



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE IN BIOTECHNOLOGY
INTRODUCTION TO RECOMBINANT DNA TECHNOLOGY (SBT2203)

Main Examination Paper

MARCH 2025

This examination paper consists of 3 pages

Time Allowed : 3 hours
Total Marks : 100
Special Requirements : NONE
Examiner's Name : PROF. J. MBANGA

INSTRUCTIONS

1. Answer **four** 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. Write short notes on the following:
 - (a) Restriction modification systems. (5 marks)
 - (b) Nomenclature of restriction enzymes. (3 marks)
 - (c) Recognition and cleavage by restriction enzymes. (6 marks)
 - (d) Mechanism of CRISPR-mediated immunity in bacteria. (11 marks)

2.
 - (a) Define high capacity cloning vectors. (3 marks)
 - (b) Briefly describe how selection of transformants with recombinant DNA molecules is accomplished in recombinant DNA technology. (10 marks)
 - (c) Outline the methods that are used to prevent plasmid DNA from reforming during ligation. (6 marks)
 - (d) Using named examples, distinguish between insertion and replacement vectors. (6 marks)

3. Give an account of the methods that are used to introduce recombinant DNA into the following;
 - (a) plants, and (15 marks)
 - (b) mammalian cells. (10 marks)

4.
 - (a) Describe how you would create a recombinant DNA molecule using an insert and cloning vector without common restriction sites. (5 marks)
 - (b) Describe the creation and immunological screening of a cDNA library. (14 marks)
 - (c) List and briefly explain each step of Southern blotting. (6 marks)

5.
 - (a) State the features of a shuttle vector. (4 marks)
 - (b) Explain the functions of the following features that may be found in expression vectors:
 - (i) T7 promoter. (6 marks)
 - (ii) Histidine Tag. (5 marks)
 - (iii) F1 ori. (3 marks)
 - (iv) Leu 2 gene. (4 marks)
 - (v) Neomycin resistance gene. (3 marks)

6. Write an essay on **two** methods that are used in the creation of transgenic animals. In your answer, highlight **two** applications of transgenic animals.

END OF EXAMINATION