071305T4EOP

ELECTRICAL OPERATION (POWER OPTION) LEVEL 5

ENG/OS/PO/CR/04/5 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. Attempt **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 answer booklet.
5. Do not write on the question paper.

This paper consists of FIVE (5) 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)

Attempt ALL the questions in this section.

1. Semiconductors aid in the manufacture of various kinds of electronic devices, including diodes, transistors, and integrated circuits. Define the term semiconductor as used in electronics. (2 marks)

2. There is of electric charges in various materials. Distinguish between conductors, insulators, and semiconductors as far as conductivity is concerned. (3 marks)

3. Semiconductors are manufactured through a complex process that involves multiple steps, starting from the preparation of raw materials and ending with the production of finished devices. Outline TWO examples of semiconductor materials. (4 marks)

4. Understanding intrinsic and extrinsic semiconductors is essential for grasping the basics of modern electronics. While intrinsic materials set the theoretical foundation, extrinsic semiconductors have powered real-world innovations from microchips to solar panels. List TWO differences between intrinsic and extrinsic semiconductors.

(4 marks)

5. Semiconductor devices are made of P-N junctions either silicon or germanium. Define a P-N junction. (4 marks)

6. Various transistor functions are achieved by biasing. Define the term 'transistor biasing' as used in electronics. (4 marks)

7. In any electronics equipment operation, stability is very vital. Define the term stabilization of the operating point. (4 marks)

8. Transistor biasing is very important in electronic circuits. State FOUR essentials of a biasing circuit. (4 Marks)

9. Trve various applications in the electronic field. List any TWO applications of a transistor. (2 marks)

10. P-N junctions joined back to back forms a transistor. Differentiate between **NPN** and **PNP** transistors as used in electronics. (4 marks)

11. The main reason for using semiconductor devices in the manufacturing of electronics devices and components is the ability to easily manipulate its conductivity of charge carriers i.e. electro types of special semiconductor devices.

(2 marks)

12. Transistor biasing is very important in electronic circuits. State THREE essentials of

(3 Marks)

SECTION B (60 MARKS)

Attempt Any THREE Questions in This Section

13.

(a) Digital world is vastly embraced, briefly explain FOUR advantages of using digital electronic devices over analog. (8 marks)

(b) Logic gae basic building blocks of digital circuits and electronic devices.
Outline THREE practical applications of logic gates in digital systems and electronic devices. (6 Marks)

(c) With the aid of a well-labeled diagram, explain the working principle of reverse biased P-N Junction. (6 marks)

14.

(a) Transistors can be categorized mainly as NPN or PNP types, each with distinct chacs. Explain THREE differences between NPN and PNP transistors in terms of their operation. (6 Marks)

(b) Transistors can be connected in various ways to achieve different functions in electronics. Describe FOUR transistor configuratio in electronics. (8 Marks)

(c) Special semiconductor devices, such as LEDs, photodiodes, and thyristors, have unique applications in industry. Explain THREE common applications of special semiconductors in industry. (6 Marks)

15.

(a) Rectification is a way chanower to DC, explain THREE key differences between half-wave and full-wave rectification. (6 Marks)

(b) The potential divider method is an important concept used in rectification and voltage regulation. Describe the potential divider method as applied in rectification. (6 marks)

(c) Diodes are key components in electronics, and their performance depends on several conditions. Describe FOUR factors that affect the performance of diodes under different conditions. (8 Marks)

16.

(a) A transistor is a fundamental building block in the ever-advancing world of electronic devices and systems. With a well labelled circuit diagram explain the working of an NPN transistor. (10 marks)

(b) Transistor is a widely used component in electronics circuits. Discuss **five** facts about the NPN (10 marks)