GWANDA STATE UNIVERSITY

FACULTY OF LIFE SCIENCES

DEPARTMENT OF CROP SCIENCES

BACHELOR OF SCIENCE (HONOURS) DEGREE IN CROP SCIENCE

LCS 2103 SOIL FERTILITY AND PLANT NUTRITION

FIRST SEMESTER EXAMINATION

February 2022

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Special Requirements: **Nil**

Examiner's Name: **Mathema. N**

INSTRUCTIONS

1. Answer **any five (5)** questions

MARK ALLOCATION

Every question carries twenty (20) marks

Question 1

a) Describe the three methods that are used to inoculate soya beans with Rhizobia japonicum.

[6]

b) Explore the challenges that are encountered when inoculating soya bean seed with Rhizobia japonicum.

[14]

Question 2

a) Outline the significance of phosphorous on plant growth.

[12]

b) Describe symptoms that may be displayed by plants when phosphate is deficient, relating the deficiency symptoms to its physiological functions . [8]

Question 3

a) Suppose you are a smallholder farmer in Gwanda South district, describe the attributes that you would you consider when selecting a crop to use as green manure crop.

[10]

b) Explain the effectiveness of the following methods of phosphate fertilizer application and its availability to crops in soils of the humid tropics:

i) Banding

[2]

ii) Broadcasting

[2]

iii) Application of high phosphate doses.

[2]

c) In semi- arid regions phosphorous availability is a problem to crops. Defend this statement.

[2]

d) Explain one management strategy that can be used to enhance phosphorous availability in semi-arid soils.

[2]

Question 4

a) Describe the soil sampling procedures used to collect soil samples for analysis to generate fertilizer recommendations in a ten (10) ha plot of land used for maize production.

[14]

b. Citing examples of your choice, explain any three influences of bio-fertilizers on physical properties of soils.

[6]

Question 5

a) Give two constituent macro-nutrients and one constituent micro-nutrient of the chlorophyll molecule. State the forms in which they are absorbed by plant roots.

[6]

b) Describe the active uptake mechanism of nutrients by plant roots.

[4]

c) Outline FIVE factors that affect the uptake of nutrients by plant roots.

[10]

Question 6

a) Outline the process of nitrification in soils

[10]

(b) Discuss the beneficial and detrimental effects of termites in cropping systems

[10]

Question 7

a) Distinguish Nitrogen fixation from Phosphorous fixation.

[10]

b) Assuming you were an Agricultural Extension officer in Gwanda district and you visit a farmer's field. Outline how you would determine the nutrient status of the soil.

[10]

Question 8

A farmer applied the Ammonium nitrate top dressing fertilizer in his field and noticed that there was no response on his crop to fertilizer application after a hot day which was followed by a wet spell.

a) Using your knowledge of fertilizer losses, describe the factors that could have led to his observation. [15]

b) Citing a crop of your choice, explain why it is important to apply fertilizers at a specific time during the growth of a crop. [5]

END OF EXAMINATION