



FACULTY OF ENGINEERING AND THE ENVIRONMENT

DEPARTMENT OF MINING ENGINEERING

MINE MANAGEMENT

EMI 5102

Final Examination Paper

September 2023

This examination paper consists of 3 pages

Time Allowed: 3 hours.

Total Marks: 100

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Mr A Antonio

INSTRUCTIONS

1. This paper contains **ONE** section with **SIX** 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.
7. This paper comprises 3 printed pages.

Additional Requirements

Calculator

Question One

- a. What role does planning play in fostering coordination and alignment among different departments or teams within an organization? **[5 marks]**
- b. How would you define mining as a business activity, and what are the main characteristics of mining as a business? **[10 marks]**
- c. Explain the importance of interpersonal relationships, transfer of information, and decision-making. in the role of a manager and how they contribute to effective leadership. **[10 marks]**

Question Two

- a. As the Project Manager at Epoch, briefly describe 6 general steps that you will conduct to synthesize a project schedule for expanding a mine's production capacity. **[12 marks]**
- b. The table overleaf provides details of activities required to accomplish the project mentioned in (a).

ACTIVITY	PREDECESSOR	TIME (MONTHS)
A	-	2
B	-	3
C	A	2
D	A, B	4
E	C	4
F	C	3
G	D, E	5
H	F, G	

- i. Construct the CPM network for the activities mentioned in the above table. **[8 marks]**
- ii. Compute the length of each path in the network. **[3 marks]**
- iii. Determine the project completion duration. **[2 marks]**

Question Three

- a. How does understanding the history of management in an underground mine setup contribute to effective change management and the successful implementation of new strategies or technologies? **[5 marks]**

- b. Describe 4 situational variables that are widely applied in the Contingency Approach to management. **[10 marks]**
- c. For each of the situational variables mentioned in (b), discuss how you would implement them in the case where you are the miner in charge of a production team. **[10 marks]**

Question Four

- a. Epoch Mine uses 10 000 boxes of explosive cartridges every year. The buying price is USD 150 per box. The cost of replenishing the inventory levels is USD 15 per order and the inventory holding cost is 20% of the purchase price per box per order. Given that no shortages should be incurred, calculate the following:
 - EOQ, **[5 marks]**
 - The optimum interval between orders, **[5 marks]**
 - Minimum annual inventory costs **[5 marks]**
- b. How do geological conditions and ore characteristics impact inventory levels in underground mining operations? **[5 marks]**

Question Five

Davis Granite is in a contract to supply a construction company with rubble rocks (of size 280mm to 300mm) and concrete aggregate (of size 15mm to 25mm). The quarry management has budgeted to only incur a total operating cost of \$11 per tonne. Producing each tonne of rubble and aggregate costs \$4 per tonne and \$3 per tonne respectively. Moreover, whenever the construction company places an order, the quarry must produce the order in 6 hours, and it takes 1 hour 10 minutes to produce a tonne of rubble and 1 hour 10 minutes to produce a tonne of aggregate. Given that the profit per tonne for rubble and aggregate is \$6 per tonne and \$5 per tonne, how much of each product must be produced to maximize profits?

[25 marks]

Question Six

- a. Explain the importance of human resource management with regards to;
 - i. Societal objectives. **[5 Marks]**
 - ii. Organizational objectives. **[5 Marks]**
 - iii. Functional objectives. **[5 Marks]**
- b. Discuss the five pillars of Corporate Social Responsibility and explain their relevance to the Zimbabwean mining industry. **[10Marks]**