

**GWANDA STATE UNIVERSITY**



**FACULTY OF NATURAL RESOURCES AND AGRICULTURE**

**DEPARTMENT OF CROP SCIENCE**

**BACHELOR OF SCIENCE HONOURS DEGREE IN CROP SCIENCE**

**SOIL FERTILITY MANAGEMENT**

**LCS 2201**

**Second Semester Examination Paper**

**JUNE 2023**

This examination paper consists of 3 pages.

**Time Allowed: 3 Hours**

**Total Marks: 100**

**Special Requirements: None**

**Examiner's Name: Mathema N**

**INSTRUCTIONS**

1. Answer **ALL** questions in Section A
2. Answer **TWO** questions in Section B

**MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
<b>SECTION A</b>	<b>60</b>
<b>SECTION B</b>	<b>40</b>
<b>TOTAL ATTAINABLE MARKS</b>	<b>100</b>

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## SECTION A: ANSWER ALL QUESTIONS IN SECTION A

### **Question 1**

(a) Relate the physiological functions of the following plant nutrients to the deficiency symptoms exhibited by crops when their supply is limited in soils.

- i. Iron [4 Marks]
- ii. Magnesium [4 Marks]
- iii. Boron [3 Marks]

b) Citing relevant examples, discuss the factors that cause lime induced chlorosis in a crop of your choice. [9 Marks]

### **Question 2**

With the aid of suitable examples, predict the effects of excessive salts in cropping soils under the following headings:

- a) Osmotic effects [7 Marks]
- b) Common ion effect [8 Marks]
- c) Physical effects [5 Marks]

### **Question 3**

a) Elaborate on the following regarding saline soils:

- i. Define a saline soil [2 Marks]
- ii. Explain why salinity is detrimental to plant growth [3 Marks]
- iii. Suggest how saline soils can be reclaimed for use in crop production [5 Marks]

b) Elaborate on the following regarding sodic soils:

- i. Define a sodic soil [2 Marks]
- ii. Explain why sodicity is detrimental to plant growth and development [3 Marks]
- iii. Suggest ways of managing sodicity in cropping soils [5 Marks]

## SECTION B: ANSWER TWO QUESTIONS IN SECTION B

### **Question 4**

Tile drainage is an uncommon method of managing water-logging or poor drainage in Zimbabwe and most African countries. Suppose you were an Agricultural Extension Officer and you have been asked to give a briefing to policy makers and funders about the benefits of the technology, outline the need to introduce the technology in Zimbabwe's farming sector under the following headings:

- a) Background behind the concept of drain tilling [8 Marks]
- b) Advantages of using the technology [8 Marks]
- c) Disadvantages of using the technology [4 Marks]

### **Question 5**

Discuss the mechanisms and functions of the following microorganisms in enhancing the growth and yield of named crops.

- a) Nitrogen fixing bacteria. [10 Marks]
- b) Mycorrhizae or Fungus roots [10 Marks]

### **Question 6**

- a) Transfer the Law of diminishing returns commonly used in Agricultural Economics to application of top-dressing fertilizer in maize after the grain filling stage. [10 Marks]
- b) 'The nutritional value of a soil is as valuable as the availability of its most limiting nutrient'. Defend this statement, citing relevant examples in view of the Law of the minimum. [10 Marks]

### **Question 7**

Identify and describe the attributes that you would you consider when selecting a crop to use as a green manure in your crop field [20 Marks]

### **Question 8**

- a) Citing examples, differentiate mobile from immobile plant nutrients [10 Marks]
- b) Define soil pH, in the process indicate the pH scale [2 Marks]
- c) Citing examples, describe four circumstances that can influence soil pH. [4 Marks]
- d) Describe how soil pH affects the production of any leguminous crop of your choice. [4 Marks]

***End of Examination***