FACULTY OF ENGINEERING AND ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINING METHODS

EMI 2205

Final Examination Paper

June 2020

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr D. Chawira

INSTRUCTIONS

1. This paper contains One section with Five questions
2. Answer Question One (25 marks) and any other **Three** questions (25 marks each)
3. Where a question contains subdivisions, the mark value of each subdivision is shown in brackets.
4. Start each question on a new page

NB: DO NOT TURN OVER THE QUESTION PAPER OR COMMENCE WRITING UNTIL INSTRUCTED TO DO SO

Additional Requirements

Non-Programmable Calculator

MARK ALLOCATION

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

Question 1 (25 marks)

a. Draw a neat sketch diagram of section through an open pit showing the following:

- bench, bench face, toe of bench, crest of bench, bench slope angle, pit floor, berm, berm height, berm slope angle, road and ramp width, overall pit slope angle **[12 marks]**

b. As the project engineer for mining company X, you have been tasked to do a pre-feasibility study on a greenfield. Describe factors would you consider for the selection of a suitable mining method? **[8 marks]**

c. The open pit has pit slopes which are benched. Explain why pit slopes are benched. **[5 marks]**

Question 2 (25 marks)

Mine X has reached an economic pit limit, the long term mine plan is to transition from open pit mining to underground mining using sublevel caving mining method for the deposit.

a. Outline the typical geology to be expected in such a deposit with special reference to the relative dimensions and the dip of the ore body, and the quality of the rock masses in the ore, hanging and foot walls. **[6 marks]**

b. Describe sublevel caving mining with special reference to:

1. Application **[5 marks]**
2. Development **[5 marks]**
3. Production **[5 marks]**
4. Ore handling **[4 marks]**

Question 3 (25 marks)

a. Explain, with the aid of sketches the showing a near vertical narrow vein orebody, the following terms as used to describe underground mine workings

1. Foot wall
2. Stope
3. Raise
4. Winze
5. Ore-pass
6. Cross cut
7. Shaft
8. Hanging wall

9. Foot wall **[13 marks]**

b. Discuss the advantages and disadvantages of block caving mining method. **[8 marks]**

c. What orebody geometric and rock features are necessary for the adoption of block caving mining method? **[4 marks]**

Question 4 (25 marks)

a. In underground mining, there are four basic preliminary parameters considered in the adopting underground mining over surface mining. Describe these basic parameters. **[8 marks]**

b. The 'Cut and Fill' stoping mining method can be broadly subdivided as 'overhand' versus 'underhand', and 'open' versus 'tight'. What do you understand by this statement? **[8 marks]**

c. Discuss the cycle of operations in mechanised overhand cut and fill stoping. **[9 marks]**

Question 5 (25 marks)

a.

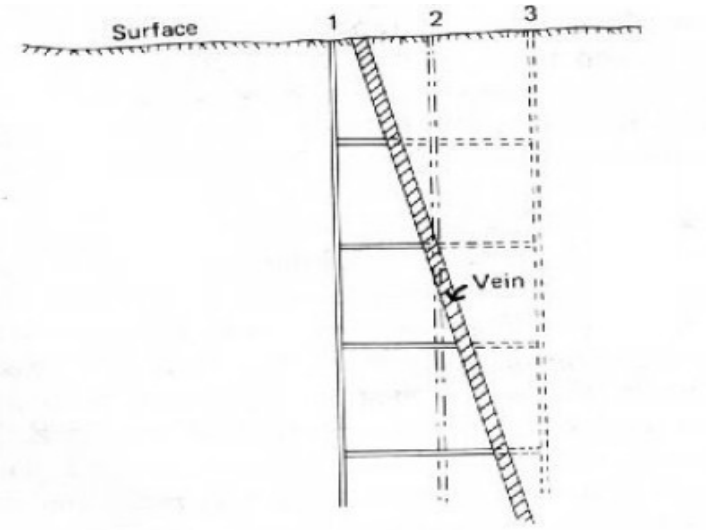

Figure 1: Shaft positions on a dipping vein

The positioning of a shaft is important in mine planning. Figure 1 shows dipping vein and three positions where a shaft can be positioned. Justify why position 1 is more favourable for positioning a shaft. **[6 marks]**

b. Discuss the shaft sinking cycle in underground mining operations. **[7 marks]**

c. In underground mining there are three primary accesses to the deposit. Briefly describe these three primary accesses to the deposit giving reference to their respective advantages and disadvantages. **[12 marks]**