FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

INTRODUCTION TO MINERALS INDUSTRY

EMI 1207

Final Examination Paper

AUGUST 2021

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr B MLAMBO

INSTRUCTIONS

1. **Answer any TWO (2) questions from section A and any TWO (2) questions from section B**
2. Each question carries **25** marks

Additional Requirements

None

MARK ALLOCATION

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

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SECTION A: ANSWER ANY TWO QUESTIONS

QUESTION 1

(a) Distinguish between:

(i) Mining and mining engineering **[2]**

(ii) Mineral and rock **[2]**

(iii) Resource and reserve (**Hint**: include the different categories of resources and reserves in your answer) **[6]**

(b) Briefly discuss three underground mining methods (being applied in Zimbabwe) involving the exploitation of strategic minerals **[15]**

QUESTION 2

(a) ND Resources has been prospecting for platinum along the Great Dyke of Zimbabwe for the past 2 years. Recently they discovered a possible mineral occurrence. Briefly describe how a mineral deposit can be identified and then converted into monetary value. In your answer include all the processes that are involved throughout the entire life cycle of a mining project. **[15]**

(b) Clearly outline the Quebec five-point safety system showing the importance of developing and administering SHEQ at a mine. **[10]**

QUESTION 3

(a) Historical development of mining has followed mankind's quest to satisfy needs or wants. Indicate how development of mining in Zimbabwe has followed trends in international human development. **[5]**

(b) How has development in mining in Zimbabwe facilitated and mirrored technology development? **[10]**

(c) What have been the advantages and disadvantages of development of the mining industry

to the Zimbabwean economy? **[10]**

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION 4

(a) Define Metallurgy **[1]**

(b) Briefly describe any three main groups of metallurgy. **[12]**

(c) Define mineral ore processing and briefly describe the unit operations involved **[12]**

QUESTION 5

(a) Write short notes on the following Metallurgical extraction processes:

(i) Pyrometallurgy

(ii) Hydrometallurgy

(iii) Electrometallurgy **[15]**

(b) With the aid of balanced equations, describe the cyanidation processing of gold, highlighting the optimum conditions necessary for the reactions to take place. **[10]**

QUESTION 6

(a) What are the two fundamental operations in mineral processing and how are they achieved? **[5]**

(b) Which physical (or chemical) properties are utilized for the separation of gangue minerals from the valuable minerals? Give examples of the separation techniques for each property. **[5]**

(c) Why is the speed of rotation of the ball mill critical during the process of grinding in a mineral processing plant? **[5]**

(d) With aid of a clearly labeled diagram describe the process of froth flotation. Include in your description the reagents that are utilized. **[10]**

END OF EXAMINATION