UNIVERSITY
OF
JOHANNESBURG

PROGRAM : BACCULARUS ENGINEERING TECHNOLOGIAE
MINING ENGINEERING

SUBJECT : **Mine Planning and Design**

CODE : **MPDMNA3**

Final Exam

DATE : 31 May 2019

DURATION : 08:30 – 11:30

TOTAL MARKS : 100

EXAMINER : PROF RUPPRECHT

MODERATOR : MR H HOFFMANN

NUMBER OF PAGES : 3 PAGES

INSTRUCTIONS : WRITE NEATLY AND LEDGIBLE

REQUIREMENTS : ONE EXAMINATION SCRIPT.

INSTRUCTIONS TO CANDIDATES:

ANSWER ALL THE QUESTIONS.
WRITE NEATLY AND LEGIBLE

You must answer each question in a legible manner. Illegible answers will not be marked! Read all questions carefully and answer all questions completely. Keep your answer short and to the point. Answer should reflect information sourced from reading and lectures in class – not your general experience on the mine.

1.0 *Graduate Attribute exit level outcome 1 (Problem solving). Financial modelling*

As a mining engineer you have been provided with the following information regarding the development of a small open pit gold mine.

Your answer must be reported in tabular form on an annual basis, Noting that each year equates to 25% of the total of each individual line question. A minimum of 60% is required to pass this question. Less than 60% will limit the student to a maximum mark of 35% for this exam.

Year 1

Description	Year 0	Year 1	Year 2	Year 3
ROM tonnage	0	1,500,000	2,500,000	3,000,000
Grade	0	4,5	5,0	6,0
Process recovery	0	85%	95%	98%
Gold Price	$1300/oz	$1300/oz	$1300/oz	$1300/oz
Cost of production	0	$1100/t$_{ROM}$	$1000/t$_{ROM}$	$900/t$_{ROM}$
CAPEX	$10,000,000	$5,000,000	0	0

Provide gross in-situ tonnes of gold in Kg.   (10)
Provide recovered gold in ounces   (20)
Provide gross revenue ($)   (10)
Provide total cost of production ($/t)   (10)
Determine gross profit ($)   (10)
If a royalty of 4% is applied what is EBIT   (10)
What is profit after tax if a tax of 28% is applied   (10)
What is the discounted cashflow if a discount of 10% is applied   (10)
What is the NPV   (10)
TOTAL   **(100)**

A minimum value of 60 points is required to pass Graduate attribute 1

Value of Question   **(20)**

2.0   Graduate Attribute 2 (*Application of scientific and engineering knowledge*) – Volume and grade estimate of a deposit

You have been provided with a surface gold deposit that outcrops on surface and is made up of sulphide material from 50m below surface to surface. The hydrothermal deposit is orientated 90 degrees vertical and is 25m thick. The slope of the mountain is 45 degrees. Estimate the *tonnes of waste and ore, as well as in-situ gold* content if the strike of the deposit is 1500m. The density of the waste and ore is 2.78t/m^3 and the grade of the ore is 6.0g/t.

A minimum of 60% is required to pass this question. Less than 60% will limit the student to a maximum mark of 35% for this exam.

(20)

3.0 mechanisation

Explain how the strategic plans of Lonmin and Brad Mills negatively affected Lonmin. Explain whether Lonmin's failure was due to poor strategic planning, poor tactical planning or both.

(20)

4.0 Mine Access

Provide the advantages and disadvantages of utilizing an incline shaft to access near surface orebodies.
According to Wilson what is the maximum distance a incline shaft should operate.
How are incline used for older deposit that do not have extensive mineral resource.

(20)

5.0 Contract Mining

Explain why a company would choose a contractor knowing that you as an owner may pay a premium of 15% to 20%. Provide a number of reasons why contract mining might provide an advantage to an owner.

(20)

GRAND TOTAL   **[100]**