



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
BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION
BSC (BIOLOGY)**

SBT 420: BIOTECHNOLOGY

DATE: 10/3/2023

TIME: 2.00 – 4.00 PM

INSTRUCTIONS

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

QUESTION ONE (30 MARKS)

- a) With illustrate the role Sau3A in cloning (3 marks)
- b) Outline CRISPR /CAS9 process in Biotechnology (4 marks)
- c) Describe composite transposons (3 marks)
- d) Outline three features of plasmids that can be used for monitoring in genetic engineering (3marks)
- e) Describe the regulatory region of the gene (3marks)
- f) Diagrammatically illustrate gene inversion (3 marks)
- g) Describe any three features of the IS elements (3 marks)
- h) Outline the importance of T-DNA in plant biotechnology (3 marks)
- i) Briefly describe gene silencing (3 marks)
- j) Distinguish Uracil from Thymine (3 marks)

QUESTION TWO (20 MARKS)

Discuss the production of a transgenic mice using genetically engineered embryonic stem (ES) cells (20 marks)

QUESTIONS THREE (20 MARKS)

Using specific example discuss

- a) Negative feedback mechanism in gene regulations in prokaryotic cells (12 marks)
- b) Positive feedback mechanism in gene regulations in prokaryotic cells (8 marks)

QUESTIONS FOUR (20 MARKS)

Discuss in a stepwise process the construction of cDNA libraries using BamH1 linkers (20 marks)

QUESTIONS FIVE (20 MARKS)

Discuss step by step the process of translation in Eukaryotic cells (20 marks)