

BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY  
4th YEAR 1st SEMESTER EXAMINATION, 2024

**Bioinformatics**

Time: 3 Hrs.

Full Marks: 100

**ANSWER FROM EVERY GROUP**

**Group 1: CO1 (Answer questions 1, 2 and any TWO from rest) (3 + 12 + 10 = 25)**

1. What is the biological significance of geographical closeness among the species? 3
2. Write short note on (any 4) (3 x 4 = 12)
  - A. Genome Mapping
  - B. DNA Mapping
  - C. Central dogma of the human cell.
  - D. Phylogenetic Tree
  - E. Parsimony Tree
3. What is Gene? Write down the difference between DNA, RNA, and Protein. 5
4. Draw the structure of DNA and label its Components. 5
5. What is Bioinformatics? Discuss the types of data analyzed in Bioinformatics. 5

**Group 2: CO2 (5 + 9 + 6 = 20)**

6. What is the purpose of the PDB database? Explain the need of database searching in the context of Bioinformatics? 2 + 3
7. What do you mean by protein structure? Explain the secondary and tertiary protein structure and briefly mention how it helps in sequencing and prediction problems. 2 + 4 + 3
8. Briefly explain any **two** of the following keywords. 3 x 2 = 6
  - A. Genome Sequencing
  - B. SCOP Database
  - C. Multiple Alignment
  - D. Pairwise sequence alignment

**Group 3: CO3 and CO5 (16 + 14 = 30)**

9. Discuss the hierarchical clustering technique in relation to a microarray gene analysis. 5
10. Write the Viterbi algorithm in detail. Why it is used? 5
11. What is gene microarray clustering? 3
12. What biological insight can be obtained from the clustered microarray? 3
13. Illustrate with a suitable example and briefly explain the application of it in bioinformatics on any **four** (4) of the following topics. 4 x 3.5 = 14
  - A) Feature Extraction
  - B) Dimensionality Reduction
  - C) Support Vector Machine
  - D) Markov Chains
  - E) Hidden Markov Model
  - F) Baum-Welch algorithm

**Group 4: CO4 (5 x 5 = 25)**

8. Write down in detail about any **Five** (5) of the following:
  - A) DNA Sequencing
  - B) Sequence Assembly
  - C) Protein Folding
  - D) Maximum Parsimony
  - E) Phylogram
  - F) Bootstrapping
  - G) Exploratory and confirmatory analysis