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

DATE: 16 October 2009 (Thursday)
TIME: 08:30 – 11:30 (3 Hours)

TOTAL MARKS: 100
TO PASS: 50

MINING ECONOMICS I

NOTE:

1. Any pocket calculator may be used and intermediate results need not be shown. The make and model number of the calculator used must be noted on the front cover of the answer book.
2. Tables that may be used are attached hereto.
3. Graph, Probability and Log paper will be supplied if required
4. Your examination number must be written on all graph paper and loose sheets that are handed in with your examination script.

Question 1

Define the following:

a) Ore reserve mining factor (3)
b) Development (1)
c) Payable development (1)
d) Milling width (2)
e) Vamping (2)
f) Tonnage discrepancy (2)
g) Block factor (2)

[13 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

Briefly describe the procedure followed during underground sampling of a stope face in a gold mine.

[9 marks]

Question 4

Explain how alluvial deposits are sampled.

[4 marks]

Question 5

(i) Use the information below to calculate the following:

a) The tramming width (cm) and value (g/t)

b) The milling width (cm) and value (g/t)

Area stoped on reef	25 000m^2
Stope width and value	105cm @ 15.2g/t
Waste mined from gullies	800 tons @ 0.0g/t
Waste sorted in stopes	1 500 tons @ 1.8g/t
Development advance on reef	200m @ 3.0m wide X 2.5m high
Value of development rock	9.5g/t
Waste sorted on surface	5 000 tons @ 0.8 g/t
Rock density	2.7 t/m^3

(ii) Explain the difference between the tramming width and milling width.

[12 marks]

Question 6

From the beginning of a financial year the development advance in a gold mine is to be reduced from 2 000m to 1 000m per month for a period of twelve months only. During this period, the rate of milling and working profit is to be maintained at its former level by mining more ore from reserves.

Calculate:

a) The ore reserve mining factor prior to the reduction in development.

b) The block value of ore reserves mined and the ore reserve mining factor when the mine operates on the new basis.

c) The percentage payability of development, assuming that this will remain constant and that, prior to the change in policy, development advances had maintained the ore reserve position.

d) The ore reserve position at the end of the twelve month period, assuming that the value of new ore brought in by development is at the value of the ore reserves at the beginning of the year.

Given:

Ore reserves at the beginning of the year	3 500 000t at 20.0g/t
Average stoping width	120cm
Block factor	102%

Monthly operations prior to the change:

Tonnage milled	99 000t
Surface sorting	10% at 0g/t
Plant recovery factor	95%
Mine call factor	90%
Tonnage discrepancy	Nil

Working costs	R1 560/t milled
Breaking costs	
Development	R10 400/m advanced
Stoping	R1 430/m^2
Price of gold	R234 000/Kg

Ore mined monthly from:

Source	Tons	Current sampling value (g/t)
Ore reserves	90 000	21,0
Development	10 000	6,0
Other sources	10 000	7,0

Assume:
Overhead charges are constant
Density of rock is 2.70 t/m^3
All driving, raising and winzing are on reef and amounts to 50% of total development advance
Raise-winze connections are 130m apart and 100m in length

[30 marks]

Question 7

The ore reserves of a metal mine working two reefs have the following values:
Reef A = 2.0 Kg/t
Reef B = 1.1 Kg/t

Calculate what percentage must be mined from each reef to obtain a recovery value of 1.5 Kg/t given:

(i) Waste sorted = 5% at 0.02 Kg/t
(ii) Plant recovery factor = 90%
(iii) Mine call factor = 92%
(iv) Tonnage discrepancy = Nil

[10 marks]

Question 8

The following figures have been extracted from the annual report of a tin mine which sends its concentrates to the smelter:

Ore sent to crusher	80 000 t
Underground sampling of ore to crusher	0.8% tin
Waste discarded by heavy metal separation after crushing	55 000 t
Value of waste discarded	0.2% tin
Concentrates recovered	520 t
Assay value of concentrates	58% tin
Residue value	0.7% tin in residue discarded

Calculate:

a) The sampling value of ore after the waste is discarded.
b) The Mine Call Factor for the year.

[7 marks]

Total [100 marks]