RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B. Sc. (General) Degree in Applied Sciences
Third Year - Semester I Examination – October / November 2015

PHY 3206 – SOIL PHYSICS

Answer all questions **Time: 2 hours**

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01. (a) Give a detailed description on the types of water associated with soil and determine their availability for plants. [15 marks]

(b) *"At the Wilting Point (WP) of a plant, the maximum tension that a plant can provide is balanced by the soil water tension"*. Explain the above statement. [05 marks]

(c) What is the Field Capacity (FC) of a soil and which factors does it depend on? [05 marks]

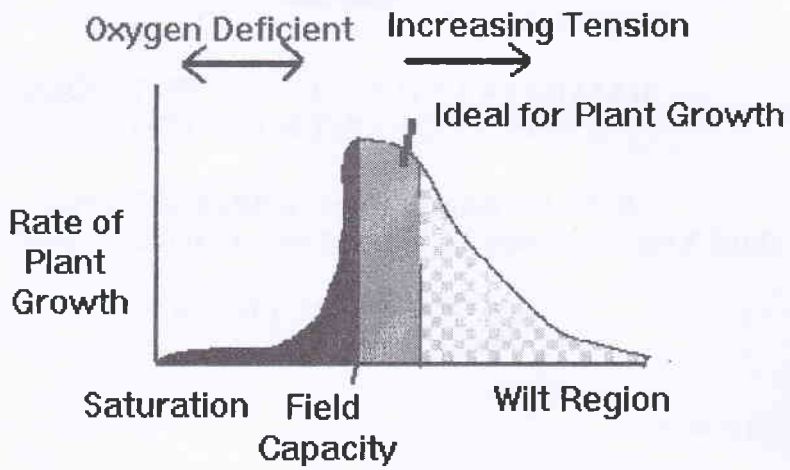
02. (a) A sample of wet soil having a wet mass of 1000 g and a volume of 650 cm^3 was oven dried and had a dry mass of 800 g. If the particle density of soil is 2.65 g cm^{-3}, calculate the following properties of the soil:

(i) Bulk density (without water) [03 marks]
(ii) Total porosity [03 marks]
(iii) Void ratio [03 marks]

(b) With the aid of a diagram, show how the consistency of soil varies with moisture content as we move from a very dry soil to a very wet soil. What are the physical forces responsible for the consistency at each stage? [10 marks]

(c) *"Over tillage will destroy soil structure and lead to soil compaction"* Do you agree or disagree with the above statement? Justify your answer. [06 marks]

03. (a) Explain the following graph. [10 marks]



(b) Explain a method, in detail, used to determine the saturated hydraulic conductivity of a highly permeable soil. [10 marks]

(c) Discuss the working principle of the *water manometer tensiometer* used to measure the matric potential of an unsaturated soil. [05 marks]

4. Write <u>short notes</u> on the following.

(i) Surface energy balance equation of soil. [06 marks]

(ii) The effect of soil water content on thermal conductivity. [06 marks]

(iii) Soil albedo. [06 marks]

(iv) Isomorphous replacement in clays. [07 marks]

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