

GWANDA STATE UNIVERSITY



FACULTY OF LIFE SCIENCES

DEPARTMENT OF CROP SCIENCE

BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE

LCS 2103 SOIL FERTILITY AND PLANT NUTRITION

FINAL EXAMINATION PAPER

JANUARY 2021

This examination paper consists of 3 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: Calculator

Examiner's Name: Mathema. N

INSTRUCTIONS

1. Answer **all** questions in Section A
2. Answer **only two** questions in Section B

MARK ALLOCATION

QUESTION	MARKS
SECTION A	60
SECTION B	40
TOTAL ATTAINABLE MARKS	100

SECTION A: ANSWER ALL QUESTIONS

Question 1

- a) Describe the process of Soil sampling for fertilizer recommendations in a field meant for Crop production. [14]
- b) Citing examples of your choice, explain any three influences of bio-fertilizers on physical properties of soils. [6]

Question 2

- a) Give two constituent macro nutrients and one constituent micronutrient nutrients of the chlorophyll molecule and 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 3

- a) Discuss the physiological effects of phosphorous on plant growth and the deficient symptoms that may be displayed by plants as a result of its deficiency. [15]
- b) Illustrate why a farmer's field in Filabusi where there are red soils with high Clay content would require larger amounts of lime than a farmer's field in Lupane with sandy soils, to produce the same pH change. [3]
- c) Describe the 1st step and 2nd step processes of nitrification. [2]

SECTION B ANSWER ANY TWO (2) QUESTIONS IN THIS SECTION

Question 4

- a) Outline the process of nitrification in soils [10]
- b) Discuss the beneficial and detrimental effects of termites in cropping systems [10]

Question 5

- a) Which areas of Zimbabwe are likely to have hyperthermic soils and their effect on crop growth? [5]
- 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 fertilizer dose [2]
- c) In semi- arid regions phosphorous availability is a problem to crops. Justify this statement. [2]
- d) Explain one management strategy that can be used to enhance phosphorous availability in semi-arid soils. [2]

Question 6

- a) Distinguish Nitrogen fixation from Phosphorous fixation. [10]

- b) Assuming you were an Agricultural Extension officer in Insiza district and you visit a farmer's field. Outline how you would determine the nutrient status of the soil. [10]