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UNIVERSITY OF SWAZILAND
FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRICULTURAL AND BIOSYSTEMS ENGINEERING (ABE) II

COURSE CODE: ABE207

TITLE OF PAPER: LAND SURVEYING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO OTHER QUESTIONS.

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SECTION I: COMPULSARY

QUESTION ONE

A) Name any three (3) methods of computing **areas from maps** other than the **Simpson's** and **Trapezoidal's rules.** **(3 marks)**

B) The following chain surveying data were recorded in the field when chaining and measuring off-sets of a proposed road or track from a near-by embankment (**Table 1**).

Table 1. Embankment chaining field data.

Station	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**
Chainage (m)	0	15	30	45	60	75	90	105	120	135	150	165
Offset (m)	6.3	4.2	3.8	2.1	8.2	9.3	6.7	4.6	3.2	1.2	0.2	1.0

i. Compute the **area** between the **road and the embankment** using the **Simpson's rule.** **(6 marks)**

ii. Compute the **area** between the **road and the embankment** using the **Trapezoidal's rule.** **(6 marks)**

C) i. What is the name of the **branch of land surveying** used to produce **Figure 1?** **(1 mark)**

ii. **Name** any **three (3)** of the other **five branches** of **land surveying.** **(3 marks)**

iii. State any **three attributes** of this **branch** of **land surveying.** **(3 marks)**

iv. Describe **briefly** what makes the **pegs** at each **corner** of the **farm unique** beyond **falsification.** **(5 marks)**

D) i. What are the **three methods** that could be used for slope measurement? **(3 marks)**

ii. A land use planner was given a **contour map or plan** showing an area **proposed** for use as a **botanical garden** by the **Siteki Town Board.** The map was drawn on a **scale** of **1:1000.** The **land use planner** was asked to determine the **general slope** of the area in order to **facilitate decision making** and planning. While doing this, she discovered that one of the major slope breaks occurred between contour lines **29.0 m** and **34.0 m**, whose distance was **10 cm** apart. **Calculate** the **percentage slope** for this slope break. **(5 marks)**

S. G. OFFICE COPY

S.G. No. S 32 /90

	SIDES Metres	DIRECTIONS		CO-ORDINATES Y System Lo. 31° X	
		CONSTANTS		0	+2900000.00
AB	153.42	268.15.10	A	-19277.14	+26811.93
BC	365.62	356.54.10	B	-19430.49	+26807.25
CD	203.20	101.56.00	C	-19450.25	+27172.34
DA	319.42	184.36.50	D	-19251.44	+27130.32

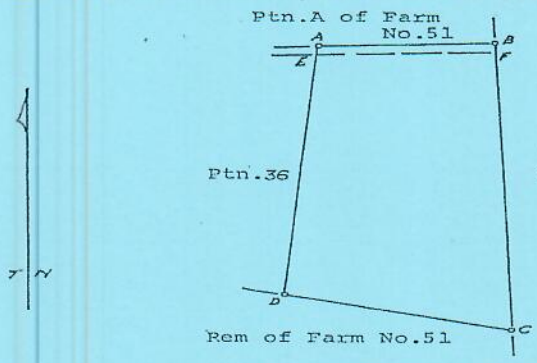
Approved

for Surveyor General.

Date 23.04.1990

Servitude.

The figure ABFE represents a Servitude of Right of Way 12.58 metres wide, vide Diagram S.G.No.S 176/54



REVENUE E2 SWAZILAND

Description of Beacons.

A C D 12 mm Peg in Cairn.
B Section of Iron Standard in Cairn.

Scale 1: 5000

The figure A B C D

represents 6.0229 Hectares of land being

Portion 37 (a portion of Portion 7) of Farm No.51

Situate in the District of Hhohho Swaziland.

Surveyed in October 1989 by me

Land Surveyor

This Diagram is annexed	Original Diagram is	File No. F 51/1
to	S.G. No.S 176/54	S.R. 19/90
No. Dated	Transfer / Grant / Cession	Compilation. 5/2
	C.C.T./G.R.T.	Drawing No. 3039 3040
Registrar of Deeds.	CONSENT FILED Page 25 No.	Apollo B 732

Figure 1. Map of Portion 37 (a portion of Portion 7) of Farm N0. 51.

E) Discuss in detail the **land surveying process** stating the **three stages involved**. The discussion should state the examples of land surveying techniques which could utilize the process when making measurements of the earth's features. **(5 marks)**

[40 marks]

SECTION II: ANSWER ANY TWO QUESTIONS

QUESTION TWO

A) **Figure 2** reflect efforts by an **ABE land surveying student** to calculate the land **area** of a given farm in **Terrabethea, Neverland.**

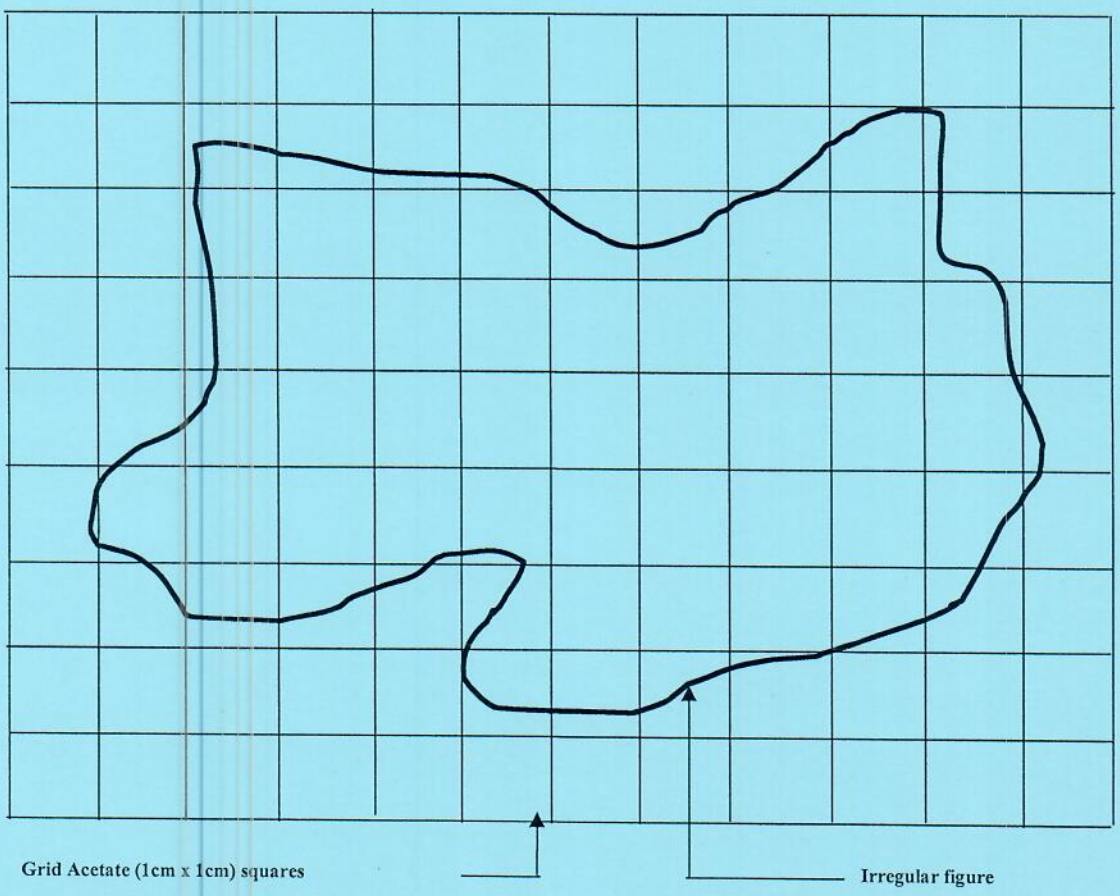


Figure 2. Terrabethea farm, Neverland.

i. What was the **land surveying technique** that was used to **determine the area** of the **farm?**

(2 marks)

ii. Given that the **scale** of the farm was **1: 10 000**, calculate the area of the farm in **meter squared** and **hectares.**

(5 marks)

iii. Discuss **in detail** how this land surveying techniques is used to determine the area of land.

(8 marks)

B) i. What are the **four (4) statements** that could be used to express **map scales?** **(4 marks)**

ii. What are the **three (3) categories** of **scale sizes?** **(3 marks)**

iii. A map had a scale of **1:30 000 000** and a principal scale of **1:15 000 000**, calculate the **scale factor** and explain what it **meant.** **(2 marks)**

iv. Explain briefly why **scales** are important in **land surveying.** **(4 marks)**

[30 marks]

QUESTION THREE

A) i. A maize small scale farmer with a pace factor of **0.65 m/pace** measured the length of his maize field as **89 paces. Calculate** the length of the maize field in meters **(m).**

(3 marks)

ii. State **two disadvantages** of **pacing** as a method of **linear measurement.** **(2 marks)**

B) i. What are the **two types** of **measuring wheels or odometers** that could be used for linear measurement? **(2 marks)**

ii. An **odometer** was **calibrated** and used to measure the **dimensions** of a field. One of the dimensions was measured as **10 revolutions**. Calculate the **length** of this dimension if the following data was obtained during calibration **(Table 2).**

(3 marks)

Table 2. Fabricated wheel odometer calibration

Measurement runs (x)	Length (Revolutions)
1	1.6
2	1.5
3	1.3
Total	4.4

iii. **State** and **discuss** the **land surveying technique** shown in **Figure 3.** **(5 marks)**

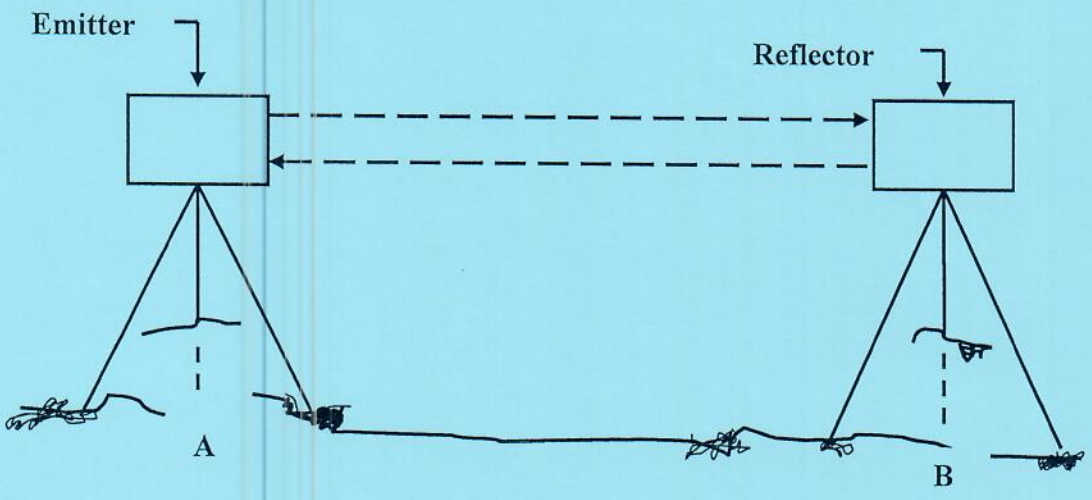


Figure 3. Measurement of length **AB**

[30 marks]

QUESTION FOUR

A) i. What are the **names** of the **stadia hairs** indicated by the **surveyor's level** telescope in **Figure 4**? **(4 marks)**

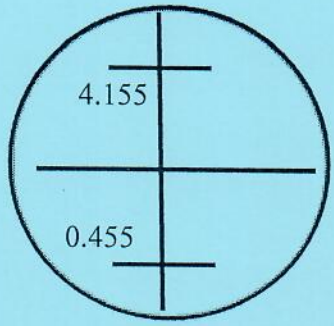


Figure 4. Surveyor's level telescope.

ii. What are the **three (3)** types of a **surveyor's level?** **(6 marks)**

iii. Which of the **three (3) stadia** is used for **height measurement?** **(2 marks)**

iii. Calculate the **distance** that was **measured** using the **surveyor's level** with the **levelling staff measurements** or **reading** shown in **Figure 4**. **(3 marks)**

iv. Discuss **with the aid of a diagram** how the **surveyor's level** could be used to measure the **distance or length of any given land.** **(15 marks)**

[30 marks]