Semester	6
Course	**Minor**
Paper Code	B3MB230611T
Paper Title	**Bioinstrumentation**
No. of Credits	**4**
Theory / Practical / Composite	Theory
Minimum No. of preparatory hours per week a student has to devote	4 hours/week
Number of Modules	No modules
Syllabus	**Unit 1: Physico-chemical techniques** Basic principle, types of centrifugation, types of centrifuges and biological applications of centrifuge. Analytical problems. Basic principle, types of conventional chromatography- Paper chromatography, thin layer chromatography, Column chromatography, Gas Chromatography, GLC. HPLC; biological applications of chromatography. **Electrophoresis:** Principle, types and different types of Blotting techniques. **Viscosity:** basic principle and study of Ostwald viscometer. **Unit 2: Spectroscopy** Properties of light relevant to spectroscopic studies, principles of light absorption and emission. Concept of chromophores, fluorophores, quenching and photobleaching. Basics of UV-Vis spectroscopy, Instrumentation and application Fluorescence spectroscopy Instrumentation and application Basics of IR spectroscopy and Mass Spectrometry. **Unit 3: Advanced Microscopy** Advanced fluorescent microscopy: wide-field, evanescent, confocal, super resolution. Principles and uses. Super resolution microscopy, Correlative Light and electron microscopy and advanced electron microscopy. Biological applications. **Unit 4: Non-Invasive Biomedical Imaging** Basics and use of MRI, PET scans

Learning Outcomes	• To understand the basics and use of fundamental physico-chemical techniques in biology. • Concise knowledge about principle and use of major types of spectroscopy in understanding various property of biomolecules. • Biomedical imaging fundamentals to understand its use in detection of physiological problems in human and direct clinical applications.

Reading/Reference Lists	1. Biophysical chemistry –principles and application by Upadhyay, Upadhyay and Nath. Himalaya Publishing house 2. Biophysics and biophysical chemistry by Debajyoti Das, Academic Publishers 3. Molecular techniques in Biochemistry and biotechnology by S Srivastava, NCB Agency Ltd 4. Fundamentals of bioanalytical techniques and Instrumentation by Ghosal and Srivastava, PHI learning Pvt Ltd 5. Biomedical imaging by Shukla and Qureshi, Discovery Publishing house Pvt Ltd 6. Introductory biomedical imaging by Abney and Scalettar, CRC press 7. Physical biochemistry by D Freifelder, WH Freeman Publisher	
Evaluation	Theory CIA: 30 Semester Exam:70	Practical (if applicable) CA: Semester Exam:
Paper Structure for Theory Semester Exam	**Full marks 70** Short questions: 10 (each 2 marks) from 12 (10x2=20) Long questions: 5 (each 10 marks) from 7 (5x10=50)	