RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OFAPPLIED SCIENCES

B. Sc. (General) Degree in Applied Sciences
Third Year - Semester II Examination – February / March 2019

PHY 3206 – SOIL PHYSICS

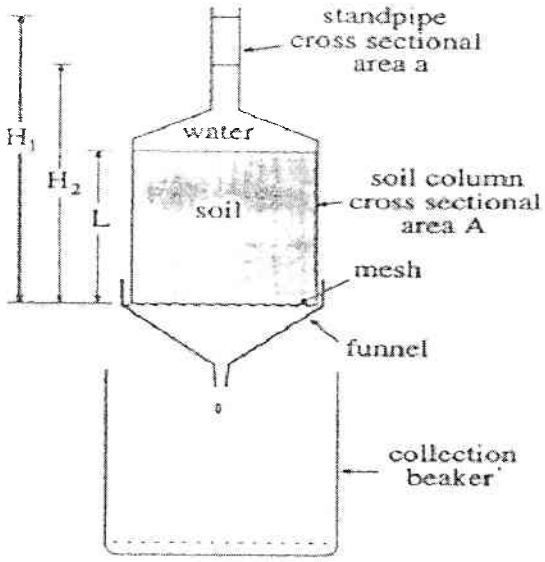
Time: 2 hours

Answer four (04) questions only

1. (a) Explain why the "constant head method" is not employed in the determination of the saturated hydraulic conductivity (K_s) of relatively low permeable soil?

(05 marks)

(b) A schematic diagram of the "falling head method" employed in place of "constant head method" is shown in the following diagram. H_1–H_2 is the fall of the water level in the standpipe in time t.



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Show that K_S is given by

$$K_S = \frac{aL}{At} \log_e \frac{H_1}{H_2}$$

(20 marks)

2. (a) "Soil is a dynamic natural body formed by the combined effect of **climate** and **biota,** moderated by the **topography,** acting on **parent material** over **time**".

The **highlighted** ones in the above sentence are the soil forming factors. Describe each of them comprehensively. (15 marks)

(b) What is "karst topography" and how does it form? (05 marks)

(c) What are the natural hazards associated with karst topography? (05 marks)

3. (a) What is soil texture? (05 marks)

(b) Describe how soil is classified according to the particle size. (05 marks)

(c) Briefly explain how the soil textural triangle is used to determine the textural class of a given soil sample. (05 marks)

(d) What are the different types of water present in soil? (05 marks)

(e) *"Field capacity of a clayey soil is higher than that of a sandy soil"*. Justify the statement. (05 marks)

4. (a) Briefly discuss the structure of clays and distinguish between 1:1 clays and 2:1 clays. (05 marks)

(b) "*1:1 clays are widely used in whiteware industry*" Justify the statement. (05 marks)

(c) X-Ray Diffraction (XRD) is one of the most versatile techniques used to characterize **crystalline** materials.

Discuss the basics of XRD technique. (10 marks)

(d) Explain why XRD cannot be used to characterize **amorphous** materials. (05 marks)

4. Write short notes on the following.

(a) Soil profile. (06 marks)

(b) Soil structures. (06 marks)

(c) Particle density of soil. (06 marks)

(d) Soil tilth. (07 marks)

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