

**REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERAL RESOURCES
EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY**

DATE: 15 April 2011 (Friday)
TIME: 08:30 – 11:30 (3 Hours)

TOTAL MARKS: 100
TO PASS: 50

MINING ECONOMICS I

NOTE:

1. Any pocket calculator may be used. The make and model number of the calculator used must be noted on the front cover of the answer book.
2. Assume RD of in situ rock = 2.75 t/m³ unless stated.
3. Answer all questions.

Question 1

Explain the following terms used in mine valuation:

- | | |
|------------------------------|-----|
| a) Ore reserve mining factor | (3) |
| b) Block width | (2) |
| c) Milling width | (2) |
| d) Internal waste width | (2) |
| e) Tonnage discrepancy | (3) |
| f) Block factor | (2) |

[14 Marks]

Question 2

Describe the procedure followed in the assay office from the delivery of gold ore samples to the dispatch of the results.

[15 Marks]

Question 3

The ore reserve of a metal mine working two reefs has the following values:

Reef A = 2.3 Kg/t

Reef B = 1.2 Kg/t

Calculate what percentage must be mined from each reef to obtain a recovery value of 1.8 Kg/t given:

- | | |
|--------------------------|-------------------|
| a) Waste sorted | = 5% at 0.02 Kg/t |
| b) Plant recovery factor | = 90% |
| c) Mine call factor | = 92% |
| d) Tonnage discrepancy | = Nil |

Check your answer using an alternative method

[12 Marks]

Question 4

Ten vertical boreholes were drilled to sample a horizontal coal seam. The coal seam covers 300ha. The sampling results are as follows:

Borehole No.	True width cm	Average calorific value MJ/Kg
1	263	29,456
2	252	28,103
3	254	27,713
4	323	28,504
5	275	27,692
6	315	28,605
7	247	26,515
8	234	28,076
9	321	27,514
10	253	26,528

The coal block (300ha) is being worked on the bord and pillar system, with pillars 10m x 10m having centres of 16m. During the first year of production 230 000 tons of coal was sold and 30 000 tons, at an average calorific value of 19,500 MJ/Kg, was discarded.

Assume the following:

- The results of the sampling are accurate.
- The percentage discard and its calorific value will remain the same in the future years as in the first year.
- 10% of the area will not be mined due to geological losses.
- The tonnage sold from year two will increase to 320 000 tons per annum.
- Density of in situ coal is 1,43 tons/m³.

Calculate:

- a) The average calorific value of the coal sold.
- b) The total life of the 300ha coal block.

[22 Marks]

Question 5

- i. Use the information below to calculate the following:
- The tramming width and value (g/t)
 - The milling width and value (g/t)

Area stoped on reef	30 000m ²
Stope width and value	105cm @ 14,7g/t
Waste mined from gullies	800 tons @ 0,0g/t
Waste sorted in stopes	1 500 tons @ 1,8g/t
Development advance on reef	300m @ 3,0m wide x 2,5m high
Value of development rock	9,5g/t
Waste sorted on surface	4 500 tons @ 1,0 g/t
Rock density	2,75 t/m ³

- ii. Explain the difference between the tramming width and milling width.

[12 marks]

Question 6

- a) In carrying out assays for gold on mine samples, an assayer obtains a bead consisting of gold and silver, from the weight of which he deducts 10% for the silver and returns the remaining weight as grams of gold per ton in the sample.
If subsequent investigation showed that the silver content is actually 15% of the total gold and silver, what was the percentage error in the sampler's determination of the value of the ore mined?
- b) Assuming correct assay conditions for mine samples as well as for those of waste sorted, determine the true Mine Call Factor from the following data:
- | | |
|--------------------------------|------------|
| Sampler's value of ore mined | = 11,0 g/t |
| Waste sorted | = 25% |
| Value of waste sorted | = 1,1 g/t |
| Actual recovery per ton milled | = 9,5 g/t |
| Extraction | = 97% |
- c) What erroneous Mine Call Factor would have been returned with data as in (b) if assays of mine samples as well as for those of waste sorted, were made by the incorrect method set forth in (a)?

[17 marks]

Question 7

A mine reports an annual shortfall of 24%. Give 8 possible reasons for the shortfall.

[8 marks]

[Total 100 marks]