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MECHANICAL PRODUCTION TECHNOLOGY LEVEL 5

ENG/OS/ME/CC/02/05 Use Common Metallic and Non-Metallic Materials November/December 2025

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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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INSTRUCTIONS TO CANDIDATE

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1. This paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section A and **ANY THREE** 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.

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This paper consists of FOUR (4) printed pages

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

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SECTION A (40 MARKS)

Answer ALL the questions in this section.

1. A technician is planning to cut a component in the workshop using a ferrous metal. List FOUR common metals the technician can use. (4 Marks)

2. Highlight TWO finishing process in production of metallic and non-metallic components. (2 Marks)

3. A technician is working with metallic material in a workshop. Outline THREE safety precautions the technician must follow when handling. (3 Marks)

4. In Engineering field, non-metallic materials are produced using different methods depending on their type and application. List FOUR of these methods. (4 Marks)

5. A mechanic is unsure whether a bar is steel or aluminium. State FOUR tests that can help identify the bar. (4 Marks)

6. List FOUR charge material for cupola furnace. (4 Marks)

7. Outline FOUR classifications of ceramic materials based on composition. (4 Marks)

8. Highlight FOUR forms of material supply in engineering. (4 Marks)

9. Outline three methods a technician may employ to protect metal parts from corrosion. (3 Marks)

10. An environmental inspector observed poor disposal of metallic and non-metallic waste around a workshop. List FOUR environmental effects of such poor disposal. (4 Marks)

11. List FOUR advantages of using non-metallic materials in engineering. (4 Marks)

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SECTION B (60 MARKS)

Answer Any THREE Questions in This Section

12.

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a. Recycling is a waste management method applicable to both metallic and non-metallic materials. Highlight FOUR methods used in mechanical workshop. (4 Marks)

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b. Explain each of the following factors in the selection of a corrosion prevention method: (8 Marks)

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i. Cost;
ii. Aesthetic;
iii. Functionality;
iv. Environment.

c. During the heat treatment process of metals, workers are exposed to various risks. Explain FOUR health and safety hazards associated with this process. (8 Marks)

13.

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a. In engineering, metals often undergo property modification through heat treatment process. Explain the three stages involved in this process. (6 Marks)

b. Describe each of the following quenching methods of metals: (6 Marks)

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i. Water quenching;
ing
iii. Brine quenching.

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c. A structure beam in a workshop roof cracked during use. Discuss FOUR causes of this failure. (8 Marks)

14.

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a. Heat treatment is an important process in mechanical engineering for improving the properties of metals. Discuss FIVE methods applicable in this process (10 Marks)

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b. A fabrication company is producing large pressure vessels for an oil refinery. Radiographic Testing and Magnetic particle inspection methods are administered to ensure the vessels are free from both internal defects and surface cracks.

i. Explain the working principle of the two inspection methods (4 Marks)

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ii. Outline TWO advantages and ONE disadvantages of each method.

(6 Marks)

15. You have been hired bl manufacturing company to advise on material selection for kitchen equipment. The environment includes heat, moisture, and frequent cleaning.

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a. Suggest FIVE metallic materials suitable for this application. (5 Marks)

b. Recommend FIVE non-metallic materials that may be used in parts like handles and covers. (5 Marks)

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c. Explain FIVE reasons why proper material selection affects product performance. (10 Marks)

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