



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

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 2022	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY QUESTION PAPER	
EXAMINER	DR LAMECH MWAPAGHA
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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 THREE (3) PAGES
(Including this front page)

- Question 1** [10]
- a) What were the main goals of the Human genome project? (4)
 - b) Distinguish between a genome map and a genome sequence. (2)
 - c) Briefly elaborate on how the knowledge of human genetic variation can be utilised in promoting health and combating disease. (4)

- Question 2** [17]
- a) State **TWO (2)** ways in which genes can be transferred in DNA recombination technology, and for each give **TWO (2)** examples. (6)
 - b) Mention **THREE (3)** demerits of the Retrovirus-mediated Gene Transfer (3)
 - c) RNA splicing is a form of RNA processing in which a newly made precursor messenger RNA (mRNA) is transformed into a mature RNA by removing the non-coding sequences termed introns. Describe RNA alternative splicing. (8)

- Question 3** [11]
- a) Compare and contrast the One- and Two-Channel DNA microarray hybridisation approaches. (4)
 - b) What are the **THREE (3)** major steps you would follow in order to identify a peptide of interest using the Peptide mass finger printing technique. (3)
 - c) Discuss **FOUR (4)** important tools providing investigators with sensitive and specific means of identifying and characterizing proteins. (4)

- Question 4** [16]
- a) DNA ligase is used for ligation of foreign DNA and vectors during gene cloning. Briefly explain the mechanism of DNA ligase in the enzymatic reaction of DNA ligation. (5)
 - b) Describe the mechanism and purpose of dephosphorylation in cloning. (3)
 - c) Distinguish between the following types of vectors; (8)
 - I. Shuttle Vectors;

II. Plasmid Vectors;

III. Retrovirus Vectors;

IV. Cosmid Vectors;

Question 5

[18]

- a) What are some of the concerns that scientists grapple with when it comes to animal cloning? (4)
- b) Therapeutic cloning involves creating a line of embryonic stem cells genetically identical to an individual. These stem cells can then be used in experiments aimed at understanding disease and developing new treatments for disease. In line with the above description outline the steps involved in therapeutic cloning. (10)
- c) Give a description of the nucleic acid probe technique as used in DNA recombination technology. (4)

Question 6

[12]

- a) The Particle bombardment device (gene gun), was developed to enable penetration of the cell wall so that genetic material containing a gene of interest can be transferred into the cell. Briefly describe the mechanism of action of the gene gun (4)
- b) State **FOUR (4)** ethical issues associated with human cloning. (4)
- c) Give **FOUR (4)** differences between the Ti and Ri Plasmids (4)

Question 7

[16]

- a) Discuss **FOUR (4)** applications of metabolomics: (8)
- b) State **FOUR (4)** limitations of metabolomics: (4)
- c) What are some of the ethical arguments for and against the cloning of humans? (4)

THE END