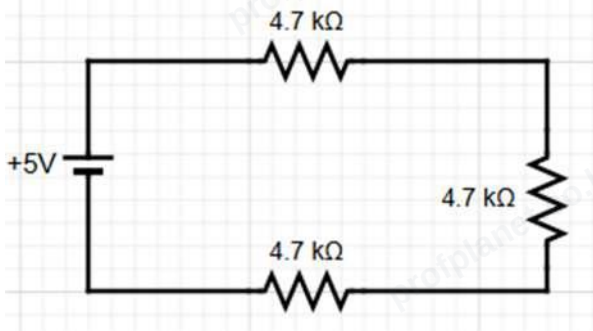
Candidate should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

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

- Beyond the atomic structure of a material, list TWO things that affect the conductivity of a material. (2 marks)
- Identify TWO main types of bipolar junction transistors. (2 marks)
- Figure 1 below shows symbols of electrical components. Label each. (3 marks)

*Figure 1*

- State any TWO dopants used to form n-type semiconductors. (2 marks)
- Figure 2 below shows a circuit with three resistors and a power supply. Use arrows to label direction of flow of electrons. (2 marks)

*Figure 2*

- Calculate the current that must flow if 0.24 coulombs are to be transferred in 15 ms. (3 marks)
- An image with a resolution of 3840 x 2160 pixels and color depth of 32 bits is stored on a desktop. Calculate the amount of memory storage used in megabytes. (4 marks)
- Using energy band theory, describe how the covalent bonding in materials like silicon results in the formation of valence and conduction energy bands. (4 marks)
- At absolute zero temperature, pure silicon forms a covalent crystal lattice that behaves as an insulator but becomes a semiconductor at room temperature. What role do thermal energy and the band gap play in this behavior? (4 marks)
- An electric fan consumes 1.8 MJ when connected to a 250 V supply for 30 minutes. Find the power rating of the heater. (3 marks)
- A resistor is marked as 4R7K. Determine its value and tolerance. (2 marks)

12. A circuit has a power supply with a potential difference of 240 V and three resistors connected in series. Draw the circuit diagram assigning labels R1, R2, R3 to the resistors. (4 marks)
13. Justify why cache memory is placed above main memory (RAM) in the memory hierarchy, with reference to: speed, cost and capacity. (3 marks)
14. A multimedia editing workstation requires fast data access and temporary storage for large files during processing. Giving ONE reason, recommend the most suitable memory type for this task. (2 marks)

SECTION B (60 MARKS)

Answer question **FIFTEEN (15)** and any other **TWO (2)** questions in this section

15. a. Germanium is a semiconductor. Draw its atomic structure. (5 marks)
- b. Explain the difference between forward-bias and reverse-bias P-N junction when connected to direct current power supply. (4 Marks)
- c. Using a well labelled diagram, explain the formation of a p-type semiconductor made from germanium and gallium which is atomic number 31. (11 marks)
16. a. A coil of copper wire has a resistance of $100\ \Omega$ when its temperature is 0°C . Calculate its resistance at 80°C if the temperature coefficient of resistance of copper at 0°C is $0.0043/^{\circ}\text{C}$. (4 marks)
- b. Explain FOUR advantages of using integrated circuits in the manufacture of electronic devices. (8 Marks)
- c. Figure 3 below shows a circuit with four resistors R1, R2, R3, R4.

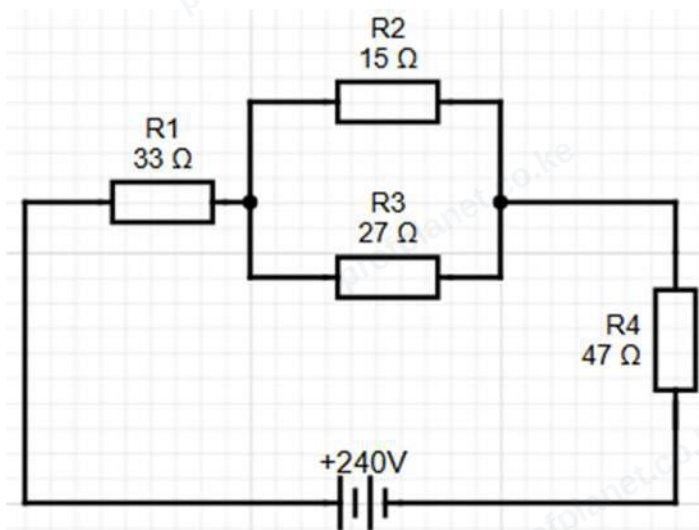


Figure 3

- i. Calculate the supply current I. (5 Marks)
- ii. Determine the potential difference across the resistor in parallel. (3 Marks)
17. a. Convert the following numbers to the respective number system. (9 marks)
 - i. 10.110_2 to decimal
 - ii. $1A4_{16}$ to decimal
 - iii. 125_8 to decimal
- b. Evaluate $454_{10} + 234_{10}$ using BCD (5 marks)
- c. Given that $X = 24_8$ and $Y = 88_{10}$. Encode the sum of X and Y using Excess-3. (6 marks)

18. a. Solid state disks (SSD) have gained popularity and are replacing the hard disk drives (HDD). Discuss THREE of their advantages. (6 marks)
- b. An office assistant used 45 minutes to press office curtains for 45 minutes using an electric iron. Given that it is rated 1450W and connected to a 250V supply, calculate the cost of operating the appliance if electricity costs Ksh 30 per kWh. (4 marks)
- c. Refrigerators, dishwashers and washing machines use read only memory. Explain any THREE types of these memories. (6 marks)
- d. A graphics software running on a computer whose RAM is 16 GB uses 1200 MB of memory to run. Assuming that 2 GB of RAM is reserved for the operating system and background processes, calculate instances of the application can run simultaneously without exceeding the available RAM. (4 marks)