



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE HONOURS	
QUALIFICATION CODE: 08BOSH	LEVEL: 8
COURSE CODE: MRT811S	COURSE NAME: METHODS IN RECOMBINANT DNA TECHNOLOGY
SESSION: JUNE 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS	
<ol style="list-style-type: none">1. Answer ALL the questions.2. Write clearly and neatly.3. Number the answers clearly.4. All written work MUST be done in BLUE or BLACK ink.	

PERMISSIBLE MATERIALS

None

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES
(Including this front page)

Question 1

[12]

a) Briefly explain the purpose of the following components as used in western blotting technique. (4)

- I. Tetramethylethylenediamine (TEMED)
- II. Primary Antibody
- III. Blocking Media
- IV. Nitrocellulose Membrane

b) Discuss the cause of the following mishaps encountered following western blotting and how to resolve them. (8)

- I. Weak signals
- II. High background
- III. Patchy and uneven spots on the blot
- IV. No bands

Question 2

[14]

a) The genetic code is the set of rules defining how the four-letter code of DNA is translated into amino acids, which are the building blocks of proteins. Discuss **THREE (3)** characteristics of the genetic code. (6)

b) Briefly describe the following mutations; (8)

- I. Nonsense Mutation
- II. Frame shift Mutation
- III. Silent Mutation
- IV. Misense Mutation

Question 3 [17]

- a) Describe **FOUR (4)** applications of DNA microarray technology. (4)
- b) Describe **FOUR (4)** limitations of DNA microarray technology. (4)
- c) Outline the Next Generation Sequencing (NGS) technique associated with the Illumina platform. (9)

Question 4 [10]

- a) The Ti plasmid is one of the most commonly used vector for introducing new genes into plant cells. Briefly explain this technique. (4)
- b) What are the steps followed in plant transformation using particle bombardment? (6)

Question 5 [16]

- a) Name **SEVEN (7)** benefits of using mice in transgenic studies? (7)
- b) Explain the following medical applications of transgenic animals; (9)
 - I. Xenotransplanters
 - II. Tools in the study of immunoglobulin genes
 - III. Chemical Safety Testing

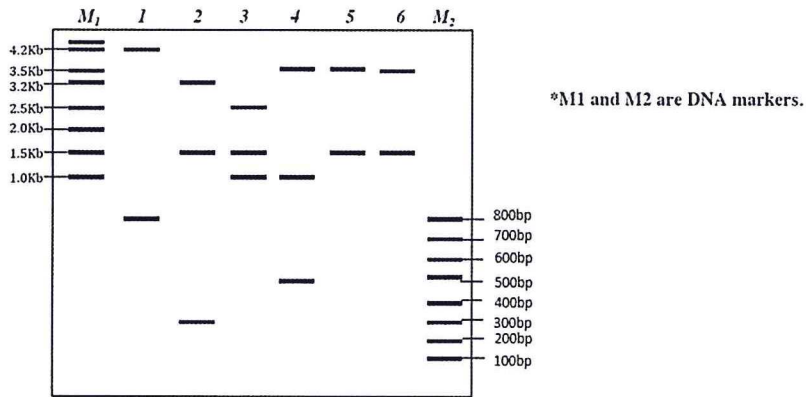
Question 6 [15]

- a) Discuss **FOUR (4)** applications of metabolomics. (8)
- b) State **SEVEN (7)** limitations of metabolomics. (7)

Question 7

[16]

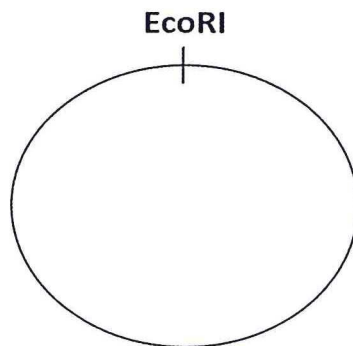
You are given a plasmid. In order to map this plasmid you set up a series of restriction digests and obtain the following results using agarose gel electrophoresis.



Lane	Digest	Size of fragments in bp
1	EcoRI and NotI	4200, 800
2	NotI and HindIII	3200, 1500, 300
3	HindIII and XbaI	2500, 1500, 1000
4	EcoRI and HindIII	3500, 1000, 500
5	HindIII	3500, 1500
6	XbaI and EcoRI	3500, 1500

a) What is the approximate size of the plasmid? (2)

b) Add the NotI, HindIII, XbaI restriction sites onto the plasmid map shown below. On your map give the distances between each of the restriction sites. (10)



c) Mention **FOUR (4)** factors that make a Vector ideal for cloning. (4)

THE END