NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF ENGINEERING AND BUILT ENVIRONMENT

DEPARTMENT OF CIVIL, MINING AND PROCESS ENGINEERING

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

FIRST OPPORTUNITY QUESTION PAPER	
EXAMINER(S)	**PROF. GODFREY DZINOMWA AND MR. RUBEN MWALWANGE**
MODERATOR:	**MR REHABEAM NEPAYA**

INSTRUCTIONS
1. Answer all questions. 2. Read all the questions carefully before answering. 3. Marks for each question are indicated at the end of each question. 4. Please ensure that your writing is legible, neat and presentable.

PERMISSIBLE MATERIALS

1. Examination paper.
2. Calculator and appropriate stationery

THIS QUESTION PAPER CONSISTS OF 7 PAGES (Including this front page)

Question 1 **[20 marks]**

Nam Gold is a newly established mining company. It is presented with the organizational structure shown in figure X. The initial stages of the strategic planning process have taken into consideration whether a divisional or functional organizational structure should be employed.

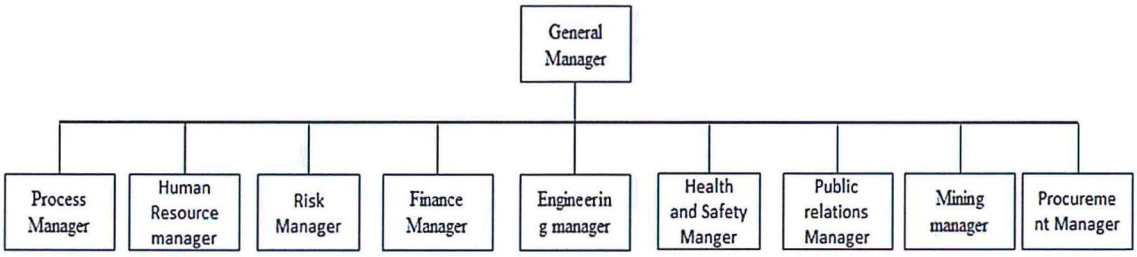

Figure X. Organizational Structure

(a) Explicitly distinguish between divisional and functional organizational structure [2]
(b) By critically analyzing the organizational structure in figure X,

(i) What weakness can you point out in this structure? [2]

(ii) What are the likely negative consequences of employing such a reporting structure in Nam Gold Mining company? [2]

(iii) How would you address the stated weaknesses to improve the organization's operational efficiency? [2]

(c) Advise the management of Nam Gold as a new mining company, on how to get a social license to operate and the merits of having such a license. [2]

(d) You are the manager of two supervisors, both of whom are not performing satisfactorily. One (Alice) was recently transferred from another section and you attribute her poor performance to lack of familiarity with the job. The other (Liz) has been in the position for a while and you have spoken to her about the need to improve her performance several times but there has been no notable improvement.

Explain how you would address the poor performance in each case (in terms coaching, motivation and disciplining) [10]

Question 2 **[15 Marks]**

Agilent4.0 Mine, a copper producer in southern Africa took cognizance of embarking on a modular Business Process Re-engineering (BPR) in 2002. In addition, the mine adopted the concept of lean management. It was the management effort for the mine to remain competitive amid serious threats to operational viability due to hyperinflation. Figure XY shows the simplified BPR cycle for Agilent4.0 Mine.

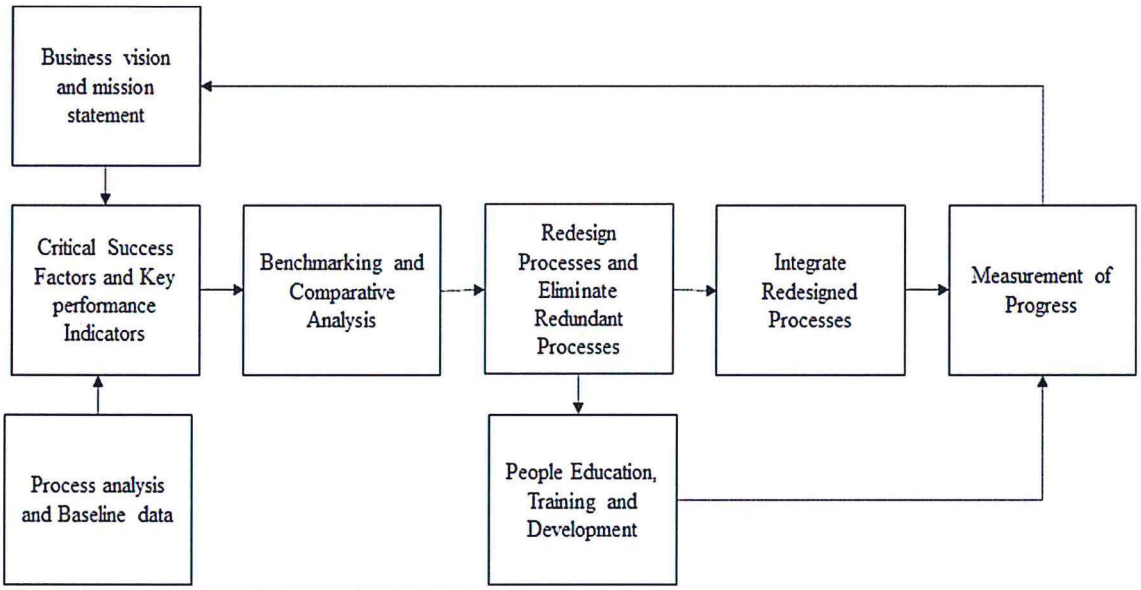

Figure XY. Simplified BPR cycle for Agilent4.0 Mine

(a) Evaluate the significance of adopting the concept of lean management in Agilent4.0 Mine's mining and processing operations. [5]

(b) Evaluate the strength of the developed BPR model in figure XY and outline at least four main objectives of Business Process Re-engineering. [2;4]

(c) Advise the management of Agilent4.0 Mine of what is not considered as Business Process Re-engineering practice. [4]

Question 3 **[15 Marks]**

Mining operations utilize risk analysis models with the main purpose of identifying accidents and incidents in a mine as well as their root causes and to perform a risk analysis. Figure ZX presents an accident risk analysis matrix used in BMX open cast Mine.

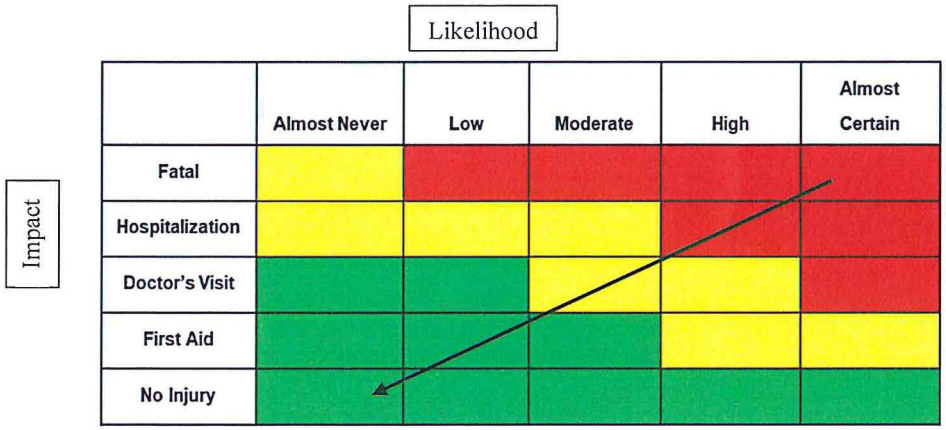

Figure ZX. Risk Analysis Matrix

(a) What risk management strategies would you employ at an accident-prone BMX opencast mine, in order to move from the 'Fatal – Almost certain' operating zone to 'No injury- Almost never' operating environment [5]

(b) Discuss the succession management plan of a multi-national company to select and develop a future Chief Executive Officer [5]

(c) A civil engineer decides to present himself to potential employers as professionally competent in mine engineering, based on his belief that the two disciplines are similar. Discuss the shortcomings of such conduct from an ethical point of view [5]

Question 4 **[7 Marks]**

(a) Mine ZV's Human Resource department renegotiated with a retirement fund representative on behalf of their employees, who are their important assets. They decided to pay $ 6000 per year for 30 years into a retirement account at an annual interest rate of 5% compounded annually.

(i) What is the value of the account in 30 years? [5]

(ii) What would be the lump sum value of the arrangement in present dollars? [4]

Question 5 **[11 Marks]**

An engineer for a mining company is directed to examine a special property and to advisethe company's management as to its potential value. Estimates of the ore readily available are 800 000 tonnes and she bases her evaluation on that figure. Miningequipment available will meet an annual production estimated at 75 000 tonnes of ore. It is estimated that gross income will be $15.75 per tonne of mined ore and that mining operations, transportation and smelting costs will total $7.75 per tonne of ore. Administration and other expenses are estimated to be $55 000 per year.

(a) What would the engineer report as expected life of mine? [2]

(b) If the interest for the project was 7.5% per year compounded annually,

(i) Calculate the probable present value of the property. [5]

(ii) Would the engineer be justified in recommending that the company invests $10 million in the property? Show your working and state your reasons clearly. **[2;2]**

Question 6 **[5]**

Maintenance costs for a new piece of mining equipment which costs $150,000 are expected to be $25,000 in the first year, rising by $1,000 per year every year thereafter. The machine has a life of 5 years and interest is 10% annually. The salvagevalue is $55 000.

What is the net present value of these costs? **[5]**

Question 7 **[5 Marks]**

A certain gold mine has a production capacity of 200 000 tonnes per month at an ore grade of 3.5 g/t. The mill recovery is 86% while that for the subsequent smelting and refining is 90%. If the mining and overall processing costs are $40 and $30 per tonne ofore respectively, while tax is 20% of profit; **Assume 1Oz = 30g.**

What is the after tax income of the operation if the gold price is US$1700/Oz? **[5]**

Question 8 **[15]**

RBM Mines Ltd is considering the expansion of its medium-sized open pit copper mine and Process Plant consisting of a Concentrator, Smelter and Refinery. For a capital investmentof US$14.5 million, the operation can be expanded from 9 000 to 12 000 tonnes per day ore production with a commensurate increase in waste stripping.

Given the following data from RBM Mines Ltd, ***determine the grade*** of the Ore (i.e %Cu)that will give a rate of return on Investment of 10% per annum. [15]

Data:

Ore grade = **%** Cu ?
Net copper price from custom smelter = $1500/t
Overall process recovery = 85%
Total annual cash costs including income taxes = $4 500 000
Mine life = 10 years
No salvage value
Operating days per year = 360

Question 9 **[5]**

Define sustainability as it applies to the mining industry. Give three examples of sustainability measures being applied at a mining operation. [5]

Formulas:

Time value of money compound interest formulas:

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

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

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

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

Compounding under different time horizons:

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

-END-