



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

**Bachelor of Science in Applied Sciences**

**Second Year - Semester II Examination – Jan / Feb 2023**

**PHY 2211 – SOIL PHYSICS**

**Time: Two (02) hours**

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**Answer all questions.**

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1.
  - a) Give a detailed description on the types of water associated with soil and determine their availability for plants. (20 marks)
  - b) What is Field Capacity (FC) of soil and explain why the FC of clayey soil is higher than that of sandy soil. Use diagrams where appropriate. (10 marks)
  - c) What is “puddling” in agriculture and explain how puddling decreases the bulk density of soil and produces an impervious (not allowing water to pass through) layer on the surface of the soil. (10 marks)
  - d) Distinguish between macronutrients and micronutrients essential for plant growth. (10 marks)
  
2.
  - a) What are the major components of soil? Briefly explain each of them. (15 marks)
  - b) What is soil albedo and explain why light bare soil has a higher albedo than that of dark bare soil. (05 marks)
  - c) Write down the **surface energy balance equation** of soil clearly identifying the quantities involved. (10 marks)

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d) What are the two most important properties of soil which would decide the temperature of the soil beneath the surface (e.g. in the root zone)?  
(10 marks)

e) *"Soil with a little moisture content conducts heat more effectively than the same soil when it is totally dry"*

Substantiate the above statement. (10 marks)

3. a) Distinguish between "pressure potential" and "matric potential" of soil.  
(20 marks)

b) By way of a clear diagram briefly explain the action of a **vacuum gauge tensiometer** used to determine the matric potential of soil (10 marks)

c) State the Darcy's Law for saturated flow clearly identifying the quantities involved. (05 marks)

d) Discuss the **constant head method** used to determine the saturated hydraulic conductivity of high permeable soils. (10 marks)

e) Explain why the method used in d) above is not suitable to determine the saturated hydraulic conductivity of low permeable soils, (05 marks)

4. Write short notes on the following.

a) Particle density vs. bulk density of soil. (12 marks)

b) Soil plasticity (12 marks)

c) Soil profile. (12 marks)

d) 1:1 clay minerals. (14 marks)

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