mineral resources & energy

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

MINE MANAGER'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING I

METALLIFEROUS MINING

DATE: 08 APRIL 2025 **TOTAL MARKS: 100**

TIME ALLOWED: 3 HOURS **TO PASS: 50**

(09H00 to 12:00)

INSTRUCTIONS:

- This question paper consists of **FIVE** pages including the cover page.
- **All** questions must be answered and are to be presented in a neat and readable manner. Answer books will not be marked if not readable.
- Read the instructions on the front page of your answer book carefully.
- The use of a non-programmable calculator is allowed.
- Use a pen that writes in ink and should not be erasable.
- Do not use a red pen.
- Restrict the use of highlighters.
- No cellular phones, computers, laptops and any other related devices shall be allowed in the examination venue.

QUESTION 1

Rock Engineering

1.1 What are the main functions of rock bolting, and how are bolt binding effects accomplished? (5)

1.2 Remnants should be identified on stope sheets and mine plans and should be given adequate attention during mine planning and operational meetings. What is a remnant and what precautionary measures would you put in place to ensure that the stope support is adequate on a remnant? (7)

[12]

QUESTION 2

Mine Evaluation

Ikamva is a small hydrothermal gold deposit in Barberton area. Given the following month-end returns:

Tonnes milled	45 000t
Residue value	0.4 g/t
Surface Sorting	10% @ 0.7 g/t
Recovery	470 kg of gold
Underground Stope sorting	5% at no value
Reclamation	500t @ 8.0 g/t
Development Rock	2000t @ 7.5 g/t
Stoping ore	10.3 g/t

2.1 Calculate the MCF (5)

2.2 The average value of tonnes milled, and (5)

2.3 The tonnages broken in stopes (5)

2.4 Briefly explain the term: Sample Salting (3)

[18]

QUESTION 3

Underground Narrow Tabular Mining

3.1 Calculate the replacement factor for a conventional underground hard rock mining a layout that applies the scattered breast mining layout. Use the following parameters: (5)

Crosscut Spacing	210m
Dip of Reef	12°
Inter Level Spacing	45m
Crosscut length	180m
Traveling way length	16m
Number of Box holes per Crosscut	2
Total geological loss (known and unknown)	18%

Make the necessary assumptions regarding regional pillar support, spacing between crosscuts, and mining losses.

3.2 For a deep level Conventional Gold mine, face advance relates to stoping width. Calculate the profit (per half-level) if stope face advance is 1.2 m a day. Use the following parameters: (10)

Face length (m)	30
Reef width (m)	0.80
Reef value (g/t)	7.5
RD (t/m^3)	2.8
Cost per ton (R/t)	1850
Plant recovery (%)	90
Crews per half-level	9
Shifts	23

Make the necessary assumptions with regards to blast frequency, gold price and exchange rate and waste relative density.

[15]

Question 4

Massive Mining

With the aid of diagrams write about Sub Level Open Stoping Mining Method under the following headings:

4.1 Description (5)

4.2 Application (5)

4.3 Blast holes (5)

4.4 Production (5)

4.5 Ore collection and transport (5)

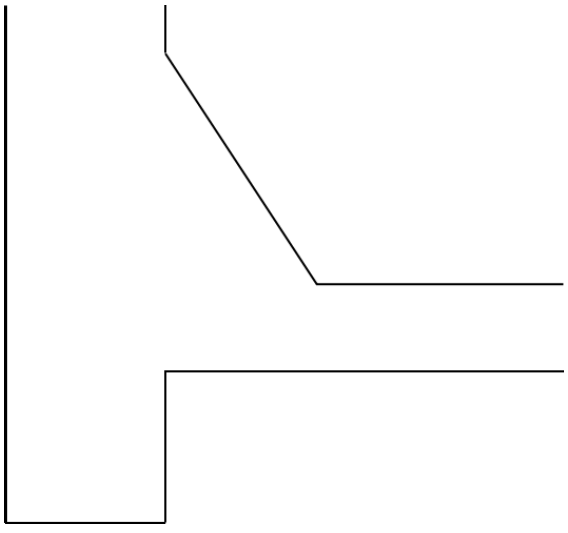
[25]

Question 5

Shafts and Shaft Sinking

5.1. Vertical Shaft Sinking consist of three phases namely Collar Construction, Pre-Sink and Main Sink. Describe how the Pre-Sink phase is executed taking into consideration the cleaning methodology, drilling, limit of the phase and all safety aspects. (10)

5.2. The sinking of the main vertical shaft is in progress and the first station must be established. Use a Gantt chart to show the activities and the duration of the total planned shaft station development. (5)



5.3. Discuss cover drilling during shaft sinking. (5)

[20]

QUESTION 6

Large Excavations

The use of alternative methods other than drill and blast to break rock is considered breakthrough technology.

6.1 List nine rock properties that affect boring performance and cutter usage. (5)

6.2 Write concise notes on other technologies that have been applied to the South Africa mining industry. (5)

[10]

Total marks **[100]**