FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

UNDERGROUND MINING

EMI 5201

Final Examination Paper

August 2021

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: **Eng. T. Nyamagudza**

INSTRUCTIONS

1. This paper contains **ONE** section with **SIX** questions.
2. Answer **any five questions**.
3. Each question **carries 25 marks**.
4. Where a question contains subdivisions, the mark value of each subdivision is shown in brackets.
5. Illustrate your answer, where appropriate, with large clearly labelled diagrams.
6. Start each question on a new page.

Additional Requirements

Calculator

MARK ALLOCATION

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

Question 1

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

(b) Mucking in shafts can either be manual or mechanised. Discuss three types mucking equipment commonly used during shaft sinking. **[10]**

Question 2

(a) Describe the development layout of a long wall coal mining system, with the aid of detailed diagrams. **[8]**

(b) Discuss, with the aid of detailed sketches, any three raising techniques. **[12]**

Question 3

(a) Describe the freezing method and steel pilling method in shaft sinking. **[10]**

(b) The density of ANFO is 0.92g/cm^3. To charge a 51mm diameter hole in a stope for blasting, ANFO is pumped in to fill 2/3 of the whole length and the remaining part is stemmed. If the whole length is 3.4m, what is the linear charge density? If ten such holes are required to liberate 4.5m^3 of ore in-situ, what is the powder factor? **[10]**

Question 4

(a) Briefly explain the sequence and method of extraction in an underground mining level of a steeply dipping orebody. **[5]**

(b) Describe the process of determining how explosives are to be loaded into a production ring made up of an upward fan of holes in sublevel open stoping with the drilling drive placed in the centre of the orebody given:

i) Drilling drive dimension of 3m width by 3m height

ii) A burden of 2m and a hole spacing of 2.5m

[15]

Question 5

(a) Explain the following ore extraction terms:

i. Up-dip sequencing
ii. Down-dip sequencing.
iii. Advance System of Attack.
iv. Retreat System of Attack
v. Reef mining.

[10]

(b) PGM mines on the Great Dyke of Zimbabwe use primarily the room and pillar mining method. How are pillar and room sizes and their orientation determinedon the Great Dyke? **[10]**

Question 6

Describe the mining layout (development and production) of a block caving mining system, with the aid of detailed diagrams. **[20]**