



FACULTY OF ENGINEERING AND ENVIRONMENT
DEPARTMENT OF METALLURGICAL ENGINEERING

ORES AND RESOURCES

EMR 3102

Final Examination Paper

January 2019

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. N Ndlovu

INSTRUCTIONS

1. This question paper consists of 6 questions, answer **ANY FOUR QUESTIONS**
2. Each question carries 25 marks
3. Answer each question on a new page and write as eligible as possible

Additional Requirements

None

MARK ALLOCATION

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

Question 1: Ore genesis and ore classification {25 marks}

- 1.1 Define a mineral. [4]
- 1.2 List the four ore forming processes and give examples of ore for each process. [4]
- 1.3 With the aid of a diagram, describe the formation of kimberlites and hence diamonds. [5]
- 1.4 What are layered mafic intrusions? Give an example of a layered mafic intrusion and the two main ores of such bodies. [4]
- 1.5 Explain the surficial ore forming process and the process that concentrates the ore on surface. [5]
- 1.6 Differentiate between syngenetic and epigenetic ores giving examples of each. [3]

Question 2: Stratigraphy and mineral occurrence {25 marks}

- 2.1 Discuss the economic significance of the mineral occurrences found in each of the following stratigraphies: Craton, Archean Greenstone Belts, and Karoo Supergroup. [6]
- 2.2 There has been great amounts of Nickel being mined in Zimbabwe. Describe the mineralization of Ni at Epoch mine. Include local geology, ore body sulphides, host rocks and ore minerals. [10]
- 2.3 List the six platinum group metals. [3]
- 2.4 Describe the geological occurrence of PGMs in Zimbabwe and their genesis. [6]

Question 3: Ore beneficiation {25 marks}

- 3.1 What are the four objectives of ore beneficiation? [4]
- 3.2 Describe the ore concentration process and list the five common processes involved. [6]

- 3.3 Explain the gravity separation in the ore concentration process. [4]
- 3.4 List and discuss the steps in the cyanide extraction and beneficiation of gold. [9]
- 3.5. What is classification in ore beneficiation? [2]

Question 4: Economic geology of Zimbabwe and Resource reporting {25 marks}

- 4.1 What are the nine major mineral resources of Zimbabwe? [9]
- 4.2 Briefly describe the three major history divisions that host Zimbabwe's mineralization. [6]
- 4.3 What is a mineral resource? [2]
- 4.4 What geological evidence is required for the estimation of mineral resources? [5]
- 4.5 Mineral resources are divided into three categories. What are the categories? [3]

Question 5: Sampling Theory, QA/QC and Resource estimation {25 marks}

- 5.1 What is sampling? What is the role of sampling in the stages of the Mine value chain? [5]
- 5.2 Explain the two basic types of sampling errors. [4]
- 5.3 Explain the terms quality control (QC) and quality assurance (QA) and what they mean to sampling. [6]
- 5.4 Describe the mineral resource estimation process and explain why there should be a geological model in resource estimation. [5]
- 5.5 Illustrate the SAMREC reporting code showing the three main categories. [5]

Question 6: **Miscellaneous** {25 marks}

- 6.1 What is the most important global source of iron ore? How is it formed? [4]
- 6.2 What is a placer deposit? List any three valuable minerals that are common as placer deposits. [4]
- 6.3 The Great Dyke is composed of short narrow, narrow hills and ridges. Discuss the geology of the Great Dyke, its emplacement and mineralization. [8]
- 6.4 What is the economic significance of the Karoo Supergroup? [5]
- 6.5 List the four kinds of magmas associated with igneous ore forming processes. [4]