

REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF MINERALS AND ENERGY
EXAMINATION FOR THE MINE SURVEYOR'S CERTIFICATE OF COMPETENCY

Date: 14 October 2004 (Thursday)
TIME: 8:30 – 11:30 (3 hours)

TOTAL MARKS: 100

SURVEY I

QUESTION 1

The following levels were taken at 15 metre intervals in a straight line across a valley. A level bank 3.0 metres wide with sides sloping at 45 degrees is to be thrown across the valley to the height of the point B.M.

- a) Determine the elevation of each station, assuming the elevation of point B.M. to be +1 067.000m.
- b) Calculate the total volume of filling necessary to construct this embankment.
- c) Calculate the total cost of the project if the cost of filling is R0.95 per cubic metre.

Station	Distance from Start	B/S	I/S	F/S
BM	Nil	1.070		
A	15m		1.982	
B	30m		2.593	
C	45m	0.613		5.032
S	60m		3.052	
W	75m		4.886	
D	90m		2.441	
G	105m	5.031		0.303
H	120m		3.202	
J	135m		2.293	
K	150m			1.379

25 marks

QUESTION 2

- Define the term "Contour Line".
- What are contour lines used for?
- In your own words, describe two methods of interpolation of contour intervals
- For what purposes are Topographical maps used.
- What is Photogrammetry?

15 marks

QUESTION 3

Point A is a beacon on top of a hill. In order to obtain the elevation of points B and C on the side of the hill, a surveyor set up a theodolite at point B. the staff was held vertically on the beacon A and then vertically on the point C, and the following readings were taken: -

READINGS ON STAFF				VERTICAL ANGLES
	Top stadia hair	Middle stadia hair	Bottom stadia hair	
To Point A	1.984	1.527	1.070	+05°46'10"
To Point C	1.780	1.347	0.914	-06°18'05"

Height of instrument at B : 1.134m
Elevation of beacon at A : +1 316.976m
Multiplying constant : 100

- Calculate
- The elevation of points B and C
 - The horizontal distances AB and BC

10 marks

QUESTION 4

- a) What is meant by balancing a traverse.
- b) The following is an extract from a direction sheet of a traverse with a closure onto a point of origin

Given

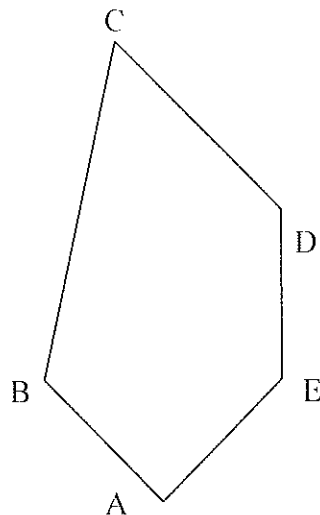
- a) Co-ordinates point A - 962.490 + 868.230
- b) Direction A – X for orientation $50^{\circ}27'30''$

Direction A – B	$230^{\circ}43'20''$	distance	233.450m
Direction B – C	$267^{\circ}53'40''$	distance	199.740m
Direction C – D	$298^{\circ}04'00''$	distance	170.470m
Direction D – E	$28^{\circ}45'30''$	distance	260.470m
Direction E – F	$58^{\circ}24'10''$	distance	166.240m
Direction F – A	$132^{\circ}22'00''$	distance	357.100m
Direction A - B	$230^{\circ}43'20''$	distance	233.450m
Direction A– X	$50^{\circ}28'40''$	(for bearing closure only)	

Calculate the adjusted co-ordinates of all points in the traverse.

18 marks

QUESTION 5



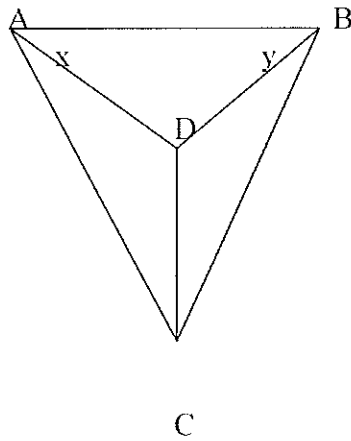
Calculate the area of figure ABCDE, given the following co-ordinates.

Co-ordinates of A : +259.060 +578.870
 Co-ordinates of B : +348.700 +421.980
 Co-ordinates of C : +140.040 +6.190
 Co-ordinates of D : + 4.410 +328.840
 Co-ordinates of E : + 71.260 +526.140

15 marks

QUESTION 6

(a) From the figure below prove: $\frac{\sin y}{\sin x} = \tan K$



(b) Using tan K formula and given the following:

Distance	AB	80.00m
Angle BCD	25°	
Angle ACD	35°	
Angle ADB	120°	
Angle BDC	115°	
Angle ADC	125°	

Calculate: distance DC

17 marks
[Total 100 marks]