



# MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

SBT 420: AGRICULTURAL BIOTECHNOLOGY

DATE: 3/5/2019

TIME: 11:00 – 1:00 PM

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## INSTRUCTION:

Answer Question One and Any Other Two Questions

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Differentiate between the structure of DNA and RNA (2 marks)
- b) Describe the components of a DNA molecule (3 marks)
- c) Explain the functions of chromosomes (2 marks)
- d)
  - i) State six requirements of polymerase chain reaction (PCR) (3 marks)
  - ii) Describe steps involved in polymerase chain reactions (PCR) (3 marks)
- e) Describe the following techniques, indicating the applications of each:
  - i) Gel electrophoresis (3 marks)
  - ii) Recombinant DNA technology/gene cloning (5 marks)
- f) State the important biological tools used in recombinant DNA technology (2 marks)
- g)
  - i) Describe the three techniques used in protoplast fusion (3 marks)
  - ii) Explain four applications of protoplasts in Agriculture. (4 marks)

### QUESTION TWO (20 MARKS)

- a) Describe the central dogma in molecular biology (10 marks)
- b) Describe the molecular markers used in biotechnology (10 marks)

**QUESTION THREE (20 MARKS)**

- a) Describe the restriction enzymes applied in biotechnology (10 marks)
- b) Describe the important GMOs in Agriculture. (10 marks)

**QUESTION FOUR (20 MARKS)**

Discuss the applications of biotechnology in Agriculture.

**QUESTION FIVE (20 MARKS)**

- a) i) Describe the media components of plant tissue cell culture. (10 marks)  
ii) Explain the application of plant tissue/cell culture in agriculture. (5 marks)
- b) Explain the applications of Marker assisted selection (MAS) in breeding (5 marks)