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#### MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY

**DEPARTMENT: MINING AND MINERAL PROCESSING ENGINEERING**

**MODULE: INTRODUCTION TO MINING AND METALLURGY**

**CODE: ENGP121**

### SESSIONAL EXAMINATIONS

**DECEMBER 2023**

**DURATION: 3 HOURS**

**EXAMINER: A. BRITO**

## INSTRUCTIONS

1. *Answer* ***All*** *in Section A*
2. *Answer* ***two*** *questions in Section B.*
3. *Start a new question on a fresh page.*
4. *Total marks 100*

**SECTION A**

**QUESTION 1**

1. Define the following terms as they are used in geology:
2. Ore deposit **[2]**
3. Reserve estimation **[2]**
4. Brownfield exploration **[2]**
5. Make a comparison between metallic and non-metallic minerals. **[4]**
6. What exploration techniques are used in the first stage of a mine life cycle. **[4]**
7. Discuss the classification of ore deposits, giving examples in each class. **[6]**

**QUESTION 2**

1. Explain the mine life cycle paying particular attention to the importance of each stage to the cycle. **[15]**
2. Discuss the unit operations of mining, which contribute directly to mineral extraction. **[5]**

**QUESTION 3**

1. Why must size distribution be controlled in a mineral processing plant? **[2]**
2. What are the objectives of communition? **[4]**
3. What is the difference between crushing and grinding? **[4]**
4. Classify the different types of crushers according to product size, giving two examples in each class? **[6]**
5. Make a comparison between mineral processing and extractive metallurgy. **[4]**

**SECTION B**

**QUESTION 4**

1. Distinguish between mineral resources and mineral reserves. **[4]**
2. Classify, giving examples the different mineral deposits according to ore concentration processes. **[6]**
3. With the aid of a diagram, illustrate the orientation of an orebody in terms of its strike, dip, and plunge. **[4]**
4. Describe how orthomagmatic mineral deposits and hydrothermal mineral deposits are formed. **[6]**

**QUESTION 5**

1. What are the different underground support mechanisms and give 2 examples of supported mining methods. **[5]**
2. Discuss the most important factors to be considered during selection of a mining method. **[5]**
3. Sketch and describe any 2 of the following mining methods.
4. Room and pillar mining
5. Sublevel open stoping
6. Longwall mining **[10]**

**QUESTION 6**

1. What are the goals of mineral processing. **[2]**
2. Make a comparison between liberation and separation in mineral beneficiation. **[4]**
3. Discuss the pyrometallurgical processes of calcination and roasting, with the aid of chemical equations.
4. What factors govern the choice of a leaching reagent in hydrometallurgy. **[4]**
5. Distinguish between hydrometallurgy and electrometallurgy. **[4]**
6. With the aid of a clearly labelled diagram, describe the process of vat leaching. **[6]**

**END OF EXAMINATION**