

073106T4LAS

**LAND SURVEY AND MAPPING LEVEL 6 LSM/OS/LS/CR/01/6 Conduct
Topographical Survey November/December 2025**



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

WRITTEN ASSESSMENT

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. Reference marks are essential for any topographical survey project. Distinguish between a 'permanent bench mark' and a 'temporary benchmark'. (4 Marks)
2. Horizontal control can be established using multiple techniques; Outline TWO methods that can be used to establish horizontal control. (4 Marks)
3. In order to adhere to the principle of working from whole-to-part, controls must be established before new surveys are conducted. Outline TWO types of survey monuments. (4 Marks)
4. Before any topographical survey, surveyors must plan effectively to reduce field challenges. Highlight FOUR preparations that should be carried out before the survey. (4 Marks)
5. Control surveys form the basis of accurate mapping. Highlight THREE classifications of control survey. (3 Marks)
6. Bearing conversion is a common task in surveying. Convert the following Whole Circle Bearings into quadrantal bearings. (4 Marks)
 - a. $222^{\circ} 42' 56''$;
 - b. $271^{\circ} 34' 16''$.
7. Scales are chosen depending on the survey and the final product. Outline FIVE factors influencing the choice of drawing scale. (5 Marks)
8. Modern equipment has redefined how survey is done. State FOUR advantages of using EDMs as compared to traditional methods of distance measurement. (4 Marks)
9. Relative heights of various points on the map, may be represented by different methods. Outline TWO methods used to represent relief on maps apart from contours. (4 Marks)
10. Monuments are used to delineate the position of control points on the ground surface are referred to as beacons. Outline TWO characteristics of a good survey monument. (4 Marks)

SECTION B: (60 MARKS)

Answer any THREE questions in this section.

11.
 - a. Contours provide a reliable means of representing the general terrain of an area that has been mapped. Outline THREE characteristics of contours. (6 Marks)

- b. **Table 1** shows a page of a level book with the first reading taken on a benchmark with a R.L = 249. 26 m. Calculate the reduced levels of all the points using the Rise and Fall method and perform the necessary arithmetic checks.

(14 Marks)

Table 1

Station	Backsight	Intermediate Sight	Foresight
1	3.250		
2	1.755		4.000
3		1.950	
4	3.840		1.920
5		2.340	
6		1.340	
7	1.850		2.185
8		5	
9		5	
10	2.100		1.895
11			1.350

12.

- A traverse may be defined as the course taken when measuring a connected series of straight lines. Explain the TWO main classifications according to the type of traverse. (4 Marks)
- Highlight FIVE main steps involved in preparing a topographical map from field observations. (5 Marks)
- You have been instructed to use a geodetic GNSS to establish the coordinates of two points. Explain THREE segments that constitute a GNSS. (6 Marks)
- Table 2** shows the coordinates of point A and B. Calculate the length and bearing of line AB. (5 Marks)

Table 2

Point	Northings (meters)	Eastings (meters)
A	970.50	850.40
B	1200.40	602.20

13.

- a. The procedure of conducting control and topographical survey involves a systematic process to capture accurate and detailed information about the Earth's surface and its features. Explain FIVE methods you can use in carrying out the topographical surveying. (10 Marks)
 - b. Azimuths are expressed as angular measurements from a reference line or meridian to an observed line and they are mainly used by land surveyors during demarcation. Explain FIVE most commonly used azimuth references. (10 Marks)
14. **Table 3** below shows the bearings and observed lengths for a traverse from a known point A to another known point F. The known coordinates of stations A and F are $X_A = 11419.20$ m and $Y_A = 9877.41$ m, $X_F = 9774.73$ m and $Y_F = 8372.97$ m. Adjust this traverse and compute the final coordinates of points B, C, D and E using the Bowditch method. (20 Marks)

Table 3

Line	Bearing	Distance (m)
A-B	$236^{\circ}15'55''$	473.05
B-C	$223^{\circ}37'15''$	393.10
C-D	$219^{\circ}31'06''$	432.41
D-E	$219^{\circ}28'05''$	716.28
E-F	$194^{\circ}57'00''$	425.00