

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

Course Code: CHB-523

Title of the Course: Practical Course in Biochemistry-III

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:	This course develops basic understanding and skills of various techniques and instruments in biochemistry research, Immunology and Environmental science.	
Content:	1. Enzymology (Any six) a. Assay of enzyme activity, rate of reaction. b. Optimization of parameters for enzyme activity. c. Determination of specific activity of enzyme. d. Determination of K_m, V_{max}. e. Screening of microbes for production of enzymes (amylases, cellulases). f. Purification of enzyme by salting-out using ammonium sulphate. g. Dialysis of the precipitated enzyme. h. Purification of enzyme by Gel filtration. i. Determination of fold purification, percentage recovery of protein. j. Molecular weight determination of the enzyme by SDS-PAGE.	No of hours 30
	2. Analytical Biochemistry – II (Any six) a. Visualization of cells by Light microscopy. b. Visualization of cells by Phase contrast microscopy. c. Verification of Beer Lambert law using biomolecules or organic compounds. d. Qualitative analysis of any one of the given amino acids or organic compounds using calorimetry. e. To perform UV-Visible spectroscopic studies to determine extinction coefficient of different organic compounds including biomolecules. (Tryptophan, Tyrosine, Methionine, Proline, Arginine, Cysteine, Cystine, Histidine). f. Calibration of spectrofluorometer using quinine sulphate. g. Analysis of biomolecule/ organic molecule using GC. h. Analysis of biomolecule/ organic molecule using IR. i. Analysis of biomolecule/ organic molecule NMR. j. Analysis of biomolecule/ organic molecule LC-MS.	30

	k. Elucidation of structure of cellular metabolites using IR, NMR and Mass profiles.	
	3. Immunology and Immunotechniques (Any six) a. Agglutination assays. i. Haemagglutination: Determination of ABO and Rh blood group. ii. Latex bead agglutination: Rheumatoid Arthritis factor determination. b. Immunodiffusion assays. i. Single Immunodiffusion. ii. Double Immunodiffusion: Ag-Ab pattern and Antibody titration. c. VDRL test. d. Widal test: Slide and tube method. e. Rapid tests. i. Malarial antigens Pv/Pf. ii. Dengue IgM and IgG antibodies. iii. Hepatitis HBsAg. f. ELISA: Dot-ELISA method. g. Immunoelectrophoresis. h. Determination of Immunoglobulins. i. Precipitation of antibodies with $(\text{NH}_4)_2 \text{SO}_4$. ii. Determination of antibody concentration. iii. Separation and visualization of immunoglobulins by SDS PAGE.	30
	4. Industrial biochemistry (Any six) a. Production of wine and monitoring of sugar reduction during the fermentation b. Production of wine and monitoring of alcohol production during fermentation c. Production of vinegar and estimation of acetic acid d. Isolation and screening of probiotics e. Study of fermentation process of milk to curd by microscopic observation and monitoring of pH. f. Study fermentation of dosa batter and monitor pH and microbial load in given dosa batter samples g. To perform comparative study of rheology of substrate solutions and fermentation broth (any Indian fermentation products (Idli/ dosa)	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. Berg, J.M., Stryer, L., Tymoczko, J., Gatto, G., Biochemistry, WH Freeman, 2019, 9th Edition. 2. Prescott, H. Laboratory exercise in Microbiology, MacGraw-Hill Companies, 2002, 5th Edition.	

	3. Vogel's Text book of Quantitative Inorganic Analysis, Pearson Education, Asia, 2000, 6th Edition. 4. Owen, J.; Punt, J.; Stranford, S.; Patricia, J.; Kuby Immunology, WH Freeman and Company, 2012, 8th Edition.
Course Outcomes:	1. Enzymology part of this practical will impart skills on isolation of enzymes from living cells, their purification and understanding their substrate interactions. 2. From the Analytical Biochemistry-II part of this practical, students will be able to explain the principle and working of basic instruments in analytical laboratories and interpret spectral data to elucidate structures of certain secondary metabolites. 3. From the Industrial Biochemistry part of this course, students will develop the skills required for production and analysis of various industrially important metabolites. 4. From the Immunology and Immunotechniques unit of this practical students will be able to evaluate and design various techniques in Immunological research.