



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF BIOLOGICAL SCIENCES

FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (BIOLOGY)

SBT 420: BIOTECHNOLOGY

DATE: 25/7/2019

TIME: 2.00-4.00 PM

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## INSTRUCTIONS

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

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## SECTION A: ANSWER ALL QUESTIONS (30 MARKS)

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1. 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)

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

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2. Discuss the five major components of plant tissue culture medium (20 marks)
3. 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)
4. a) Discuss four methods involved in direct gene transfers into plant cells (8 marks)  
b) Discuss three categories of mutagenic agents (12 marks)
5. a) Discuss the application of genetic engineering in production of insect resistant plant (12 marks)  
b) Describe steps involved in downstream processing (8 marks)