



Master of Science (Microbiology)
M. Sc. (Microbiology) Semester I

Course Code	PS01CMIC52	Title of the Course	Biochemistry
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	To expose the students to various techniques used for biochemical studies with details understanding of the structure and function of various cell organelles, their organization and interaction with the environment. This will also enlighten them on the regulation of cell cycle and programmed cell death explaining the bases of cancer.
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Course Content		
Unit	Description	Weightage* (%)
1.	Basic principle and application of Differential, density and ultracentrifugation Principle and applications of Native-PAGE, SDS-PAGE, Agarose and 2D gel electrophoresis. Capillary electrophoresis and its applications. 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.	25%
2.	Principles of Thermodynamics; Bioenergetics and energy metabolism in cells. Carbohydrate metabolism: Glycolysis and alternate pathways of glucose utilization, TCA cycle, glyoxylate cycle, Gluconeogenesis, Glycogen synthesis and utilization.. Oxidative phosphorylation and Electron transport chain: Electron carriers, iron sulphur proteins, cytochromes, PMF, ATP synthetase complex. Uncouplers and inhibitors of energy transfer.	25%
3.	Lipids: Structure and properties of lipids, fatty acids, phospholipids, and other derived lipids; functions of lipoproteins, cholesterol, steroids and prostaglandins, membrane lipids. Lipid metabolism: synthesis and oxidation of fatty acids (α , β and ω oxidation of fatty acids). Ketone bodies: Formation and degradation. Vitamins: structure and function.	25%
4.	Protein structure: primary, secondary, tertiary and quaternary structure	25%





	of proteins. Determination of protein structure and its analysis, Ramachandran plot, Hydropathy plot. Structure, properties and classification of amino acids, amino acid metabolism, urea cycle and nitrogen balance. Disorders associated with amino acid metabolism. Nucleotides: Structure and functions, Nucleotide metabolism.	
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Teaching-Learning Methodology	Topics will be taught and discussed in interactive sessions using conventional black board and chalk as well as ICT tools such as power point presentations and videos. Practical sessions will be conducted in a suitably equipped laboratory either individually or in groups depending on the nature of exercise as well as availability of infrastructure. Course materials will be provided from primary and secondary sources of information.
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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, the learner will be able to

1.	Understand various techniques for biochemical studies and their role in understanding and elucidating structures and pathways.
2.	Explain various metabolic activities leading to synthesis or breakdown of different macromolecules and their building blocks.
3.	Understand and explain the process of energy generation in the cell.

Suggested References:

Sr. No.	References
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	1. Lehninger's Principles of Biochemistry: D L Nelson and M M Cox, Macmillan, Worth Pub. Inc., NY. 2. Biochemistry : Lubert Stryer 3. Harper's Biochemistry: R. K. Murray and others, Appleton and Lange, Stanford. 4. Microbial Physiology: Moat, Foster and Spector.
On-line resources to be used if available as reference material	
Relevant review articles / research papers / handouts of latest development in the subject.	

