

**EASTERN UNIVERSITY, SRI LANKA**  
**SECOND YEAR, FIRST SEMESTER EXAMINATION IN AGRICULTURE – 2012/2013**  
**AC 2101: PROPERTIES AND APPRAISAL OF SOIL**  
**PRACTICAL EXAM (Mar/ /Apr 2015)**

**Paper II**    **Gr. 4**

Time: 3 hours

Answer all questions

Q1) In an analysis to determine the texture of a soil using Hydrometer method, the following reading were obtained.

Hydrometer reading after 40 s	- 1.091 g/cm <sup>3</sup>
Hydrometer reading after 2 h	- 1.098 g/cm <sup>3</sup>
Temperature of soil suspension	- 80 ° F
Blank test reading	- 1.081 g/cm <sup>3</sup>

- a. If 50g of dry soil was taken for the analysis, calculate the percentage of soil primary particles.
- b. What is the importance of the knowledge of soil texture?
- c. What is meant by heavy, medium and light textures?
- d. Can soil texture in the field be changed by cultivation or other practices?

Q2) a. Explain the principle involved in determination of Flocculation and dispersion.

- b. Identify the chemicals 1N CaCO<sub>3</sub> and 1N Na<sub>2</sub>CO<sub>3</sub> in test tubes A and B with the help of the clay suspension "C" given to you.
- c. A student ordered clay suspension test tubes A, B and C by using following chemicals in an order from highly flocculated as B > A > C.

1. 1N NaCl

2. 1 N HCl

3. 1N NH<sub>4</sub>Cl

Cont ..... /2

- i. Explain the reason for the ordering by using the impact of the given chemical.
- d. Explain the influence of electrolyte concentration on Flocculation or Dispersion.

- Q3) a. Determine the soil organic matter content in the given soil sample (X) by Walkley Black method.
- b. Write down the principle involved in the above estimation.
  - c. Indicate the purpose of following chemical in the above determination.
    - i.  $\text{H}_3\text{PO}_4$
    - ii.  $\text{K}_2\text{Cr}_2\text{O}_7$
    - iii.  $\text{H}_2\text{SO}_4$
    - iv. Using 0.1N HCl

Q4) To determine the Cation Exchange Capacity (CEC) of a soil, a sample of 10 g was added 250 ml ammonium acetate and kept for overnight. The soil sample was leached with ammonium acetate and washed with alcohol of 100 ml. Treated soil was transferred to Kjeldhal flask for distillation and the gas evolved during distillation was trapped in 0.1N HCl. Receiving flask with distilled is provided to you (F).

- a. Find out the CEC of the above soil.
- b. Explain the principle involved in this experiment.
- c. Indicate the purpose of following steps in CEC estimation.
  - i. Ammonium acetate addition
  - ii. Keeping overnight
  - iii. Leached with ammonium acetate
  - iv. Getting leachate free from calcium
  - v. Leached with alcohol

Q5) A student evaporated the leachate collected from CEC estimation to small volume in an oven then ignited in muffle furnace at  $170^{\circ}\text{C}$  for 60 minutes. Then 0.2N 25 ml HCl was added and kept in water bath for 30 minutes labeled as "T"

- a. Calculate the Total exchangeable Bases present in the leachate by using sample "T"
- b. Based on the CEC and TEB calculated in question 4.a and question 5. a calculate the Percentage Base Saturation of that soil sample.
- c. If the Percentage Base saturation is more than 100 (PBS >100), what may be the reason.
- d. Indicate the purpose of following steps in Total exchangeable Base estimation
  - I. Evaporating the leachate
  - II. Keeping in muffle furnace at  $170^{\circ}\text{C}$
  - III. Adding HCl and keeping in water bath
- e. Indicate the possible error to under estimate CEC in laboratory analysis.

5) a. Explain the factors to be considered when collecting soil samples for analysis

- b. Describe an experiment to investigate aggregate stability of soil.
- c. Give 5 aggregating and cementing agents.
- d. Define plasticity and explain why clays exhibit plastic property while sand and silt do not?