

APPLIED BIOLOGY LEVEL 6

SBA 2150

INTRODUCTON TO MICROBIAL WORLD

MARCH/APRIL 2024

MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. This paper has two sections **A** and **B**.
2. You are provided with separate answer booklet.
3. Marks for each question are indicated.
4. Do not write on the question paper.

SECTION A

Answer all the questions in this section

1. Highlight **four** features of a typical bacteria. (4 marks)
2. Outline the reasons why microbiology was slow to develop as a science. (4 marks)
3. Explain the difference between Gram-positive and Gram-negative bacteria based on the structure of their cell walls. (2 marks)
4. Enumerate the available groups of bacteria based on the number and arrangement of the flagella. (4 marks)
5. Bacterial cell membrane serves as the “gate-keeper” controlling what and how much enters in and out of the cell. Outline the other four functions of the cell membrane in bacteria. (4 marks)
6. Explain two techniques that can be used to measure the bacterial cell numbers. (4 marks)
7. Outline the factors that can limit the population growth of the bacteria during the stationary phase. (3 marks)
8. Highlight two sub-units of a bacterial ribosome. (2 marks)
9. Explain any two types of horizontal gene transfer in bacteria. (4 marks)
10. Major elements are the elements that make up the cell constituents. Enumerate the roles of the following major elements as the constituents of the cell. (4 marks)
 - i. Nitrogen
 - ii. Sulfur
 - iii. Phosphorus
 - iv. Potassium
11. Summarize the experiment that Louis Pasteur conducted to disapprove the spontaneous generation theory. (5 marks)

SECTION B (60 MARKS)

Answer any **three** questions in this section

12. a) Each species of microorganism has a well defined upper and lower temperature limits within which they grow. Discuss the groups of microorganisms that are available based on their optimum temperature required for their growth. (8 marks)

b) In most bacteria, growth involves increase in cell mass and number of ribosomes, duplication of bacterial chromosomes, synthesis of new cell wall and plasma membrane and cell division. Discuss the available methods for measuring the bacterial cell mass using indirect techniques. (8 marks)

c) Highlight **four** characteristic phases in microbial growth curve. (4 marks)

13. a) Microbiology is a wide field of life science with sub-fields that merge together to form this broader field. Explain any five of these sub-fields that constitute microbiology. (10 marks)
- b) With an illustrating diagram, summarize the structure of a typical bacterium. (10 marks)
14. a) With a diagram, explain the Redi's experiment that he performed to disapprove the Spontaneous Generation theory. (10 marks)
- b) Explain the term 'Germ Theory of Disease'. (2 marks)
- c) Describe the Koch's postulates to prove the cause of an infectious disease. (8 marks)
15. a) Bacterial cell wall is a unique structure that surrounds the cell membrane. Discuss the structural importance of this cell wall. (8 marks)
- b) Describe the external surface structures found on the cell wall of the bacteria. (8 marks)
- c) Explain any **two** antibacterial compounds that target the peptidoglycan of bacterial cell wall. (4 marks)