FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINE DESIGN

EMI 5203

Final Examination Paper

July 2022

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Total Marks: **100**

Examiner's Name: **Mr. K. Dzwiti**

INSTRUCTIONS

1. This paper contains **ONE** section with **FIVE** questions.
2. Answer **QUESTION ONE** and **any other THREE questions**.
3. Question one **carries 40 marks** and the rest **carries 20 marks each**.
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	**40Marks**
Question 2 to 5	**20 marks**
Part Questions	**As shown in each part question**
Total Attainable	**100**

QUESTION ONE

Using the following information, come up with 3 top mining methods using Boshkov & Wright, Hartman, Nicholas and UBC. **[40 marks]**

Input data	Description
General deposit shape	Tabular
Ore thickness	15 metres
Ore plunge	70 degrees
Grade distribution	Gradational
depth	650 metres

DESCRIPTION	ORE ZONE	HANGING WALL	FOOTWALL
Rock substance strength	190 MPa	220 MPa	180 MPa
RQD	60 percent	75 percent	45 percent
Joint spacing	0.5 metres	0.4 meters	0.2 meters
Joint conditions	Slightly rough surface separation <1mm, hard joint wall rock	Slightly rough surface separation <1mm, soft rock wall rock	Slightly rough surface separation <1mm, soft joint wall rock
Dry conditions principal insitu stress	36 MPa	36 MPa	36MPa
RMR	75 percent	74 percent	58 percent
UCS/principal stress	5.3	6.1	5

a)

QUESTION TWO

Explain briefly three steps that you follow when designing an underground mine with an aid of diagrams and highlight critical subsystems. **[20 marks]**

QUESTION THREE

With the aid of a diagram, explain briefly all phases of a mine project life cycle. **[20 marks]**

QUESTION FOUR

You are the planning engineer at an open pit mine and you are assigned the task of determining the ultimate pit limits for different sections of a new pit. Given that the net value for stripping waste is -$4 per block and the net value for the mill feed is $12, determine the ultimate pit, its net value and the overall stripping ratio for one of the sections shown in Figure 1 using the Lerch's Grossman Algorithm.
[20 Marks]

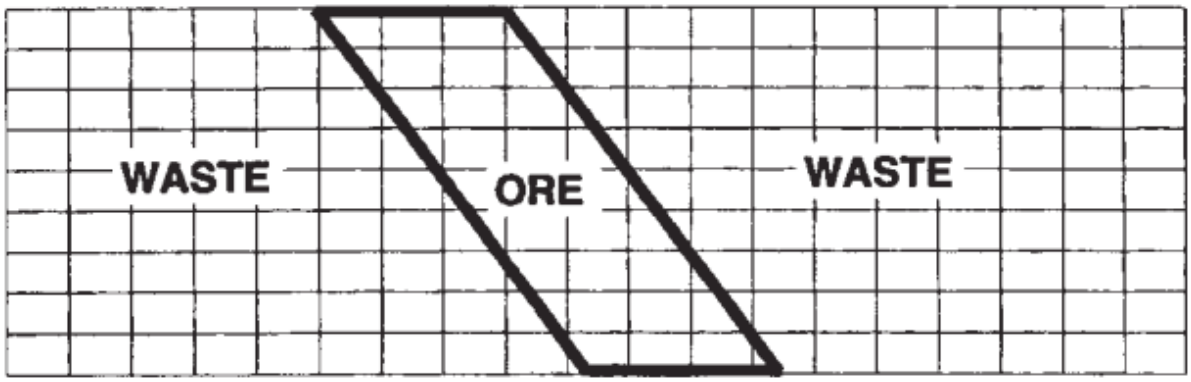

Figure 1 Ore and Waste Section

QUESTION FIVE

a) Explain briefly the major principles that should guide a mining engineer in the planning and design process?
[10 Marks]

b) Explain briefly three most commonly used resource and reserve reporting standards in the mining industry and what do they intend to accomplish. **[10 Marks]**

END OF EXAMINATION PAPER