GWANDA STATE UNIVERSITY

FACULTY OF NATURAL RESOURCES MANAGEMENT AND AGRICULTURE

DEPARTMENT OF HORTICULTURE AND CROP PRODUCTION

BACHELOR OF SCIENCE (HONOURS) DEGREE IN CROP SCIENCE

NHC2201 SOIL FERTILITY MANAGEMENT

December 2024

This examination paper consists of 3 pages

Time Allowed: **3 hours**

Special Requirements: **Nil**

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

INSTRUCTIONS

1. Answer **all** questions in section A
2. Answer THREE (3) questions in section B

MARK ALLOCATION

Question 1 carries 40 marks, all other questions carry twenty (20) marks

SECTION A: ANSWER ALL QUESTIONS

Question 1 [40 marks]

a) Outline the role of phosphorous on the various processes essential for plant growth, development, and adaptation to their environment. [12]

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

c) Suppose you are a smallholder farmer in Matobo district of Zimbabwe, describe the attributes that you would you consider when selecting a crop to use as green manure crop. [10]

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

i) Broadcasting [2]

ii) Application of high phosphate doses. [2]

iii) Banding [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]

SECTION B ANSWER ANY THREE QUESTIONS

Question 2

a) Describe the soil sampling procedures used to collect soil samples for analysis to generate fertilizer recommendations in a 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 3

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 4

a) Outline the process of nitrification in soils [10]

(b) Critique the belief that termites are a necessary evil in cropping systems [10]

Question 5

a) Distinguish Nitrogen fixation from Potassium fixation. [10]

a) Assuming you are 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 6

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]

END OF EXAMINATION