

B.Sc. Semester - 5 (NEP-2020) Examination**Oct/Nov - 2025****BIT: Modern Molecular Techniques and Bioinformatic Tools (Theory) (Minor-5)****Time: 2:00 Hours****Marks: 50****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

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- Que.1 (1) Explain the principle and working of Real-Time PCR (qPCR). (05)
(2) Explain the phosphoramidite method used in artificial DNA synthesis and mention its applications in genetic engineering. (05)

OR

- Que.1 (1) Discuss the workflow of Illumina sequencing technology and its advantages over traditional sequencing methods. (05)
(2) Describe the principle and working of Sanger sequencing method. (05)
- Que.2 (1) Differentiate between AFLP and RFLP molecular markers with respect to principle and application. (05)
(2) Briefly explain the working principle of SNP markers and mention one example of their use in genetic studies. (05)

OR

- Que.2 (1) Define gene therapy and describe one in vivo and one in vitro approach. (05)
(2) Describe the principle of restriction mapping and explain its importance in recombinant DNA technology. (05)
- Que.3 (1) Write a short note on the NCBI database, mentioning its purpose and one major tool it provides. (05)
(2) Explain the nature of biological data and state why it is important for biological discovery. (05)

OR

- Que.3 (1) Classify biological databases based on the Nucleic Acids Research (NAR) Journal. (05)
(2) Describe the purpose of the KEGG resource and give one example of how it can be applied in research. (05)
- Que.4 (1) Write a brief note on GenBank and DDBJ nucleic acid sequence databases, mentioning their scope and importance. (05)
(2) Describe the role of UniProt and InterPro in protein data analysis and annotation. (05)

OR

- Que.4 (1) What is the significance of PubMed and OMIM in biological literature research? Provide one use case for each. (05)
(2) Explain the purpose of the RCSB-PDB and MMDB protein structure databases in structural bioinformatics. (05)
- Que.5 (1) Write the short note southern blotting. (05)
(2) What is DNA footprinting? Explain how it can be used to identify protein-binding sites on DNA. (05)

OR

- Que.5 (1) Give a brief overview of the Human Genome Project highlighting its main objectives and outcomes. (05)
(2) Differentiate between primary and secondary biological databases with two suitable examples of each. (05)
