NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY

BACHELOR OF SCIENCE HONOURS DEGREE IN BIOTECHNOLOGY

PLANT BIOTECHNOLOGY (SBT4103)

Main Examination Paper

DECEMBER 2024

This examination paper consists of 2 pages

Time Allowed	:	3 hours
Total Marks	:	100
Special Requirements	:	NONE
Examiner's Name	:	DR G. ZVOBGO

INSTRUCTIONS

1. Answer four **(4)** questions. Each question carries 25 marks.
2. Where a question contains subdivisions, the mark value for each subdivision is given in brackets.
3. Illustrate your answer where appropriate with large, clearly labelled diagrams.

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**
6.	**25**
TOTAL	**100**

1.(a) Give a detailed description of DNA packaging in chromosomes. (15 marks)

(b) Compare and contrast the nuclear and mitochondrial genomes. (10 marks)

2.(a) Write an essay on three different types of genome editing techniques used in plant biotechnology including their applications and ethical issues involved. (15 marks)

(b) Compare and contrast dominant and codominant markers. (10 marks)

3. Write short notes on the following:

(a) Forward and Reverse Genetics. (5 marks)

(b) Meganucleases. (5 marks)

(c) RAPDs. (5 marks)

(d) Kompetitive Allele Specific PCR. (5 marks)

(e) DNA repair. (5 marks)

4. Describe all the necessary biotechnological steps you would take to produce a transgenic tomato plant variety that is resistant to disease **X**.

5.(a) Describe in detail the *Agrobacterium* - based transformation method. (15 marks)

(b) Outline five different types of tissue culture. (10 marks)

6.(a) Describe three vector based and three non-vector based plant transformation methods. (15 marks)

(b) Explain the biotechnological concepts involved in the development of Bt cotton, golden rice and Roundup Ready soybeans. (10 marks)

END OF EXAMINATION