

071606T4MCT

MECHATRONICS TECHNICIAN LEVEL 6

ENG/OS/MC/CC/05/6

Apply Material Science Principles

July/Aug 2023



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

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INSTRUCTIONS TO CANDIDATES

1. This paper consists of sections **A** and **B**
2. Answer **ALL** questions in section **A** and **ANY THREE** questions in section **B**.
3. Do not write on the question paper
4. You will be provided with a separate answer booklet
5. You are required to have a non-programmable scientific calculator in this assessment

This paper consists of THREE 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. Different materials are used in diverse ways to achieve the intended purpose. State FOUR types of engineering materials. (4 marks)
2. Materials should be handled appropriately to ensure long life and safety of the user and the environment. State FOUR safety measures to observe when handling engineering materials. (4 marks)
3. Materials have physical properties that are considered when handling them. Explain THREE physical properties of engineering materials. (6 marks)
4. Material test is important when dealing with materials. State FOUR reasons for testing engineering materials. (4 marks)
5. Iron ores are rocks and minerals from which metallic iron can be extracted. State THREE types of iron ores. (3 marks)
6. Coke is added to a blast furnace when carrying out heat treatment. State TWO functions of coke. (2 marks)
7. Differentiate between thermoplastics and thermosetting materials citing one example in each. (4 marks)
8. Differentiate between ferrous and non-ferrous materials and give one example of each type. (4 marks)
9. List THREE factors that contribute to corrosion. (3 marks)
10. Define the term “heat treatment”. (2 marks)
11. State FOUR importance of heat treatment. (4 marks)

SECTION B (60 MARKS)

*Answer any **three** questions in this section.*

12.

- a) Describe FOUR methods of preventing corrosion. (8 Marks)
- b) Using sketches, explain the following crystal structures:
 - i. Body-centred cubic
 - ii. Face-centred cubic
 - iii. hexagonal close-packed (12 Marks)

13.

- a) Explain FOUR mechanical properties of materials. (8 Marks)
- b) Explain FOUR heat treatment processes. (12 Marks)

14.

- a) Explain FIVE methods of material tests. (10 Marks)
- b) Explain FIVE factors to consider when selecting engineering materials. (10 Marks)

15.

- a) Define the term “corrosion” and explain FIVE types of corrosion. (10 Marks)
- b) Explain FIVE applications of engineering materials. (10 Marks)