

GUJARAT TECHNOLOGICAL UNIVERSITY

B.Pharm

SEMESTER: V

Subject Name: Pharmaceutical Analysis III

Subject Code: 2250003

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	Theory		Practical	
				External	Internal	External	Internal
3	0	3	6	80	20	80	20

Theory

Sr No	Course Contents	Total Hrs
1	Fundamentals of Spectroscopy: Classification of spectra i.e. line, band, continuous spectra / absorption, emission spectra; Wave properties of electromagnetic radiation; Particle/photon properties of electromagnetic radiation; Electromagnetic spectrum.	03
2	UV-VIS Spectroscopy: Theory; Beer and Lambert's law - limitations and deviations from the law; Terminologies associated with absorption measurements; Types of transitions; Factors affecting spectral characteristics (structural and nonstructural); Effect of conjugation; Woodward Fieser rule; Photometric titrations; Instrumentation, applications (in analysis of organic compounds and inorganic complexes), advantages and limitations of UV Visible spectroscopy; Quantitative analysis of binary mixtures of absorbing substances by simultaneous equation method; Calibration of UV Visible Spectrophotometer as per Pharmacopoeia.	10
3	Fluorescence Spectroscopy: Introduction: luminescence, photoluminescence; Theory of Fluorescence and Phosphorescence; Jablonski diagram; Factors affecting fluorescence intensity (structural and nonstructural); Instrumentation, applications, advantages and limitations of fluorescence spectroscopy	04
4	IR Spectroscopy: Theory of absorption of Infrared radiation by molecules; Molecular vibrations; Factors influencing vibrational frequencies; Calculation of vibrational frequencies (Hooke's law); Sample handling techniques; Instrumentation (Dispersion and FTIR spectrometer) and applications of IR Spectroscopy; Calibration of IR Spectrophotometer as per Pharmacopoeia.	07
5	Atomic Spectroscopy: Basics of atomic spectroscopy; Principle of atomic absorption and atomic emission spectroscopy; Interferences in atomic spectroscopy; Factors affecting atomic spectroscopy like solvents, buffers, other ions, etc; Flame Photometry; Atomic emission spectroscopy with plasma and electrical discharge sources; Instrumentation (including radiation sources like hollow cathode	05

	lamp), applications, advantages and limitations of atomic absorption and atomic emission spectroscopy.	
6	Mass Spectrometry: Theory; Ionization techniques, Ion separating techniques; Different types of ions and their significance in mass spectra, Fragmentation rules and rearrangements; Instrumentation and applications of mass spectrometry	06
7	Nuclear Magnetic Resonance spectroscopy: Fundamental Principles - nuclear spin, magnetic moment; Proton NMR spectroscopy - theory, chemical shift and factors affecting chemical shift, spin- spin coupling, coupling constant, relaxation process, Instrumentation and applications of PMR; Brief overview of C13 NMR.	07
8	Structure elucidation by joint application of UV, IR, NMR and Mass spectrometry	03

Note:

Examples based on assays & structure elucidation shall be covered at concerned subtopics in each of the above chapters

Practical – 22500P3

Sr. No.	Content
1	Calibration of UV spectrophotometer
2	Calibration of IR spectrophotometer
3	To determine % purity of paracetamol by UV Spectrophotometry
4	Determination of λ_{max} , A(1cm1%), Detection-Quantitation Limit and preparation of calibration curve (Verification of Beer's law) for any drug by UV-visible spectrophotometer.
5	To determine % purity of Metformin by UV Spectrophotometry
6	Effect of pH and solvent on the UV spectrum of given compound
7	To determine excitation and emission wavelength of drug by spectrofluorimetry
8	Assay of quinine sulphate by spectrofluorimetry
9	To determine effect of Quenching on fluorescence of quinine sulphate by fluorimetry
10	Assay of sulpha drugs by colorimetry
11	To determine %purity of paracetamol by colorimetry
12	To determine isosbetic point of indicator by UV Spectrophotometry
13	To determine dissociation constant of indicators by UV spectrophotometry
14	Content Uniformity of any drug as per Pharmacopoeia.
15	Identification of API by IR spectrum.
16	To interpret multiplication of signals of various compound by NMR
17	Workshop on structure elucidation of simple organic compounds using UV, IR, NMR, and Mass
18	To determine % purity of Paracetamol and Diclofenac Sodium Combination as per IP'96
19	Simultaneous estimation of Paracetamol & Ibuprofen/any other combination by simultaneous equation method

References Books:

1. Principles of Instrumental Analysis Skoog, Holler, Nieman, 5th edition.
2. Instrumental Methods of Analysis, H.H. Willard, L.L. Meritt, J.A. Dean and F.A. Settle Wadsworth, New York
3. Pharmaceutical Analysis: Modern methods Part A, Part B, James W. Munson.
4. Vogel's Text Book of Quantitative Chemical Analysis, G. H. Jeffery, J. Basset, J. Mendham, R. C. Denny (Rev. by), Longman, London
5. A Textbook of Pharmaceutical Analysis. Connors K.A.
6. Practical Pharmaceutical chemistry, part 1&2, A.H. Beckett and J.B. Stenlake, the athlone press, London.
7. Pharmacopoeia of India, Govt. of India, Ministry of Health.
8. British Pharmacopoeia, ministry of health and social welfare, UK.
9. The United States Pharmacopeia–National Formulary (USP–NF)