NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF ARCHITECTURE & QUANTITY SURVEYING
BACHELOR OF QUANTITY SURVEYING [HONOURS] DEGREE
PART II FIRST SEMESTER EXAMINATION – DECEMBER 2005

ENGINEERING SURVEYING I – AQS 2102

TIME: 3 HOURS   **TOTAL MARKS**: 100

INSTRUCTION

Answer any **FOUR** Questions.
All Questions carry equal marks.

QUESTION 1

a) A planimeter with a setting of 70cm² with was used to obtain the area of an irregular figure drawn on a plan to a scale of 1:500. If the reading obtained was 3,216 revolutions. Calculate the area of the irregular figure.

(5 marks)

b) A planimeter with an unkown setting was used to find the areas of an irregular figure drawn on a plan to a scale of 1:1000 and reading obtained was 4,732 revolutions. Using the same planimeter with the same unknown setting a reading of 1,130 revolutions was obtained when a circle of radius 10cm was planimetered. Calculate the area of the irregular figure.

(7 marks)
.
c) A 60m metallic tape was used to mark the straight of 100 metres on an athletic track. It was afterwards found that the tape used had stretched 0,267m. By what amount and in which direction relative to the staring point must the winning post (finishing post) be moved so that the correct distance will be 100cm from the start?

(5 marks)

d) A triangular piece of ground was measured with a 30m tape and the sides were found to be 68m, 51m and 43m. On checking the tape used, it was found that the first 2m was missing. Calculate the true area of the triangle.

(8 marks)

QUESTION 2

Calculate the total area of a plot of land shown in fig. 2. Use any two methods for the irregular bounded area.

(25 marks)

QUESTION 3

The following levelling notes below were taken along a line of a proposed road.

B.S.	I.S.	F.S.	R.L.	HORIZONTAL DISTANCES BTWN STATIONS (m)	REMARKS
3,072			1031,356	-	B.M.A
	1,389			0	St. 1
	0,441			30	St. 2
2,556		0,123		60	St.3
	1,569			90	St.4
3,792		1,011		120	St.5
		1,761		150	St.6

Reduce the levelling notes and determine the dept of cutting and filling necessary out each station to form an even gradient rising at + 1 in 20, starting at a level of 1031,500m above datum at station 1. Use the rise and fall method.

(25 marks)

QUESTION 4

a) Calculate the cross-sectional area for an embankment shown in fig. 4, which has got the following measurements:
   Formation width   AB = 16m
   Height at centre   h   = 4m
   Side Slope   1:2
   Ground Slope   1:12

(10 marks)

b) Calculate the volume of water to be contained in a dam shown in fig. 4a using any two methods you learnt.

Given

Planimeter area (m^2)	Contour Level (m)
13650	257
12470	255
11 100	250
7614	245
1151	240
176	235
111	230

The proposed mean water level of the dam is the 257m contour and the volume below the 230m contour can be neglected.

QUESTION 5

a) The magnetic declination in Chiredzi was 10^0E. Given the following compass observations taken in Chiredzi;

AB 175^0 $30'$
BC 246^0 $30'$
CD 142^0 $00'$
DE 357^0 $00'$
EF 96^0 $00'$

Calculate the true compass bearings.   (5 marks)

b) Write the following quadrant compass bearings as whole circle compass bearings:
                                                                                          (5 marks)

(i) $N10^0$ W
(ii) $S50^0$ E
(iii) $S40^0$ W
(iv) $N50^0$ E
(v) $N45^0$ W

c)   Eliminate the effects of local attraction from the following compass bearings tabulate your work and show the adjustment and the adjusted values.
                                                                                          (15 marks)

Line	Observed bearing
AE	137^0 $00'$
AB	60^0 $30'$
BA	230^0 $15'$
BC	358^0 $00'$
CB	182^0 $00'$
CD	148^0 $15'$
DC	328^0 $15'$
DE	219^0 $00'$
ED	44^0 $30'$
EA	316^0 $15'$

QUESTION 6

 The following sets of readings were taken to test a level.

Set 1
Level set up midway between two pegs A and B 60m apart horizontally.
Reading on the staff when held vertically at A = 1,508m

Reading on the staff when held vertically at B = 1,384m

Set 2

Level set up on the line AB extended, 6m from B horizontally.
Reading on the staff when held vertically at A = 1,355m
Reading on the staff when held vertically at B = 1,271m

Calculate
        (i)   the collimation error in the level per 60m of sight.   (10 marks)
        (ii)   Describe the procedure for removing the error from the level if it is
            a) a tilting level   (8 marks)
            b) an automatic level   (7 marks)

END OF EXAMINATION