



MACHAKOS UNIVERSITY

University Examinations 2019/2020 academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (BIOLOGY)

SBT 420: BIOTECHNOLOGY

DATE: 19/01/2021

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.

SECTION A: ANSWER ALL QUESTIONS (30 MARKS)

QUESTION ONE (30 MARKS)

- a) Define the following terms (3 marks)
 - i. Biotechnology
 - ii. Regeneration
 - iii. Genetic engineering
- b) Outline three importance of plant tissue culture (3 marks)
- c) Explain how protoplast development and regeneration can be maintained (3 marks)
- d) Outline steps involved in somatic hybridization (3 marks)
- e) Outline three properties of a good vector (3 marks)
- f) Explain the effects of ploidy in mutation breeding (3 marks)
- g) Outline three main methods for the mass culture of plant cells (3 marks)
- h) Outline how recombinant insulin is produced (4 marks)
- i) Explain three techniques used in bioremediation (3 marks)
- j) Outline three categories of bioreactors used for plant cell cultures (3 marks)

SECTION B: ANSWER ANY TWO (2) QUESTIONS (TOTAL 40MARKS)

QUESTION TWO (20 MARKS)

Discuss the five major components of plant tissue culture medium

QUESTION THREE (20 MARKS)

- a) Describe four protoplast culture techniques adopted to maintain number of protoplast population between minimum and maximum effective densities after plating up. (8 marks)
- b) Describe two methods used in protoplast isolation (12 marks)

QUESTION TWO (20 MARKS)

- a) Discuss four methods involved in direct gene transfers into plant cells (8 marks)
- b) Discuss three categories of mutagenic agents (12 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the application of genetic engineering in production of insect resistant plant (12 marks)
- b) Describe steps involved in downstream processing (8 marks)