



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF ENGINEERING AND BUILT ENVIRONMENT**

**DEPARTMENT OF CIVIL, MINING AND PROCESS ENGINEERING**

<b>QUALIFICATION : BACHELOR OF ENGINEERING : MINING ENGINEERING</b>	
<b>QUALIFICATION CODE: 08BMEG</b>	<b>LEVEL: 8</b>
<b>COURSE CODE: MRE810S</b>	<b>COURSE NAME: MINE AND RESOURCE ENGINEERING MANAGEMENT 414</b>
<b>SESSION: JUNE 2023</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 100</b>

<b>SUPPLEMENTARY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	<b>PROF. GODFREY DZINOMWA AND MR. RUBEN MWALWANGE</b>
<b>MODERATOR:</b>	<b>MR REHABEAM NEPAYA</b>

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer all questions.</li><li>2. Read all the questions carefully before answering.</li><li>3. Marks for each question are indicated at the end of each question.</li><li>4. Please ensure that your writing is legible, neat and presentable.</li></ol>

**PERMISSIBLE MATERIALS**

1. Examination paper.
2. Calculator and appropriate stationery

**THIS QUESTION PAPER CONSISTS OF 6 PAGES (Including this front page)**

**Question 1****[10 Marks]**

- (a) In the years 2019 - 2022, the COVID-19 pandemic has impacted on the minerals industry and is projected to continue to do so in various ways.
- (i) What are some of the changes that the pandemic has caused so far, and how do you project it to affect the mineral industry in future? [5]
- (ii) If you were the Chief Executive Officer (reporting to the Board of Directors) of a labor-intensive mining operation, what changes would you make to your organisation, and how would you communicate these to all stakeholders? [5]

**Question 2****[23 Marks]**

A town council is served by 5 rock quarries spread around the town. A road project in town requires 150,000 tons of aggregate. A survey of the 5 quarries reveals their unsold capacity and delivered cost per ton as shown in the table. Assume that the qualities of the aggregate meet specifications from all 5 quarries.

**Table: Costs and Unsold Capacity of Quarry Aggregates**

Quarry	\$ per Ton Delivered	Tons of Unsold Capacity
A	\$10.50	45,000
B	\$12.00	55,000
C	\$12.50	25,000
D	\$14.00	50,000
E	\$14.25	25,000

- a) How many tons of aggregate would be supplied by each quarry to minimize cost? [10]
- b) If the airport project budgeted \$2.0 million for aggregate, is the project going to be within budget for this item? [3]
- (c) What is the maximum cost that the town council would pay if procurement manager did not pay attention to cost and how many tonnes would be delivered by each quarry in that situation? [5]
- (d) If the municipality was constrained to procure at least 50% of the stocks from each of the community owned Quarry D and Quarry E while minimizing costs, what quantities would be supplied by each quarry and what would be the total cost for the 150k tons? [5]

**Question 3****[25 Marks]**

Project management is the process of leading the work of a team to achieve all project goals within the given constraints.

(a) Discuss two important aspects of a project which a project manager should control and what are the tool(s) the project manager should apply to make such aspects realistic and accurate at the planning stage [7]

(b) You are presented with the following project scenarios, tabulated below.

<b>Project No.</b>	<b>Budget at Completion (BAC) (\$)</b>	<b>Budget Cost of Work Scheduled (BCWS) of Planned Value (\$)</b>	<b>Budgeted Cost of Work Performed (BCWP) or Earned Value (\$)</b>	<b>Actual Value of Work Performed (ACWP) (\$)</b>
1	40,000	20,000	20,000	20,000
2	40,000	20,000	18,000	18,000
3	40,000	20,000	20,000	15,000
4	40,000	20,000	22,000	18,000
5	40,000	20,000	18,000	20,000
6	40,000	20,000	12,000	20,000
7	40,000	20,000	18,000	22,000
8	40,000	20,000	20,000	22,000
9	40,000	20,000	25,000	12,000
10	40,000	20,000	16,000	18,000
11	40,000	20,000	24,000	25,000

Project scenario 1 is the ideal situation where the planned progress and cost are the same at the time of evaluation, which means that the project is both on schedule and within budget.

Comment on the status of the project as reflected in each of Scenarios 2 through to 11 in terms of whether it is ahead/on/behind schedule and within/above budget. [10]

- (c) In the case of a new Gold mine that has been approved for construction within a certain period, what are the possible risks of completing the construction and commissioning the mine a year later than scheduled? [8]

**Question 4**

[5 Marks]

A potential investor considers four projects with the same present values and the cashflows shown in Figure MX.

Which project(s) would the investor select if the interest is 10%? Justify your answer. [5]

Year, n	Cash Flow (1)	Cash Flow (2)	Cash Flow (3)	Cash Flow (4)
1	\$1,000	\$3,500	\$3,154.71	\$0
2	\$1,000	\$3,250	\$3,154.71	\$0
3	\$1,000	\$3,000	\$3,154.71	\$0
4	\$11,000	\$2,750	\$3,154.71	\$14,641
Total	\$14,000	\$12,500	\$12,618.84	\$14,641

Figure MX: Cash Flow

**Question 5**

[10 Marks]

Mine XY's executive committee of management (EXCO) decided to invest \$20 000 in a Cash Deposit compounded annually at 4% annual interest for 10 years.

- (a) What is the value of a cash deposit when it matures in 10 years? [5]
- (b) What is the value of the Cash deposit at maturity if the interest compounds every 3 months? [5]

**Question 6****[12 Marks]**

NamGold LTD, is undergoing a restructuring of its organizational structure. The executive management decided to replace the Chief Executive Officer by honoring the succession plan which is part of the company's strategic plan. However, proper change management is required thereafter.

- (a) Define the concept 'Change Management'. [2]
  
- (b) Discuss the succession management plan of a multi-national company such as NamGold LTD, to select and develop a future Chief Executive Officer [10]

**Question 7****[15 Marks]**

Before an investment is made, it is advisable to weigh the viability of the project. A payback period is one of the measures of projects' viability.

- (a) Apart from the payback period method, discuss at least five (5) suitable criteria that can be used to make an informed choice of a single project from several optional projects to invest in. [10]
  
- (b) Illustrate the relationship between metal price, ore cut-off grade and ore reserves, and explain how the latter two are impacted by metal price? [5]

**Formulas:**

**Time value of money compound interest formulas:**

$$F = P(1 + i)^n$$

$$P = \frac{F}{(1 + i)^n}$$

$$F = A \cdot \frac{[(1 + i)^n - 1]}{i}$$

$$P = A \cdot \frac{[(1 + i)^n - 1]}{i(1 + i)^n}$$

**Compounding under different time horizons:**

$$A = p \left( 1 + \frac{r}{n} \right)^{nt}$$