namibia university
OF SCIENCE AND TECHNOLOGY
FACULTY OF ENGINEERING AND SPATIAL SCIENCES

DEPARTMENT OF ARCITECTURE AND SPATIAL SCIENCES

QUALIFICATIONS:	
BACHELOR OF GEOMATICS and DIPLOMA IN GEOMATICS	
QUALIFICATIONS CODES: 07BGEO, 06DGEO	**QUALIFICATION LEVEL:** Level 7 - 07BGEO Level 6 - 06DGEO
COURSE CODE: BSV521	**COURSE NAME:** Basic Surveying
DATE: July 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER:	Mr F. J. Louw
MODERATOR:	Mr S. Sinvula

INSTRUCTIONS
1. You **MUST** answer **ALL 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, ruler, pencil and eraser.

THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page and 2 Data Sheets)

Question 1

1.1.	Distinguish between Precise Observations and Accurate Observations.	(2)
1.2.	Distinguish between the terms Grid and Graticule.	(2)
1.3.	Why should intermediate sights onto important points be avoided during levelling?	(2)
1.4.	Briefly describe ANY FOUR characteristics of Contours.	(4)
1.5.	What are the purposes of a Reference Object (R/O)?	(3)
1.6.	Name the THREE requirements of a Reference Object(R/O).	(3)
1.7.	There are two principal classifications of surveying, name ANY ONE and fully explain it.	(2)
1.8.	Briefly explain how a surveyor would take a level reading under a bridge. What is this method called?	(2)

[20]

Question 2

You are appointed to subdivide an Erf in Windhoek North. You found two working stations from previous surveys done by another land surveyor, but you are not able to set-up your instrument any one of them. Use the information below to calculate co-ordinates for **Rev1**.

Please note:

- The Atmospheric Correction and the Conversion to German Legal Metre is already applied to all measured distances

- You have to calculate a **DOUBLE REVERSE POLAR**.

- Use the following combination: **Hohe Win and WP1, and Nubuamis and WP2**

  Combined Sea level & Scale Enlargement Factor = $1+ [(y^2/(2R^2) - H/R)]$, where $R = 6\,370$km and $H = 1700.000$m

Co-ordinates

Point	Y	X
Hohe Win	-11 071.260	+64 410.770
Nubuamis	- 5 533.620	+53 318.300
WP1	- 7 751.067	+60 651.665
WP2	- 7 863.582	+60 667.863

@Rev1   HI = 1.580m

Point	Mean. Observ. Hor. Direction	Slope Distance	Zenith Angle
Hohe Win	319°05'01"		87°19'15"
WP1	65°47'16"	49.117	87°42'17"
Nubuamis	162°48'38"		88°59'21"
WP2	298°13'06"	76.877	89°44'12"
RO	319°05'13"		87°19'01"

[20]

Question 3

3.1.   Calculate oriented directions for the traverse by completing the direction sheet on Data Sheet 1. Use the said Data Sheet for all your calculations. Please detach the Data Sheet and submit with your examination book.   (10)

3.2.   Calculate the final co-ordinates for the traverse points on Data Sheet 2. Use the said Data Sheet for all your calculations. Use the Bowditch Rule to adjust the traverse. Please note that the directions are oriented, and the distances are final. Please detach the Data Sheet and submit with your examination book.   (10)

[20]

Question 4

Use the information and observations below to calculate the co-ordinates for the point **RES,** by using the Q-point method for a resection calculation.   (20)

Co-ordinate List.

Name	Y	X
Δ MOUNT	+ 33 252.460	+ 182 505.030
Δ SPOON	+53 689.320	+ 203 390.460
Δ VALLEY	+ 27 619.400	+ 194 045.970

@ RES   Height of Instrument = 1.853

Name	Fin. Observed Dir.	
Δ VALLEY	290° 00' 00"	
Δ SPOON	66° 08' 37"	
Δ MOUNT	177° 03' 12"	Long Leg

[20]

Question 5

Use the information below to answer the questions that follow.

Co-ordinates

Name	Y	X	Description
Δ Blau	+ 37 054.410	+ 228 354.540	Standard Concrete Pillar
Kalk	+ 43 991.910	+ 219 483.720	Iron Standard
Morn	+ 43 786.880	+ 222 042.600	20mm Iron Peg

@ Kalk	Height of Instrument = 1.655m
Name	Final Observed Direction
Δ Blau	315° 58'15"
Morn	355° 25' 03"
MAST	70° 54' 34"

@ Morn	Height of Instrument = 1.685m
Name	Final Observed Direction
Δ Blau	313° 09' 15"
MAST	109° 43' 13"
Kalk	175° 25' 12"

5.1.   Use the above observations and information to calculate orientated directions at Kalk and Morn.

(9)

5.2.   Calculate the MEAN co-ordinates of point MAST.

(11)

[20]

Student Number_____   Data Sheet 1

Question 3.1.

Direction Sheet

1	2	3	4	5	6	7
Station	Final Observed Direction	Incoming/ Back Direction	Prov. Correction	Outgoing/ Forward Direction	Final Correction	Join Direction / Final Oriented Direction
@ Resec						
Δ Ounois	200° 13' 57"					**200° 13' 46"**
Δ Snake	2° 28' 16"					**2° 28' 01"**
Tr1	109° 49' 33"					
@Tr1						
Resec	289° 49' 15"					
Tr2	107° 46' 58"					
@Tr2						
Tr1	287° 46' 43"					
RP	127° 31' 23"					
@RP						
Δ Triumph	55° 31' 12"					**55° 31' 20"**
Δ Sieg	152° 44' 55"					**152° 45' 05"**
Tr 1	307° 31' 30"					

Student Number_____   Data Sheet 2

Question 3.2.

Bowditch Rule - Adjustment Sheet

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

DIRECTION & DISTANCE	JOINS	DIFFERENCES		STATION	FINAL	COORDINATES
		ΔY	ΔX		Y	X
				A	- 2 228.357	+ 56 477.839
278° 51' 12"						
714.917m						
				B		
279° 49' 43"	Do NOT Calculate Joins					
652.269m						
				C		
283° 58' 31"						
738.093m						
				D	- 4 293.734	+ 56 877.519