

Subject Code: 1PA1010103	Subject Title: PHARMACEUTICAL ANALYTICAL CHEMISTRY-I
Pre-requisite Subject	- NONE -

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
Lecture	Tutorial	Practical	Credit	Theory (T)		Total Marks
				University Assessment	Continuous Assessment	
4	NA	NA	4	80	20	100

Scope and Objectives:

This course deals with the fundamentals of analytical chemistry. Fundamentals, principles and application of titrimetric analysis. Titrimetric analysis involves principles like acid-base, redox, complexometric, gravimetric, non-aqueous, precipitation etc. The course also covers stability testing of drugs and biochemical analysis.

Learning Outcome:

- Student shall have good understanding of the basic concept of the analytical chemistry, titrimetric analysis, and gravimetric analysis with its application to the pharmaceutical analysis.
- Students will be able to carry out various volumetric titrations and develop analytical skills
- Students will be able to learn stability studies and biochemical analysis concept

Unit	Content	Hrs
1	<p>Pharmaceutical analysis: Definition and scope of pharmaceutical analysis, different techniques of analysis (classification), types of analysis, factors affecting selection of method for analysis, methods of expressing concentration, chemicals (types, purification, checking purity) and glassware's (types, calibration, cleaning).</p> <p>Science of errors: Explain errors, types of errors, sources of errors, methods of minimizing errors, accuracy, precision and significant figures, interferences and its removal, sampling techniques</p> <p>Standardization: fundamentals of volumetric analysis, primary and secondary standards, Preparation and standardization of various molar and normal solutions – sodium hydroxide, hydrochloric acid, Sulphuric acid, oxalic acid, sodium thiosulphate, potassium permanganate and ceric ammonium sulphate</p>	12
2	<p>Acid base titration: Law of mass action, ionic products of water, pH, common ion effect, relative strength of acid and base and its effect on titration, acid base indicators, theories of acid base indicators, hydrolysis of salts, classification of acid-base titrations, back titrations, pharmacopoeial applications and neutralization curves.</p> <p>Redox titrations: Concepts of oxidation and reduction, redox indicators, types of redox titrations (Principles and applications), redox titration curve, Cerimetry, Iodimetry, Iodometry, Bromometry, Dichrometry, Titration with potassium iodate</p>	12
3	<p>Precipitation titrations: Precipitation reactions, Solubility Products, factors affect upon solubility of precipitates. Mohr's method, Volhard's methods, Fajans method and estimation of sodium chloride.</p> <p>Complexometric titration: Theory and types of titration, titrants, metal ion indicators, masking and demasking agents, estimation of Magnesium sulphate and calcium gluconate.</p> <p>Non-aqueous titration: Non-aqueous solvents, titrants and indicators, differentiating and levelling solvents, pharmacopoeial applications and estimation of Sodium Benzoate and Ephedrine HCl</p>	12

4	<p>Gravimetry: Principle and steps involved in gravimetric analysis. Purity of the precipitate: coprecipitation and post precipitation, Estimation of barium sulphate.</p> <p>Diazotization titration: Basic Principle, theory and application of diazotization titration.</p> <p>Karl-Fisher titration</p> <p>Extraction techniques: Simple extraction, multiple extractions, separation of drugs in multicomponent system. Effect of pH on extractability of drugs, continuous extractions.</p>	12
5	<p>Stability Testing: Definitions, ICH guidelines for stability testing, Factors affecting stability of a formulation, Stabilizers and Methods of stabilization, stability parameters for different dosage forms.</p> <p>Stability-indicating assays: Definition, regulatory requirement, steps in development, practical considerations.</p> <p>Biochemical analysis of drugs</p>	12

References:

- 1 A.H. Beckett & J.B. Stenlake's, Practical Pharmaceutical Chemistry, Vol I&II, Stahlone, Press of University of London
- 2 Fundamentals of Analytical Chemistry by Skoog
- 3 Text Book of Pharmaceutical Analysis by K. A. Connor
- 4 Textbook of Quantitative Chemical Analysis by A. I. Vogel
- 5 Instrumental methods of chemical analysis by G. R. Chatwal
- 6 Textbook of Pharmaceutical Analysis-I & II, Vidyasagar G.
- 7 Textbook of Pharmaceutical Analysis by Ravishankar
- 8 Textbook of Pharmaceutical Analysis by Kasture
- 9 GTU book for Pharmaceutical Analysis
- 10 ICH Guideline for Stability Testing (Q1AR2)
- 11 Jems T Carstenson. Drug stability- Principles and Practices. 2nd edition, Marcel Deccer.
- 12 Venn RF, Principle and Practice of Bioanalysis, Francis & Taylor