ANALYTICAL TECHNIQUES I

Sem	Subject Code	Category	Lecture		Theory		Practical		Credit
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
III	21CBC3A	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	Understand the basic units of measurement of solution and basic separation techniques.	**K1**
CO2	Gain the knowledge about the various Electrochemical techniques	**K2**
CO3	Get clear knowledge about tissue homogenization techniques	**K2**
CO4	Understand the basic principle and methods of centrifugation.	**K3**
CO5	Obtain the knowledge about separation and identification of compounds from mixture of compounds by chromatography .	**K4**

(*CO – Course Outcomes

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

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	S	S	M	M	M
CO2	M	M	S	S	S	M
CO3	S	S	M	S	M	S
CO4	M	M	S	S	M	S
CO5	S	S	M	M	S	S

(S- Strong; M-Medium; L-Low)

Total Hours: 60

UNIT I

Units of measurement and Basic separation techniques **10 Hours**

Units of measurement of solutes in solution, e.g., Normality, Molarity, Molality and Ionic strength. Examples for this concept.Isotonic, Hypertonic and Hypotonic solutions. Osmosis and Osmotic Pressure and its applications. Principle of UltraSonication, Dialysis, Diffusion and Ultrafiltration.

UNIT II

Electrochemical Techniques **10 Hours**

Basis of acids and bases, pH, pOH, Buffers, Buffer capacity and mechanism of buffer action. Henderson – Hasselbalch equation, Buffers in body fluids, red blood cells and tissues(Hb and Bicarbonate). Reference Electrode – Calomel Eectrode.Glass electrode and Oxygen electrode - Principle, instrumentation and its applications.

UNIT III

Homogenisation Techniques **10 Hours**

Organ and tissue slice techniques. Methods of cell disruption and tissue homogenization: Mechanical - Homogenizer, Sonicator, French press and non-mechanical methods -physical, chemical and enzymatic methods.

UNIT IV

Centrifugation Techniques **15 Hours**

Basic Principle – Relative centrifugal force, Sedimentation rate, Svedberg unit. Types of Centrifuge and types of Rotors. Types of Centrifugation: Preparative - differential, density gradient. Analytical - sedimentation velocity & sedimentation equilibrium methods. Analytical Ultra-centrifugation.

UNIT V

Chromatographic Techniques **15 Hours**

General Principle – Partition and Adsorption. Principle, Procedure and applications of Paper, Thin layer, Column - Gel filtration, Ion- exchange, Affinity chromatography. Basic concepts and applications of Gas liquid Chromatography and HPLC.

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

TEACHING METHODOLOGY:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

S.NO	AUTHOR	TITLE	PUBLISHER	YEAR OF PUBLICATION
1	K.Wilson and I.Walker	Practical Biochemistry	Cambridge University press	5th edition 2000

2	S.K.Sawhney	Introductory Practical Biochemistry	Alpha Science International, Ltd	2nd edition 2005
3	David Freifelder.	Physical Biochemistry	Science Books International	2ndedition 1982
4	Galen Wood, Ewing	Instrumental Methods of Chemical Analysis	Mcgraw Hill college;	5th edition 1985
5	Robert D. Braun	Introduction to Instrumental analysis	Pharma Med Press/BSP books	2nd edition 2012
6	R.Boyer	Modern experimental biochemistry	Addison Weslery Longman Publishers	3rd edition 2000
7	D.J.Homie and H.Peck	Analytical Biochemistry	Longman group	1st edition 2003
8	SarojDua, NeeraGarg	Biochemical Methods of Analysis: Theory and Applications	Narosa	1st edition 2010
9	John F. Robyt Bernard J. White	Biochemical Techniques: Theory and Practice	Waveland PrInc	1st edition 1990

WEB SOURCES:

- www.slideshare.net/SihamAbdallaha/electrochemical-method-of-analysis-31352857#
- www.sciencedirect.com/topics/chemistry/glass-electrode
- https://microbenotes.com/centrifugation-principle-types-and-applications/
- https://microbenotes.com/chromatography-principle-types-and-applications/

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