061906T4TEL

TELECOMMUNICATION ENGINEERING LEVEL 6

ENG/OS/TLE/CC/05/6/A

Demonstrate Understanding of Electronics

November/December 2025

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

WRITTEN ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This 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 for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet.
5. Do not write on this question paper.

This paper consists of THREE (3) 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. In electronic devices, semiconductors are often categorized as extrinsic due to the introduction of impurities. Explain the term extrinsic semiconductor and give TWO examples of doping elements. (4 Marks)
2. With the aid of diagrams explain TWO types of transistors. (4 Marks)
3. Light Dependent Resistors (LDRs) are widely used in automation. Highlight their FOUR applications. (4 Marks)
4. Full-wave center-tap rectifiers are commonly used in power supply circuits to convert AC voltage into pulsating DC voltage. State their THREE disadvantages over half-wave rectifier. (3 Marks)
5. In a common base connection, current amplification factor is 0.9. If the emitter current is 1mA, determine the value of base current. (6 Marks)
6. Logic circuits are used to control decision-making processes in digital systems. Outline FOUR real-world applications of flip-flops. (4 Marks)
7. With the aid of a diagram explain how Reverse Biasing of P-N Junction is achieved. (6 Marks)
8. Sequential logic elements are crucial in digital systems. Highlight THREE examples of sequential circuits. (3 Marks)
9. In high-level programming languages, functions exchange data using parameter passing. State THREE advantages of using call by reference. (3 Marks)
10. State any THREE basic transistor biasing methods (3 Marks)

SECTION B :(60 MARKS)

*Answer **THREE** Questions in This Section.*

11.

a) Draw and explain the voltage-current (V-I) characteristics curves of a P-N junction diode. (8 Marks)

b) Diana is a technician contracted by a Steel Smelting Company to develop an electronic system for monitoring temperature within the plant. Explain THREE reasons why she will choose to use Bipolar Junction Transistor (BJT) over Field-Effect Transistors (FET) in her system. (6 Marks)

c) Transistors are categorized in different logic families. State SIX of limitations of the TTL logic family. (6 Marks)

12.

a) With the aid of a transistor equivalent circuit explain the operation of the TRIAC. (8 Marks)

b) State and explain FOUR methods of turning ON a Silicon Controlled Rectifier (SCR). (8 Marks)

c) State FOUR characteristics of a Junction Field-effect Transistor (JFET). (4 Marks)

13.

a) Give any SIX types of diodes and explain their respective applications. (12 Marks)

b) With aid of a diagram, explain the working of NPN transistor. (8 Marks)

14.

a) With the aid of a block diagrams explain a typical dc power supply stages. (10 Marks)

b) Operational amplifiers (op-amps) serve as key components in various electronic circuits for tasks such as amplification, filtering, voltage regulation, and mathematical operations. Identify any FIVE examples of op-amps, explain their configurations and functioning. (10 Marks)