BTPC2005 BIO ANALYTICAL TOOLS AND TECHNIQUES (3-0-0)

Module I

Microscopy: Principle of operation and Instrumentation of Light microscopy (Brightfield, Phase-contrast, Fluorescence), Confocal microscopy and Electron Microscopy (Scanning and transmission). Immuno-cytochemistry: Principles, techniques and application.

Module II

Principles of electrochemical techniques: Electrochemical cells and reactions, potentiometry and voltametry,The pHelectrode, ion-selective and gas-sensing electrodes, Clarktypeoxygen electrode. Biosensors, Flowcytometry.

Module III

Ultraviolet-visible absorption spectroscopy : Principle, Instrumentation and application.
Fluorescencespectrophotometry: Principle, Instrumentation and application.

Module IV

Elimentary idea about X-ray crystallography, API-Electrospray and MALDIT OF. 3. Electrophoretic techniques: General principles, support media, electrophoresis of proteins (SDS-PAGE, nativegels, gradientgels, isoelectric focusing, agarosegel electrophoresis

Module V

Centrifugation techniques: Basic principles of sedimentation, Types of centrifuges, 2.Chromatographictechniques: Principles of chromatography (Adsorption and Partition chromatography), Planar chromatography (Paper and Thin-layer chromatography), Column chromatography (Gas chromatography, Gelexclusion / permeation chromatography and FPLC, Ion-exchange chromatography, Affinity chromatography, HPLC).

Course Outcomes (COs):

1. Identify and explain the principles and functions of various bioanalytical techniques and instruments.
2. Determine appropriate applications of bioanalytical methods for analyzing drugs, biopharmaceuticals, and biomolecules.
3. Perform calculations necessary for data interpretation from different bioanalytical techniques.
4. Describe the advantages and disadvantages of each bioanalytical technique covered in the course.
5. Select suitable analytical methods to solve specific problems in biological and biomedical contexts.

Program Outcomes (POs):

1. Acquire comprehensive knowledge of bioanalytical tools and techniques applicable to research and industry settings.
2. Develop critical thinking and problem-solving skills necessary for conducting independent research in bioanalysis.
3. Integrate knowledge from various scientific disciplines, including chemistry, biology, and engineering, to enhance analytical capabilities.
4. Foster a commitment to lifelong learning and professional development in the field of bioanalysis.

5. Exhibit teamwork and leadership skills essential for collaborative projects in scientific research environments.

Books:

[1] Physical Biochemistry by David Freifelder.
[2] Practical Biochemistry by Keith Wilson and JohnWalker.
[3] Modern Experimental Biochemistry by Rodney Boyer.