UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSC AGRICULTURAL AND BIOSYSTEMS ENGINEERING (ABE) II

COURSE CODE: ABE 204

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)** What are the **six linear measurement techniques** that could be used in land surveying to measure the relative positions of the earth's surface features? **(6 marks)**

**B)** **i.** The dimensions of the maize field were measured with an electromagnetic distance measurement **(EDM)** in an effort to achieve accurate and faster results. The EDM utilizes **equation 1** to determine the distance in question.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} \qquad \textbf{(1)}$$

Given that the speed was **100 m/s** and it took **9.5 seconds** for the signal to be returned to the emitter, calculate the distance that was measured by the **EDM.** **(4 marks)**

**ii.** Which other linear measurement instrument could have been used that is appropriate, rapid, but not as accurate to measure the field? **(1 mark)**

**C)** **i.** What are the names of the **stadia hairs** indicated by the surveyor's level telescope in **Figure 1?** **(4 marks)**

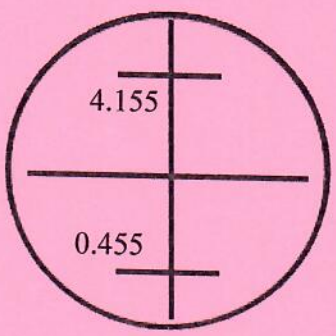



Figure 1. Surveyor's level telescope.

**ii.** Calculate the distance that was measured by the surveyor's level with the levelling staff reading shown in **Figure 1.** **(3 marks)**

**D)** **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 2** as used in surveying. **(10 marks)**

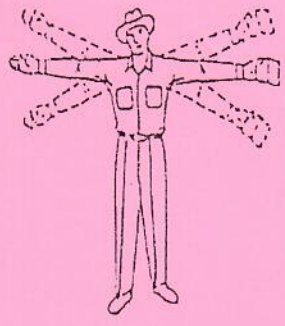
**E)** Briefly discuss the **land surveying process** and use examples of surveying techniques which utilize the process. **(10 marks)**

**[40 marks]**

**EXAMINATION NUMBER:** ..... **(10 marks)**

i. .....

ii. .....



iii. .....

iv. .....

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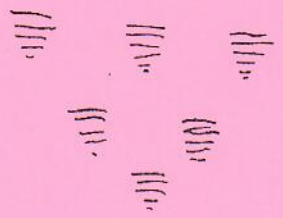

x. .....

Figure 2. Common surveying signals and symbols.

**SECTION II: ANSWER ANY TWO QUESTIONS**

**QUESTION TWO**

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

B) Name the **two (2)** methods that are used for booking levelling data. **(4 marks)**

C) The levelling data shown in **Figure 3** was conducted by Mr. Vusi Msimango on a partly cloudy day as part of his assignment for the course **ABE 204: Land Surveying**, in **5th August, 2014**. Book the data using the rise and fall method on **Table 1** and carryout the necessary **arithmetic checks**. **(20 marks)**

**[30 marks]**

**QUESTION THREE**

A) i. What are the other **two (2)** methods of **contouring** besides the **grid**? **(2 marks)**

ii. **Discuss** in **detail** how you could conduct a **topographic survey** of a selected **agricultural land site** using the **grid method.** **(13 marks)**

B) During the setting-out of a botanical garden, the site in question had to be leveled. To do this a topographic survey of **30 m x 30 m** was conducted in an attempt to provide the required contour map from which a formation depth of **1.5 m** was determined. The sum of **N** (the number of times the reduced level has been used) was computed as **40.0**, while the total height of the reduced level multiplied by **N** was **4840.0 m.** Compute the following:

i. Mean height. **(5 marks)**

ii. Depth of excavation. **(5 marks)**

iii. Volume of excavation. **(5 marks)**

**[30 marks]**

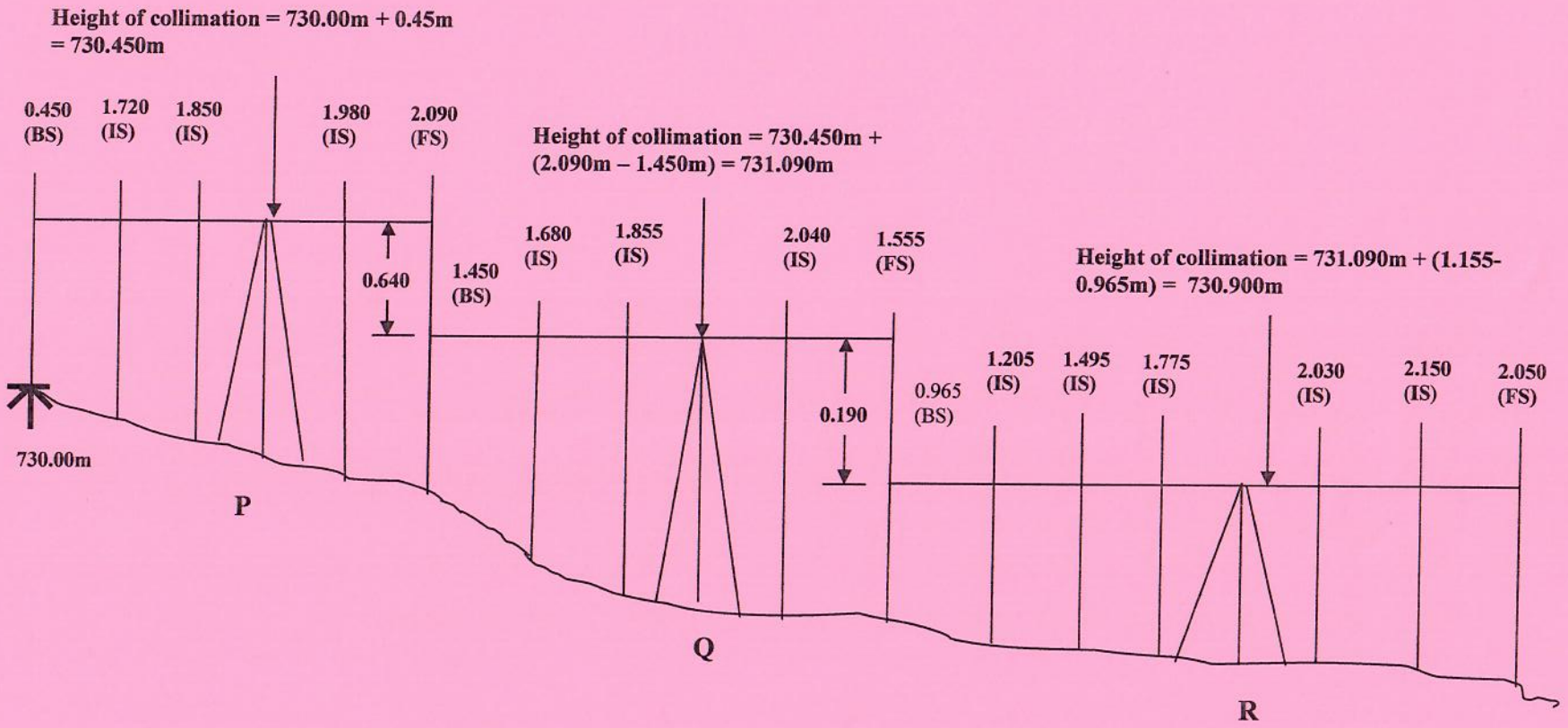


Figure 3. Road section between Cardiff Hall and the Education Centre, UNISWA, Luyengo.

Examination N0.:.....

Table 1: .....

Surveyor: ..... Name and Location of Site:.....

.....

Date:..... Instrument Type & N0.:.....

.....

Weather: .....

| Back Sight | Intermediate Sight | Fore Sight | Rise | Fall | Reduced Level | Distance (m) | Remarks |
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**QUESTION FOUR**

A) i. What are the **three (3)** methods of **slope measurement?** **(3 marks)**

ii. An arable small community **vegetable crop** development site was identified using a topographic map where it was found to lie between contour lines **44.400 m** and **42.000 m**. The horizontal distance between the contour lines in question was found to be **15 cm**. Calculate the slope of the development site if its map was eventually drawn using a scale of **1: 1000**. **(5 marks)**

iii. In your opinion, was the development site suitable for **arable crop farming?** **(2 marks)**

B) i. Name any **three (3)** methods of calculating areas from maps other than the **grid** method. **(3 marks)**

ii. A **1 cm x 1 cm** grid acetate was used to determine the area of a small agricultural farm on a map with a scale of **1: 50, 000**. The area of the farm was calculated to be **242 $cm^2$** on the map sing the grid. **Calculate** the area of the farm in **$m^2$** and **hectares**. **(7 marks)**

iii. Discuss in **detail** how the **grid method** could be used to measure the **area** of **land** from **scaled maps.** **(10 marks)**

**[30 marks]**