



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

**FOURTH YEAR SUPPLEMENTARY/SPECIAL EXAMINATION FOR DEGREE IN
BACHELOR OF SCIENCE IN ENVIRONMENT AND NATURAL RESOURCE
MANAGEMENT**

ENS 433: ENVIRONMENTAL BIOTECHNOLOGY

DATE: 10/3/2023

TIME: 2.00 – 4.00 PM

INSTRUCTIONS

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

QUESTION ONE (30 MARKS)

- a) Describe three limitations on the use of DNA technology in pollution control (3 marks)
- b) Outline the role of *B. Licheniformis* in cleaning waste waters (3 Marks)
- c) Describe three methods that can be used to introduce a foreign gene into a cell (3 marks)
- d) Describe the use of microorganisms in biosensor (3 marks)
- e) Identify and explain features of the regulatory region of the gene (3 marks)
- f) Using an example describe the role of microbial vector in environmental biotechnology (3 marks)
- g) Describe at least THREE methods of accessing germline in biotechnology (3marks)
- h) Give a sequential processes involved in the polymerisation of the mRNA (3 markers)
- i) Describe the three main types of indications in a biomarker (3 marks)
- j) Summarise in three points' process involved in the formation of replication fork (3 marks)

QUESTIONS TWO (20 MARKS)

- a) Discuss the use of Complementation Analysis in the study of Recessive Mutations (10 marks)
- b) Describe a step by step process on the use of CRISPR/CAS9 technology in biotechnology (10 marks)

QUESTIONS THREE (20 MARKS)

Discuss the use of lactose metabolism in the monitoring of bacteria contaminations in culture (20 marks)

QUESTIONS FOUR (20 MARKS)

Discuss the application of plasmids in genetic modifications (20 marks)

QUESTIONS FIVE (20 MARKS)

Discuss the use of genetically engineered stem cells in the production of transgenic organisms (20 marks)