REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERALS AND ENERGY
EXAMINATION FOR THE MINE SURVEYORS CERTIFICATE OF COMPETENCY

DATE:	**Friday 14 October 2005**	TOTAL MARKS:	**100**
TIME:	**08h30 to 11h30 (3 hours)**	TO PASS:	**50**

MINING ECONOMICS 1

NOTES:

(1) All steps must be shown;
(2) Checks must be shown since they carry marks;
(3) Density of ore in-situ 2.78 tons/m^3;
(4) Density of broken ore 1.67 tons/m^3;
(5) The examination consists of five questions. three pages.

QUESTION 1

Given the following information:

Size of property	2 000 m x 1 300 m
Average stoping width	120 cm
Payability (reserve/resource factor)	65 %
Length of back	70 m
One stope machine per face	-
Machine efficiency	10 m^2 per shift
Ore milled	35 000 tons per month
Working shifts per month	26
Sorting on surface	15 %
Percentage of tonnage mined from ore reserve	75 %

Calculate (assuming no losses for dykes or faulting):

(a) Life of mine in years (5)
(b) Amount of monthly advance necessary to maintain the ore reserve position (5)
(c) Number of stope faces to be worked monthly to maintain milling rate (5)

15 Marks

QUESTION 2

A mine is recovering metal A as its main product and metal B as its byproduct. The relationship between one to the other in the ore is variable. The total tonnage treated is processed first for recovery of metal A. Thereafter the ore is treated in a flotation plant to produce a concentrate from which metal B is recovered by leaching.

Given the following information:

Recovery of metal A	97 %
Recovery of metal B in flotation	90 %
Recovery of metal B in leaching	75 %
Tonnage milled	1 480 t
Waste sorted	133 t at 0.25 g/t metal A and 2.00 g/t metal B
Shortfall	290 t
Reclamation	60 t at 8.80 g/t metal A and 25.00 g/t metal B
Sundry sources	72 t at nil value
Measured ore broken in stopes	1 190 t
Mine call factor metal A	97 %
Mine call factor metal B	103 %

(a) Calculate the joint pay limit in g/t (25)

(b) Draw the joint pay limit graph: (10)

* *Hint: metal A on vertical axis, scale 0 – 20 g/t*
* *Hint: metal B on horizontal axis, scale 0 – 400 g/t*

35 Marks

QUESTION 3

The table below shows key efficiency indicators for a deep level gold mine. Give possible reasons for the variances between target and actual for each indicator. Also investigate if there is a correlation between the actual indicators, e.g. are vamping percentage, shaft call factor and mine call factor related? Explain.

Indicator	Unit	Target	Actual
Block factor	%	100	101
Current sweepings	%	93	90
Current vamping	%	7	3
Shaft call factor	%	92	82
Mine call factor	%	92	85
Recovery factor	%	98	97
Plant call factor	%	100	104

20 Marks

QUESTION 4

The following comprises the proposed monthly plan of a gold mine:

Milling rate	100 000 t
Extraction	97 %
Gold yield	1 400 kg
Surface sorting	12 % at 0.4 g/t sorted
Shortfall	1 290 tons
Mine call factor	96 %
Block factor	98 %

This will be mined from:

Ore reserve	80 % of area stoped at width of 112 cm
Not in reserve	20% of area stoped at 11.0 g/t and width of 105 cm
Sorted underground	9 % of stoped ore at 0.2 g/t
Development advance	2 000 m
Reef development	70 % of which 50 % trammed as ore to plant at 10.7 g/t
Size of reef development	3 m x 4 m
Development payability	40 %
Ore reserve developed	140 t per payable metre advanced
Ore reserve	3 000 000 t at 15.0 g/t at a width of 109 cm

Determine to what extent this policy will result in:

(a) Under- or overmining of the reserve (10)
(b) An increase or decrease in the ore reserve inventory of the mine (10)

20 Marks

QUESTION 5

In a gold mine 320 m^2 were broken in a resue stope which has an overall stope width of 107 cm at 17.0 g/t. The stope tracks were advanced by 10 m and averaged 1 m wide by 36 cm deep. The waste was loaded on average within 10 cm of the hanging-wall and covered an area of 310 m^2. The average value of the waste fill is 1.0 g/t.

Calculate:

(a) Trammed width (5)
(b) Value of ore to mill (5)

10 Marks

- END OF PAPER - **100 Marks**