



**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION PAPER**

**PROGRAMME: BSC AGRICULTURAL AND BIOSYSTEMS
ENGINEERING II**

COURSE CODE: ABE204

TITLE OF PAPER: LAND SURVEYING

TIME ALLOWED: TWO (2) HOURS

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY TWO
OTHER QUESTIONS.**

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GRANTED BY THE CHIEF INVIGILATOR**

SECTION I: COMPULSARY

QUESTION ONE

- A) Ms. Mzileni, a land surveyor had a task of levelling section A-B of Covehill farm in the Lowveld of Swaziland. She only knew the bench mark (BM), which was 41.030 m above ordinance datum (AOD). Section A-B was 143.25 m away from the BM, which meant that the surveyor had to take flying levels (FL) to reach the section in question as reflected in Table 1. The back site (BS) taken at the bench mark was 1.200 m at FL1. There was a change point at FL1, where the Fore sight (FS) was 1.410 m. The BM taken at FL2 was 1.790 m and the FS was 0.810 m, indicating a second change point. The BS taken at FL3 was 0.610 m and the subsequent measurements taken of section A-B were as shown in Table1.

Table 1. Spot height levels of section A-B Covehill Farm, Lowveld, Swaziland.

Staff Station	A	A1	A2	A3	A4	A5	A6	B
Distance (m)	0.00	18.25	38.00	59.50	78.00	114.30	131.10	143.25
Spot Height (m)	0.555 (IS)	1.125 (IS)	2.200 (IS)	2.270 (IS)	3.150 (IS)	3.320 (FS)	0.980 (BM)	3.320 (FS)

- i. Book the above data on Table 2 using the rise and fall method. (15 marks)
 - ii. Perform the arithmetic checks and comment on the booking. (5 marks)
 - iii. What is the other method of booking levelling data besides the rise and fall method? (3 marks)
 - iv. Plot section A-B on graph paper using scales of 1:500 horizontally and 1:100 vertically. (6 marks)
- B)
- i. What is the role of signals and symbols in Land surveying? (2 marks)
 - ii. State the meaning of the signals and symbols shown in Figure 1 as used in surveying. (9 marks)

Examination NO.:

Table 2:

Surveyor:

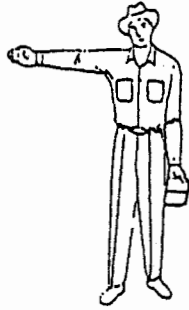
Name and Location of Site:

Back Sight	Intermediate Sight	Fore Sight	Rise	Fall	Reduced Level	Distance (m)	Remarks

(15 marks)

[40 marks]

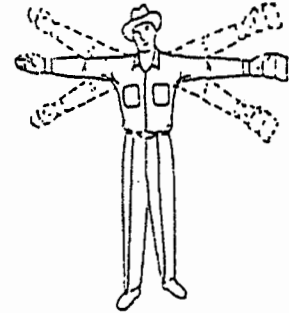
EXAMINATION NUMBER:



i.



ii.



iii.



iv.



v.



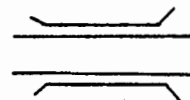
vi.



vii.



viii.



ix.



x.

Figure 1. Common surveying signals and symbols.

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO

- A) Name any three (3) methods of computing areas from maps other than the Grid method. (6 marks)

 - B) Discuss in detail how the Grid method could be used to determine the area of a given farm on a scaled map. (15 marks)

 - C) Discuss the role of Surveying as an elementary course which will lay a strong foundation for other courses to be taken later as well as its applications in your future professional lives in Land and Water Management. (9 marks)
- [30 marks]**

QUESTION THREE

- A) What are the three (3) methods of contouring? (6 marks)

 - B) Discuss briefly the applications of contouring in agriculture? (9 marks)

 - C) A topographic survey of a pond site with dimensions of 30 m x 30 m was conducted in an attempt to provide a formation depth of 68.0 m. The number of times the reduced level was used (N) was computed as 38.0, while the total height of the reduced level multiplied by N was 4755.0 m.
 - i. Compute the mean height. (5 marks)

 - ii. Calculate the depth of excavation. (5 marks)

 - iii. Determine the volume of excavation. (5 marks)
- [30 marks]**

QUESTION FOUR

- A) What are the **three methods** that could be used for slope measurement? **(3 marks)**
- B) A land use planner was given a **contour map or plan** showing an area **proposed** for use as a **botanical garden** by the **Mankayane 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.
- i. Calculate the percentage slope for this slope break. **(10 marks)**
 - ii. In your opinion state if this slope would be suitable for the establishment of a botanical garden and give your reason why it is suitable. **(5 marks)**
- C) i. Briefly discuss the land surveying process stating the **three stages** involved. **(5 marks)**
- ii. Name any three linear measurement surveying techniques other than Pacing. **(5 marks)**
 - iii. Discuss in detail how you could measure an unknown field using pacing. **(5 marks)**
- [30 marks]**