

073105T4LAS

LAND SURVEY LEVEL 5

LSM/OS/LM/CC/02/5

Operate Survey Instruments

November/December 2025



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

WRITTEN

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. The paper consists of **TWO** sections: **A** and **B**.
3. Attempt **ALL** the questions in section A and any **THREE** questions in section B.
4. Candidates are provided with a separate answer booklet
5. **DO NOT** write on this 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. Chain is one of the equipment used for linear measurements. Highlight FOUR features of a gunter's chain. (4 Marks)
2. Surveyors use both metric and imperial unit systems. List TWO examples of each of the unit systems. (4 Marks)
3. Stadia system is one of the systems of tacheometric measurements. Outline TWO different types of systems in stadia method. (4 Marks)
4. Electromagnetic Distance Measurement (EDM) and Optical Distance Measurement (ODM) are instruments used in surveying. Differentiate between EDM and ODM instruments. (4 Marks)
5. Bearings can be expressed using different systems. Outline TWO characteristics of whole circle bearing. (4 Marks)
6. Due to errors, repeated observation of the same quantity will often yield different values. Distinguish between precision and accuracy measurements. (4 Marks)
7. Precautions should be taken when entering data in a level book. Highlight FIVE points to be remembered while entering the data. (5 Marks)
8. A highway alignment survey requires the establishment of two control points. A surveyor established control point A (-140787.89, -5831.32) and control point B (-140891.40, -5772.35). Calculate the distance and bearing between control point A and B. (4 Marks)
9. Theodolite is used for setting out engineering works requiring higher precision. Distinguish between transit theodolite and non-transit theodolite. (4 Marks)
10. A surveyor is tasked with establishing control points in a remote forest using GNSS receivers. Outline THREE advantages of using GNSS receivers over total station. (3 Marks)

SECTION B (60 MARKS)

Answer *THREE* the questions in this section.

11.

- a) Measurements taken in survey can be either linear or angular. Highlight FIVE methods of linear measurements. (10 Marks)
- b) A construction firm is carrying out a topographical survey for a new housing estate. They want accurate linear measurements, right angles, and marked stations. Explain TWO errors likely to occur in linear measurements and how they can be corrected. (10 Marks)

12.

- a) A good magnetic needle for a compass should meet several key requirements to function accurately and reliably. Outline FIVE requirements of a good magnetic needle. (10 Marks)
- b) A compass is used to measure the magnetic bearing of survey lines. Outline FIVE differences between a surveyor's magnetic compass. (10 Marks)

13. The equipment shown in figure below is used for traversing operations together with the tape.



Figure

a) Outline the temporary adjustments of the instrument. (12 Marks)

b) The length of survey line measured by 30m tape was found to be 531.5m. When the tape was compared with the standard tape, the tape used in the survey was found to be 0.10m shorter. Calculate the actual length of the survey line.

(4 Marks) c)

Outline TWO types of traverses.

(4 Marks)

14. Levelling is a method of survey that determines the relative heights of different objects on or below the surface of the earth.

a) To check the accuracy of a level machine, two peg tests is carried out. Outline the procedure of carrying out two peg test. (12 Marks)

b) Explain FOUR different types of levels. (8 Marks)