



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF AGRICULTURAL EDUCATION AND EXTENSION[
BACHELOR OF SCIENCE (BIOLOGY)
SBT 420: BIOTECHNOLOGY

DATE: 21/10/2020

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

1. Answer Question 1 (compulsory) and **any two** questions in Section B.
2. Clearly and cleanly illustrate your answer as appropriate

SECTION A: COMPULSORY

QUESTION ONE (30 MARKS)

- a) Explain how protoplast development and regeneration can be maintained (3 marks)
- b) Outline the process of somatic hybridization (3 marks)
- c) Explain the properties of a good vector of a gene (3 marks)
- d) Outline the key components of tissue culture (3 marks)
- e) Explain the categories of bioreactors used in plant tissue culture (3 marks)
- f) Explain the meaning of the following terms (3 marks)
 - i) Biotechnology
 - ii) Regeneration
 - iii) callus tissue
- g) Define bioremediation and explain how it can be achieved (3 marks)
- h) Outline how recombinant insulin is produced (3 marks)
- i) Explain the advantages of tissue culture over conventional plant propagation (3 marks)
- j) Explain why a Gamma cell irradiator is inappropriate for sterilizing materials used in tissue culture (3 marks)

SECTION B: ANSWER ANY TWO QUESTIONS (40 MARKS)

QUESTION TWO (20 MARKS)

- a) Discuss the mutagenic agents used in plant breeding (12 marks)
- b) Discuss methods of gene transfer in plant cells (8 marks)

QUESTION THREE (20 MARKS)

Discuss the components of plant tissue culture medium

QUESTION FOUR (20 MARKS)

Describe how protoplast culture techniques maintain effective densities

QUESTION FIVE (20 MARKS)

- a) Discuss downstream processing (10 marks)
- b) Discuss the application of genetic engineering in production of insect resistant plants (10 marks)