



**FACULTY OF ENGINEERING AND THE ENVIRONMENT**

**DEPARTMENT OF MINING ENGINEERING**

**MINING GEOLOGY**

**EMI 2207**

**Final Examination Paper**

**June 2023**

This examination paper consists of 4 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Examiner's Name: Mr. N Ndlovu**

**INSTRUCTIONS**

1. This paper contains **ONE** section with **SIX** questions.
2. Answer **QUESTION ONE** and **any other THREE questions**.
3. Each question **carries 25 marks**.
4. Where a question contains subdivisions, the mark value of each subdivision is shown in brackets.
5. Illustrate your answer, where appropriate, with large clearly labelled diagrams.
6. Start each question on a new page.

**Additional Requirements**

**None**

**MARK ALLOCATION**

<b>Question 1 to 6</b>	<b>25Marks</b>
<b>Part Questions</b>	<b>As shown in each part question</b>
<b>Total Attainable</b>	<b>100</b>

### **Question 1**

- a. Define and explain mining geology with emphasis on the relevance of mining geology to the mine value chain. [10]
- b. Rock-ore association is an important criterion in selection of an area for mineral prospecting. Explain with examples. [10]
- c. Explain the difference in magma viscosity and density, citing low to high viscous magma. [5]

### **Question 2: Petrology (25 marks)**

- a. Elucidate on the process of formation of sedimentary rocks and the basis of classification. [5]
- b. Give an account on the different types of water that participate or influence ore forming processes [5]
- c. With the aid of a fully annotated diagram, describe the Bowen's Reaction Series. [9]
- d. What are the different types of plate boundaries and what geological features do they create? Use diagrams where possible. [6]

### **Question 3: Ore depositional textures and Mineralogy (25 marks)**

- a. What are the two considerations for factors that govern wall rock alteration? Elucidate on the different aspects of the two considerations. [6]
- b. Discuss the rock forming minerals. Give a brief account of the physical properties of the minerals. [10]
- c. Explain the importance of the study of mineralogy in mining engineering. [9]

### **Question 4: Ores and Resources (25 marks)**

- a. Describe the genesis of coal and its applications. [10]
- b. Deliberate on the main processes that led to the formation of the Bushveld complex in South Africa and the Great Dyke in Zimbabwe. [12]

- c. List six main minerals mined in Zimbabwe. [3]

**Question 5: Ore Deposit geology (25 marks)**

- a. Zimbabwe is endorsed with many minerals such as gold, diamond, lithium etc.... Give a brief account of the genesis of gold ore in placer and alluvial deposits. [9]
- b. Define Hydrothermal Deposits and state the conditions necessary for the formation of hydrothermal deposits. [6]
- c. Discuss the economic significance and importance of deposits related to surface weathering. [4]
- d. Distinguish between early magmatic and late magmatic deposits. [6]

**Question 6: Exploration geology (25 marks)**

- a. Enumerate 4 different methods of geophysical exploration and the principle for each of them. [16]
- b. Write detailed short notes on the following
- i. Geological exploration [5]
  - ii. Geochemical exploration [4]