

# MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

(MIP 101T)

## Course of study

Course code	Name of the course	No. of hours	Tutorial	Credit points
MIP101T	Modern pharmaceutical analytical techniques	4	-	4

## Schemes for internal assessments and end semester examinations semester wise

Name of the course	Name of the course	Internal Assessment			End Semester Exam		Total Marks	
		Continuous Mode	Sessional Exam		Marks	Duration		
			Marks	Duration				
MIP101T	Modern pharmaceutical analytical techniques	10	15	1Hr	25	75	3 Hrs	100

# MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

(MIP 101T)

## Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC and other hyphenated techniques.

## Objectives

After completion of course student is able to know,

1. The analysis of various drugs in single and combination dosage forms
2. Theoretical and practical skills of the instruments

## THEORY

45 HOURS

1. **A. UV-Visible spectroscopy:** Introduction, Theory, Laws, Instrumentation 9 Hrs  
associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy.  
**B. IR spectroscopy:** Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of IR Spectrometer, Applications of IR spectroscopy.
2. **NMR spectroscopy:** Principle, Instrumentation, Solvent requirement in NMR, 9 Hrs  
NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of  $^1\text{H}$ -NMR and  $^{13}\text{C}$  NMR.  
Applications of NMR spectroscopy.
3. **Mass Spectroscopy:** Principle, Theory, Instrumentation of Mass 9 Hrs  
Spectroscopy, Different types of ionization like FAB and MALDI, ESI, APPI  
Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules,  
Applications of Mass spectroscopy.
4. **Chromatography:** Principle, apparatus, instrumentation, chromatographic 9 Hrs  
parameters, factors affecting resolution, isolation of drug from excipients, data  
interpretation and applications of the following:

A. High Performance Thin Layer Chromatography, Gas chromatography, High Performance Liquid chromatography, Ultra High Performance Liquid chromatography, Super-critical Fluid chromatography

**B. Hyphenated Techniques:** Principle, Instrumentation and Applications of the following :

a) GC-MS b) LC-MS c) LC-FTIR

5 **A. Thermal Techniques:** Principle, thermal transitions and Instrumentation 9 Hrs

(Heat flux and power-compensation and designs ), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications.

**B. Particle size analysis:** Introduction, principle, instrumentation and application of DLS, SEM and TEM.

## REFERENCES

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers. 4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4<sup>th</sup> edition, CBS Publishers, New Delhi, 1997.
4. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
5. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3<sup>rd</sup> Edition, CBS Publishers, New Delhi, 1997.
6. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series
7. Textbook of Pharmaceutical Analysis, KA.Connors, 3rd Edition, John Wiley & Sons, 1982.