



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF NATURAL RESOURCES AND SPATIAL SCIENCES

DEPARTMENT OF GEO-SPATIAL SCIENCES AND TECHNOLOGY

QUALIFICATION : NATIONAL DIPLOMA IN ENGINEERING (CIVIL AND PROJECT MANAGEMENT)	
QUALIFICATION CODE: 35DCPM	LEVEL: 6
COURSE CODE: SUR110S	COURSE NAME: SURVEYING 1
SESSION: JUNE 2019	PAPER: THEORY
DURATION: 2 HOURS	MARKS: 80

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER:	Mr. T. Makaza
MODERATOR:	Mr. S. Sinvula

INSTRUCTIONS	
1.	You MUST answer ALL the questions.
2.	Write clearly and neatly.
3.	Number the answers clearly.
4.	Make sure your Student Number is on the EXAMINATION BOOK(s).
5.	Make sure your Student Number is on all the Data Sheets and that you submit them with your EXAMINATION BOOK(s).

PERMISSIBLE MATERIALS

1. Calculator
2. Ruler
3. Pencil
4. Eraser

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

Question 1

1.1. Give the term for each of the following statements or explanations or procedures:

- a. Surveys that assume that the earth is flat. (1)
 - b. The design and production of maps compiled from existing data and the development and maintenance of map information systems. (1)
 - c. The difference between a measured value and the true value of a reading. (1)
 - d. Observations that are closely grouped but their average value is not necessarily accurate. (1)
 - e. The measure of the rotation of an angle so as to bring the initial line to zero direction i.e grid south. (1)
 - f. A reference system that uses lines of latitude and longitude. (1)
 - g. In levelling, any reading that cannot be classified as a backsight or foresight. (1)
 - h. A permanent reference point or mark of known height. (1)
 - i. EDM instruments capable of detecting a beam of light reflected from a natural surface such as a wall. (1)
 - j. The measurement interval of a GPS receiver. (1)
- 1.2. Describe the FOUR qualities of a surveyor. (4)
- 1.3. What are the THREE methods of height determination? (3)

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Question 2

- 2.1. Explain how GNSS development started, highlighting the original applications of the technology. (2)
- 2.2. State ANY THREE Satellite Navigation Systems and their countries of origin. (6)

2.3. Explain the term autonomous navigation in the context of GNSS and indicate why it is not generally used for precise engineering work. (4)

2.4. State the FOUR most common coordinate systems for referring to the position of any finite point on the earth's surface. (4)

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Question 3

A 90 m pipeline has a constant falling gradient of 1:25 for the first 60m and a rising gradient of 1:20 for the remaining 30m. Given that its formation level is 234.560m at chainage 0, calculate the formation levels, cut or fill at each of the chainages. Use Data Sheet 1 to answer this question. (18)

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Question 4

4.1. What is the purpose of a traverse? (2)

4.2. Explain the TWO types of traverse and state the reason why one type is better than the other. (5)

4.3. Calculate coordinates for the traverse A-B-C-D-E-F using the given orientated directions and reduced distances. Use Data Sheet 2 to answer this question. (Adjustment of the traverse should be done to THREE decimal places using the Bowditch method. (20)

4.4. Determine the accuracy of the traverse. (2)

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Data Sheet 1

Question 3.

Chainage	Reduced Level	Formation Level	Cut(+)	Fill (-)
0.00	234.56	234.56		
10.00	235.58			
20.00	232.26			
30.00	230.45			
40.00	236.22			
50.00	236.52			
60.00	230.20			
70.00	232.03			
80.00	233.09			
90.00	234.10			

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Data Sheet 2

Question 4.3

Bowditch Adjustment Sheet

Note: All answers must be rounded off to 3 decimal places

DIRECTION & DISTANCE	DIFFERENCES		STATION	FINAL Y	COORDINATES X
	ΔY	ΔX			
			A	1385.125	62249.156
54-48-30					
83.324					
			B		
43-07-55					
77.368					
			C		
144-20-39					
130.684					
			D		
207-14-22					
123.685					
			E		
107-40-50					
105.324					
			F	1625.842	62105.677