



**RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES**

B. Sc. (General) Degree
Third Year - Semester II Examination – March / April 2014

PHY 3206 – SOIL PHYSICS

Answer all questions

Time: 2 hours

1. (A) **Select the best possible answer for the question numbers (i) – (x).**

[10 marks]

- (i) “Texture” describes the _____ of particles in a soil.
(a) size (b) colour (c) wetness (d) structure
- (ii) Which of the following is not a textural class name?
(a) sand (b) silt (c) loam (d) sandy silt
- (iii) Capillarity in soils involves _____.
(a) both adhesion and cohesion (b) only cohesion
(b) only adhesion (c) none of the above
- (iv) Which of the following sources of water have the shortest average residence time?
(a) soil moisture (b) clouds (c) groundwater (d) oceans
- (v) A sticky, putty-like feel indicates a high percentage of which soil class?
(a) clay (b) silt (c) loam (d) sand
- (vi) Which type of soil structure is typically found in surface soil (A horizon)?
(a) columnar (b) platy (c) granular (d) prismatic

- (vii) For which substance would the particle density equal the bulk density?
- (a) organic soil (b) inorganic soil (c) quartz pebble
(c) wet soil
- (viii) Soil tilth refers to the _____.
(a) physical suitability of a soil for plant growth
(b) amount of water in soil
(c) amount of air in soil
(d) puddling
- (ix) X Ray Diffraction techniques cannot be used to characterize _____.
(a) primary minerals (b) secondary minerals (c) ceramics (d) glass
- (x) Falling Head Method is used to determine the Hydraulic Conductivity of _____.
(a) dry soil (b) wet soil (c) permeable soil (d) impermeable soil

(B) Determine whether the following statements [(i) - (xii)] are TRUE (T) or FALSE (F). [15 marks]

- (i) Light-coloured surface soils are likely to be warmer than dark-coloured surface soils if soil moisture and other conditions are the same. (T / F)
- (ii) When the soil is too wet, tillage is likely to increase the soil bulk density. (T / F)
- (iii) The percentage of total pore space in a soil can be calculated if only the particle density and the organic matter content are known. (T / F)
- (iv) Proper timing of tillage is generally more difficult for a clayey than a sandy soil. (T / F)
- (v) Soil consistence changes with the soil water content. (T / F)
- (vi) The adsorption of water on soil surfaces encourages capillarity. (T / F)
- (vii) The tenacity with which water is held in soils is directly related to the soil moisture content, the higher the moisture level the greater the attraction of the water to the soil. (T / F)

- (viii) Osmotic and matric potentials are commonly negative because the soil water has a lower energy level than that of pure water. (T / F)
 - (ix) Filling the bottom half of a flower pot with gravel will greatly improve the aeration of the soil-mix in the top half. (T / F)
 - (x) The water potential in soils generally considered lower than that in the atmosphere. (T / F)
 - (xi) The pollution of ground water is often increased by the presence of macropores in soils. (T / F)
 - (xii) An abundance of macropores in soils helps assure an abundance of oxygen in the soil. (T / F)
2. (a) What is shear strength of soil? [02 marks]
- (b) Briefly discuss the Mohr's theory of failure. [15 marks]
- (c) Explain the "Direct Shear Test" used to determine the "Apparent Cohesion" and the "Angle of Shearing Resistance" of a given soil sample. [08 marks]
3. (a) Write a comprehensive account on "soil structures" paying special attention on the importance of soil structures for plants and animals. [20 marks]
- (b) "*Excessive tillage is harmful for soil structures*"
Comment on the above statement. [05 marks]
4. Write short notes on the following.
- (i) Vacuum gauge tensiometer. [06 marks]
 - (ii) Soil water. [06 marks]
 - (iii) Soil porosity. [06 marks]
 - (iv) Plasticity of soil. [07 marks]

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