



FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINING GEOLOGY

EMI 2207

Final Examination Paper

July 2022

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

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

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. Name the different classes of igneous rocks and give examples of each class. [4]
- b. Explain how changes in cooling rate during crystallization of a melt can affect the texture of an igneous rock. [3]
- c. Describe the clastic sedimentary rocks and give an example of each. [6]
- d. Define the following terms
 - i. Contact metamorphism [2]
 - ii. Regional metamorphism [2]
 - iii. Hydrothermal metamorphism [2]
- e. 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. [8]
- b. List and explain the four main groups that conform to deposition from external processes. [8]
- c. A mineral is defined as a **naturally occurring, homogenous solid**, with a **definite (not fixed) chemical composition** and a **highly ordered atomic arrangement**, usually **formed by inorganic processes**. Using appropriate examples, explain the underlined expressions. [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. Placer deposits are classified according to the place of deposition. Elucidate and differentiate between the Residual, Eluvial and Alluvial placers giving examples of deposits associated with each classification. [6]
- b. Explain the sources of hydrothermal fluids. [8]
- c. Discuss the economic significance and importance of deposits related to surface weathering. [5]
- d. Kimberlitic magma deposits are the primary source of diamonds. With an aid of a known kimberlitic deposit, write short notes on the geomorphology, mineralogy and classification of kimberlites. [6]

Question 6: Exploration geology (25 marks)

- a. Explain in detail the geochemistry methods used in exploration. [10]
- b. Write detailed short notes on the types and application of geophysical exploration methods. [15]