

UNIVERSITY OF FORT HARE

GLG 211

**Crystallography, Mineral Optics, Igneous
Petrology, Sedimentology**

Main Examinations: JUNE 2023

Time: 3 Hours

Marks: 100

Subject: Geology

One paper

This paper consists of 2 pages including the cover page

Internal Examiners:

Internal Moderator

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INSTRUCTIONS

Answer all questions from sections A, B, C and D.

SECTION A: CRYSTALLOGRAPHY

QUESTION 1

[25]

- a) Explain the terminologies of cleavage, fracture and parting in crystallography and mineralogy. [4]
- b) Give the definitions of the seven crystal systems in terms of length and angular relationships of their crystallographic axes. [7]
- c) Distinguish between the various elements of symmetry. [6]
- d) With the aid of diagrams, differentiate between the various unit cells. [8]

SECTION B: MINERAL OPTICS

QUESTION 2

[25]

- a) What is a mineral? [2]
- b) What is a space lattice? [2]
- c) Differentiate between isotropic and anisotropic media. [2]
- d) What is plane polarized light? [2]
- e) What happens when light intersects an isotropic material? [3]
- f) Define the following terms:
 - i) Euhedral, subhedral and anhedral minerals. [3]
 - ii) Pleochroism. [3]
 - iii) Cleavage. [3]
 - iv) Relief. [3]
 - v) Inclusions. [2]

SECTION C: IGNEOUS PETROLOGY

QUESTION 3

[25]

- a) Hypabyssal intrusions show sharp contact relations with the rocks that they intrude. Several types are found. What are they and briefly describe each. [10]
- b) In tabular form, distinguish between the three types of magmas in terms of chemical composition, temperature, viscosity and gas content. [10]
- c) The rock forming minerals may be divided into three groups according to colour. What are they and which common rock-forming minerals occur in each groups? [5]

SECTION D: SEDIMENTOLOGY

QUESTION 4

[25]

- 4.1 Give three categories of the depositional environments. [3]
- 4.2 Based on the categories given in question 4.1 above, give one type of depositional environment, the depositional process, and the rock type associated with each category. [9]
- 4.3 Explain how the formation of organic deposits leads to the thermal evolutionary series of organic matters. [5]
- 4.4 List and describe 4 (four) primary sedimentary structures. [8]