

UNIVERSITY OF RUHUNA

Final Examination in BSc Agricultural Resource Management and Technology (Part I)

July 2019

SS 4104 Techniques in Soil Research

Time allocation: 2 hours

Index number

INSTRUCTIONS

Answer all questions.

Please use the space provided in the question paper to answer the question No. 01

Only non-programmable calculators are permitted.

Mobile phones and smart devices are NOT permitted.

1)

a. Which parameters of the soil are worth measuring for an ordinary farmer? (10 Marks)

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b. Use the following information and the map to answer the given questions.

A farmer has a cinnamon land with the topographic features as indicated (periphery is demarcated with the black square) in Figure 01. A sales agent of an agrochemical company instructs the farmer to apply dolomite to the field to ameliorate the acidity. However, before buying the dolomite, the farmer requests you to check whether the recommendation of the sales agent is valid or not.

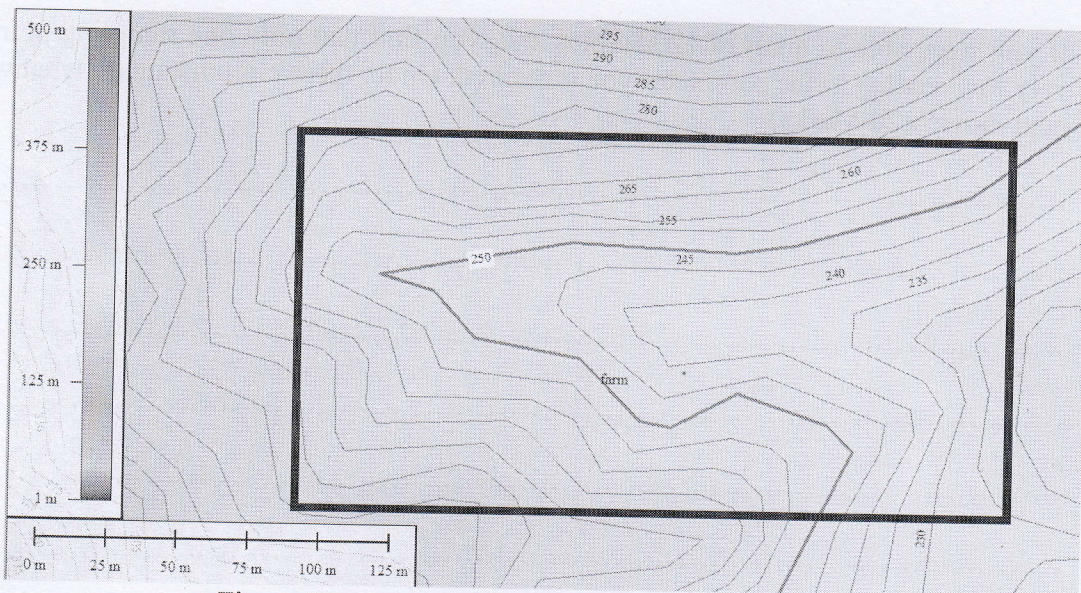


Figure 01: topographic data of the farm land

i. What is the soil parameter that you are going to evaluate to verify the statement of the agrochemical sales agent? (10 Marks)

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ii. What are the factors that you have to consider before deciding on the number of samples? (20 Marks)

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iii. The total number of samples you can obtain is limited to 12. Demarcate the areas where you wish to obtain soil samples **on the map** using numbers (1 to 12) (assume that only the top soil is analyzed). (30 Marks)

iv. If you wish to take composite samples, which samples (out of the samples you indicated on the map above) will be pooled to reduce the total number of samples to be analyzed, while keeping an acceptable level of representation of the spatial distribution of the soil property you are going to evaluate? (10 Marks)

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v. If you were able to analyze 12 samples and, you find that only one sampling point is having a very low reading in the parameter you measured. Under these circumstances, what would be your next move? (20 Marks)

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- 2) Reducing the occurrence of errors is one of the key aspects of any analysis.
- a. State the avenues that could lead to errors in your analysis process. (25 Marks)
 - b. State the techniques or strategies that you can use to detect errors. (25 Marks)
 - c. In a particular soil pH analysis, the pH values you have obtained for the replicates of a pooled sample are 3.5, 4 and 6. Can you accept these values are accurate? Explain the reason behind your answer. (25 Marks)

d. A soil sample taken from a natural vegetation in Mapalana area shows a pH value of 7.2, 7.3 and 7.4 for three tested replicates. What do you think of these readings? (25 Marks)

3)

- a. What is meant by “calibrating of an equipment”? (15 Marks)
- b. State the material you need to calibrate an equipment? (10 Marks)
- c. When should you calibrate an equipment? (25 Marks)
- d. Explain the working principle of an analytical instrument that you prefer using an illustration/sketch. (30 Marks)
- e. Explain the requirements of the samples which can be fed to the instrument you explained under question “3) d.” above. (20 Marks)

4)

- a. Soil sampling is one of the most challenging works. What are the factors that make it so challenging? (25 Marks)
- a. What are the preparatory steps that you have to follow to make your soil samples to be ready for measuring soil parameters? (consider general sample preparation) (25 Marks)
- b. State the difference between qualitative and quantitative analysis (20 Marks)
- c. Indirect measurements are very much helpful in soil evaluations. Elaborate on this statement. (30 Marks)