



FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

UNDERGROUND MINING

EMI 5201

Final Examination Paper

June 2023

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. D Jaibes

INSTRUCTIONS

1. The question paper contains **2** questions in Section A and **3** questions in **Section B**
2. Answer **ALL** question in **Section A** and any **TWO** in **Section B**
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. Be as **INFORMATIVE** as you can be
7. Start each question on a new page.

Additional Requirements

Calculator

MARK ALLOCATION

Question 1 to 5	25Marks
Part Questions	As shown in each part question
Total Attainable	100

Section A: Answer all questions

Question One.

a. Write short notes on the following:

- i. Stemming
- ii. Fly rock
- iii. Dilution.

(6)

b. Define and with the aid of a sketch show the mining openings

- i. Shaft
- ii. Cross cut
- iii. Drift
- iv. Raise
- v. Winze.

(10)

c. Discuss any 4 differences between tunnelling and drifting. (9)

Question 2

a. Briefly discuss the pre-production phases in any mining project. (5)

b. Explain the following terms related to ore extraction;

- i. Up-dip sequencing and Down-dip sequencing (2)
- ii. Advance system of attack (2)
- iii. Retreat system of attack (2)

c. Discuss the ore extraction technique in sub-level open stoping mining method. (7)

d. Differentiate bulky and selective mining, make us of examples. (7)

Section B: Answer any TWO questions

Question 3

After extensive and detailed exploration work the following information has been gathered for the mineral deposit that is to be mined if the feasibility studies guarantee the decision to carry out mining operations on the geological formation:

- Ore is steeply dipping (dip $>50^\circ$) and the dip is exceeding the natural angle of repose of the ore material.
 - Competent ore
 - Comparatively stable hanging wall and footwall
 - Regular ore boundaries
 - Ore is not affected by storage in the stopes
- a. The geological information is presented to you by the exploration company and as the Senior Mining Engineer for your Mining entity. Select the appropriate mining method for this ore deposit so as to efficiently and economically exploit the mineral resource. (1)
- b. Describe the layout, development, production ore handling sequences, advantages and disadvantages of this mining method. Use sketch diagrams, sections or plans to clearly outline your mining method of choice to senior project managers and investors. (16)
- c. Briefly outline the guidelines for selecting an underground mining method. (8)

Question 4

- a. Explain sympathetic detonation and gap sensitivity in in blasting operations. (6)
- b. Marking/lashing in shafts sinking is either manual or mechanised. Discuss, with the aid of clearly labelled diagrams some of the commonly used equipment in mechanised marking in any shaft operations. (9)
- c. Describe the development of the longwall mining before production starts, with the aid of sketches. (10)

Question 5

- a. Briefly explain the sequence and method of extraction in an underground mining level of a steeply dipping orebody. (5)
- b. Outline the influence of grade of ore in comparison and selection of underground mining methods. (5)
- c. 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 center 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)

END OF EXAMINATION