NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION : BACHELOR OF SCIENCE HONOURS	
QUALIFICATION CODE: 08BOSH	**LEVEL:** 8
COURSE CODE: AGE811S	**COURSE NAME:** ADVANCED GEOPHYSICS
SESSION: JULY 2022	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SUPPLEMENTARY/ SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
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MODERATOR:	Mr. Robert Mwanachilenga

ANSWER QUESTION ONE (1) AND ANY OTHER THREE (3)

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Including this front page)

QUESTION 1: Compulsory

1.1 Name any 4 branches of Geophysics and the relevant rock physical property
on which each branch relies. [5]

1.2 What are the units that we use in <u>magnetic</u> and <u>gravity</u> surveys? [5]

1.3 Name four (4) major applications of geophysical methodology. [10]

1.4. Name the arrays commonly used in resistivity and IP

surveys for <u>sounding</u> and <u>profiling</u>. [5]

QUESTION 2.

2.1 Write the general formula which expresses the form and amplitude of a
gravity (or magnetic) anomaly. Briefly explain the effect on an anomaly

of each of the parameters in the formula and outline possible ambiguities.
[10]

2.2 Show, with the aid of a sketch, the effect on a magnetic anomaly of taking
readings at too coarse a spacing. Discuss how this will affect interpretation?[5]

2.3 Of the two effects on a magnetic (or gravity) anomaly that happens as one buries
its source at progressively at deeper depths, use a sketch to show how the gravity or
magnetic profile will look at (i) shallow depth, (ii) intermediate depth and (iii) very deep
levels. [4]

2.4. Show three differences between a gravity and magnetic anomaly [6]

QUESTION 3

3.1 Name the reductions that need to be applied to observed gravity data
in order to produce a Bouguer anomaly map. [4]

3.2 The magnetic data is normaly produced in Total Magnetic intensity anomalies.
From this is calculated the First Vertical Derivative and Analytical Signal. List the
benefits, and drawbacks, of doing so in each case. [9]

3.3   What is meant by the terms: induced   magnetization;   remanent

magnetization and   magnetic coercivity   [6]

3.4 Sketch a gravity anomaly across the given ore bodies in Figure 1 below. Give a brief

explanation outlining why the anomaly shapes differ.   [6]
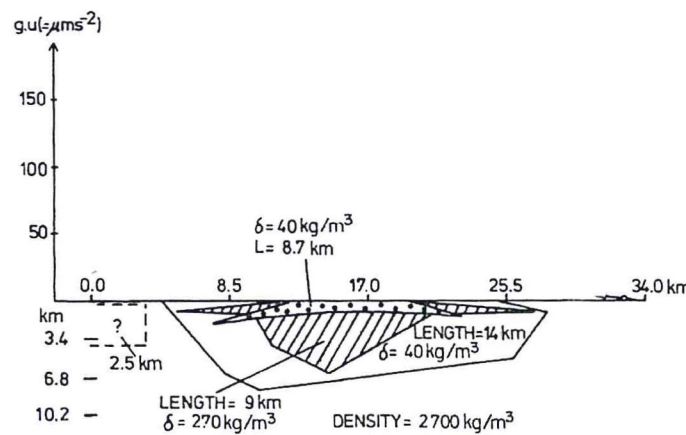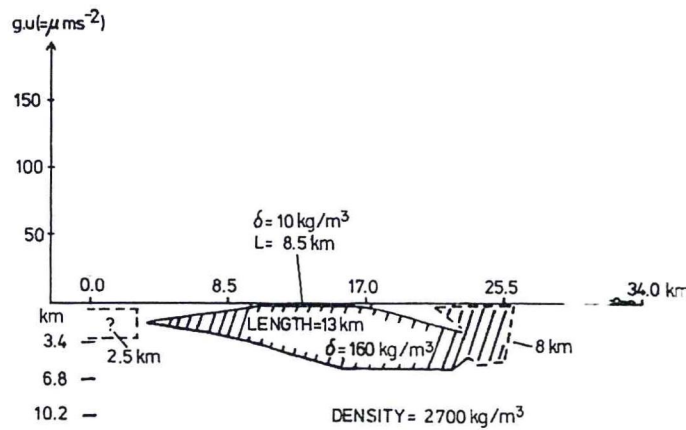
Figure 1 a and b.

QUESTION 4

a. Explain the following terms and their usefulness in data filtering: (i) first vertical
derivative (FVD); (ii) analytic signal (AS).   [10]

b. Sketch the Wernner and Schlumberger arrays and state what the main difference
between the two is.   [5]

c. Name the elements/minerals that we can explore for using radiometrics, and state the name one of the instruments used in this method. [5]

d. For deeper ore bodies, which method would give us the best result between gravity and magnetics? Explain your answer. [5]

QUESTION 5

5.1. Discuss the usefulness of radiometrics in the exploration of mineral deposits and give an example of one such mineral/element/material. [9]

5.2. Explain in some detail the differences on how gamma spectrometers and scintillometers actually obtain data. [8]

5.3. In the case of borehole spectrometer surveys, discuss the methodology and the material we use to cover the borehole probe, giving details why this is necessary. You may use a suitable sketch to illustrate your answer. [8]

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