FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINE DESIGN

EMI 5203

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 **TWO** questions in Section A and **THREE** 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;

Scientific 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 1

a. Give short notes on the followings: (8)

   i. Aspects of interpolation techniques as applied to a mineralized deposit.

   ii. Geometrical methods of interpolation

   iii. Distance weighting methods of interpolation

   iv. Geostatistical techniques of interpolation

b. Describe the mineralized interpolation techniques of polygon methods in brief. (6)

c. Explain the inverse distance interpolation method in detail. (6)

d. What is variogram? Explain the function of ore grade variance in developing variograms. (5)

Question 2

(a) Give brief account on the followings: (10)

   a. Production scheduling

   b. Production schedules

   c. Production rate

   d. Operating layout

   e. Pit optimization

(b) Discuss the relationship of production scheduling to mine design in brief. (10)

(c) Explain the importance of production schedule as a mining plan. (5)

SECTION B : Answer any TWO Questions

Question 3

(a) Discuss the fundamental aspects required for the planning and designing of a water management system for a deep underground mine operation. (15)

(b) Discuss the steps you would take when planning for ventilation requirements for an underground greenfield mining project. (10)

Question 4

(a) Explain the approaches / techniques used to estimate annual production capacities for mining projects. (5)

(b) As a Mine Planning Engineer what can you say about the important aspects of dewatering during mining operations. (5)

(c) Explain how the following affect the size of an underground mine;

i. Market conditions and the price of the product.

ii. The grade of the mineral and the corresponding reserve tonnage.

iii. The effect of the time required before the property can start producing. (15)

Question 5

(a) Briefly explain the increamental pit expansion method for pit definition. **(**5)

(b) Using a clear diagram, illustrate the general outline of a computerized mine design system. **(**5)

(c) The hypothetical property shown in the figure below represents a vertical section through a block model of the property's deposit. Each square represents the net value of a block if it were independently mined and processed. Determine the pit outline that gives the maximum profit using Lerchs Gossman Technique. (15)

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

The End!