FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF METALLURGICAL ENGINEERING

PROCESS MINERALOGY

EMR 2206

Final Examination Paper

JUNE 2019

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. N Ndlovu

INSTRUCTIONS

1. This question paper consists of section **A** and **B**. Answer all questions in section **A** and TWO questions in section **B**.
2. All questions have a total mark of 20.
3. Answer each question on a new page and write as eligible as possible

Additional Requirements

None

MARK ALLOCATION

Question 1 to 3	**20 Marks**
Part Questions	**As shown in each part question**
Question 4 to 6	**20 marks**
Total Attainable	**100**

Section A

Question 1

1a. What is a mineral? Explain the definition. [10]

1b. Define the following terms, giving examples where necessary. [10]

i. Isotropism [2]

ii. Crystal [2]

iii. Crystallography [2]

iv. Phase [2]

v. Closed system [2]

Question 2

2a. Wet chemical analysis is a method used in the analysis of minerals. What is wet chemical analysis and what are the three different types of wet chemical analysis? [4]

2b. Name four ways in which the chemical composition of minerals can be determined. [4]

2c. Briefly discuss the four ways in which minerals form. [4]

2d. What are the six polymorphs of SiO_2? Briefly describe their stability. [8]

Question 3

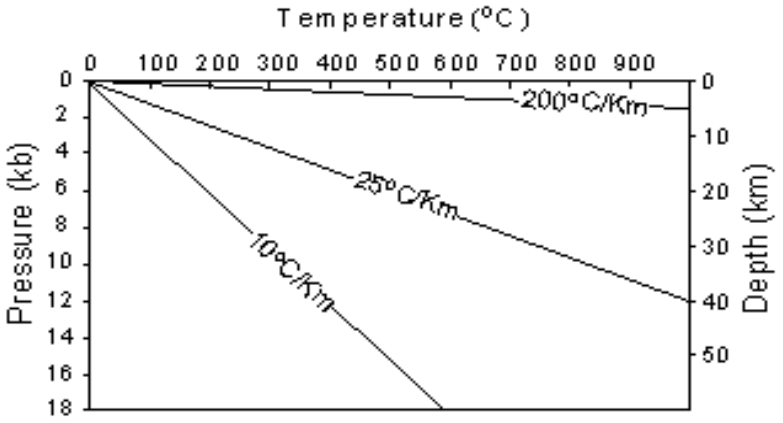
3a. The crystal system is a grouping of crystal structures that are categorized according to the axial system used to describe their atomic lattice structure. List the seven crystal systems. [7]

3b. Listed below are common minerals. Give the chemical classification for each. [5]

$BaSO_4$, ZnS , $CaMg[Si_2O_6]$, NaCl , $Ca_5(PO_4)_3(OH)$. E.g. $Zr(SiO_4)$ is an orthosilicate.

3c. List four elements of symmetry for a crystal. [4]

3d. Explain the diagram below. [4]



Section B

Question 4

With the aid of appropriate examples, explain the physical properties of minerals. [20]

Question 5

Name and explain, with reference to principles and results, four ways in which the chemical composition of minerals can be determined. [20]

Question 6

Discuss the mineralogy and textures of the common ore deposit types, with special emphasis on how the mineralogy and textures impact on ore processing. [20]

END OF EXAMINATION