

LJ UNIVERSITY

LJ INSTITUTE OF PHARMACY

SEMESTER: VII

Subject Name: Instrumental Analysis

Subject Code: BP703TP

Scope: This subject deals with the application of instrumental methods in qualitative and quantitative analysis of drugs. This subject is designed to impart a fundamental knowledge on the principles and instrumentation of spectroscopic and chromatographic technique. This also emphasizes on theoretical and practical knowledge on modern analytical instruments that are used for drug testing.

Objectives: At completion of this course it is expected that students will be able to understand-

1. Understand the interaction of matter with electromagnetic radiations and its applications in drug analysis
2. Understand the chromatographic separation and analysis of drugs.
3. Perform quantitative & qualitative analysis of drugs using various analytical instruments.

Teaching scheme and examination scheme:

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	Theory		Practical	
				External	Internal	External	Internal
3	1	4	6	75	25	35	15

Sr. No.	Course Contents	Hours
1	UV Visible spectroscopy Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations. Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode. Applications - Spectrophotometric titrations, Single component and multi component analysis Fluorimetry Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions, factors affecting fluorescence, quenching, instrumentation and applications	10
2	IR spectroscopy Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations Instrumentation - Sources of radiation, wavelength selectors, detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and applications Flame Photometry -Principle, interferences, instrumentation and applications Atomic absorption spectroscopy - Principle, interferences, instrumentation and applications Nepheloturbidometry - Principle, instrumentation and applications	10

3	Introduction to chromatography Adsorption and partition column chromatography -Methodology, advantages, disadvantages and applications. Thin layer chromatography - Introduction, Principle, Methodology, Rf values, advantages, disadvantages and applications. Paper chromatography -Introduction, methodology, development techniques, advantages, disadvantages and applications Electrophoresis – Introduction, factors affecting electrophoretic mobility, Techniques of paper, gel, capillary electrophoresis, applications	10
4	Gas chromatography - Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications High performance liquid chromatography (HPLC) -Introduction, theory, instrumentation, advantages and applications.	08
5	Ion exchange chromatography - Introduction, classification, ion exchange resins, properties, mechanism of ion exchange process, factors affecting ion exchange, methodology and applications Gel chromatography - Introduction, theory, instrumentation and applications Affinity chromatography - Introduction, theory, instrumentation and applications	07
Total Hours		45

Practical

Practical application and analytical principles of drugs. Performance of chemical tests and physical parameters along with Quantitative analysis and qualitative analysis of pharmaceutical substances.

1. Determination of absorption maxima and effect of solvents on absorption maxima of organic compounds
2. Estimation of Dextrose by colorimetry
3. Estimation of Sulfanilamide by colorimetry
4. Simultaneous estimation of Ibuprofen and Paracetamol by UV spectroscopy
5. Assay of Paracetamol by UV- Spectrophotometry
6. Estimation of Quinine Sulfate by fluorimetry
7. Study of quenching of fluorescence
8. Determination of sodium by flame photometry
9. Determination of potassium by flame photometry
10. Determination of chlorides and sulphates by nephelo turbidometry
11. Separation of amino acids by paper chromatography
12. Separation of sugars by thin layer chromatography
13. Separation of plant pigments by column chromatography
14. Demonstration experiment on HPLC
15. Demonstration experiment on Gas Chromatography

Recommended Books:

1. 1 Instrumental Methods of Chemical Analysis by B.K Sharma

2. Organic spectroscopy by Y.R Sharma
3. Text book of Pharmaceutical Analysis by Kenneth A. Connors
4. Vogel's Text book of Quantitative Chemical Analysis by A.I. Vogel
5. Practical Pharmaceutical Chemistry by A.H. Beckett and J.B. Stenlake
6. Organic Chemistry by I. L. Finar
7. Organic spectroscopy by William Kemp
8. Quantitative Analysis of Drugs by D. C. Garrett
9. Quantitative Analysis of Drugs in Pharmaceutical Formulations by P. D. Sethi
10. Spectrophotometric identification of Organic Compounds by Silverstein