Master of Science (Botany)
M. Sc Botany Semester II

Course Code	PS02CBOT51	Title of the Course	Bio analytical techniques
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	
	1. To make the students familiarised with: (a) Various microscope techniques (b) Separation techniques like electrophoresis, centrifugation and chromatography techniques 2.To teach various spectroscopy and their application 3.To teach measurement radiation in isotopes and effect of radiation on biological systems 4. To teach biosensors and their applications.

Course Content		
Unit	Description	Weightage* (%)
1.	Electrophoresis: Support media: Agarose gels and polyacrylamide gels. Electrophoresis of proteins: SDS PAGE, Native gels, Gradient gels, Isoelectric focusing gels, 2-D PAGE, Continuous flow electrophoresis, and Protein blotting. Electrophoresis of nucleic acids: Agarose gel electrophoresis and pulsed field electrophoresis. Capillary electrophoresis and its applications Biosensors: Principle, types and applications	25
2.	Basic principle and application of Differential, density and ultracentrifugation. Principle, methodology and applications of gel – filtration, ion –exchange and affinity chromatography; Thin layer and High Performance Thin Layer Chromatography. Gas chromatography, High performance liquid chromatography and FPLC.	25
3.	Spectropscopy Principle, instrumentation and applications of UV, Visible, IR (including FTIR and ATR), AAS, NMR, fluorescence and CD spectroscopy.	25
4.	Principle and applications of tracer technique in biology: Radioactive Isotopes and half-life of isotopes; Effect of radiation on biological system; autoradiography; cerenkov radiation; radiation dosimetry;	25

	ionization and scintillation based detection and quantification of radioactivity. Principle of biophysical methods used for analysis of biopolymer structure: X ray diffraction and mass spectrometry.	

Teaching-Learning Methodology	Topics of the course will be taught through interactive classes using appropriate tools and techniques. Students will be encouraged to explore different sources of data pertained to the course. Course materials will be provided from primary and secondary sources of information.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, students will be able to	
1.	Select suitable microscopic and separation technique for their further studies.
2	Gain thorough knowledge of various spectroscopy and their application in structural determination of bio-chemicals.
3.	Understand and usage of radioisotopes and biosensors.

Suggested References:	
Sr. No.	References
1	Sharma, B. K. (1981). *Instrumental methods of chemical analysis*. Krishna Prakashan Media.

2	Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). *Principles of instrumental analysis*. Cengage learning.
3	Mu, P., & Plummer, D. T. (2001). *Introduction to practical biochemistry*. Tata McGraw-Hill Education.
4	Boyer, R. (2000). *Modern experimental biochemistry*. Pearson Education India.

On-line resources to be used if available as reference material
On-line Resources
Relevant review articles/research papers/handouts of latest development in the subject

LABORATORY EXERCISES

1. Performance of SDS PAGE
2. Performance of Agarose gel electrophoresis.
3. Performance of density gradient centrifugation.
4. Performance of thin layer and paper chromatography
5. Demonstration of HPLC and Flash chromatography
6. Determination of absorption maxima in visible spectroscopy.
7. Estimation of protein by UV-Visible spectroscopy.
7. Demonstration of FTIR