

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**FOURTH YEAR EXAMINATION FOR THE AWARD OF
DEGREE OF BACHELOR OF SCIENCE**

BOTA 412: PLANT BIOTECHNOLOGY

STREAMS: BSc, BIO, BEd, SCI

TIME: 2 HOURS

DAY/DATE : WEDNESDAY 22 /09/ 2021

8.30 AM – 10.30 AM

INSTRUCTIONS TO CANDIDATES:

- Answer All questions in SECTION A and any TWO in SECTION B
- Do not write anything on the question paper

SECTION A

1. Explain how a naturally occurring Ti plasmid from *Agrobacterium tumefaciens* can be manipulated to develop a vector for use in *Agrobacterium* mediated gene transfer. [5 Marks]
2. Describe the methods of DNA repair that occur in cells during genome editing through CRISPR /Cas9. [4 Marks]
3. a) Below is DNA sequences of a restriction site. Use it to describe how restriction enzymes are used in recombinant DNA technology. [3 Marks]

5' GAATTC3'
- b) Explain two practical situations in which DNA polymerase is used. [2 Marks]
4. a) Differentiate between cytological markers and biochemical markers. [2 Marks]
- b) Describe any two PCR based markers [4 Marks]

- 5. a) Describe two methods that are used for genetic engineering of plants other than the *Agrobacterium* mediated transformation. [4 Marks]
- b) Outline the differences between genetic engineering and conventional plant breeding. [2 Marks]
- 6. a) During the tissue culture of cassava, newly formed shoots failed to elongate and died within three weeks. Describe how this problem can be solved. [4 Marks]

SECTION B

- 7. a) Describe the process of recombinant DNA Technology. [10 Marks]
- b) Discuss the application of molecular markers in plant breeding. [10 Marks]
- 8. a) Discuss the applications of biotechnology in agriculture. [10 Marks]
- b) Explain the application of various tools of molecular biology [10 Marks]
- 9. a) Discuss the concerns that arise from genetic engineering of plants. [10 Marks]
- b) Discuss the composition of plant tissue culture medium [10 Marks]

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