

OBJECTIVE

To impart knowledge on the various methods available to analyse the samples

OUTCOME

On completion of the course the students are expected to have a thorough knowledge on the various spectroscopic methods available to analyse various materials and their characteristics

UNIT I INTRODUCTION OF SPECTROMETRY

Properties of electromagnetic radiation- wave properties – components of optical instruments – Sources of radiation – wavelength selectors – sample containers – radiation transducers – Signal process and read outs – signal to noise ratio - sources of noise – Enhancement of signal to noise

- types of optical instruments – Principle of Fourier Transform optical Measurements.

UNIT II MOLECULAR SPECTROSCOPY

Molecular absorption spectrometry – Measurement of Transmittance and Absorbance – Beer's law – Instrumentation - Applications -Theory of fluorescence and Phosphorescence – Instrumentation – Applications – Theory of Infrared absorption spectrometry – IR instrumentation – Applications – Theory of Raman spectroscopy – Instrumentation – applications.

UNIT III MAGNETIC RESONANCE SPECTROSCOPY AND MASS SPECTROMETRY

Theory of NMR – environmental effects on NMR spectra – chemical shift- NMR-spectrometers – applications of ^1H and ^{13}C NMR- Molecular mass spectra – ion sources – Mass spectrometer. Applications of molecular mass - Electron paramagnetic resonance- g values – instrumentation.

UNIT IV SEPARATION METHODS

General description of chromatography – Band broadening and optimization of column performance- Liquid chromatography – Partition chromatography - Adsorption chromatography – Ion exchange chromatography -size exclusion chromatography- Affinity chromatography- principles of GC and applications – HPLC- Capillary electrophoresis – Applications.

UNIT V ELECTRO ANALYSIS AND SURFACE MICROSCOPY

Electrochemical cells- Electrode potential cell potentials – potentiometry- reference electrode

– ion selective and molecular selective electrodes – Instrument for potentiometric studies

– Voltametry – Cyclic and pulse voltametry- Applications of voltametry . Study of surfaces –

Scanning probe microscopes – AFM and STM.

TEXT BOOK

1. Instrumental Methods of Analysis. D.A. Skoog, F. James Holler, Stanley, R.Crouch . Cengage Learning – 2007.