



MACHAKOS UNIVERSITY

University Examinations for 2017/2018 Academic Year

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: 15/12/2017

TIME: 8.30-10.30 AM

Instructions:

Answer **question one** and any other **two questions**

QUESTION ONE

Explain the following terms:

- a) Genetic marker (1 mark)
- b) Tissue culture (1 mark)
- c) Agricultural biotechnology (1 mark)
- d) Restriction enzyme (1 mark)
- e) Describe the biochemical composition and structure of deoxyribonucleic acid (DNA). (4 marks)
- f) Explain **four** properties of a good plasmid vector. (4 marks)
- g) Explain **four** components of a PCR reaction. (4 marks)
- h) Explain the role of genomics in Agriculture. (3 marks)
- i) Explain **four** applications of PCR Technology in Agriculture. (4 marks)
- j) Using a well labelled diagram, describe the structure of a chromosome (5 marks)
- k) Explain **two** preferences for Amplified Fragment Length Polymorphism to Random Amplified Polymorphic DNA markers in genetic characterization of rice (*Oryza sativa*). (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain **two** fundamental advantages of Marker-assisted selection over conventional phenotypic selection. (4 marks)
- b) Explain the steps followed in micro-propagation of a banana plant. (16 marks)

QUESTION THREE (20 MARKS)

- a) Explain any **five** advantages of micro-propagation. (5 marks)
- b) Marker-assisted selection is a tool for genetic improvement of crops. Discuss. (15 marks)

QUESTION FOUR (20 MARKS)

- a) Explain any **five cons** of transgenic plants. (5 marks)
- b) Applications of biotechnology can solve food insecurity in Africa. Discuss (15 marks)

QUESTION FIVE (20 MARKS)

- a) With aid of a well labelled diagram, describe the Protoplast Culture Technique.(8 marks)
- b) Plant Tissue Culture is of great importance in the 21st century. Discuss. (12 marks)