MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER EXAMINATIONS
FOR
BACHELOR OF SCIENCE IN MICROBIOLOGY

MIC 4217: ENVIRONMENTAL BIOTECHNOLOGY

DATE: **TIME:**

Instructions

A. Answer ALL questions in section A and any TWO in section B

B. Illustrate your answers with diagrams and give examples where appropriate.

SECTION A

Answer ALL Questions. (30marks)

1. Define biofilm and explain its role in environmental biotechnology. **(3mks)**
2. Describe the process of bioremediation of soil environments. **(3mks)**
3. Discuss microbial fuel cells and its potential as a substitute for fossil fuels. **(3mks)**
4. Identify and explain limitations associated with bioremediation techniques. Propose strategies to address these limitations. **(3mks)**
5. Define coliform bacteria and list examples. **(3mks)**
6. Define acid mine drainage (AMD) and discuss its environmental implications. **(3mks)**
7. Highlight the role of microorganisms in waste water treatment. **(3mks)**
8. Explain the application of biosensors in environmental monitoring. Give examples of biosensors used for detecting environmental pollutants. **(3mks)**
9. Compare and contrast biological pesticides and biological fungicides. **(3mks)**
10. Describe methods for generating valuable products from waste materials using biotechnological approaches. **(3mks)**

SECTION B

Answer Any TWO Questions (40 Marks)

11. Discuss the formation of biofilms by microbial consortia and their significance in environmental biotechnology. Provide examples to support your discussion. **(20mks)**

12. Analyze the challenges encountered in the bioremediation of heavy metals in soil environments. Propose innovative strategies to enhance the efficiency of metal bio treatment processes. **(20mks)**

13. Evaluate the potential of biological pesticides and fungicides as alternatives to chemical pesticides in agriculture. Discuss their benefits and limitations in sustainable pest management. **(20 mks)**

14. Explore the application of biotechnological approaches in the treatment of wastewater from industrial sources. Discuss the advantages of using microbial processes in wastewater remediation. **(20 mks)**