



**FACULTY OF ENGINEERING AND THE ENVIRONMENT**

**DEPARTMENT OF MINING ENGINEERING**

**SURFACE MINING**

**EMI 5202**

**Final Examination Paper**

**July 2022**

This examination paper consists of 3 pages

**Time Allowed: 3 hours**

**Total Marks: 100**

**Examiner's Name: Eng. T. Nyamagudza**

**INSTRUCTIONS**

1. This paper contains **ONE** section with **FIVE** questions.
2. Answer **any FOUR** questions.
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. Start each question on a new page.

**Additional Requirements**

**Calculator**

**MARK ALLOCATION**

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

### Question One

- (a) Indicate the conditions (i.e. with respect to ore body shape, ore body dip and waste handling methodology **only**) which suit application of each of the following surface mining methods:
- i. Terrace mining; [3]
  - ii. Strip mining; and [3]
  - iii. Open Pit mining. [3]
- (b) With the aid of suitable sketches, briefly describe the strip mining method. [16]

### Question Two

- (a) Differentiate the terms overall stripping ratio and break-even stripping ratio. [4]
- (b) Calculate the overall stripping ratio for a mining company given that during the year 5.4 million tonnes of material was mined and that the milling section processed 2.1 million tonnes. [3]
- (c) Illustrate with suitable cross-section sketches showing ore and waste components, how overall stripping ration can be; **Constant**, **Increasing** or **decreasing** over the life of an open-pit mine. Give one (1) advantage and one (1) disadvantage for each case. [18]

### Question Three

- (a) Illustrate each of the following open pit mine structures/features on a single clearly labelled diagram. Berm width, berm slope angle, pit floor, overall pit slope angle, crest of bench, toe of bench, bench slope angle, road and ramp width, bench face bench. [10]
- (b) The Dragline is the most widely used machine in surface strip coal mining. Discuss in detail the advantages and disadvantages of draglines in strip coal mining application. [15]

### Question Four

- (a) Briefly describe the operating principle of percussion drilling using the four basic functions involved. [8]
- (b) During drilling, the feed force is needed to keep the drill bit in contact with the rock. Outline (2) two negative consequences for each of the following operating conditions

- i. Excessively low feed [2]
  - ii. Excessively high feed [2]
- (c) What is the purpose of the following during drilling?
- i. Water
  - ii. Lubricant
  - iii. Compressed air. [6]
- (d) Differentiate Out-Of the Hole and Down-The-Hole drilling. [6]

### **Question Five**

- (a) A quarry is planned to be working on a rock of Andesite with an estimated production of about 120,000 tonnes per month. What is the estimated requirement of explosives per month? Assume that the SG of Andesite is 2.7 and the powder factor for andesite is 0.7 kg/m<sup>3</sup>. [4]
- (b) A nickel deposit has a strike length of 350m, a width of 200m and a dip of 80°. Current exploration work indicates that the deposit is starting at 20m below surface and is not closed down dip. Geologists have quantified a minimum reserve tonnage of 10 million tons. Determine the best mining method and its justification [6]
- (c) Discuss the mining method above (b) while including the cycles of operation, the equipment to be used, the advantages and disadvantages of the method [15]

**END OF EXAMINATION**