

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

DATE: 15 April 2004 (Thursday)
TIME: 8h30 – 11h30 (3 Hours)

TOTAL MARKS: 100
TO PASS: 50

SURVEY I

- Note:**
- (1) Work to 1 second of arc and 0,001m.
 - (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

- (a) Mention ten sources of errors and mistakes when taping. (10)
- (b) Explain very briefly the following;
1. contour line
 2. topography
 3. tellurometer
 4. pantograph
 5. vernier
 6. sextant
 7. equator
 8. latitude
 9. true north
 10. planimeter
 11. meridian
 12. azimuth
 13. magnetic poles
 14. lasers
 15. gyro (15)
- (c) Aberration is inconsistencies in the refraction of light rays passing through a simple lens, thus blurring the image and affecting sharp focus. Mention five classifications of aberration. (5)

[30]

QUESTION 2

The area of an equilateral triangular plot of ground was calculated as 6777 square metres. The steel tape used to measure the sides was subsequently found to have stretched by 0,25%. Calculate the correct area of the plot. [6]

QUESTION 3

Calculate the area of ABCDE given the following co-ordinates.

	Y	X
A	+1679,021	- 521,320
B	+2146,923	-3000,000
C	+ 3,321	-2001,021
D	+ 83,421	- 900,321
E	+1020,443	- 40,279

[15]

QUESTION 4

Point P has been fixed by measuring distances from two known points A and B. Point P lies east of line AB.

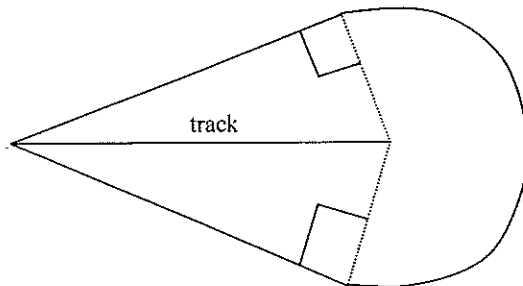
Given;

	Y	X
A	-9 268,453	-243,987
B	-9 268,453	+988,463

The horizontal distances from A to P is 657,336m and from B to P is 1 653,234m.
Calculate the co-ordinates of P.

[15]

QUESTION 5



The track leading to the top of the dump has an inclination of 15° to the horizontal and the angle of repose of the rock is 35° . The height of the dump is 83,0m.
Assume the RD of broken rock is 1.67

Calculate the volume of the dump to the nearest 1 000 tons.

[15]

QUESTION 6

A church was observed from a point A, 3 kilometres from the church. Observations were taken to D the top of the roof of the church and C the top of the tower vertically above D.

Given

Vertical angle to the top of the roof = 10°

Vertical angle to the top of the tower = 15°

AB, the horizontal distance to the church = 3km

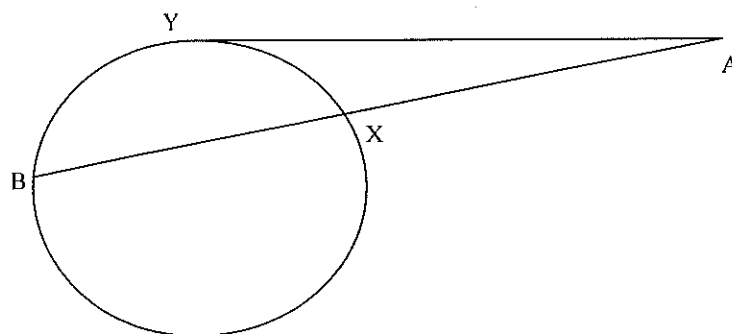
- Calculate:
- 1) The total height of the church, BC.
 - 2) The height of the tower DC.

[5]

QUESTION 7

A circular slimes dam having a diameter of 500 metres, has a return water pipe line leading in a straight line from a pump house at B, across the dam to a point X (both B and X are on the circumference of the dam) and then to a tank at A. Due to difficulties in servicing the portion of a pipe line positioned over the dam (i.e B-X) it was proposed to relay the pipe along a new route A-Y-B, where Y will be a tangent point and Y-B will be along the circumference of the dam. $BX = 45\text{m}$ and $XA = 280\text{m}$.

Calculate the total length of the new pipe-line route, A – Y – B.



[14]

[Total 100 marks]