



**FACULTY OF ENGINEERING AND THE ENVIRONMENT**

**DEPARTMENT OF MINING ENGINEERING**

**MINE PLANNING AND DESIGN**

**EMI 5203 / EMN4201**

**Final Examination Paper**

**April 2024**

This examination paper consists of 3 pages

**Time Allowed:** 3 hours

**Total Marks:** 100

**Examiner's Names:** Mr. T. Dombo

Miss B. Ncube

**INSTRUCTIONS**

1. Answer ALL questions in SECTION A.
2. Answer 3 questions in SECTION B.
3. Each question carries 20 marks.
4. Where question contains subdivisions, the mark value of each question is shown in brackets.
5. Illustrate your answer, where appropriate, with large clearly labeled diagrams.
6. Start each question on a new page.

**Additional requirements:**

Scientific calculator

**MARK ALLOCATION**

Question 1 to 6	20 Marks
Part questions	As shown in each part question
Total attainable	100

## **SECTION A: ANSWER ALL QUESTIONS**

1. (a) Describe and explain the following

Exploration

Mine planning engineer

Reporting standards

Mine scheduling

Long term mine plan. (5)

(b) Through the use of a flow chart, describe the relationship between exploration information, resources and reserves. (5)

(c) As a student engineer, propose a list with relevant items that can be used on field investigations and when preparing mine design reports. (10)

2.(a) i) Briefly describe kriging as a geostatistical technique. (3)

ii) Briefly explain two effects of geological modelling errors. (2)

(b) Describe the explicit geological modelling process. (10)

(c) Explain the importance of having domain control when geological modelling. (5)

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**SECTION B: ANSWER 3 QUESTIONS.**

3. (a) Explain the importance of strip ratio in open pit mine planning and design throughout the life of a mine. (5)
- (b) List 5 guiding principles used in open pit mine planning. (5)
- (c) Optimize this pit using the Lerch Grossman method. (10)

1	2	3	4	5	6	7	8
-1	-1	-1	-1	-1	-1	-1	-1
-2	-2	1	-2	2	1	2	-2
-3	-3	3	4	-1	4	-3	-3

4. (a) How is NPV used as a tool in the mine planning process. (5)
- (b) In many mining companies, materials handling represents a significant component of the operational cost, making equipment selection an important challenge to management.

As a mining engineer who has been recently selected to supervise a recently developed section ready for development, in an underground platinum mine; describe and explain guidelines, techniques and factors you would consider for equipment selection. (15)

- 5(a) List 4 main compositing methods. (4)
- (b) Describe the Inverse distance weighting method of grade interpolation. (8)
- (c) What are challenges faced when mine planning and scheduling. Suggest measures you would take to minimize the effects of these challenges. (Use examples if necessary) (8)
- 6(a) Describe and explain factors to be considered for practical design of Large open cast mine. (7)
- (b) Describe and explain block modelling for practical design of an Underground Mine with use of any mining software package you prefer. (8)
- (c) Briefly explain 5 Environmental aspects of Mine Planning and Design using a Case study of any coal mine in Zimbabwe. (5)

**THE END!!!**

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