

The National University of Lesotho
Faculty of Agriculture
Department of Soil Science & Resource Conservation

SSR324/3 – Soil Microbiology and Biochemistry

Final Examination

Programmes: B.Sc. Agriculture – Soil Science

Year 3

December 2017

Total marks = 100

Time: 3 Hours

INSTRUCTIONS:

There are **three (3) Sections** in this paper:

Section A: Answer **All three (3)** Questions

Sections B: Answer **Only one** Question

Section C: Answer **Only one** question

SECTION A

Answer ALL three Questions in this Section

Question 1 (20 marks)

- (a) Describe soil microbiology and the significance of studying soil microorganisms. [10 marks]
- (b) Discuss one innovative technology which uses soil microorganisms. [10 marks]

Question 2 (20 marks)

- (a) Describe five (5) groups of soil microorganisms based on energy and carbon sources. [10 marks]
- (b) State three (3) reasons why soil microorganisms require nutrients. [3 marks]
- (c) State the main substrate for the heterotrophic feeding process of microbial cells, and discuss how it affects the rate of the process. [5 marks]
- (d) Which groups of soil microorganisms use an alternative feeding method to heterotrophy for acquiring carbon? [2 marks]

Question 3 (20 marks)

Discuss biological diversity in soils, highlighting its influence on functional diversity and redundancy, and the overall role that it plays on soil quality.

SECTION B

Answer ONLY ONE Question in this Section

Question 4 (20 marks)

Discuss the process of biological N₂-fixation, highlighting the responsible soil organisms, the influence of abiotic and biotic factors in the soil, and the impact of the process to agriculture and to the environment. [20 marks]

Question 5 (20 marks)

Compare and contrast the bacteria and fungi on the basis of their adaptation to the soil environment, and significance in the maintenance of good quality soil. [20 marks]

SECTION C

Answer ONLY ONE Question in this Section

Question 6 (20 marks)

(a) Describe the criteria for classification of soil microorganisms. [20 marks]

Question 7

(a) Outline the process of microbial classification. [4 marks]

(b) Describe the three (3) approaches of microbial classification. [6 marks]

(c) Describe any two (2) methods for studying soil microorganisms, giving their respective principles. [10 marks]