

ANALYTICAL BIOCHEMISTRY

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credits
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
I	21CPBC1A	Core	4	60	4	60	-	-	4

COURSE OBJECTIVE:

- To understand the basic principles of biochemical investigations
- To gain theoretical knowledge about various biochemical techniques
- To facilitate the students towards understanding the qualitative and quantitative analysis of different molecules of biochemical reactions.

COURSE OUTCOMES:

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

CO Number	CO Statement	Knowledge Level (K ₁ – K ₄)
CO1	To discuss about the basic concepts of biochemical investigations and cell study.	K1
CO2	Describes about the basic principle and methods of centrifugation.	K2
CO3	From this unit we can obtain the knowledge about the separation and analysis of macromolecules based on their size and charge.	K2
CO4	Explains about the separation of individual compound from the mixture of compounds.	K3
CO5	We can understand the basic principles of spectroscopy and interaction of electromagnetic radiation with chemical substances.	K4

(*CO – Course Outcomes

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

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO5	PO6
CO1	S	M	S	M	M
CO2	M	M	S	S	M
CO3	S	S	M	M	S
CO4	S	S	S	S	M
CO5	M	M	M	S	S

(S- Strong; M-Medium; L – Low)

Total Hours: 75

UNIT I

General principles of biochemical investigations

10 Hours

Organ and tissue slice technique, Cell disruption and homogenization techniques, Cell sorting and counting. Osmosis, Henderson-Hasselbalch equation, pH measurement using electrodes- Glass electrode, O₂ electrode, Cryopreservation, Microscopic techniques (SEM, TEM).

UNIT II

Centrifugation and Radioactivity

15 Hours

Basic principle, method and types- Preparative centrifugation- differential, density gradient centrifugation and its applications. Radioactivity- Radioactive isotopes, units, measurement of radioactivity – Scintillation Counter, Applications of radioisotopes (Autoradiography) and its aspects.

UNIT III

Electrophoretic Techniques

15 Hours

Principle, support media, factors affecting electrophoresis and types - High Voltage electrophoresis, Paper electrophoresis, SDS-PAGE, Two dimensional PAGE, Isoelectric focusing. DNA sequencing and Blotting techniques.

UNIT IV

Chromatographic techniques

15 Hours

Column, Paper, Thin Layer Chromatography, Ion Exchange, Affinity, Gas liquid, HPLC, Gel permeation chromatography - Principle, instrumentation and applications.

UNIT V

Spectroscopic techniques

20 Hours

Basic laws of light absorption- UV-visible and FT-IR Spectrophotometry – Flame spectrophotometry and Fluorimetry – Basic principle, Instrumentation and Applications. Turbidimetry and Nephelometry. Mass spectroscopy – GC-MS, ESR and NMR Spectroscopy. Instrumentation and Application of Atomic absorption spectroscopy.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

TEXT BOOKS:

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1	AvinashUpadhyay	Biophysical Chemistry, principles and Techniques.	Himalaya Publishing House.	4 th Edition (2007)
2	Dr.P.Asokan	Analytical Biochemistry	Chinna publications	1 st edition (2001)

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1	K.Wilson and I.Walker	Practical Biochemistry	Cambridge University press	5 th edition(2000)
2	S.K.Sawhney	Introductory Practical Biochemistry	Alpha Science International, Ltd	2 nd edition(2005)
3	David Freifelder.	Physical Biochemistry	Science Books International	2 nd edition (1982)
4	Galen Wood, Ewing	Instrumental Methods of chemical Analysis	Mcgraw Hill college;	5 th edition (1985)
5	Robert D. Braun	Introduction to instrumental analysis	Pharma Med Press/BSP books	2 nd edition(2012)
6	R.Boyer	Modern experimental biochemistry	Addison Weslery Longman Publishers	3 rd edition (2000)

7	D.J.Homie and H.Peck	Analytical Biochemistry	Longman group	1 st edition(2003)
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WEB SOURCES:

- http://www.biology.arizona.edu/cell_bio/cell_bio.html
- https://ecok.libguides.com/biology/web_sources
- <https://www.nicholls.edu/biol-ds/biol155/Lectures/Cell%20Biology.pdf>
- <http://www.bio-nica.info/Biblioteca/Bolsover2004CellBiology.pdf>

SYLLABUS DESIGNER:

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