



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING ECONOMICS 1

DATE: 03 May 2017

TOTAL MARKS: 100
TO PASS: 50

TIME ALLOWED: 3 HOURS
(08h30 to 11h30)

NOTE:

- This question paper consists of **FIVE** pages including cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Make use of a density of **2.78t/m³** where it is not given.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.
- **All steps and CHECKS** must be done.
- The make and model number of your calculator must be written on the front cover of your answer book.

Question 1

A mine has a mineral resource of 600 000 tons. It currently sells 10 000 tons per month into the market, but expects that these sales volumes will drop by 15% per annum. Financially the mine breaks even at a sales volume of 5 000 tons per month. Plant recovery efficiency is 95%.

- a) Define a "Mineral Resource" as per SAMREC Code (5)
 - b) Calculate the life of the mine, in years (5)
 - c) How much of the mineral resource remains un-mined after closure (tons) (5)
- [15]

Question 2

In a crosscut below the reef horizon a borehole was drilled upwards at an angle of $+80^\circ$

To the horizontal in order to intersect reef.

The borehole was directed at an angle towards the direction of the true dip of the reef, which resulted in the reef cutting across the core at an angle of 60° .

The core was logged according to its appearance as shown below:

Sample	Core Length (cm)	Value (g/t)	Grade (cmg/t)	Comments
1	10.0	5.00	47	Reef
2	20.0	13.00	244	Reef
3	22.0	0.00	0	Trace
4	13.0	16.00	195	Reef
5	14.0	22.00	289	Reef

Question 3

A small scale platinum mine is challenged by depressed commodity prices. To curb the declining commodity prices it is very important that quality mining is maintained at all time. The mines business plan has taken into account dilution factors from stoping, and is planned to mine along those planned parameters.

Given information:

	Units	Plan	Actual
On reef	m ²	2313	1 700
Off reef	m ²	87	700
Average Stoping width	cm	200	255
Rock density	t/m ³		2.78
Grade	g/t	5.25	
Total tons mined	t	15000	

From the information given above:

- Calculate the missing information in the table below
- Comment to substantiate your answers
- Explain to management the repercussions of your results
- Give management recommendations

	Plan	Actual	% Difference	Comments
Stoping tons due to SW overbreak	1689	?	?	?
Off Reef tonnage from stoping	482	?	?	?
Total tons mined	15000	?	?	?
Grade	5.25	?	?	?

Show all your calculations

[30]

Question 4

- a) Define "Pay Limit".
- b) What basic information is required to determine pay limit
- c) The following information was extracted from the annual report of a Gold mine:

Price of Gold	R 2 500 /kg
Working costs (including development costs)	R 15,50 /t milled
Development costs	R 2,50 /t milled
Waste sorted	8.5%
Value of waste sorted	0,80 g /t
Value of residue	0,32 g /t
Mine Call Factor	93,5 %

Calculate a pay limit giving reasons for including or excluding the cost of development.

[20]

Question 5

A gold mine, currently milling 80 000 tons per month, plans to increase both the amount of development ore to the mill and the percentage waste sorted, while also decreasing the amount of external waste mined. If the milling rate is to remain unchanged, show how the grade of the ore milled and the recovery grade will be affected if:

- a) Ore milled from development increase from 3 000 tons @ 5.0 g/t to 4 800 tons @ 4.85 g/t.
- b) Surface sorting increases from 5% @ 0.5 g/t to 10% @ 0.75 g/t (surface sorting is expressed as a percentage of tons hoisted).
- c) Average stoping width is reduced from 124cm to 118cm.
- d) Original channel width and value are 47 cm and 44.3 g/t respectively.
- e) Tonnage discrepancy is nil.
- f) MCF = 97%
- g) Plant recovery factor = 92%

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