UNIVERSITY OF JOHANNESBURG

PROGRAM	:	BACHELOR OF ENGINEERING TECHNOLOGY **(**MINING ENGINEERING**)**
SUBJECT	:	**MINING 3A**
CODE	:	**MINMNA3**
DATE	:	4 JUNE 2019 FINAL EXAMINATION
DURATION	:	3 HOURS (08H30 - 11H30)
TOTAL MARKS	:	100

EXAMINERS	:	T MMOLA
MODERATOR	:	S NHLEKO
NUMBER OF PAGES	:	3 PAGES incl. COVER PAGE

REQUIREMENTS

1. ONE SCIENTIFIC CALCULATOR
2. ONE ANSWER SCRIPT

INSTRUCTIONS

1. ANSWER ALL QUESTIONS
2. UNDERLINE AFTER EACH QUESTION
3. SUBMIT YOUR QUESTION PAPER WITH THE ANSWER SCRIPT

QUESTION 1

1.1 Discuss the basic steps to exploit minerals i.e. the unit operations of mining. (10)

1.2 Define the term "rock breakage" (1)

1.3 What is the purpose of drilling in mining? (4)

1.4 What does the term "drillability" mean? (3)

1.5 Name five mechanical rock properties that have an influence on drilling and explain why it is important to know these rock properties on a mining operation. (7)

1.6 Name the five sources of error that can influence drilling accuracy (5)

[30]

QUESTION 2

2.1 Explain how explosives break rock. (10)

2.2 Explain how the following explosive properties would be taken into consideration when selecting explosives for use in a mining operation: (8)

(a) Velocity of detonation
(b) Density
(c) Water resistance
(d) Sensitivity

2.3 What is the difference between "detonation" and "deflagration"? (2)

[20]

QUESTION 3

3.1 You are the new mining engineer at a large open pit copper mine. Mining will be in hard but competent rock and in wet conditions. The mine is using a DTH percussion drill rig with 127mm drill bit. Excavation will be done with a hydraulic shovel that has a maximum reach of 15m. The manager requires you to design a blast pattern for the mine. Design the blast pattern for the mine using "rules-of-thumb". (12)

3.2 Provide a plan and section view of the design. (not to scale) (8)

3.3 What type of blast pattern have you designed? (1)

3.4 How would you alter your design to achieve the other two types of blast patterns? (2)

3.5 Assuming bulk emulsion explosives with a density of 1.2g/cc will be used, what is the quantity of explosives, in kilograms, required per hole? (7)

[30]

QUESTION 4

4.1 What are the basic rules of earthmoving? (3)

4.2 What are the advantages of correctly fragmented muckpile? (3)

4.3 Define the following terms:

(a) Swell (2)
(b) Availability (2)
(c) Utility (2)

4.4 Give two examples of transportation equipment that may be used for men, material or rock in each of the following systems:

(a) Surface mining (2)
(b) Shaft conveyance (2)
(c) Trackbound system (2)
(d) Trackless system (2)

[20]

TOTAL [100]