



FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINING GEOLOGY

EMN 2207

Final Examination Paper

April 2024

This examination paper consists of 3 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. Mining Geology intertwines with many other disciplines for production in the Mine Value Chain. Discuss these disciplines and the role of mining geology as well as the relevance of mining geology to mining engineers. [12]
- b. Rock-ore association is an important criterion in selection of an area for mineral prospecting. Explain with examples. [5]
- c. With the aid of named rocks and minerals, discuss the ore association in igneous, metamorphic and sedimentary rocks. [8]

Question 2: Petrology (25 marks)

- a. Name and discuss two textures of igneous rocks and how the textures influence mineralogy. [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 different sediments that make up sedimentary rocks and give an example of each. [6]
- d. Define the following terms
 - i. Impact metamorphism [2]
 - ii. Regional metamorphism [2]
 - iii. Contact 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. Define a mineral and explain the different aspects of a mineral. [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. Explain how metals from source rock dissolved in water and subsequently precipitated to form ore deposits. [5]
- d. Elucidate on the origin and occurrence of the carbonatites including mineralogy. [6]

Question 6: Exploration geology (25 marks)

- a. With the aid of a named mineral, explain the applications of magnetic method of geophysical exploration. [6]
- b. Describe electrically resistivity and seismic methods of geophysical exploration. [9]
- c. What is the principle behind geochemical exploration? Discuss any three geochemical exploration methods. [10]