UNIVERSITY OF JOHANNESBURG

PROGRAM	:	**BACHELOR'S DEGREE MINE SURVEYING**
SUBJECT	:	**MINERAL RESOURCE EVALUATION 2B**
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EXAMINER	:	K. S PHOGOLE
MODERATOR	:	Z MDLULI
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INSTRUCTIONS :

1. ANY CALUCULATOR IS ALLOWED.
2. SKETCHES ARE NOT DRAWN TO SCALE.
3. DRAWING INSTRUMENTS ARE ALLOWED.
4. SHOW ALL CHECKS

QUESTION 1

A new colliery is to be established on a mining area of 1150hectares. Surface drilling has established that approximately 8% of the area will not be mined due to dykes and adjoining burnt coal. In 40% of the remaining area the coal seam is only 2metres thick and in the rest of the area the seam is 3metres thick. The average density for the coal is 1.52t/m³.

The annual sales are expected to be 750000tonnes.

The proposed mining method will give an extraction rate of 72% and it is expected that of the run of the mine coal 13% will be dumped as duff. The average washing plant yield is expected to be 75%.

Calculate the life of the mine **(15)**

QUESTION 2

The following information is an extract from a monthly report of a gold mine

SOURCE		TONS	VALUE(g/t)
Total tons milled	=	120 000	
Old slime direct to cyanide plant	=	2 000	1.60
Ore from stockpile	=	2 400	7.00
Waste Sorted on surface	=	6 800	0.40
Ore and waste sorted and packed underground	=	9 000	0.60
Ore from reclamation to mill	=	24 000	8.00
Development rock to mill	=	18 500	4.00
Not in reserve stoping	=	35 000	10.00
Mine call factor	=	90%	
Mill yield value	=	12.00 g/t	
Residue value	=	0.30 g/t	

The value of the ore reserves stoped was 16.00 g/t over an estimated block width of 100 cms but the actual sampled width measure 105 cms. The sampled width of NIR was 110 cms.

Relative Density of the rock in situ is 2.75 t/m³

Calculate :

a) Average stoping width and value of ore stoped.

b) Centares broken during the month. Both Ore Reserves and Not In Reserves

c) Block Factor

(20)

QUESTION 3

Calculate the overall, stoping, and development pay limits of a mine from the following information:

Total working costs	=	R104/t milled (excluding fixed costs but including development costs)		
Fixed costs	=	R57/t milled		
Development costs	=	R37/t milled		
Plant treatment costs	=	R14/t milled		
Milling rate	=	280 000 t		
Surface sorting	=	90 000 t	@	0.80 g/t
Shortfall	=	14 000 t		
Reef development	=	7 000 t	@	2.8 g/t
Waste from other sources in stopes	=	56 000 t		
Mine Call Factor	=	91%		
Plant Recovery Factor	=	96%		
Expected Revenue from gold sales	=	R33 200/kg		
Density	=	2.80 t/m³		

If the full capacity of the mill is 300 000 tons, how much would the sub-economic pay limit be? **(25)**

QUESTION 4

A gold mine is reaching the end of its life and no longer does development, has the following fully exposed sources of ore.

Payable Mineral Reserves 3 680 000 tons at 6.2 g/t

Marginal Unpay Block 845 000 ton at 3.5 g/t

The following data is available:

Residue value 0.26 g/t

M.C.F. 98%

It is intended to mine total of 100 000 tons per month

Surface sorting 20% at 0.44 g/t

Shortfall 3%

Other sources waste 7%

Working costs R95 per ton milled

Price of gold R28 000/kg

It has been decided to mine the marginal Unpay blocks together with the payable blocks until they are exhausted, but a profit of R40,00 per ton milled must be maintained during this period.

Calculate:

4.1 How long will it take to exhaust the marginally unpay block?

4.2 For how long will the mine be able to continue at the same rate when only the payable blocks are available? **(20)**

QUESTION 5

The information given shows the average results for a gold mine based on the last year's operation.

Development advance	=	20 000m per year.
Milled from reef development	=	210 000t/year at a value of 15.4g/t
Milled from reclamation	=	300 000t at a value of 10.2g/t.
Mine Call Factor.	=	90%
Extraction	=	96%
Mill Yield	=	20.1 g/t treated.
Price of gold	=	R55 812.0886 per Kg
Tons treated	=	1 800 000 per year.

It has been decided to reduce the development rate for the following year to 15 000m.

Assuming that: -

1. Any tonnage shortages will be drawn from stopes to maintain the milling rate.
2. The amount of ore and value from reclamation will not change.
3. The ore from development to the mill will decrease in proportion to the decreased advance but the value will not change.
4. Cost of stoping additional tonnage will be R52.50 per ton broken
5. Development costs will remain constant at R900/m advance and overall costs are also expected to remain constant.
6. The price of gold R55 812.0886 per Kg.

   Other factors will not change.

Calculate by how much the value of ore mined in stopes can be lowered or increased as a result of the decrease in development if working profit is to remain unchanged

during the following year and how much more tons has to be mined to make up for development tons reduction.

(20)

TOTAL 100