ourdiu.com | Shared by Syed Mahi Hossen

Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Midterm Examination, Spring 2024

Course Code: CSE 115, Course Title: Introduction to Biology and Chemistry for Computation

Level: 1 Term: 1 Batch: All

Time: 01:30 Hours **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. In a high-tech biotech firm, a team of researchers is tasked with replicating a specific segment of DNA for a groundbreaking gene therapy project. The team meticulously follows the steps of DNA replication in a controlled laboratory setting. Describe, in detail, the step-by-step DNA replication process. Include the specific enzymes and the roles they play. **[5]** **CO1**

2. Imagine you are a forensic scientist working on a criminal investigation involving a suspicious substance found at a crime scene. The substance appears to be a mixture of different compounds. Now you have to find out the element of your interest from the mixture. **[2+3]** **CO4**
   a. Which technique will you use and why?
   b. Write down some real world application of your proposed technique.

3. Rakib and Nakib, both siblings and chemistry students, are diligently preparing for their upcoming midterm exam. They're learning about Computational Chemistry, which means using computers to study chemicals. They are focusing on two distinct methods: One method involves applying Newton mechanics, while the second method utilizes a wave equation to approximate solutions for molecular systems. **[2+3]** **CO2**
   a. Analyze the first method and how it calculates the energy of molecules?
   b. In the context of Rakib and Nakib's studies in Computational Chemistry, classify the HF and DFT methods.

4. DCS, or Distributed Control System, is a sophisticated platform used in industrial automation to monitor and manage complex processes. **[5]** **CO4**
   Draw DCS diagram and define how it is helping in automation. .

5. Imagine you're a molecular biologist tasked with sequencing a specific segment of DNA using the Sanger method. Describe the step-by-step process you would follow, including the equipment and reagents you would need. How does this method help in uncovering the genetic information encoded in the DNA sequence? **[5]** **CO1**