mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

SURVEY 1

DATE: 02 MAY 2017
TIME ALLOWED: 3 HOURS (08h30 to 11h30)

TOTAL MARKS: 100
TO PASS: 50

NOTE:

- This question paper consists of **FOUR** pages including cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Restrict the use of highlighters.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.
- **All steps** and **CHECKS** must be done.
- The make and model number of your calculator must be written on the front cover of your answer book

Question 1

(a) Name the main sources of errors in angular measurements in surveying.
(b) Briefly explain the South African co-ordinate system. Use a sketch where applicable.

[15]

Question 2

Name Of Instrument	**Uses**
Transit theodolite	
Pantograph	
Spirit level	
Distomat	
Gyro	
Planimeter	
Plane table	

[7]

Question 3

(a) What does WGS84 stand for?
(b) Describe what WGS84 is and why it was needed?

[15]

Question 4

(a) Briefly describe GPS, what it stands for, purpose and principle of operation. (5)
(b) Name three methods of map projection. (3)
(c) Name four different types of levels. (4)
(d) Name three survey systems used. (3)

[15]

Question 5

A B C

A,B and C are three points in a straight line, the distance AB and BC being 150m and the points are all at the same elevation. S is a point on the top of a sand dump. A total station is set over point S at a height of 1.489m and observations made of vertical angles to the three points A, B and C as follows:

Instrument at S	Vertical angles
to point A	-30° 10′ 06 ″
to point B	-27° 15′ 33 ″
to point C	-17° 47 ′ 21″

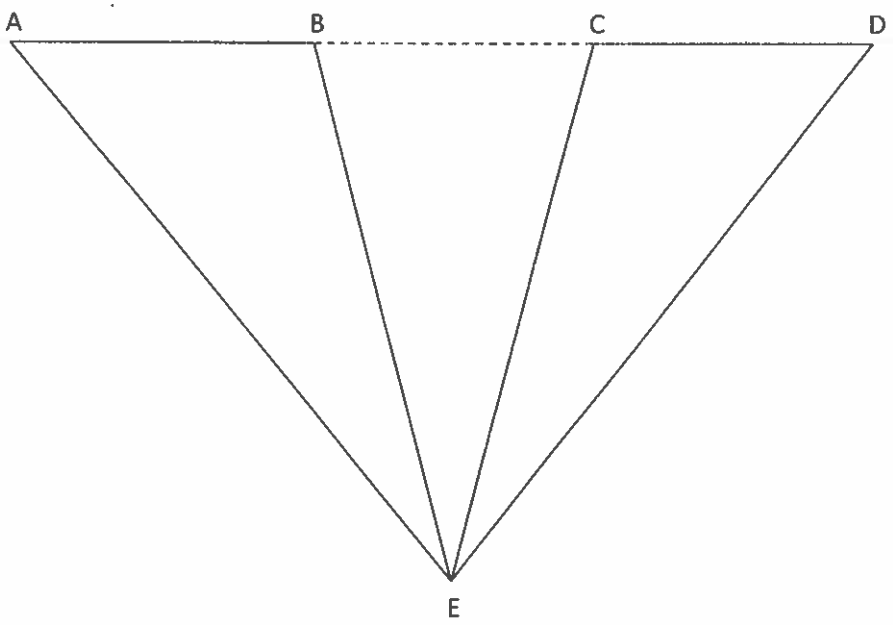
Calculate the height of point S above point A.

[15]

Question 6

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

Derive a formula to calculate distance BC.



[15]

Question 7

An abandoned gold 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 to a scale of 1:500 and the height of the dump was found to be 24m.

The following areas were planimetered:

Area of the level top of the dump	=	40,0 cm^2
Area covered by the dump	=	284,5 cm^2
Area enclosed by the 12m contour	=	147,7cm^2
Density of rock in situ	=	2,78
Ratio of solid rock to broken rock	=	12:20

Calculate how long it would take to de-water the mine by means of pumping units with a total capacity of 10 000 litres per hour, assuming 16 hours net pumping per day.

[18]

Total marks = 100