

**THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY**

**FIRST SEMESTER EXAMINATION- 2021**

**DEPARTMENT OF AGRICULTURE, 2<sup>nd</sup> YEAR DEGREE**

**AG213 SOIL FERTILITY MANAGEMENT**

**FRIDAY 11<sup>TH</sup> JUNE, 2021 (8.20 AM)**

**TIME ALLOWED:- 2 ½ HOURS**

**INFORMATION FOR CANDIDATES:**

1. You have 10 minutes to read the paper. You must not begin writing during this time.
2. Answer all questions in numerical order.
3. Answers must be written in the book provided. 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 front page of your answer book and examination attendance slip. **DO IT NOW.**
6. The marks of each question are given at the end of question.
7. Total marks = **50**.

**Answer the following questions:**

**5 Marks x 7= 35 Marks**

1. Write the chemical formulae of available forms of nutrients for the major/fertilizer nutrient elements.
2. Differentiate between the primary active uptake and the secondary active uptake of nutrients by the plants.
3. Describe the nitrification process in soils. What is the significance of nitrification to agriculture?
4. State and explain any TWO biological tests used to assess the soil fertility.
5. What is soil testing? List and explain different phases or steps of a soil testing program.
6. What are the management options in tropical acid soils to overcome phosphorous fixation?
7. What are the consequences of soil acidity on the nutrient availability in soils?

**Pick the correct answer from the multiple choices provided and write it in your answer book.**

**1 Mark x 15 = 15 Marks**

8. Maximum soil P availability to crop plants is at pH \_\_\_\_\_.  
a) 6.0-7.5                      b) 7.0-8.0                      c) 5.0-6.0                      d) 4.0-6.0
9. The neutralizing value of pure calcium carbonate to reclaim an acid soil is \_\_\_\_\_.  
a) 136%                      b) 100%                      c) 108.7%                      d) 86%
10. The most dominant or abundant form of soil potassium (K) is \_\_\_\_\_.  
a) water soluble K      b) exchangeable K      c) non exchangeable K      d) lattice K
11. Soil bacteria responsible for biological fixation of nitrogen is \_\_\_\_\_.  
a) *Rhizobium*                      b) *Azatobactor*                      c) *Azospirillum*                      d) all of them

12. The process of conversion of organic forms of nitrogen to inorganic forms of nitrogen in soil is called\_\_\_\_\_.
- a) mineralization      b) aminization      c) immobilization      d) denitrification
13. Potassium fixation is a problem in soils dominated by\_\_\_\_\_ clay.
- a) kaolinite              b) montmorillonite      c) vermiculite      d) chlorite
14. The nitrogen fixing enzyme systems requires \_\_\_\_\_ as essential elements.
- a) Mo and B              b) Fe and Mo              c) Fe and Mn              d) Mn and B
15. The soil acidity is a problem due to the excess saturation of CEC with\_\_\_\_\_.
- a)  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$       b)  $\text{H}^+$  and  $\text{Al}^{3+}$               c)  $\text{Na}^+$  and  $\text{Al}^{3+}$               d)  $\text{H}^+$  and  $\text{Na}^+$
16. \_\_\_\_\_ is a mobile nutrient element in crops.
- a) Sulfur                  b) Zinc                      c) Calcium                  d) Nitrogen
17. Denitrification process in \_\_\_\_\_ converts  $\text{NO}_3^-$  and  $\text{NO}_2^-$  to gaseous  $\text{N}_2$ .
- a) aerated soils          b) anoxic soils              c) acid soils                  d) alkaline soils
18. The sieve specification for processing (sieving) soil samples for soil fertility testing is \_\_\_\_\_ diameter.
- a) 2 cm                      b) 0.2 mm                  c) 2 mm                      d) 0.2 cm
19. The pH meter is made up of a \_\_\_\_\_ connected to a voltameter.
- a) glass electrode      b) Ag-AgCl electrode      c) calomel electrode      d) H electrode
20.  $2.58 \text{ dS/m} = \text{_____ mmhos/cm}$ .
- a) 0.258                      b) 2.58                      c) 25.8                      d) 0.0258
21. The Van Bemmlan factor used to convert organic carbon content to organic matter is \_\_\_\_\_.
- a) 0.003                      b) 0.03                      c) 1.724                      d) 58
22. The normal depth of soil sampling for fertility testing purpose in field crops is\_\_\_\_\_.
- a) 0-15 cm                  b) 0-30 cm                  c) 15-45 cm                  d) 30-60 cm