



MACHAKOS UNIVERSITY

University Examinations 2022/2023 academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

BACHELOR OF SCIENCE (BIOLOGY)

SBT 412: APPLIED MICROBIOLOGY

DATE:

TIME:

INSTRUCTIONS

1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Use clean well labelled diagrams wherever appropriate.

SECTION A (COMPULSORY)

QUESTION ONE (30 MARKS)

- a) Explain three characteristics of biogeochemical cycles found in the phosphorous cycle (3 marks)
- b) Outline three mechanisms of production of inactivated vaccines (3 marks)
- c) Illustrate three advantageous traits of plants resulting from genetic modification (3 marks)
- d) Explain the role of a specific microorganism in yogurt production (3 marks)
- e) By use of a chemical equation describe the role of *Saccharomyces cerevisiae* in bread making (3 marks)
- f) Describe the three steps of waste water treatment. (3 marks)
- g) Describe how distilled spirits such as whiskey are produced. (3 marks)
- h) Briefly discuss global warming in relation to the carbon cycle (3 marks)
- i) Describe eutrophication and its negative effects (3 marks)
- j) Describe three strategies of bioremediation (3 marks)

QUESTION TWO (20 MARKS)

- a) Describe the typical genetic modification procedure (10 marks)
- b) Discuss how *Agrobacterium tumefaciens* has been leveraged for the development of transgenic Bt maize (10 marks)

QUESTION THREE (20 MARKS)

Compare and contrast the process of beer making and wine making.

QUESTION FOUR (20 MARKS)

Describe the role of microorganisms in the nitrogen cycle.

QUESTION FIVE (20 MARKS)

- a) Discuss techniques used to optimize microbial output of industrial products. (10 marks)
- b) Describe the mechanisms used to create production strains, that are optimized for industrial purposes (10 marks)