NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
DEPARTMENT OF INFORMATICS AND ANALYTICS
BIOINFORMATICS
SCI 4101

MAIN EXAMINATION PAPER
FIRST SEMESTER 2024

This examination paper consists of 3 pages

Time Allowed:	**3 hours**
Total Marks:	**100**
Examiner's Name:	**Mrs. C. Chivasa**
External Examiner's name:	**Dr L.C. Sakala**

INSTRUCTIONS

1. Answer any 4 questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	**25**
2.	**25**
3.	**25**
4.	**25**
5.	**25**

QUESTION ONE

a) Based on the Central Dogma, outline the process by which genetic information flows from DNA to a functional protein in eukaryotic cells. Highlight at least three unique steps involved. [10]

b) Discuss the importance of bioinformatics in understanding human diseases and how computational methods contribute to advancements in genomics. [15]

QUESTION TWO

a) Another way of checking sequence similarity is by using distance. Discuss how the following work:

I. DamerauLevenshtein. [5]

II. Hamming. [5]

b) Using an example, fully demonstrate the process of protein synthesis. [15]

QUESTION THREE

a) Discuss the advantages and limitations of Sanger sequencing. [10]

b) Illustrate with the aid of an appropriate diagram the subject areas important for a successful Bioinformatics career. [15]

QUESTION FOUR

a) Discuss the role of protein databases in understanding protein structure and function. [10]

b) Suppose you are tasked with finding all publicly available nucleotide sequences for a specific gene of interest. Identify two databases you would use and describe how they are organized to facilitate easy access to genetic information. [15]

QUESTION FIVE

a) Construct a dot plot for the following sequences:

GCTAGTCAGATCTGACGCTA

GATGGTCACATCTGCCGC [10]

b) Explain the concept of protein misfolding diseases. Provide at least three examples of such diseases. [15]

END OF QUESTION PAPER