

National University of Lesotho
Faculty of Agriculture
Final Examination

SSR 324 - Soil Microbiology and Biochemistry

May 2011

100 Marks

Time: 3 Hours

General Instructions:
Answer all questions in Section A &
Answer only 3 questions in Section B

Section A: Answer all three questions

Question 1

- a) List components of the following aspects of soil ecology
 - i) Biotic components (2 marks)
 - ii) Abiotic components (4 marks)
- b) List 5 general characteristics of microorganisms (5 marks)
- c) List any five groups of microorganisms (5 marks)
- d) Define microbial ecology (4 marks)

Question 2

- a) Describe the following categories of microorganisms as used in ecological classification.
 - i) Autochthonous species (5 marks)
 - ii) Zymogenous species (5 marks)
 - iii) Allochthonous species (5 marks)
- b) Briefly discuss three the basic approaches to microbial classification (5 marks)

Question 3

- a) Discuss the four progressive levels of ecological structure (5 marks)
- b) Compare and contrast the nature of cooperative and competitive interactions among microorganisms (10 marks)
- c) Give examples of following interactions discussed in Question 3 (b) above:
 - i) Negative interactions (2 marks)
 - ii) Positive interactions (3 marks)

Section B: Answer only two questions of your choice

Question 4

Briefly discuss the microbiology of the rhizosphere highlighting its significance (20 marks)

Question 5

Briefly discuss the nature mycorrhiza and significance of agronomic interactions (20 marks)

Question 6

Briefly describe symbiotic nitrogen fixation in soil systems and highlight key soil environmental parameters (20 marks)

Question 7

Describe the Nitrogen Cycle and trace additions, transformations and losses influenced by soil microorganisms only (20 marks)

Question 8

Organic farming systems are based on the application of organic manures and crop residues to the soil. The basic hypothesis is that organic matter decomposition during the growing season will release adequate nutrients to meet the demand of the economic crops hence the application of inorganic fertilizers is a thing of the past. Provide a critical discussion of this hypothesis.