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

DATE: 19 April 2007 (Thursday) TOTAL MARKS: **100**
TIME: 8:30 to 11:30 (3 Hours) TO PASS: **50**

SURVEY I

Note:
(1) Work to 1 second of arc and 0,001m except where stated otherwise.
(2) All steps and checks must be shown.
(3) Logs and functions must be shown to six (6) decimal places.
(4) Sketches are not drawn to scale.
(5) The make and model number of your calculator **must** be written on the front cover of your answer book.

QUESTION 1

When adjusting a theodolite, there are two categories of adjustments made, namely temporary adjustments and permanent adjustments. Under the two categories name the different adjustments made and briefly describe how they are done.

[18 marks]

QUESTION 2

Briefly describe the following instruments,

a) Gyro-theodolite
b) Laser
c) Optical square
d) Stereometer
e) Optical plummet
f) Auxiliary telescope

[12 marks]

QUESTION 3

a) Name the three methods of map projections.

b) Briefly describe what is meant by the following terms

i. Mercators projection
ii. Graticule
iii. Prime meridian
iv. Grid
v. Magnetic declination
vi. Isogonic lines
vii. Magnetic meridian
viii. Agonic lines

[15 marks]

QUESTION 4

A crushed stone dump is to be constructed on a level piece of ground. If the base of the stone dump is to be 60m long by 40m wide, the sides slope uniformly at 37^{o} and the top is to be flat and level, calculate the volume of crushed stone contained in the dump if the vertical height is to be 10m, answer to the nearest m^2.

[8 marks]

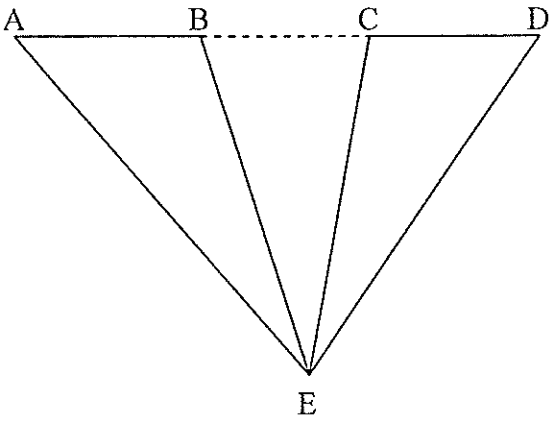
QUESTION 5

AB and CD are two portions of a base line separated by the portion BC that cannot be directly measured. An instrument is set up at E, and readings are taken to A, B, C and D (A, B, C and D are on a straight line).

Given.

Distance AB	=	152,989 m
Distance CD	=	126,473 m
Angle AEB	=	34° 09' 09"
Angle BEC	=	10° 46' 25"
Angle CED	=	33° 45' 23"

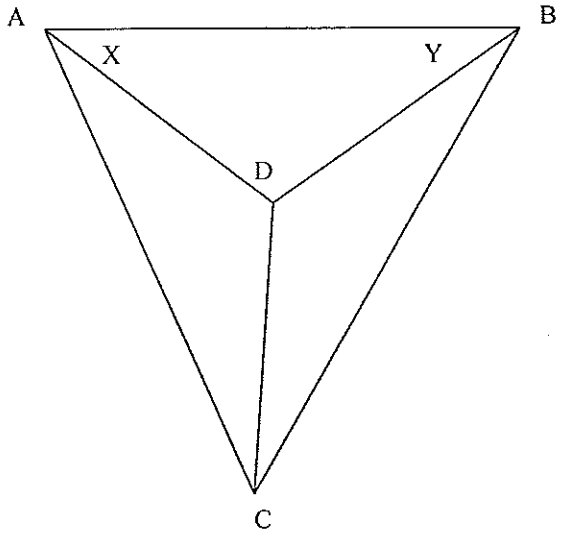
Calculate the distance BC.



[13 Marks]

QUESTION 6

a) From the figure below prove $\frac{\text{Sin y}}{\text{Sin x}} = \text{Tan K}$



b) Using the Tan K formula and given the following;

Dist AB	=	80,000m
Angle BCD	=	25°
Angle ACD	=	35°
Angle ADB	=	120°
Angle BDC	=	115°
Angle ADC	=	125°

Calculate distance DC.

[17 marks]

QUESTION 7

A 60 metre tape is found to have stretched uniformly by 0,05%. The first 30 metres is cut off and a new correct 30 metres end is joined on the stretched tape. The distance between two points A and B is measured as follows (in four sections):

A to point 1	=	55,047m
Point 1 to point 2	=	59,936m
Point 2 to point 3	=	51,962m
Point 3 to B	=	48,902m

It is subsequently found that making the join in the tape used that the 30 metre mark on the new end was joined incorrectly to the 31 metre mark graduation on the stretched tape.

What is the correct distance between A and B.

[8 marks]

QUESTION 8

a) A planimeter was used to measure the area of a circle having a radius of 50mm. A reading of 1,879 revolutions was obtained. Using the same planimeter with the same setting, the area of an irregular figure drawn on a plan to a scale of 1:100 was traced. If the reading obtained was 5,637 revolutions, calculate the area of the irregular figure represented by the drawing.

Answer to the nearest square metre.

b) A planimeter was used to obtain the area of a circle 20cm in diameter. If the reading obtained was 5,236 revolutions, what was the setting in square centimetres of the planimeter?

[9 marks]

[Total 100 marks]