



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF AGRICULTURAL AND FOOD SCIENCES**

**FIRST YEAR SECOND SEMESTER UNIVERSITY EXAMINATION FOR THE
DEGREE OF BACHELOR OF SCIENCE IN AGRICULTURAL EXTENSION EDUCATION, DEGREE
OF BACHELOR OF SCIENCE IN ANIMAL SCIENCE AND BACHELOR OF SCIENCE IN
HORTICULTURE**

2024/2025 ACADEMIC YEAR

REGULAR

COURSE CODE: AAB 1102

COURSE TITLE: Agricultural microbiology

EXAM VENUE:

STREAM: BSc. Agricultural Extension Education

BSc. Animal Science

BSc. Horticulture

DATE:

EXAM SESSION:

TIME: 2 HOURS

Instructions:

- 1. Answer ALL questions in section A and ANY other 2 Questions in section B.**
- 2. Candidates are advised not to write on question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

SECTION A (30 MARKS)

Answer ALL questions from this section

1. Define the term Agricultural Microbiology. (1 mark)
2. (a) Identify the importance of Koch's postulates. (2 marks)
- (b) What is a potential challenge to the application of Koch's postulates? (1 mark)
3. Explain the importance of observations made by Hooke and Van Leeuwenhoek. (4 marks)
4. Compare spontaneous generation and biogenesis. (2 marks)
5. Define the following:
 - a. Facultative Anaerobic bacteria. (1 mark)
 - b. Flagellum (1 mark)
 - c. Mycelium (1 mark)
 - d. Fermentation (1 mark)
6. Distinguish between catabolism and anabolism. (2 marks)
7. Briefly state the role played by microorganisms in each of the following: (4 marks)
 - a. Recycling of elements
 - b. Sewage treatment
8. Identify two plant diseases caused by bacteria. (2 marks)
9. The term "Rhizosphere" refers to: (2 marks)
10. What is the primary role of the following microorganisms in Agriculture? (2 marks)
 - a. *Agrobacterium tumefaciens*
 - b. *Bacillus thuringiensis*
11. What is the primary function of mycorrhizal fungi in plants? (1 mark)
12. Distinguish between aerobic and anaerobic respiration. (2 marks)
13. What is the role of a capsid to a virus? (1 mark)

SECTION B (40 MARKS)

- 1) (a) Explain the role of microbes in each of the following processes.
 - i. Biological control of pests and diseases. (4 marks)
 - ii. Bioremediation (4 marks)
 - iii. Biofertilisation (4 marks)
- (b) Describe the general life cycle of a fungal organism. (8 marks)
- 2) (a) Using specific examples describe the different morphological forms of bacteria. (13 marks)
- (b) Explore the significance of the innovations by Robert Koch and Luis Pasteur on the evolution of modern microbiology. (7 marks)
- 3) (a) Define the term bacterial metabolism. (2 marks)
- (b) Diagram a Gram – positive and Gram – negative bacterial cell wall. (6 marks)
- (c) Explain the differences in the structure of these types of bacterial cell walls. (4 marks)
- (d) Explain beneficial activities of microorganisms in food production. (8 marks)
- 4) (a) Outline the nitrogen cycle, and explain the roles of microorganisms in this cycle. (15 marks)
- (b) Define ammonification, nitrification, denitrification and nitrogen fixation. (5 marks)