ADVANCED TECHNIQUES OF FOOD ANALYSIS

Sem	Subject Code	Category	Lecture		Theory		Practical	Credits
IV	19CPFN4B	Core paper XI	Hrs/sem	Hrs/Per week	Hrs/sem	Hrs/Per week	----	4
			120	8	120	8		

COURSE OBJECTIVES

The students will be able to

1. To learn the basic principles of gravimetric, colorimetric, titrimetric, chromatographic and spectrometric analyses applied in the analysis of foods
2. To acquire laboratory skills required for performing a range of chemical and physicochemical analyses of food components
3. To understand the methods used to assess the accuracy and precision of the analytical techniques performed in lab

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level (K1 – K4)
CO1	To develop and understanding about the advanced analytical and instrumental techniques.	K1-K2
CO2	To understanding the processing of enzymes	K1-K2
CO3	To learn about the flavouring technology	K1-K2
CO4	Understanding the technology of food emulsions.	K1-K2
CO5	To describe bio-chemical analysis of food components	K1-K4

Knowledge level: K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse.

MAPPING WITH PO

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

S – Strong, M – Medium, L – Low

UNIT-I **24 Hours**

SPECTROSCOPY:

a) UV-Visible spectroscopy, Atomic absorption spectroscopy, Flame photometry, Fluorescence spectroscopy, Emission spectroscopy, Mass-spectroscopy, Fourier Transform Infra-Red.

b) **Gas liquid chromatography**: principle; different types of detectors and its applications: discharge ionization detector (DID), electron capture detector (ECD), flame photometric detector (FPD), Hall electrolytic conductivity detector (ElCD), helium ionization detector (HID), Nitrogen phosphorous detector (NPD), mass selective detector (MSD), photoionization detector (PID), pulsed discharge ionization detector (PDD), thermal energy analyzer (TEA); various applications of GLC.

UNIT-II **24 Hours**

ENZYMES IN THE PROCESSING OF FATS AND OILS

a) Specificity, stability and application of lipases and related enzymes Role of enzymes in hydrolysis of triglycerides, interesterification and randomization.

b) **Starch degrading enzymes**: sources, analysis and application of starch degrading enzymes Hemicellulase: sources, analysis and application.

UNIT-III **24 Hours**

FLAVOUR TECHNOLOGY

a) Principle types of flavorings used in foods, natural flavoring substances, Flavour constituents from Onion, garlic, cheese, milk, meat, vegetables, fruits; Flavour constituents of wine, coffee, tea, chocolate, spices and condiments

b) Methods of flavour extraction, isolation, separation; Distillation, solvent extraction, enzymatic extraction, static headspace, dynamic headspace etc. Principles and techniques of flavour encapsulation, types of encapsulation; Factors affecting stabilization of encapsulated flavour and their applications in food industry.

UNIT-IV **24 Hours**

TECHNOLOGY OF FOOD EMULSIONS, FOAMS AND GELS:

a) **Food emulsions**- conventional and nano emulsions; emulsifiers and their functions in foods; HLB concept in food emulsifiers; Emulsion formation and

stability; Examples of emulsions in food- mayonnaise, sauce, beverages Polymers and surfactants.

b) **Structure of foods representing emulsions, foams and gels**: Physical structure of fat rich, concentrated, fermented, coagulated and dried products. Techniques for evaluation of structure for food emulsions, foams and gels.

UNIT-V **24 HRS**

a) Microbial techniques in food analysis: Infectious and toxigenic agents of food borne diseases: detection, identification and control methods. Antibiotic resistant strains; methods of detection-conventional, modern, rapid methods, genetic approaches.

b) Scanning Electron Microscopy principles and applications, study of the structure of a variety of food gels.

Distribution of Marks: Theory – 25 (IA) + 75 (univ. exam) = 100 Marks

TEXT BOOKS:

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Francis Rouessac and Annick Rouessac	Chemical Analysis: Modern Instrumentation Methods and Technique	John Wiley & Sons Ltd	2007
2.	C. Moir	Spoilage of Processed Foods: Causes and Diagnosis	AIFST Inc. (NSW Branch) Food Microbiology Group, Sydney	2001
3.	C. Blackburn	Food Spoilage Microorganisms	CRC Press	2006
4.	D. Tagu and C. Moussard	Techniques of Molecular Biology	Science Publishers	2006
5.	Lawrence Jack Bradshaw	Introduction to Molecular Biological Techniques	Prentice-Hall,	1966

REFERENCE BOOKS:

S.No.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	B. Welz	Atomic Absorption Spectrometry, Third Edition	Wiley-VCH, Weinheim, Germany	1998
2.	.Eugene F. Barry; Grob, Robert Lee	Modern practice of gas chromatography	New York: Wiley-Interscience	2004
3.	Wilfried M.A. Niessen, Wilfried M. Niessen	Liquid Chromatography-Mass Spectrometry, Third Edition (Chromatographic Science).	Boca Raton: CRC	2006
4.	M.P. Doyle and M. Doyle	Food Microbiology: Fundamentals and Frontiers, 3rd ed	ASM Press.	Springer Publishing, 2006
5.	Kary B. Mullis	The Polymerase Chain Reaction: A Textbook	Birkhäuser	2004

WEB SOURCES:

1.http://www.gjust.ac.in/department/fdt/M.Tech%20syllabus_110517.pdf

2.https://food-science.uark.edu/_resources/pdfs/food-analysis-syllabus-spring2016.pdf