



# THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

DEPARTMENT OF AGRICULTURE

SECOND SEMESTER FINAL EXAMINATION- 2021

**AG 122 INTRODUCTION TO SOILS**

First Year Bachelor of Science in Agriculture [B.Sc.(Ag.)]

TIME ALLOWED :- 2½ HOURS

Wednesday 27<sup>th</sup> October, 2021

12.50 pm

Venue: RKLR 1&2

STUDENT NAME: \_\_\_\_\_ ID No: \_\_\_\_\_

## INFORMATION FOR CANDIDATES:

1. You have 10 minutes to read the paper. You must not begin writing during this time.
2. Questions are in **THREE** parts. Answer **ALL** from three parts in numerical order.
3. Answers must be written in the space provided in the question paper. No other written materials will be required.
4. Rules, calculators and correction fluids are required in the examination room. Notes and text books are not allowed.
5. Write your name and student number clearly on the first page of your question/answer book and examination attendance slip. **DO IT NOW.**
6. Total marks = 50.

## PART A

Encircle the correct answer from the options given. (1 mark x 15=15 marks)

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- The master horizon \_\_\_\_\_ is considered as zone of illuviation.  
a. C                                      b. A                                      c. E                                      d. B
- The soil with pH greater than 8.5, electrical conductivity greater than 4 dS/m and exchangeable sodium percentage more than 15% is a \_\_\_\_\_.  
a. saline soil                      b. saline-sodic soil                      c. sodic soil                      d. calcareous soil
- A soil with bulk density of 1.25 g/cc and a particle density of 2.5 g/cc shall have a total porosity of \_\_\_\_\_.  
a. 50%                                      b. 60%                                      c. 75%                                      d. 25%
- Greatest soil erosion could be in \_\_\_\_\_ structured soils.  
a. crumb                                      b. massive                                      c. blocky                                      d. single-grain
- Tensiometers can be used to measure \_\_\_\_\_ of soil.  
a. oxygen concentration              b. matric potential              c. solute potential              d. gravitational potential
- A soil with Munsell's colour notation of 2.5YR  $\frac{5}{8}$  shall have a hue of \_\_\_\_\_.  
a. 2.5YR                                      b. 5                                      c. 8                                      d.  $\frac{5}{8}$
- \_\_\_\_\_ is a free-living nitrogen fixing bacterium in the soil.  
a. *Rhizobium* sp                      b. *Frankia* sp                      c. *Azotobactor* sp                      d. *Anabaena* sp
- Immobilization of N could be expected when an organic matter source with a C : N ratio of \_\_\_\_\_ is incorporated to soil.  
a. 8:1                                      b. 20:1                                      c. 15:1                                      d. 100:1
- Chemoautotrophic microorganisms of the soil derive their energy from \_\_\_\_\_.  
a. sunlight                                      b. inorganic chemicals                      c. organic matter                      d. all of them
- Detailed soil survey maps are prepared at a \_\_\_\_\_ scale on the aerial photographs.  
a. 1:15,000                                      b. 1:100,000                                      c. 1:200,000                                      d. 1:1,000,000



6. Bulk density

7. Base saturation percentage

8. Available soil water

9. Soil tilth

10. Cation exchange capacity (CEC)

## **PART C**

**Answer the following questions.**

**(5 marks x 5=25 marks)**

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1. Briefly explain *any five* factors that influence availability of soil water to plants.

2. Enlist the soil forming factors. Describe the influence of *an active (any one)* soil forming factor on the pedogenesis.

3. Briefly explain the beneficial roles of soil microorganisms on plant growth?

4. A core cutter of 5.1 cm height, 5 cm internal diameter and weighing 25 g was used to draw a soil core. The moist soil with core cutter weighed 200 g. Later, the core cutter and soil core were oven-dried to constant weight and reweighed 175 g. Calculate the bulk density and volumetric water content given that specific gravity of water is  $1 \text{ g cm}^{-3}$ . Clearly show each step of calculation and the formulae used for calculations.

5. Sketch a hypothetical soil profile, label different horizons and explain the importance of each horizon in the soil classification.

---Good luck---