Faculty of Pharmacy
Bachelor of Pharmacy (B. Pharm.)
(W. E. F.: 2023-24)
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Name of Faculty	:	Faculty of Pharmacy
Name of Program	:	Bachelor of Pharmacy
Course Code	:	2BPH03
Course Title	:	Biochemistry
Type of Course	:	Basic Pharmaceutical Sciences
Year of Introduction	:	2023-24

Prerequisite	:	Zeal to learn the subject
Course Objective	:	Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	To remember the properties, significance and metabolic reactions of carbohydrates, lipids, nucleic acids, proteins and amino acids
	CO2	To understand the metabolism of nucleic acids, lipids and amino acids and process of electron transport and ATP formation
	CO3	To apply the concept of catalytic activity and enzyme inhibition in design of new drugs, diagnostic and therapeutic applications of enzyme
	CO4	To understand the process of DNA replication, transcription and translation
	CO5	To analyse the causes, manifestations and diagnosis of metabolic disorders

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
03	01	04	06	75	25	35	15	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with COs
1	Biomolecules Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins. Bioenergetics- Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP	8	17.77%	CO1 CO2
2	**Carbohydrate metabolism** Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase(G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD)Gluconeogenesis-Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus **Biological oxidation** Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate Level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers	10	22.22%	CO1 CO2

3	**Lipid metabolism** β-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosisDe novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol intobile acids, steroid hormone and vitamin D Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis,fatty liver and obesity. **Amino acid metabolism** General reactions of amino Acid Metabolism:Transamination,deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders(Phenyketonuria, Albinism, alkeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin,dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice	10	22.22%	CO1 CO2 CO5
4	**Nucleic acid metabolism and genetic information transfer** Biosynthesis of purine and pyrimidine nucleotides Catabolism of purine nucleotides and Hyperuricemia and Gout disease Organization of mammalian genome Structure of DNA and RNA and their functions. DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors	10	22.22%	CO1 CO2 CO4
5	**Enzymes** Introduction, properties, nomenclature and IUB classification of enzymesEnzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples Regulation of enzymes: enzyme induction and repression, allostericenzymes regulation Therapeutic and diagnostic applications of enzymes and isoenzymesCoenzymes –Structure and biochemical functions	7	15.55%	CO3

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**40**	**20**	**20**	**0**	**0**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)	8
2	Identification tests for Proteins (albumin and Casein)	4
3	Quantitative analysis of reducing sugars (DNSA method) and Proteins (Biuret method)	4
4	Qualitative analysis of urine for abnormal constituents	4
5	Determination of blood creatinine	4
6	Determination of blood sugar	4
7	Determination of serum total cholesterol	4
8	Preparation of buffer solution and measurement of pH	4
9	Study of enzymatic hydrolysis of starch	4
10	Determination of Salivary amylase activity	4
11	Study the effect of Temperature on Salivary amylase activity.	4
12	Study the effect of substrate concentration on salivary amylase activity.	4
13	Qualitative analysis of carbohydrates (Glucose, Fructose, Lactose, Maltose, Sucrose and starch)	4
14	Identification tests for Proteins (albumin and Casein)	4

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Test tubes
2	Beakers
3	pH meter
4	Electronic balance

Suggested Learning Websites

Sr. No.	Name of Website
1	https://pci.nic.in/pdf/Syllabus_B_Pharm.pdf
2	https://www.aicte-india.org/downloads/bpharma.pdf.
3	https://www.ipc.gov.in/

4	https://www.ayush.gov.in/
5	https://ayudmla.gujarat.gov.in/home.php
6	https://www.fda.gov/
7	https://www.pharmacopoeia.com/
8	https://ipapharma.org/
9	https://gpat.nta.nic.in/
10	https://drnaitiktrivedi.com/
11	https://gdc4gpat.com/course/gpat/
12	https://niscpr.res.in/
13	https://delnet.in/
14	https://ihubgujarat.in/
15	https://www.ssipgujarat.in/

Reference Books

Sr. No.	Name of Reference Books
1	Principles of Biochemistry by Lehninger.
2	Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3	Biochemistry by Stryer.
4	Biochemistry by D. Satyanarayan and U.Chakrapani
5	Textbook of Biochemistry by Rama Rao.
6	Textbook of Biochemistry by Deb.
7	Outlines of Biochemistry by Conn and Stumpf
8	Practical Biochemistry by R.C. Gupta and S. Bhargavan.
9	Introduction of Practical Biochemistry by David T. Plummer. (3rd Edition)
10	Practical Biochemistry for Medical students by Rajagopal and Ramakrishna.
11	Practical Biochemistry by Harold Varley.