

UNIVERSITY OF RUHUNA

Final Examination in B.Sc. Agricultural Resource Management and Technology (Part I)

March 2017

SS 4101 Soil Physics

Answer all questions

Time: 2 h

Each question carries a total of 100 marks

1. I. a) Name the primary soil particles. (5 marks)
- b) State two features of each primary particle you have mentioned in I(a). (10 marks)
- c) Name the physical properties of soils that are related with the size of particles in soil. (10 marks)

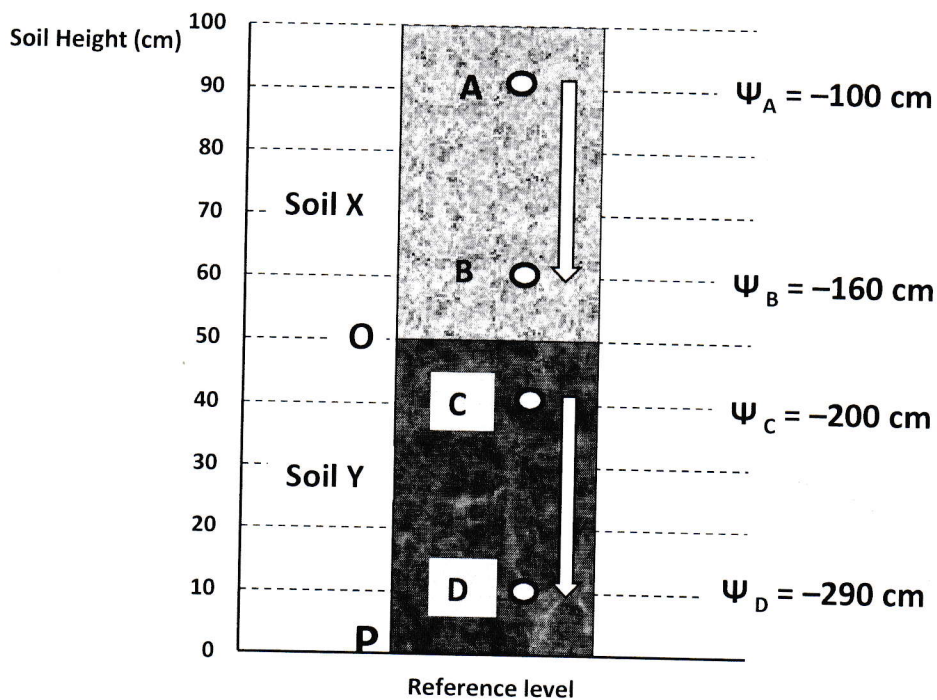
- II) a) Explain briefly the following terms:
 - i. Soil textural triangle (10 marks)
 - ii. Leaching (10 marks)
 - iii. Plant available water (10 marks)
 - iv. Soil aggregates (10 marks)

- III) a) Comment on bulk density and total porosity of clayey and sandy soils (15 marks)
- b) Explain why clayey soils are termed "heavy", implying lower porosity? (20 marks)

2. I. a) What is meant by the term 'soil structure'? (10 marks)
- b) Name the types/shapes of structures in soils. (10 marks)
- c) Name the processes and activities in soil that are influenced by soil structure. (10 marks)
- d) Explain how structure affects the water movements in soil. (15 marks)

- II. a) Differentiate between "conventional tillage" and "conservation tillage". (10 marks)
- b) Name the soil properties that would be affected by tillage. (10 marks)
- c) Explain briefly the problems occur with no-till farming. (10 marks)
- d) Discuss the significance of tillage considering its positive and negative impacts on soils. (25 marks)

3. I. a) Explain briefly the following terms:
- Hygroscopic co-efficient (10 marks)
 - Field capacity (10 marks)
 - Permanent wilting point (10 marks)
 - Saturation (10 marks)
- II) a) A laboratory experimental setup for determining saturated hydraulic conductivity of two soils is given below.
- Find the hydraulic gradient between points A and B. (10 marks)
 - Find the hydraulic gradient between points C and D. (10 marks)
- b) If the hydraulic flux at Point O and P are respectively 10 and 9 cm/h, calculate the saturated hydraulic conductivities of Soil X and Soil Y. (20 marks)
- c) List possible reasons for a soil to have a lower hydraulic conductivity. (20 marks)



4. I. a) What is meant by erosion? (10 marks)
- b) What is meant by Universal soil loss equation (USLE)? (10 marks)
- c) Explain briefly the practice factor in USLE. (15 marks)

- II. a) What are the means of water loss from soils? (10 marks)
- b) Explain briefly the methods for reducing water losses from soils. (15 marks)

- III. a) What is meant by soil compaction? (10 marks)
- b) Explain briefly the effects of compaction on;
 - i. Soil structure. (10 marks)
 - ii. Water movements in soil. (10 marks)
 - iii. Plant root growth. (10 marks)