ANALYTICAL TECHNIQUES II

Sem	Subject Code	Category	Lecture		Theory		Practical		Credit
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
IV	21CBC4A	Core	4	60	4	60	-	-	4

COURSE OBJECTIVE:

- To enable the students to determine the concentration of a chemical compound or chemical element.
- To facilitate the students towards understanding the qualitative and quantitative analysis of different molecules of biochemical reactions.
- To enable the students towards to gain the knowledge about age of fossils and Nuclear medicine.

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 principle and methods of Electrophoresis.	**K1**
CO2	Obtain the knowledge about separation and analysis of macromolecules based on their size and charge.	**K2**
CO3	Understand the basic principles of spectroscopy and interaction of electromagnetic radiation with chemical substances.	**K2**
CO4	Describe the basic principle of Spectroflourimetry and flame photometry and its application in vitamin and metal assay.	**K3**
CO5	Obtain the clear knowledge about the Radio Isotopes, its measurement and its applications.	**K4**

(*CO – Course OutcomesKnowledge 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	S	S
CO2	S	M	M	S	S	M
CO3	S	S	M	S	M	S
CO4	M	M	S	S	M	S
CO5	S	S	S	M	S	S

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

Total Hours: 60

UNIT I

Electrophoresis – I **10 Hours**

General principle, Migration of ions in electric field, Factors affecting electrophoretic mobility. Types of Electrophoresis- Moving Boundary and Zone Electrophoresis.Paper electrophoresis, and its applications. Gel electrophoresis - Types of gels, Solubilizers, Procedure, Column & slab gels - Detection, Recovery, Estimation of macromolecules and its applications.

UNIT II

Electrophoresis – II **10 Hours**

Disc-Gel electrophoresis, SDS-PAGE and its applications. Isoelectric focussing, Principle, Establishing pH gradients, Stabilization against convection, Procedures & applications. Principle and applications of Immunoelectrophoresis.

UNIT III

Elecromagnetic Radiation **10 Hours**

Basic principles of electromagnetic radiation. Wavelength, Wavenumber and frequency. Absorption and Emission spectra. Beer and Lambert's law of light absorption and its transmittance. Colorimetry - Instrumentation and applications.UV- Visible spectrophotometry principle, instrumentation and applications on enzyme assay (LDH, CPK).

UNIT IV

Spectroflourimetry and Flame Photometric Technique **15 Hours**

Principle, instrumentation and applications of spectroflourimetry in vitamin assays (riboflavin and thiamine). Principle, instrumentation and applications of Flame photometry in trace elements (Na+, K+) analysis. Atomic absorption Spectrophotometry and its applications.

UNIT V

Radio Isotope Techniques **15 Hours**

Atomic structure, radiation, radioactive decay, half life, units of radioactivity. Detection and measurement of radioactivity – method based on ionization (GM counter), method based on excitation (Scintillation counter). Applications of radioisotopes. Biological hazards of radiation and safety measures in handling radio isotopes.

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	David Freifelder.	Physical Biochemistry	Science Books International	2ndedition (1982)

3	Galen Wood, Ewing	Instrumental Methods of Chemical Analysis	Mcgraw Hill college	5th edition (1985)
4	Robert D. Braun	Introduction to Instrumental analysis	Pharma Med Press/BSP books	2nd edition (2012)
5	R.Boyer	Modern experimental biochemistry	Addison Weslery Longman Publishers	3rd edition (2000)
6	D.J. Homie and H.Peck	Analytical Biochemistry	Longman group	1st edition (2003)
7	David W. Ball	The Basics of Spectroscopy	SPIE Press	2001
8	Faure G	Isotopes Principles And Applications	John Wiley	3rd edition 2012

WEB SOURCES:

- https://en.wikipedia.org/wiki/Electrophoresis
- www.biologydiscussion.com/biochemistry/electrochemical-techniques/top-10-types-of-electrophoretic-techniques-used-in-biochemistry/12669
- www.slideshare.net/NarenYadav2/spectroscopy-principle-procedure-application
- https://web.nmsu.edu/~esevosti/report.htm
- www.slideshare.net/abhigiri02/radioisotope-technique-and-methods

SYLLABUS DESIGNER:

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