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MECHANICAL PRODUCTION TECHNICIAN LEVEL 6**ENG/OS/ME/CC/06/6****Apply Material Science and Perform Metallurgical Processes****November /December 2025**Printed By: Bungoma North Technical And Vocational College
Date: 20.11.2025 09:02 AM

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

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WRITTEN ASSESSMENT**Time: 3 HOURS**

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INSTRUCT CANDIDATEPrinted By: Bth Technical And Vocational College Date:
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1. The paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** Questions in Section A and any **THREE** 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

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**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)***Answer ALL the questions in this section.***

1. Most metals are not in their pure form but are extracted from ores. Define an ore. (2 Marks)
2. During smelting process in a furnace, limestone is added to the iron ore. Identify TWO roles of limestone in this process. (2 Marks)
3. Define the term **materials**. (3 Marks)
 - a. Composite materials;
 - b. Ceramic;
 - c. An alloy.
4. Engineering materials possess different properties. Outline FOUR physical properties of engineering materials. (4 Marks)
5. In workshop practice, steel is often selected based on the amount of carbon it contains. List FOUR classifications of plain carbon steels according to their carbon content. (4 Marks)
6. Adding other materials to steel improves its properties. Highlight THREE effects of silicon in steel. (3 Marks)
7. A trainee is required to design a composite material for a high-temperature turbine blade. She decides to use silicon carbide fibers combined with silicon carbide matrix. Give three reasons for her choice. (3 Marks)
8. Metals corrode faster in the coastal region compared to metals in central region;
 - a. State TWO reasons for this observation. (2 Marks)
 - b. Suggest TWO solutions to minimize this problem. (2 Marks)
9. Ceramics are one of the materials used in engineering although they are brittle in nature. Give FOUR reasons why ceramics are brittle. (4 Marks)
10. Coke is one of the charging materials used in the extraction of iron in a blast furnace. Mention TWO roles of coke in the extraction process. (2 Marks)
11. Copper is one of the highly used engineering materials worldwide. List FOUR properties of copper that make it indispensable in the manufacturing industry. (4 Marks)
12. Aluminium is used in some motor-vehicle components such as spark plug insulators and brake linings. State THREE properties that make alumina suitable for such application. (3 Marks)
13. A mechanical technician operates under very hot working conditions. Identify TWO Personal Protective Equipment (PPE) the technician should use. (2 Marks)

SECTION B (60 MARKS)***Answer Any THREE Questions in This Section.***

14.

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- a. In metalworking industries, heat treatment is a crucial process applied to improve the performance and service life of components. Discuss EIGHT benefits of heat treatment in metals. (8 Marks)

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- b. Manufacture engine parts by choosing materials according to their mechanical properties. Explain SIX mechanical properties of engineering materials. (12 Marks)

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15.

- a. During an industrial visit to a manufacturing company, trainees were oriented on the importance of understanding the properties of engineering materials in manufacturing. Explain EIGHT points of importance highlighted to them. (8 Marks)
- b. With the help of a well labeled sketch, Describe the function of a blast furnace in iron extraction. (12 Marks)

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16.

- a. A quality control agency inspects ceramic products before they are released into a country's market. Describe FIVE tests carried out during this inspection. (10 Marks)
- b. Aerospace Companies uses aluminum during of aircraft parts. Identify FIVE reasons why aluminum is preferred over other materials. (10 Marks)

17.

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- a. You technician at a Manufacturing company and your company has purchased several materials for its operation. You are to perform the Brinell hardness test. (5 Marks)

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Describe the steps you would follow when carrying out this test. (5 Marks)

- b. Employees at a Metal Works industry performs heat treatment processes on metals while fabricating new components. Describe FIVE heat treatment processes that improve product quality. (10 Marks)

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- c. You are a worker in a fabrication company and you have been tasked to educate attachés on different copper-tin alloys. Discuss FIVE points you would include in your presentation. (5 Marks)

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