

NATIONAL UNIVERSITY OF LESOTHO
FACULTY OF AGRICULTURE
DEPARTMENT OF SOIL SCIENCE & RESOURCE CONSERVATION

SSR 320/3 & SSR323/4 – Soil Fertility and Plant Nutrition

Final Examination

Year: 3

**Programmes: B.Sc. Agriculture – Agricultural Economics, Agricultural Extension, Crop Science,
General and Soil Science options;**

B.Ed, B.Sc.Geography and B.Sc. Environmental Sciences

May 2019

Total marks = 100

Time: 3 Hours

INSTRUCTIONS:

Answer ONLY FOUR (4) Questions

Section One

Answer ALL questions in this section

Question 1

- (a) Differentiate between soil fertility and soil productivity. [10 marks]
- (b) Give the general forms in which nutrients occur in soil, and categorize them
- (i) In terms of availability concept,
 - (ii) As active and passive forms. [15 marks]

Question 2

- (a) What are the attributes that have led to the great progress made in fertilizer technology and the use of nutrient fertilizers, particularly the nitrogen (N), phosphorus (P) and potassium (K) to date? [15 marks]
- (b) Briefly discuss the use of fertilizer in relation to population, known as *Per Capita*. [10 marks]

Section two

Answer any two (2) questions in this section

Question 3

Describe all the mode of nutrients transport from the bulk soil toward the plant root surfaces, and how each of them is affected by soil moisture content. [25 marks]

Question 4

- (a) Describe the concept of cation exchange capacity (CEC) in soil. [10 marks]
- (b) With reference to the benchmark soil series of Lesotho, discuss the classification of soils with respect to their natural soil fertility status based on CEC and percent base saturation (%BS). [15 marks]

Question 5

- (a) Discuss the interaction effects of soil pH and humus content on soil phosphorus availability. [20 marks]
- (b) Demonstrate with a graph, distribution of ionic P in relation to soil pH. [5 marks]

Question 6

- (a) Discuss three (3) key functions of nitrogen in plants [15 marks]
- (b) Which between legume plants and cereal plants require nitrogen fertilizer? Give explanation? [10 marks]