

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF BUILT ENVIRONMENT
DEPARTMENT OF QUANTITY SURVEYING
PART I SECOND SEMESTER EXAMINATIONS – JUNE 2013
ENGINEERING SURVEYING – AQS 1208

Time: 3 Hours

Total Marks: 100

INSTRUCTIONS

1. Answer **ALL** Questions. Each question carries 20 marks.
2. Carry out all necessary checks.
3. Untidy work will be penalised.
4. Diagrams drawn should be labelled clearly.

REQUIREMENTS

1. A non- programmable scientific calculator
 2. A graph paper
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QUESTION ONE

- a) Briefly describe the two main classification of surveying. **[3 marks]**
- b) State and explain the fundamental principle of surveying. **[5 marks]**
- c) All surveying measurements are prone to errors. State and describe briefly the three types of errors that constitute what is commonly referred to as the measurement errors. **[9 marks]**
- d) Differentiate between the following types of traverses, a loop traverse and a link traverse and in each case give a sketch to approximate the type of traverse. **[3 marks]**

QUESTION TWO

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

Staff Position	Horizontal Circle Readings	Vertical Angle	Lower	Middle	Upper
B	30° 45' 00''	87° 20' 00''	2.377	2.565	2.753
C	115° 13' 00''	92° 45' 00''	1.533	1.956

Height of Instrument = 1.450 m

Reduced Level of A = 100.000 m

Instrument multiplying constant **K** = 100

Additive constant **C** = 0

a) Determine distances AB, AC, and BC

b) Determine the reduced level of C given the reduced level of A as 1 431.820m.

[20 marks]

QUESTION THREE

a) Prove that the effects of collimation error in levelling can be eliminated by keeping the backsights and foresights of equal length.

[5 marks]

b) The following notes of a sectional levelling were taken along the line of a proposed road.

B.S	I.S	F.S	R.L	M.D. (m)	Remarks
3.072			+ 31.356		
	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

Calculate the reduced level at each station and the depth of cutting and filling necessary at each station to form an even gradient rising at 1 in 20 and starting at a level of 31.500m above datum at station 1.

[15 marks]

QUESTION FOUR

a) What are the responsibilities of an Engineering Surveyor on a construction project of a large dam or a multi-storey building or a Shopping mall. [10 marks]

b) 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]

QUESTION FIVE

a) In a tape offset survey the following offsets were taken from a fence to a survey line.

Chainage (m)	0	20	40	60	80	100	120	140	160	180
Offset	0	5.49	9.14	8.03	10.17	13.00	8.73	4.27	1.83	0

Find the area (hectares) between the fence and the survey line, using Simpson's Rule.

[10 marks]

b) A steel of nominal length 30m was suspended between two supports to measure the length of a line on a slope $3^{\circ} 50' 00''$. The measured length was 29.859m and the mean temperature during observations was 12°C . Tension applied was 100N. The standard length of the steel tape is 30.005m at 20°C and the standard tension is 45N. Calculate the corrected horizontal length or the true length. Take the weight of the tape to be 0.15N/m and its cross sectional area to be 2.5mm^2 and also the co-efficient of linear expansion to be $1.5 \times 10^{-5} / ^{\circ}\text{C}$ and Young's Modulus of Elasticity to be $2.0 \times 10^5 \text{ N/mm}^2$. [10 marks]

END OF EXAMINATION