

St.James College of Pharmaceutical Sciences St.James medical Academy River Bank, Chalakudy			
Programme:	B. PHARM	Sem.:	7 <sup>th</sup>
Name of Course: (Subject)	Instrumental methods of analysis	Course Code:	
Teaching faculty of the course			

### Summary of the Lecture Plan

Topic	Lectures	Hours
UV visible spectroscopy	Electronic transitions, chromophores, auxochromes, spectral shifts, solvent effect on absorption spectra, Beer and Lambert's law, Derivation and deviations	4
	Instrumentation - Sources of radiation, wavelength selectors, sample cells, detectors- Photo tube, Photomultiplier tube, Photo voltaic cell, Silicon Photodiode.	3
	Applications - Spectrophotometric titrations, Single component and multi component analysis.	1
Fluorimetry	Theory, Concepts of singlet, doublet and triplet electronic states, internal and external conversions	2
	Factors affecting fluorescence	1
	Quenching, instrumentation and applications	1
	Single beam spectrofluorimeter & Spectrofluorimeter	1
IR spectroscopy	Introduction, fundamental modes of vibrations in poly atomic molecules, sample handling, factors affecting vibrations	1
	Instrumentation - Sources of radiation, wavelength selectors	2
	Detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector and application	1
	Single and double beam I R, Applications	1
Flame Photometry	Principle, interferences, instrumentation and applications.	2
Atomic absorption spectroscopy	Principle, interferences, instrumentation and applications	2
Nepheloturbidometry	Principle, instrumentation and applications	1
Adsorption & partition chromatography	Method, advantage, disadvantage and applications	1
TLC	Principle, Rf values method, advantage, disadvantage and applications.	1

Paper chromatography	Methodology, development techniques advantage, disadvantage and applications.	1
Electrophoresis	Factors affecting electrophoretic mobility, techniques of paper, gel, capillary electrophoresis & applications.	2
GC	Theory Instrumentation Derivatization Temperature programming Advantage, disadvantage and applications	3
HPLC	Theory Instrumentation Advantage & applications	3
Ion exchange chromatography	Classification Ion exchange resins properties Mechanism, factors affecting, applications.	2
Gel chromatography	Theory, instrumentation & application.	1
Affinity chromatography	Theory, instrumentation & application.	1

**Major issues or Core aspects to be addressed/ covered:**

<b>UV visible spectroscopy</b>
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.
Single component and multi component analysis.
<b>Fluorimetry</b>
Theory
Concepts of singlet, doublet and triplet electronic states.
Factors affecting fluorescence
Quenching, instrumentation and applications
<b>IR spectroscopy</b>
Fundamental modes of vibrations
Sample handling
Factors affecting vibrations
Instrumentation - Sources of radiation,
Detectors - Golay cell, Bolometer, Thermocouple, Thermister, Pyroelectric detector
Applications
<b>Flame Photometry</b>

Principle, interferences
Instrumentation
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Principle, Rf values method, advantage, disadvantage and applications
Paper chromatography
Methodology, development techniques advantage, disadvantage and applications.
Electrophoresis
Factors affecting electrophoretic mobility
Techniques of paper, gel, capillary electrophoresis & applications
GC
Theory
Instrumentation
Derivatization
Temperature programming
Advantage, disadvantage and applications
HPLC
Theory
Instrumentation
Advantage & applications
Ion exchange chromatography
Classification

Ion exchange resins properties
Mechanism, factors affecting, applications
<b>Gel chromatography</b>
Theory, instrumentation & application
<b>Affinity chromatography</b>
Theory, instrumentation & application

### Sample Questions

<b>UV visible spectroscopy</b>
Explain the construction and working of UV spectrometer. Explain with examples auxochromes and chromophores.
Discuss applications of ultra violet spectroscopy giving emphasis to different methods of quantitative analysis.
Define and explain Beer-Lamberts law. Explain different types of monochromaters and detectors used in ultra violet spectroscopy.
What are the different types of monochromaters used in visible spectrophotometry?
Define spectroscopy. Discuss the principle of ultraviolet spectroscopy. Explain the different parts of a spectrophotometer.
Give short notes on types of transitions in UV-visible spectroscopy
<b>Fluorimetry</b>
Define quenching and explain its different types.
Explain the factors influencing fluorecence intensity.
Give short notes on light sources and detectors used in spectofluorimeter.
<b>IR spectroscopy</b>
Explain applications infra-red spectroscopy. Mention the different types of molecular vibrations caused by infra-red radiations.
Explain the methods of sample handling in infra-red spectroscopy. Mention the different parts of infrared spectrophotometer.
Explain the principle of infra-red spectroscopy.
Explain the construction and working of IR spectrophotometer.
<b>Flame Photometry</b>
What are the different types of burners used in flame photometry?
Give the principle of flame photometry.
What are the applications of flame photometry?

<b>Atomic absorption spectroscopy</b>
Explain the working of a hollow cathode lamp.
What are the applications of AAS.
<b>Nephelometry</b>
Theory of light scattering and pharmaceutical applications of nephelometry.
Explain the working principle of nephelometer.
. Explain the working principle of instrument used in nephelometric analysis.
<b>Adsorption &amp; partition chromatography</b>
Differentiate column chromatography and HPLC.
Explain the principle of separation, preparation of column and methods of detection in column chromatography
<b>TLC</b>
High performance thin layer chromatography – explain.
Explain the different methods of preparing a TLC plates.
<b>Paper chromatography</b>
Explain the different developmental techniques used in paper chromatography.
<b>Electrophoresis</b>
Explain paper electrophoresis.
Explain the instrumentation of electrophoresis.
Give notes on principle of separation in electrophoresis
<b>GC</b>
Discuss the principle of separation in gas chromatography and detectors used in GC.
Give short notes on types of columns used in gas chromatography.
<b>HPLC</b>
Explain any 3 detectors in HPLC.
What are the pharmaceutical applications of HPLC.
Explain the instrumentation of HPLC.

### Ion exchange chromatography

Give notes on ion exchange chromatography.

Classify ion exchange resins with examples.

Explain mechanism of ion exchange and its application.

### Gel chromatography

What are the different types of stationary phases used in gel filtration? Explain the application of gel filtration in health science.

Explain about the mobile phases used in gel chromatography.

### Affinity chromatography

Explain the principle of affinity chromatography

Give short notes on affinity chromatography.