BIOCHEMISTRY AND BIOPHYSICS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
			Hrs/ week	Total Hours/ Semester	Hrs/ week	Total Hours/ Semester		
III	21CPZO3D	Elective-III	3	45	3	45	Nil	3

COURSE OBJECTIVES:

- To understand the structure of atoms, principles of biophysical chemistry, Stabilizing interactions, Bioenergetics, Photo biophysics , metabolism of amino acids and vitamins.
- To understand and analyse the principle of colorimetry
- To understand the stability and metabolism of amino acids and vitamins.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to:

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	To understand the structure of atoms ,molecules and chemical bonds and study about the principles of biophysical chemistry**.**	K2
CO2	To understand about the stabilizing interactions and structure of biomolecules	K2
CO3	To understand and imbibe knowledge on bioenergetics, principles and mechanism of enzyme catalysis.	K2
CO4	To understand and analyze about the electromagnetic spectrum and delayed effects of radiation.	K2&K4
CO5	To update the knowledge on stability of proteins and nucleic acids and metabolismof nutrients.	K3

Knowledge Level : K1-Remember ; K2 –Understand ; K3 – Apply ; K4 – Analyze

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	M	M	S	S	M
CO3	S	S	S	M	S
CO4	M	S	M	S	M
CO5	S	M	S	M	S

S- Strong; M – Medium ; L- Low

DISTRIBUTION OF MARKS: THEORY 100%

UNIT-I

BASICS OF BIOMOLECULES AND BONDING **9 Hours**

Structure of atoms, molecules and chemical bonds. Composition, nature of bonds/linkages, structure of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).

Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties). Forces between Molecules (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).

UNIT- II BIOCATALYST AND BIOENERGETICS **9 Hours**

Enzymes: Principles of catalysis, classification of enzymes and enzyme kinetics, enzyme regulation, inhibitors of enzymes - mechanism of enzyme catalysis, isozymes Stability of proteins and nucleic acids. Metabolism of amino acids, carbohydrates, lipids, nucleotides and vitamins.

UNIT-III MICROTECHNIQUES **9 Hours**

Fixation, histological and histochemical staining methods for proteins, carbohydrates, lipids and nucleic acids, Different fixation and staining techniques for electron microscope. **Immunocytochemistry** – principles and applications- in situ localization by FISH and GISH. Photometry – Principle and applications of flame photometry and flow cytometry.

UNIT- IV NUCLEAR MEDICINE : **9 Hours**

In-vitro & in-vivo imaging using radioisotopes, Blood volume determinations by isotopic method, Radioiodine diagnosis & therapy in thyroid disorders.

Principle, method and applications of Radioimmunoassay, organ scans-thyroid, liver, brain, bone, renal imaging, cardiac imaging, PET scan, nuclear medicine for therapy, radiopharmaceuticals-concept, production & use.

UNIT-V PHOTO BIOPHYSICS **9 Hours**

Electromagnetic spectrum - visible and invisible region. Principles involved in Photoelectric colorimetry. Principle of Spectroscopy - UV & IR Spectroscopy in biological investigation. Effects of UV on biological systems. Delayed effects of radiation - Senectitude, reduction in life span and cancer. Radioactive isotopes - measurements - GM tubes, Liquid Scintillation counters. Autoradiography. Effects of radiation.

TEXT BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Murray, R. K., Granner, D. K.,	Harper's Biochemistry	Prentice Hall International Inc.	2000

	Mayes, P. A., Rodwell, V. W			
2.	C Jain, J.L., Sunjay Jain and Nitin Jain	Fundamentals of Biochemistry	S. Chand & Company Ltd., New Delhi	2007
3.	C. Satyanarayanan	Essentials of Biochemistry,	Uppala Author – Publisher Interlinks, Vijayawada Lehninger,	2004
4.	Voet. D., Judith, G. Voet, Charlotte W. Pratt.	Fundamentals of Biochemistry.	John Wiley & Sons Inc. New York	1999
5.	Casey, E. J	Biophysics - Concepts and Mechanisms	East West Press Pvt. Ltd. New Delhi	1962
6.	Daniel, M	Basic Biophysics for Biologist	Agro Botanical Publishers, Bihaner, India	2005
7.	Narayanan, P	Essentials of Biophysics	New Age International (P) Ltd.Publishers	2007
8.	Skoog, A. D. and James, J. L.	Principles of Instrumental Analysis	Saunders GoldenSunberst Series.	1992
9.	Vasanthan, P. and Gautham, N.	Biophysics	Narosa Publishing House, New Delhi.	2002

REFERENCE BOOKS

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Rodney Cotteril	Biophysics – An Introduction	Johnwiley & Sons Publications	2003
2.	.P.K.Srinivastava	Elementary Biophysics An Introduction	Alpha Science International	2005
3.	V.Satyanarayana And V. Chakarapani	Essentials Of Biochemistry	Elsevier Generic Publications	5th Edition 2019
4.	V.Sathyanarayana	Essentials Of Biochemistry	Books and Allied (P)Ltd Publishers	2008
5.	Dr. Jain, Sunjay Jain , Nitin Jain	Fundamentals Of Biochemistry	S.Chand Publications	2016
6.	R. Ferrier	Lippincott's Illustrated Review Biochemistry	7th Edition Wolters Kluwer India Pvt Ltd	2017

WEB SOURCES:

www.livescience.com

www.sciencemag.com

www.treehugger.com

www.nature.com

TEACHING METHODOLOGY

- Class room teaching
- Assignments ,Seminars and Models
- Group Discussions
- Home test
- PPT Presentations
- Board and chalk
- Demonstration from the Video slides, Animated videos and interactive software.

SYLLABUS DESIGNERS

- Dr D.Sasikala, Assistant Professor & HOD
- Dr.V.Kiruthiga, Assistant Professor
- Dr V.Rekha, Assistant Professor
- DrA.Vinodhini, Assistant Professor
- Dr.G.Vidhya, Assistant Professor
- Dr. S. Vijayakumari, Assistant Professor