



FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

FINANCIAL VALUATION

EMI 5103

Final Examination Paper

January 2021

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: Mr. R Nyirenda

INSTRUCTIONS

1. This paper contains **ONE** section with **FIVE** questions.
2. Answer **QUESTION ONE** and **any other THREE 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.
7. This paper comprises **4** printed pages.

Additional Requirements

Calculator

MARK ALLOCATION

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

Question One

After conducting a rigorous exploration and feasibility study exercise, a certain mining company has 2 Mt of probable reserves mineable using the sub level stoping method. An initial US\$ 40 million investment is made to start operating the mine. The following are some of the economic information for the mine:

- Estimated annual operating expenditure = US\$ 9.89 million
- Average grade of the mineable reserves = 4.5 g/t
- Annual production rate = 0.4 Mt
- Metal recovery = 95%
- Assumed gold price is US\$ 368 per troy ounce
- Royalty charged at 2.5%
- Corporate income tax charged at 30%

NB: 1 troy ounce = 31 grammes

- Calculate the life-of-mine. **[1 mark]**
- Using the straight-line method, determine the annual depreciation. **[1 mark]**
- Construct a nominal dollar DCF model for this operation. **[20 marks]**
- Using a discount rate of 10%, compute the mine's NPV. **[2 marks]**
- Determine the Capital Efficiency Index for the operation. **[1 mark]**

Question Two

- Critically discuss the pros and cons of funding mining operations with debt finance. **[10 marks]**
- Dindingwe mine generates a fixed annual cash flow of US\$ 4 225 000. The company is seeking a US\$ 6 200 000 bank loan so as to deepen the shaft and increase the haulage fleet. Of all the banks in the country, XYZ bank is offering the lowest interest rate of 10%. Given that the bank only approves loan applications if the Debt-to-Service ratio is greater than 1.5, determine whether or not the mine's loan application will be successful. **[9 marks]**
- Describe 3 aspects, about a mining operation, that merchant banks analyse when they want to decide the approval of project finance. **[6 marks]**

Question Three

a) The following is financial data for the Wing Buck mining operation:

- Total company debt = US\$ 267 500
- Shareholder's equity = US\$ 1 437 250
- Cost of debt, $R_D = 15\%$
- Cost of equity, $R_E = 18\%$
- Tax rate, $t = 30\%$

- i. Compute the Debt-to-Equity ratio. **[4 marks]**
- ii. Using Equation 1, calculate the Weighted Average Cost of Capital (WACC). **[8 marks]**

$$WACC = \left(\frac{D}{D+E} \right) \times R_D \times (1-t) + \left(\frac{E}{D+E} \right) \times R_E \quad (\text{Equation 1})$$

- iii. Given that the operation will generate a total net cashflow of US\$ 33 645 000 accumulated over a mine life of 9 years, calculate the net present value for Wing Buck mine. **[3 marks]**

- b) It is common knowledge that gearing (or the Debt-to-Equity ratio) leverages profitability of mining operations. Despite this, explain why the balance sheets of most mining companies have relatively low levels of debt? Use the graphical relationship between gearing ratio and the costs of debt, equity, and WACC to explain your answer. **[10 marks]**

Question Four

- a) Briefly describe the main financial objective of all mining operations, highlighting how any 4 factors contribute towards achieving this objective. **[10 marks]**

- b) Discuss 5 factors that make the valuation of mining projects different from the valuation of other industries. **[15 marks]**

Question Five

- a) Describe any 5 major components of a mining project's value. **[15 marks]**
- b) Using a sketch graph, illustrate and explain how the value of mining projects changes throughout the stages of exploration, feasibility studies, development, production and mine closure. **[10 marks]**

END OF EXAMINATION PAPER