UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSC 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: COMPULSORY

QUESTION ONE

A) The figures in Table 1 were extracted from a levelling field book. Some of the entries are illegible due to exposure to rain. Insert the missing figures and conduct the arithmetic checks. **(10 marks)**

Table 1. Development site levelling field book entries

Back sight	Intermediate Sight	Foresight	Height of Instrument (HI)	Reduced Level	Remarks
			279.080	277.650	OBM
	2.010				
				278.070	
3.370		0.400		278.680	
	2.980				
	1.410			280.640	
				281.370	TBM

B) Re-book the field book data using the rise and fall method and conduct the necessary arithmetic checks. **(10 marks)**

C) What is the main advantage of the rise and fall method of booking? **(4 marks)**

D) **i.** What is the main application of levelling in agricultural engineering? **(3 marks)**

ii. An embankment was formed on ground that was level traverse to the embankment but falling at 1 in 20 longitudinally so that three sections 20 m apart have centre-line heights of 6.00 m, 7.60 m and 9.20 m, respectively above original ground level. Note that the mid-area A_2 is **not the mean** of A_1 and A_2. If side slopes of 1 in 1 are used, calculate the volume of fill between the outer sections when the formation width is 6.00 m using the Trapezoidal Rule. **(13 marks)**

[40 marks]

SECTION B: ANSWER ANY TWO QUESTIONS

QUESTION TWO

A) i. State how you would correct systematic errors for lengths and areas brought about by damaged chains. **(6 marks)**

ii. Given that the calculated area on a map of scale 1:1000, was 3000 cm^2 and that the lengths were measured using a chain that was 0.4% too short. Calculate the true area and the percentage error of the area. Please show all your work. **(6 marks)**

B) Describe the land surveying process stating the three stages that are involved. **(15 marks)**

[30 marks]

QUESTION THREE

A) State the complete set of instruments or technique used in direct distance measurements as well as in optical distance measurements. **(5 marks)**

B) With the aid of a diagram, describe how the electromagnetic distance measurement instrument operates. **(10 marks)**

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

D) 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. **(7 marks)**

ii In your opinion state if this slope would be suitable for the establishment of a botanical garden and give your reason. **(5 marks)**

[30 marks]

QUESTION FOUR

A) The computation of areas and volumes is very important in plane surveying. Name any two (2) methods that could be used to compute areas from maps other than the grid method. **(4 marks)**

B) State any two limitations of the grid method as a means of area estimation. **(6 marks)**

C) An area of a farm on a map of scale 1:50 000 was estimated using a 1 cm^2 grid as 20.0 cm^2. Compute the true area of the farm in square meters and hectares. **(5 marks)**

D) 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]