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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

**JUNE 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. Feasibility study **[2]**
4. Exploration geochemistry **[2]**
5. Distinguish between greenfields and brownfields mineral exploration. **[4]**
6. What are mineral resources and mineral reserves. **[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 as a whole. **[15]**
2. Discuss the unit operations of mining, which contribute directly to mineral extraction. **[5]**

**QUESTION 3**

1. What are the four types of atomic bonds in engineering materials. **[4]**
2. Discuss the basic operations of the two commonly used primary crushers. **[6]**
3. Give four types of grinding mills and explain the primary differences between them as they are used in mineral beneficiation. **[4]**
4. Make a comparison between pyrometallurgy and hydrometallurgy. **[4]**
5. Explain the difference between electrowinning and electro-refining of metals. **[2]**

**SECTION B**

**QUESTION 4**

1. Discuss the classification of mineral deposits by ore concentration processes. **[10]**
2. Make a comparison of coal and coal bed methane. **[5]**
3. With the aid of a diagram, illustrate the orientation of an orebody in terms of its strike, dip and plunge. **[5]**

**QUESTION 5**

1. Discuss the auxiliary operations of mining, that support the mine production cycle. **[5]**
2. State and explain 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 is the difference between ferrous metallurgy and non-ferrous metallurgy. **[2]**
2. What are the goals of mineral processing. **[2]**
3. State and describe the thermal pre-treatment processes used in the mineral beneficiation processes of pyrometallurgy. **[6]**
4. What factors govern the choice of a leaching reagent in hydrometallurgy. **[4]**
5. With the aid of a clearly labelled diagram, describe the process of in-situ leaching. **[6]**

**END OF EXAMINATION**