NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF THE BUILT ENVIRONMENT
DEPARTMENT OF QUANTITY SURVEYING
BACHELOR OF QUANTITY SURVEYING (HONOURS) DEGREE
PART I SECOND SEMESTER EXAMINATIONS – AUGUST 2009

ENGINEERING SURVEYING AQS 1208

TIME: 3HOURS TOTAL MARKS: 100

Requirements
A non-programmable calculator

Instructions to candidates
Answer question 1 and any other three.
Carry out all necessary checks.
Untidy work will be penalised.
All diagrams to be neatly drawn and labelled.
Each question carries 25 marks.

Question 1

a) Briefly describe the two main classifications of surveying. (5 marks)

b) State and explain the fundamental principle of surveying. (5 marks)

c) All surveying measurements are prone to errors. State and describe briefly three types of errors that constitute what is commonly referred to as measurements error. (9 marks)

d) Differentiate between the following types of traverses and in each case give a sketch to approximate the type of traverse. A loop traverse and a link traverse. (4 marks)

e) State any three methods used to distribute the coordinate misclosure in any type of traverse. (2 marks)

Question 2

a) The following tacheometric observations were made with a theodolite set up @ A and the staff, held vertical, foliage partially obstructs the view when the following readings were taken.

Staff @	Horizontal circle readings	Vertical angles	Lower m	Middle m	Upper m
B	30^0 45' 00"	87^0 20' 00"	2,377	2,565	2,753
C	115^0 13' 00"	92^0 45' 00"	1,533	1,956	-

Height of instrument =1,450m
Reduced level of A =100,00m
Instrument constant k =100
Additive constant c =0

i) Determine distance AB, AC and BC
ii) Determine the reduced level of A is 1431, 820m. (15 marks)

b) The following data was obtained by stadia tacheometry, vertical angle was $+8^0$ 10' 00", staff intercept (s) was 2,5m, stadia interval factor was known to be 100, additive constant was 0 and the distance from centre of instrument to principal axis (C) was 0,75m.

Calculate the horizontal distance (H) from the peg to staff and the vertical distance (V). (10 marks)

Question 3

a) Define the following terms:
i) Datum (2 marks)
ii) Change point (2 marks)
iii) Foresight (2 marks)
iv) Benchmark (2 marks)
v) Mean sea level (2 marks)

b) Given the following field book page, calculate the reduced levels of all pegs and adjusting the misclosure by the HPCmethod, showing all checks.

BS	IS	FS	Reduced Level	Remarks
0,731			96,667	(BM)A
1,342		4,381		B_1
	3,080			B_2
	2,430			B_3
0,943		3,112		B_4
	4,070			B_5
	3,610			B_6
	3,420			B_7
	4,130			B_8
		3,481	89,015	(BM) B

(15 marks)

Question 4

a) A distance of 220,450m was measured with a steel tape of nominal length 30m. On standardisation the tape was found to be 30,003m. Calculate the correct measured distance.
(5 marks)

b) A line was measured under the following conditions using an old steel tape.

Line	Distance	Slope angle	Field tension	Field temp	No of bays
PQ	30,003	00^0 21' 40"	150N	25^0C	1

Tape Details

Standard Tension =120N
Standard temperature $=20^0$c
Mass of tape/metre =0,026kg/m
Cross-sectional area $=3,5mm^2$
Coefficient of linear expansion =0, 000011/^{0}c
Young's modulus of elasticity $=207x10^4MN/m^2$
Radius of the earth =6367
Height above sea level of line PQ =1950M
1KGF =9,81N
What is the correct distance of PQ to 4 decimal places? (20 marks)

Question 5

a) Write brief notes on the following:-
   i) Reconnaissance
   ii) Triangulation

NB Include the importance of such processes (5 marks)

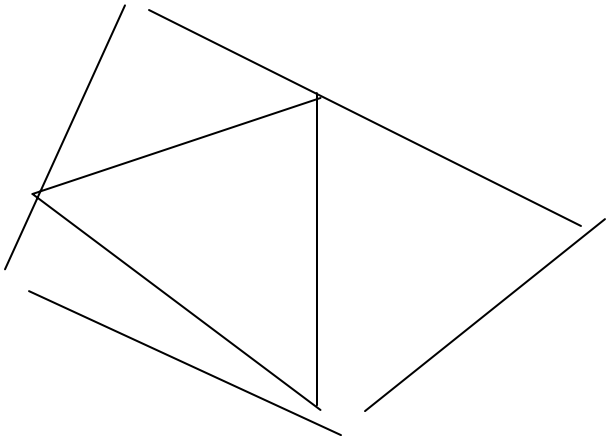
c) A triangulation exercise was carried out to coordinate a point F from several already existing stations. The following observations and data was made available to triangulate F.

Coordinates

A	600,584	615,620
B	744,236	502,487
D	769,266	814,307

Angles

$\hat{CAB} = 43^0\ 01'\ 30''$
$\hat{CBA} = 61^0\ 39'\ 10''$
$\hat{ECD} = 35^0\ 42'\ 20''$
$\hat{EDC} = 91^0\ 01'\ 50''$
$\hat{FAE} = 48^0\ 51'\ 40''$
$\hat{FEA} = 62^0\ 13'\ 00''$



Calculate coordinates of F. (20 marks)

Question 6

a) In deformation surveys it is very important to plan the survey. What are some of the most important considerations during the planning stage? (10 marks)

b) It is planned to construct a dam in a mountain area. Before construction commences a network of points to monitor the movement of the dam wall at a later stage has to be constructed on the dam wall in order to monitor the movements during construction, whilst some have to be constructed on the crown of the dam wall, in order to monitor the movements of the dam wall as the dam fills up.

Using these guidelines describe fully how you could monitor the movements of the dam during and after construction.
(15 marks)

END OF EXAMINATION