

B.Sc. Semester - 6 (CBCS) Examination**March/April-2025 (NEW COURSE)****Analytical Techniques and Bioinformatics (Core (New))****Time: 2:30 Hours****Marks: 70****Instructions:**

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

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- Que-1(A) Give specific answers. (04)**
- 1) _____ is used to measure the absorbance of light by a solution at a specific wavelength.
 - 2) NMR spectroscopy is primarily used to analyse atomic emission spectra. (True/False)
 - 3) Name the primary detector used in mass spectrometry.
 - 4) Name one application of mass spectrometry in biosciences.
- Que-1(B) Answer in Brief. (Any one out of two) (03)**
- 1) Differentiate between colorimetry and spectrophotometry.
 - 2) How are radioisotopes used in biosciences? Provide two applications.
- Que-1(C) Write a Note on. (Any one out of two) (07)**
- 1) Explain the working principle and applications of atomic absorption spectroscopy.
 - 2) Describe the basic principles of IR and NMR spectroscopy and their applications in biological research.
- Que-2(A) Give specific answers. (04)**
- 1) _____ chromatography is based on the interaction between a ligand and a specific biomolecule.
 - 2) The mobile phase in HPLC is usually a _____.
 - 3) Gas Chromatography is primarily used for the separation of volatile compounds. (True/False)
 - 4) Name one type of detector used in Gas Chromatography.
- Que-2(B) Answer in Brief. (Any one out of two) (03)**
- 1) What is the difference between TLC and Paper Chromatography?
 - 2) How does Affinity Chromatography work?
- Que-2(C) Write a Note on. (Any one out of two) (07)**
- 1) Explain the working principle of Gas Chromatography and its applications.
 - 2) Compare and contrast HPLC and FPLC in terms of their principle, application, and resolution.
- Que-3(A) Give specific answers. (04)**
- 1) _____ electrophoresis is widely used for the separation of nucleic acids based on their size using a porous gel matrix.
 - 2) In SDS-PAGE, proteins are denatured and coated with _____ to provide a uniform negative charge.
 - 3) Capillary electrophoresis is a slow and inefficient technique compared to traditional gel electrophoresis. (True/False)
 - 4) What is the full form of PFGE in electrophoresis?
- Que-3(B) Answer in Brief. (Any one out of two) (03)**
- 1) Differentiate between Paper Electrophoresis and Agarose Gel Electrophoresis.
 - 2) What are the key applications of biosensor technology in medical diagnostics?

- Que-3(C) Write a Note on. (Any one out of two) (07)**
1) Explain the principle and applications of 2D-PAGE.
2) Describe the principle of GC-MS and its significance in biosciences.
- Que-4(A) Give specific answers. (04)**
1) PCR consists of three main steps: denaturation, annealing, and _____.
2) SNPs (Single Nucleotide Polymorphisms) are variations in DNA sequence that occur at a single position in the genome. (True/False)
3) What is the full form of RFLP?
4) Which method is used to synthesize DNA artificially in a lab?
- Que-4(B) Answer in Brief. (Any one out of two) (03)**
1) Write the short note on RAPD?
2) What is the difference between Northern blotting and Southern blotting?
- Que-4(C) Write a Note on. (Any one out of two) (07)**
1) Explain the principle and applications of Automated DNA Sequence analysers.
2) Describe the PCR technology and their applications in biotechnology.
- Que-5(A) Give specific answers. (04)**
1) _____ is a tool used for sequence alignment in bioinformatics.
2) Phylogenetic trees are constructed using _____ algorithms based on sequence similarities.
3) FASTA is a sequence alignment tool that is faster but less accurate than BLAST. (True/False)
4) What is the full form of BLAST?
- Que-5(B) Answer in Brief. (Any one out of two) (03)**
1) What are the differences between local and global sequence alignment?
2) Explain the significance of SRS (Sequence Retrieval System) in bioinformatics.
- Que-5(C) Write a Note on. (Any one out of two) (07)**
1) Describe the different types of sequence alignment methods and their applications.
2) Explain how bioinformatics tools like BLAST and CLUSTAL W are used in genomic research.
