NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

## FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

### DEPARTMENT OF LAND AND SPATIAL SCIENCES

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|---|---|
| **QUALIFICATION:** BACHELOR OF NATURAL RESOURCE MANAGEMENT (NATURE CONSERVATION), BACHELOR OF GEOINFORMATION TECHNOLOGY, BACHELOR OF LAND ADMINISTRATION, BACHELOR OF PROPERTY STUDIES HONOURS, BACHELOR OF REGIONAL AND RURAL DEVELOPMENT, BACHELOR OF URBAN AND REGIONAL PLANNING, DIPLOMA IN PROPERTY STUDIES | |
| **QUALIFICATION CODE:** 07BNRS, 07BGEI, 07BLAM, 08BOPS, 07BORR, 07BURP, 06DIPS | **LEVEL:** 4 |
| **COURSE:** INTRODUCTION TO GEOSPATIAL DATA | **COURSE CODE:** IGD411S |
| **SESSION:** JUNE 2024 | **PAPER:** THEORY |
| **DURATION:** 2 HOURS | **MARKS:** 80 |

### FIRST OPPORTUNITY EXAMINATION QUESTION PAPER

**EXAMINER:** Ms D. Husselmann
**MODERATOR:** Mr E. Naoseb

**THIS QUESTION PAPER CONSISTS OF 6 PAGES** (Including this front page)

### INSTRUCTIONS

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.
4. Answers to calculations must be rounded off to three decimal places, excluding answers to co-ordinate conversions

### PERMISSIBLE MATERIALS

1. Examination paper.
2. Examination script.
3. Calculators and other drawing equipment.

**Question 1**

Select only the letter considered to be the correct answer. (10)

1.1. The term geospatial data is a composite of two words. "Geo" refers to the earth, and the second part "spatial data" is data that contains...

a. Data values about satellites in space
b. Data about special state projects
c. Co-ordinate values
d. None of the above

1.2. A map is ...

a. A collection of geographic information
b. A sheet that shows pictures of an area
c. A representation of the real world on a limited size of paper
d. All of the above

1.3. A thematic map is a map that is used to...

a. Only display census data
b. Depict a specific theme/topic
c. Only displace different soil types
d. None of the above

1.4. A large-scale map...

a. Covers a large area and shows greater detail than a small-scale map
b. Covers a small area and shows greater detail than a small-scale map
c. Covers a small area and shows less detail than a small-scale map
d. None of the above

1.5. Which of these form part of the marginal information of a map?

a. Meridians
b. Contour lines
c. Namibian boundary
d. None of the above

1.6. Contour interval is ...

a. The length of a contour line
b. The vertical distance between two contour lines
c. The number written on the bolded contour line
d. None of the above

1.7. Satellite images are obtained by ...

a. Satellites in space
b. Sensors on satellites in space
c. Cameras on satellites in space
d. None of the above

1.8. Orthophotographs are ...

a. Aerial Photographs that are generalised
b. Photographs that are used by orthopedic surgeons to plan surgery
c. Aerial photographs that have been geometrically corrected
d. None of the above

1.9. GPS stands for ...

a. Geographic Positioning System
b. Graphic Placement System
c. Global Placement Satellite
d. Global Positioning System

1.10. The basis of GPS is ... from satellites.

a. Measurement
b. Trilateration
c. Comparison
d. None of the above

**[10]**

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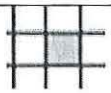
**Question 2**

2.1. Match each word with the correct description/statement using the appropriate letter and number. (5)

| WORD | DESRCRIPTION / STATEMENT |
|---|---|
| A. Map Projection | 1. Has both magnitude and direction |
| B. Vector | 2. Scale varies from foreground to background. |
| C. Generalisation | 3. Converts the three-dimensional earth to a two-dimensional flat surface. |
| D. Oblique Photography | 4. Uses a single stand alone receiver. |
| E. Absolute Postitioning | 5. Reduces the amount of details in a map. |

2.2. What are the three characteristics of geospatial data? (3)

2.3. Which of these pictures show a vector data model? (1)

| Picture A | Picture B |
|---|---|
|  |  |

2.4. Mention: (2)

i. the set of lines which run from North to South but show location in the East-West direction and

ii. the set of lines that run from East to West but show location in the North-South direction.

2.5. Complete the sentence: The ... is the most convenient mathematical model for measuring locations. (1)

2.6. Calculate the straight-line distance from 56° 10′ 20″ E to 47° 38′ 29″ E at 78° 51′ 39″ S. (4)

**[16]**

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**Question 3**

3.1. A Land parcel located in the Usakos area has the following co-ordinates: (5)

| Point | Y | X |
|---|---|---|
| A | -10 697.20 | +20 719.20 |
| B | -13 742.20 | +21 546.70 |
| C | -14 050.60 | +22 829.50 |
| D | -11 581.50 | +23 233.60 |

i. Calculate the distance from B to D

3.2. Convert the following geographical coordinates into degrees, minutes and seconds. (6)

a. 22.639°S

b. 17.963°E

3.3. Calculate the scale of map A if the length of a river is 3 cm on the map, while the same river is 40 mm on map B with scale 1:150 000. (4)

**[15]**

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**Question 4**

4.1 A scale is defined as the ratio or relationship between the size of the features on the map and their corresponding features on the ground. List the six factors that effects the choice of scale. (6)

4.2 What do you call the bolded contours on a map? (1)

4.3 Given a slope of 85.67% convert your slope to degrees. (3)

4.4 Given the following figures of a mountain, calculate the volume of the dam. (5)

| Contour (m) | Area ($m^2$) |
|---|---|
| 1500 | 3650 |
| 1550 | 3213 |
| 1600 | 2954 |
| 1650 | 2346 |
| 1700 | 2158 |

**[15]**

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**Question 5**

5.1 Name two different types of aerial photographs. (2)

5.2 List the four basic requirements to produce an orthophotograph. (4)

5.3 Which covers a larger area, aerial photograph or satellite image? (1)

5.4 Calculate the scale of a photograph covering Rehoboth taken at a flying height of 2500 m using an aerial camera with a focal length of 135 mm. Round your scale off to the nearest 1000 place. (4)

**[11]**

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**Question 6**

6.1 Name the three components that make up a GPS system. (3)

6.2 What is the minimum number of satellites required to compute a reliable GPS position? (1)

6.3 What does DOP stand for? (1)

6.4 Below are two DOP values. indicate the Stronger DOP value. (1)

DOP value of 2

DOP value of 9

6.5 List seven GPS/GNSS error sources, excluding human error. (7)

**[13]**

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