

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

DATE : 14 April 2005
TIME : 8:30 – 11:30

TOTAL MARKS: 100
TO PASS: 50

SUBJECT: SURVEY 1

Notes

- (1) All steps must be shown
- (2) Checks must be shown, since they carry marks
- (3) Answer to three decimal places.

QUESTION 1

- (a) Describe the steps necessary to ensure that a dumpy level is in adjustment. (10)
- (b) Briefly explain the following terms.
- (i) GPS (5)
 - (ii) WGS84 (5)

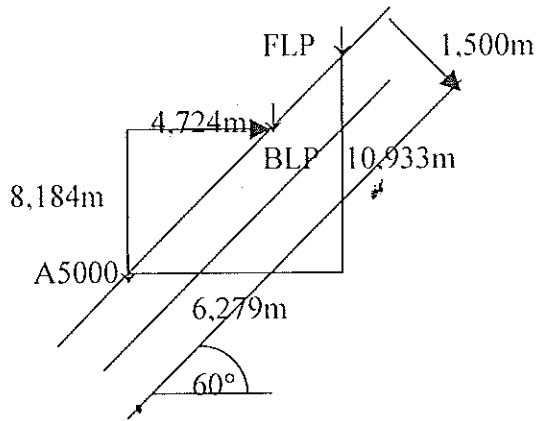
[20 Marks]

QUESTION 2

- (a) A base line was measured with a steel tape which was standardized at a temperature of 17°C and was found to be 169,000 metres. If the temperature during the measurements was 21°C, what is the true length of the base line? The coefficient of expansion is known to be 0,000 012. (5)
- (b) Determine the sag correction, given the following:
- | | | | |
|-------------------|---|-----------|-----|
| Measured distance | = | 100,00m | |
| Tension applied | = | 70N | |
| Mass of tape | = | 0.01 kg/m | |
| Vertical angle | = | 60° | (5) |

[10 Marks]

QUESTION 3



The sketch shows the survey data relative to an ore pass.

- Horizontal distance peg A5000 to BLP = 4,724 m
- Vertical difference peg A5000 to BLP = 8,184 m
- Horizontal distance peg A5000 to FLP = 6,279 m
- Vertical difference peg A5000 to FLP = 10,933 m
- Elevation of peg A5000 = - 1 000,000 m
- Dip of ore pass = 60°
- Height of ore pass normal to dip = 1,500 m @ peg A5000

Calculate the length of grade chains to be hung from the BLP and the FLP so that the developer can be instructed to carry the grade line in the centre of the face.

[15 Marks]

QUESTION 4

An abandoned mine, in which a considerable amount of development has been done, is completely flooded. No records are available but a development dump, situated on level ground and consisting of all the rock from the mine, has been left undisturbed. A contour plan of this dump has been plotted on to a scale of 1:1 000 and the height of the dump was found to be 10 metres.

The following areas were planimetered:

Area of level top of the dump	=	31,0 cm ²
Area covered by the dump	=	234,8 cm ²
Area enclosed by the 5 m contour	=	107,7 cm ²

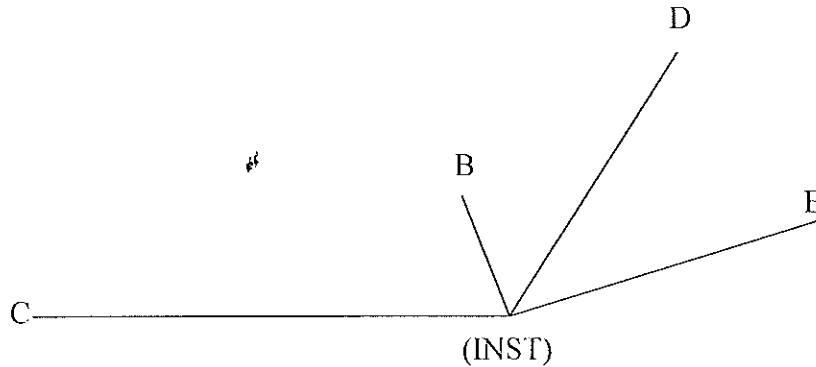
Estimate how long it would take to dewater the mine by means of pumping units having a total capacity of 136 380 litres per hour, assuming 15 hours nett pumping per day.

Assuming the relative density of rock in situ	=	2.78
One Gallon	=	4,5461 litres
Ratio of solid rock to broken rock	=	12:20
Therefore the relative density of broken rock	=	$\frac{12}{20} \times 2,78$
	=	1.67

[25 Marks]

QUESTION 5

Given the information below calculate the following directions B – D and B – E to the nearest second.



The following observations were made by setting up a theodolite 1,676 m from beacon B.

HORIZONTAL DIRECTIONS

HORIZONTAL DISTANCE

To C :	348° 22' 10"	1 828,800 m
To D :	70° 00' 15"	1 371,600 m
To E :	104° 26' 17"	548,640 m
To B :	09° 20' 00"	1,676 m

[15 Marks]

QUESTION 6

The following magnetic bearings in a closed traverse of a quadrilateral ABDC have been adopted.

A – B	=	N 39° 45' E
A – D	=	S 81° 30' E
C – B	=	N 37° 40' W
C – B	=	S 25° 00' W

- (a) Show a sketch to indicate this quadrilateral.
- (b) Calculate:
- (i) The internal angles at A, B, C and D and show your final check
- (ii) The true direction of each side of the quadrilateral assuming zero south, if the magnetic declination is 12° 30' west of the true north.

[15 Marks]
[Total 100 Marks]