



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE
(BIOLOGY)

SBT 413: ENVIRONMENTAL MICROBIOLOGY

DATE: 28/7/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

Question one

- a) Explain how excess water in the soil influences microorganisms' populations in the soil (3 marks)
- b) Explain the structure and role of akinete in some algae. (3 marks)
- c) Explain why a plant growing together with *Anabaena* can survive in a nitrogen deficient environment. (3 marks)
- d) Describe the main algae groups found in the soil (3 marks)
- e) Explain why the rod coccus, *Arthrobacter*, are capable of surviving in extreme environments. (3 marks)
- f) Briefly describe the process of the formation of geosmin in the environment. (3 marks)
- g) Distinguish between autochthonous and zymogenous bacteria. (3 marks)
- h) State three environmental conditions that accelerate denitrification (3 marks)
- i) Explain three microbial functional environmental characteristics of a rhizosphere. (3 marks)
- j) State three possible causes of for a limited environmental biodegradation of wastes. (3 marks)

QUESTION TWO

- a) Describe how humidity and soil fertility factors facilitate the development of microorganism in the soil. (10 marks)
- b) Discuss how the reaction pH of the soil influences the microbial population activities in the soil. (10 marks)

QUESTION THREE

- a) Discuss the population density and habitats of algae and protozoa in a typical profile of a farm soil. (10 marks)
- b) Discuss how the quantity and quality of light affects the population of soil algae and protozoa populations in the soil. (10 marks)

QUESTION FOUR

- a) Discuss the various algae groups found in the soil (10 marks)
- b) Discuss the components and roles of the phytoedaphon. (10 marks)

QUESTION FIVE

- a) Discuss the process of humus synthesis in an ecosystem. (10 marks)
- b) Discuss, citing examples the significance of bacterrhiza and mycorrhiza in the environment. (10 marks)