Name of the Programme: M.Sc. Part-I (Biochemistry)

Course Code: CHB-521 **Title of the Course:** Practical Course in Biochemistry-I

Number of Credits: 4

Effective from AY: 2022-23

Pre-requisites for the Course:	Students should have graduate level knowledge either in chemical or life sciences or should have qualified change of discipline test.	
Course Objectives:	1. To understand principles, theory and calculations of each experiment. 2. To gain hands on preparation of all the solutions and to standardize solutions individually. 3. To develop basic understanding and skills of various instruments and techniques used for analysing biomolecules.	
Content:		No of hours
	1. **Biomolecules and Bioenergetics (Any six)** a. Estimation of reducing sugars by DNSA method. b. Colorimetric methods for protein estimation by Biuret method. c. Colorimetric methods for protein estimation by Folin-Ciocalteau methods. d. Estimation of total sugars by anthrone method. e. Estimation of amino acids (ala, tyr, trp) and protein by UV-Vis spectroscopy. f. Estimation of nucleic acid by UV-Vis spectroscopy. g. Estimation of DNA by diphenylamine method. h. Estimation of RNA by orcinol reaction.	30
	2. Analytical Biochemistry-I (Any six) a. Calibration of pH meter using standard buffer solutions and determination of pH of given unknown solution b. Preparation of acetate and phosphate buffer of different pH values using calibrated pH meter. c. Separation of mixtures of compounds (organic compounds including biomolecules) based on their chemical nature using solvent extraction. d. Separation of lipids by thin layer chromatography. e. Separation of mixtures of compounds (organic compounds including biomolecules) by thin layer chromatography. f. Column chromatographic separation of mixtures of compounds (organic compounds including biomolecules). g. Separation of amino acids by paper chromatography.	30
	3. Molecular Biology (Any six) a. Preparation and maintenance of microbial culture. b. Isolation of genomic DNA of bacterial cells.	30

	c. Estimation of quantity and purity of DNA by spectrophotometry. d. Agarose gel electrophoresis of bacterial DNA. e. PCR amplification of a specific gene using genomic DNA as a template. f. Agarose gel analysis of PCR product to determine amplicon size. g. Isolation of plasmid DNA from microbial cells. h. Agarose gel electrophoresis of plasmid DNA.	
	4. Cell Biology (Any six) a. Use of aseptic techniques of sterilization and disinfection in microbial culture. b. Isolation of microbial species from an environmental sample such as soil/water. c. Cell counting and viability of fungal/bacterial cells via spread plating. d. Primary identification and characterization of bacterial/ fungal cells via colony characterization on solid media. e. Determining the Gram character of a bacterial species via Gram's staining technique. f. Isolation of tissue, culturing and maintenance of cell lines. g. Microscopic examination and cell counting, viability testing using a haemocytometer. h. Surface sterilization of plant material, excision, aseptic tissue transfer i. Induction of callus using plant explant and micropropagation.	30
Pedagogy:	Prelab exercises / assignments / presentations / lab hand-out or a combination of some of these. Sessions shall be interactive in nature to enable peer group learning.	
References/ Readings:	1. Wilson K, Walker J; Principles and Techniques of Practical Biochemistry; Cambridge University Press; 2010; 7th Edition 2. Sawhney, S. K., Singh, R.; Introductory Practical Biochemistry; Narosa Publishing House; 2005. 3. Freshney, I. R.; Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications; Wiley-Blackwell; 2016; 7th Edition. 4. Kumar, D. K.; Plant tissue culture; New Central Book Agency; 2008; 1st edition.	
Course Outcomes	1. After learning the biomolecules and bioenergetics unit of the practical students will be able to skilfully handle biomolecules. Students will be able to quantify biomolecules with appropriate methods. 2. With Analytical Biochemistry-I part of this practical, students will be able to choose between the separation techniques and carry out separation and purification of biomolecules. 3. Molecular Biology unit of the practical will train the students in techniques involved in genomic DNA isolation and PCR amplification for its use in molecular research. 4. In the Cell Biology part of the practical, the students will be able to demonstrate the various cell culture techniques needed to work in a biological research laboratory.	