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#### MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

**FACULTY OF ENGINEERING, APPLIED SCIENCES AND TECHNOLOGY**

**DEPARTMENT: MINING AND MINERAL PROCESSING ENGINEERING**

**MODULE: UNDERGROUND MINING**

**CODE:ENGP 226**

**SESSIONAL EXAMINATIONS**

**JUNE 2023**

**DURATION: 3 HOURS**

**EXAMINER: M.S. KANONGOVERE**

## INSTRUCTIONS

1. ***Question*** *1 is compulsory*
2. *Answer any* ***THREE*** *questions from the remaining questions.*
3. *Each question carries 25 marks,*
4. *Start a new question on a fresh page*
5. *Total marks 100*

*ADDITIONAL MATERIALS: CALCULATOR*

***Additional material(s):***  *Calculator*

**QUESTION 1 COMPULSORY**

1. A blast design has the following parameters;

Hole diameter = 66mm

Hole depth = 6m

Number of holes = 40

Stemming = 1.5m

The explosive used is ANFO with a density of 0.85kg/litre.

Calculate;

1. The volume of the blast. **[5]**
2. The quantity of explosives required for the blast. **[5]**
3. The powder factor. **[5]**

**b)** Explain the important factors that you would consider when determining the site for a shaft **[10]**

**QUESTION 2**

1. Outline the mechanics of rock breaking by a rock drill **[7]**
2. State 3 types of feed systems used on Rock drills **[3]**
3. Describe any 3 types of cuts used in underground tunneling with the aid of diagrams , and state the significance of a cut during blasting operations. **[10]**
4. State the ‘basic mine development rule’ and explain the three types of mine development. **[5]**

**QUESTION 3**

1. State and briefly explain the most important factors to be considered when selecting a mining method **[10]**
2. Describe the development layout of a shrinkage stoping mining method,with the aid of detailed diagrams**.[10]**
3. Outline the geological considerations for the Room and Pillar technique **[5]**

**QUESTION 4**

1. Define Primary Explosives, Secondary Explosives and High Explosives with examples **.[10]**
2. Define the following terms -
3. Powder factor **[2]**
4. Detonation **[2]**
5. Deflaguration **[2]**

**C**) Explain why the powder factor is high in shaft sinking **[2]**

**d**) Make a sketch of a well labelled underground development round with a 5-hole burn cut **[7]**

**QUESTION 5**

1. Discuss briefly the cycles of operations in conventional shaft sinking. **[10]**
2. Define a raise, and briefly discuss its significance during mine development **[5]**
3. Discuss with the aid of a labelled diagram, any 3 raising techniques **[10]**

**END OF QUESTION PAPER**