NATIONAL UNIVERSITY of SCIENCE AND TECHNOLOGY

FACULTY of APPLIED SCIENCES

DEPARTMENT of APPLIED PHYSICS

BSc. PART III (SES)

POTENTIAL FIELD EXPLORATION METHODS

SES 3102

First Semester Examination Paper

December 2024

This examination paper consists of **3** printed pages

Time Allowed : **3 Hours**

Total Marks : **100**

Special Requirements : **None**

Examiner : **Mr. J.M. Zulu**

INSTRUCTIONS

ANSWER ALL PARTS OF QUESTION 1 IN SECTION A AND ANY THREE QUESTIONS FROM SECTION B. SECTION A CARRIES 40 MARKS AND SECTION B CARRIES 60 MARKS.

MARK ALLOCATION

QUESTION	MARKS
1.	40
2.	20
3.	20
4.	20
5.	20
Maximum possible mark	100

SECTION A

1 a.) What are potential field geophysical exploration methods? [5]

b.) Distinguish between gravity and gravitational potential fields. [5]

c.) What is the difference between induced and remanent magnetism. [5]

d.) Explain the concept of magnetic susceptibility and its importance in the interpretation of magnetic data. [3, 2]

e.) What is the Bouger correction and why is it applied to gravity data? [5]

f.) Explain the effect of topography on gravity. [5]

g.) Outline the significance of density contrasts in gravity interpretation. [5]

h.) Why is integration of geophysical exploration methods important in exploration projects? [5]

SECTION B

2 a.) Compare and contrast the Earth's gravitational and magnetic fields. [8]

b.) State the use of gravity methods of Fourier analysis and Eueler deconvolution. [2]

c.) Discuss the factors influencing the Earth's gravitational field. [10]

3 a.) Describe the role of the gravity method in basin analysis. [10]

b.) What are the advantages of using gravity surveying in structural mapping? [5]

c.) Explain the processing steps for gravity data. [5]

4 a.) Describe the principle of magnetic surveying including the magnetic survey design. [10]

b.) Describe the limitations of magnetic surveys in structural mapping. [5]

c.) Explain the corrections applied to magnetic data. [5]

5 a.) Describe the nature of the geomagnetic field. [10]

b.) What is a magnetic anomaly? [2]

c.) What is the significance of paleomagnetism? [6]

d.) What is geomagnetic field reversal? [2]

6 a.) Compare and contrast land and airborne gravity surveys. [10]

b.) Explain how gravity surveys are used to identify subsurface structures. [3]

c.) Explain the application of gravity surveys in fault detection. [4]

d.) What do you understand by the term regional gravity field? [3]

END OF EXAMINATION