

073206T4CEN

CIVIL ENGINEERING LEVEL 6

CON/OS/CET/CR/01/6

Conduct Material Testing

November/December 2025



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

WRITTEN ASSESSMENT

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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 the question paper.

This paper consists of FOUR (4) 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)

Answer ALL the questions in this section.

1. Data collection is a key step in planning for construction projects and site investigations. List FOUR methods of data collection during a site analysis. (4 Marks)
2. Road construction requires the use of various materials obtained from natural and artificial sources. State FOUR sources of construction materials commonly used in road works. (4 Marks)
3. Bitumen is widely used as a binder in road construction, but it has some limitation. Explain TWO disadvantages of using bitumen as a road construction material. (4 Marks)
4. Compaction testing of soil requires the use of specialized equipment to achieve accurate results. Name FOUR essential equipment used in soil compaction testing. (4 Marks)
5. Quality control tests on concrete help to ensure compliance with specifications. Outline FOUR reasons for testing concrete in construction projects. (4 Marks)
6. Timber samples are subjected to laboratory tests to check their viability for structural use. Explain TWO properties of timber that are commonly tested. (4 Marks)
7. Bitumen used in road construction must undergo quality tests in the laboratory. State FOUR bitumen properties that can be determined through laboratory testing. (4 Marks)
8. The accuracy and reliability of test results depend on the condition of material testing equipment. List FOUR preventive measures that should be taken to ensure proper maintenance of material testing equipment. (4 Marks)
9. Test results must be documented and shared to engineers, contractors and stakeholders. State FOUR reasons for preparing and presenting material testing reports in construction projects. (4 Marks)
10. Sampling of construction materials in the field often presents difficulties that can affect the reliability of results. Describe TWO challenges likely to be encountered when carrying out material sampling in the field. (4 Marks)

SECTION B (60 MARKS)

Answer Any THREE Questions in This Section

12. On a construction site, engineers need to determine the strength of subgrade soils before road pavement layers are placed. Laboratory soil tests are carried out to assess load-bearing capacity
- a. Describe the step-by-step procedure for carrying out a CBR test on soil samples in the laboratory. (10 Marks)
 - b. Explain FIVE factors that may affect the accuracy of soil test results on-site and in the laboratory. (10 Marks)
13. As a laboratory technician responsible for quality control during road and building construction, you are required to carry out tests on fresh and hardened concrete to confirm compliance with specifications.
- a. Describe THREE apparatus required when carrying out a slump test on fresh concrete. (6 Marks)
 - b. With the aid of sketches, describe FOUR types of slumps that may be observed during concrete test. (8 Marks)
 - c. Describe THREE possible site factors that may cause low compressive strength in concrete cubes. (6 Marks)
14. As a trainee on attachment in a road construction laboratory, you gained practical experience in testing construction materials. One of your responsibilities was to carry out tests on bitumen to ensure it meets the required standards for durability, workability, and performance under traffic loading and varying environmental conditions.
- a. Describe SIX apparatus used to carry out the penetration test for bitumen. (12 Marks)
 - b. Explain FOUR significances of the viscosity test in ensuring quality of bitumen for pavement construction. (8 Marks)
15. As a site engineer, you are required to ensure that structural timber and steel used in construction projects are tested in the laboratory to verify their strength and suitability for load-bearing applications.
- a. Explain the procedure for determining the tensile strength of timber in the laboratory. (6 Marks)
 - b. Outline the steps followed when testing structural steel for tensile strength using a tensile testing machine. (8 Marks)

- c. Explain THREE advantages of carrying out timber and steel tests before their use in construction works. (6 Marks)