7th SEMESTER

Course Code	Course Title	Teaching Load			Marks		Exam (hrs)		Credits
		L	T	P	Int.	Ext.	Int.	Ext.	
BP701T	Instrumental Methods Of Analysis	3	1	-	25	75	1	3	4

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: Upon completion of the course, the student shall be able to

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.

Module 01 **10 Hours**

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.

Module 02 **10 Hours**

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.

Module 03 **10 Hours**

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.

Module 04 **08 Hours**

Gas Chromatography

- Introduction, theory, instrumentation, derivatization, temperature programming, advantages, disadvantages and applications.

High Performance Liquid Chromatography (HPLC)

- Introduction, theory, instrumentation, advantages and applications.

Module 05 **07 Hours**

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.

Recommended Books (Latest Editions)

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.