NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

SCHOOL OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGY, CHEMISTRY AND PHYSICS

QUALIFICATION: BACHELOR OF SCIENCE	
QUALIFICATION CODE: 07BOSC	**LEVEL:**7
COURSE CODE: GPH701S	**COURSE NAME:** GEOPHYSICS
SESSION: JULY 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER (S)	MR EMMANUEL EJEMBI
MODERATOR:	MR OLUWOLE JACOB OLUWASANMI

INSTRUCTIONS
1. Write all your answers in the answer booklet provided. 2. Read the whole question before answering. 3. Begin each question on a new page.

PERMISSIBLE MATERIALS

Scientific Calculator

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

QUESTION 1 **(15)**

1.1 Draw a well labelled diagram of the earth's structure, showing the mechanical subdivision, and the continental and oceanic crust. (5)

1.2 What materials are in the continental crust? (4)

1.3 List any of the four major tectonic plates. (2)

1.4 Briefly explain the following mechanical subdivisions of the earth.

1.4.1 Asthenosphere (2)

1.4.2 Siderosphere (2)

QUESTION 2 **(20)**

2.1 Define seismic velocity. (2)

2.2 What are body elastic waves? Briefly outline the Characteristic difference between these waves. (5)

2.3 What do you understand by the term dipping angle ($\propto$) of a single horizontal reflection? (5)

2.4. What is the crossover distance for direct and critically refracted rays in the case of an horizontal interface at a depth of 200 m separating a top layer of velocity 3.0 km/s from a lower layer of velocity 5.0 km/s (8)

QUESTION 3 **(15)**

3.1 What do you understand by the term coherent noise? (2)

3.2 List 3 sources of seismic noise. (3)

3.3 Briefly discuss the factors that affect seismic velocities. (5)

3.4 Briefly explain seismic data arrangement process. (5)

QUESTION 4 **(20)**

4.1 State the two Newton laws on which the gravity method depends on. (4)

4.2 What do you understand by the term curie temperature (TC)? (3)

4.2 Show that the maximum attraction of a body of mass M is caused at point P as if the whole mass is concentrated at the centre is given by $g_{zmax} = \frac{4\pi G\rho}{3}\frac{R^3}{Z^2}$. (6)

4.4 Calculate the maximum gravity anomaly due to a sphere of radius 1km and a density containing 300 kgm^{-1} buried at a depth of 15 km ($G = 6.672 \times 10^{-11} Nmkg^{-2}$) (7)

QUESTION 5 **(15)**

5.1 Write down the equation for magnetic potential and define the various parameters. (2)

5.2 List the three varieties of ferromagnetism (3)

5.3 Differentiate between primary and secondary remanent magnetization. (4)

5.4 Explain the following terms:

5.4.1 Chemical remanent magnetization (CRM). (2)

5.4.2 Detrital remanent magnetization (DRM). (2)

5.4.3 Thermoremanent magnetization (TRM). (2)

QUESTION 6 **(15)**

6.1 What equipment is used in electrical resistivity survey? (2)

6.2 List two important physical properties of rocks required for electrical surveying. (4)

6.3 Which two characteristic of the ground determines its electrical resistivity? (4)

6.4 Write down the equation for resistivity in the double-dipole Configuration and define the various parameters. (5)