

UNIVERSITY OF RUHUNA

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

May 2017

SS 4104 Techniques in Soil Research

Time allocation: 2 hours

Index number

**INSTRUCTIONS**

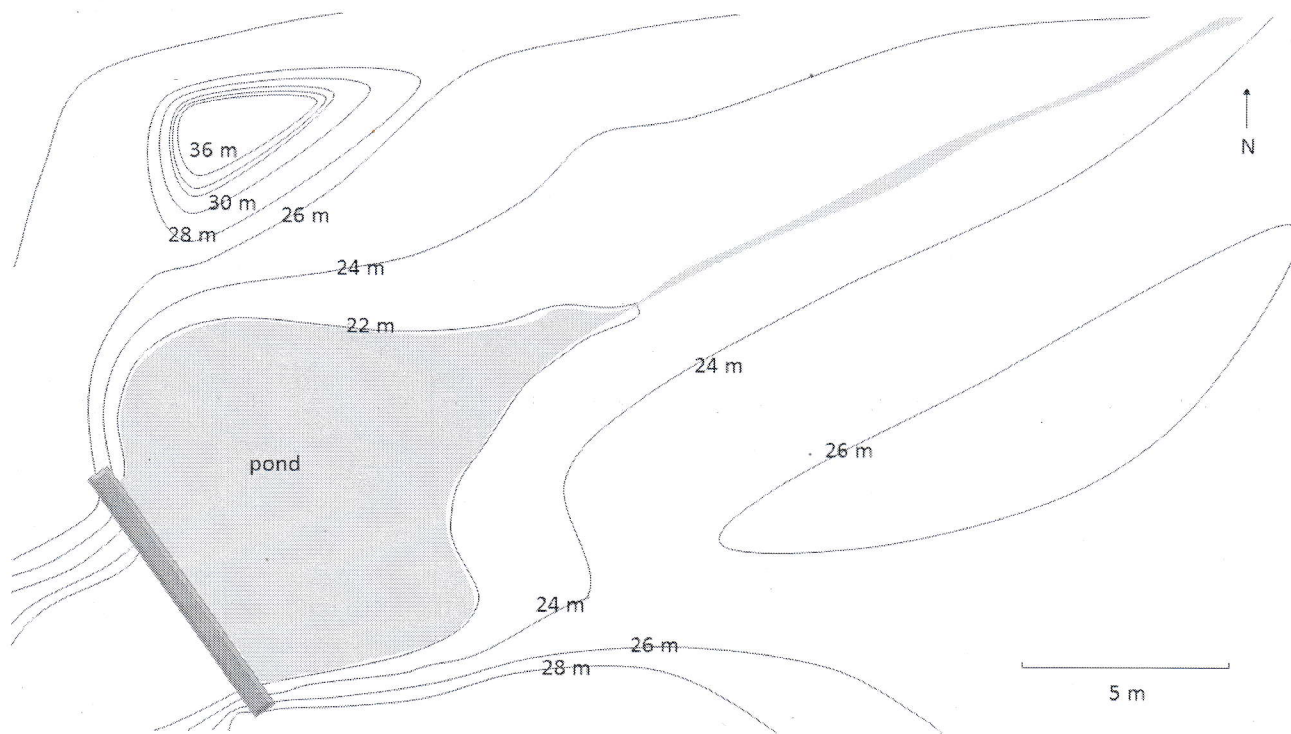
Answer all questions.

Please use the space provided in the question paper

Only non-programmable calculators are permitted.

Mobile phones are NOT permitted.

1) Given below is a map of a farm land which is located in the Hambantota District.



- a) Using encircled numbers (Ex: ①), indicate three (3) areas of the land where you might find soils with contrasting differences. (6 marks)
- b) The owner of the above farm wants to analyze the soil of his land and he requests your advice on doing it. List the first few questions you might ask from him when you get the request? (10 marks)

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- c) Suppose you need to get a general idea of the soil of the land, but your budget is very much limited. Mark the areas where you would sample the soil including the replicates. Use encircled symbols (Ex: ⊙) to show the sampling points. Use the same symbol for replicates. (6 marks)
- d) List three (3) major parameters of soil that you would check in your attempt to get a general idea of the soil. (3 marks)

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2)

- a. Enlist the challenging aspects of soil analysis (5 marks)

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- b. In the soil analysis that you are about to perform in the case of the farm land concerned under question number one above, instead of going to the farm, you instruct the farm owner to bring the soil samples to the laboratory from the areas you mark on the map. What is the important information that you are going to miss in this approach? (6 marks)

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c. What are the measures you can take to reduce the occurrence of errors? (6 marks)

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d. During the laboratory analysis, what are the avenues that you have to use to detect errors? (4 marks)

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e. State how the analytical instruments could be more accurate, error-free, and faster compared to the human counterparts. (4 marks)

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3)

a. Explain accuracy and precision using a labeled diagram (5 marks)

b. What conditions could lead to precise but inaccurate results in instrumental analysis? (5 marks)

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c. How do you confirm whether your results are both accurate and precise? (7 marks)

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d. What would you do if you find that your results are precise but not accurate? (8 marks)

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4) Instrumentation is indispensable in modern day soil analysis

a. If you intend to buy an analytical instrument, what are the factors that you would consider before selecting a machine? (5 marks)

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b. Although analytical instruments can be very handy in soil analysis, there are some aspects that you must check before start analyzing in order to receive a better output. What are those aspects? (7 marks)

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c. Indicate what chemical or physical property/s of samples is/are measured in the following analytical instruments. (5 marks)

AAS - .....  
Flame photometer - .....  
ICP - .....  
Spectrophotometer - .....  
Chromatography - .....

d. Give a labeled diagram with descriptions to explain the working principle of **one** of the following instruments - Flame photometer, Spectrophotometer, AAS, Gas chromatograph and ICP. (8 marks)

*Please use overleaf (page 5) for the answer.*