Reg. No. : ....

Name : ....

Second Semester M.Sc. Degree Examination, September 2024

Biotechnology

BT 203 : MATHEMATICS, COMPUTER SCIENCE, BIOINFORMATICS AND RESEARCH METHODOLOGY

(2020 Admission Onwards)

Time : 3 Hours

Max. Marks : 75

PART – A

Answer any **two** of the following.

1. Explain the role of computational tools in the analysis of biological data and how they have revolutionized biological research.

2. Compare and contrast the different types of biological databases, including sequence databases, structural databases, and pathway databases. Provide examples of each.

3. Explain the process of identifying and formulating a research problem in the context of scientific research. Provide examples to illustrate the importance of a well-defined research problem.

(2 × 15 = 30 Marks)

PART – B

Answer any **nine** of the following.

4. Perform the following operations and write the result in standard form $(a + bi)$

   (a) $(3 + 2i) + (1 - 4i)$

   (b) $(4 + 3i)(2 - i)$

5. Determine the sum of the first 15 terms of an AP if the first term is 4 and the common difference is 3.

6. Find the roots of the quadratic equation $2x^2 - 5x - 2 = 0$.

7. Compare the characteristics of Windows and Linux as standard operating systems. Highlight their strengths and typical use cases.

8. Describe the basic components of the Internet's infrastructure.

9. Define a programming language and explain its role in computer programming.

10. Write the difference between local and global sequence alignment with example.

11. Explain the concept of hub proteins and their significance in mediating multiple protein interactions within a cell.

12. Describe the secondary structure elements of proteins and methods for protein 2D structure prediction.

13. Describe the process of constructing a genetic map using linkage analysis and the determination of genetic distances between markers.

14. Define a research hypothesis and explain its role in the research process. Provide an example of a well-formulated research hypothesis.

15. Discuss the advantages and disadvantages of random sampling as a sampling technique. Provide examples of situations where random sampling is appropriate.

(9 × 5 = 45 Marks)

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