St. James' College of Pharmaceutical Sciences St.James' medical Academy River Bank, Chalakudy			
Programme:	M.Pharm	Sem/Year:	1st SEM
Name of Course: (*Subject*)	Modern Pharmaceutical Analytical Techniques	Subject Code:	MPH 101T MPC 101T MPA 101T
Teaching faculty of the course	Dr. K.Krishnakumar / Dr. David Paul		

Summary of the Lecture Plan

Topic	Lectures	Hours
UV-Visible spectroscopy	Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy.	3
IR spectroscopy	Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy	3
Spectroflourimetry	Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.	3
Flame emission spectroscopy and Atomic absorption spectroscopy	Principle, Instrumentation, Interferences and Applications.	1
NMR spectroscopy	Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, SpinSpin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.	10
Mass Spectroscopy	Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy	10
Chromatography	Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: a) Thin Layer chromatography	10

	b) High Performance Thin Layer Chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Ultra High Performance Liquid chromatography h) Affinity chromatography i) i) Gel Chromatography	
X ray Crystallography	Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, Xray powder technique, Types of crystals and applications of X-ray diffraction.	5
Immunological assays	RIA (Radio immuno assay), ELISA, Bioluminescence assays.	2
Electrophoresis	Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing	3
Potentiometry	Principle, working, Ion selective Electrodes and Application of potentiometry.	3
Thermal Techniques	Principle, thermal transitions and Instrumentation (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. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.	7

Major issues or Core aspects addressed/ covered:

Modern Pharmaceutical Analytical Techniques (MPH 101T/MPC 101T/MPA 101T)
Mentioned Detail in Summary

Sample Questions from Lectures

Topic	Questions
UV-Visible spectroscopy	Explain in detail : Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Write a note on the Choice of solvents and solvent effect and Briefly give the Applications of UV- Visible spectroscopy.
IR spectroscopy	Explain in detail : Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Give the Factors affecting vibrational frequencies Write briefly on the Applications of IR spectroscopy
Spectroflourimetry	Explain in detail : Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.
Flame emission spectroscopy and Atomic absorption spectroscopy	Explain in detail : Principle, Instrumentation, Interferences and Applications.
NMR spectroscopy	Explain in detail : Chemical shift and Factors influencing chemical shift, SpinSpin coupling, Coupling constant, Nuclear magnetic double resonance, Briefly outline the principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.
Mass Spectroscopy	Briefly exlain the Principle, Theory, Instrumentation of Mass Spectroscopy, Write a note on the : electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight. Explain in detail the Mass fragmentation and its rules, Write a note on Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy
Chromatography	Give the Principle, apparatus, instrumentation and applications of the following: a) Thin Layer chromatography b) High Performance Thin Layer Chromatography c) Ion exchange chromatography d) Column chromatography e) Gas chromatography f) High Performance Liquid chromatography g) Ultra High Performance Liquid chromatography h) Affinity chromatography i) i) Gel Chromatography
X ray Crystallography	Briefly explain the Production of X rays, Different X ray diffraction methods, Bragg‘s law, Rotating crystal technique, Xray powder technique,
Immunological assays	Explain briefly on RIA (Radio immuno assay), ELISA, Bioluminescence assays.

Electrophoresis	Give the Principle, Instrumentation and applications : a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing
Potentiometry	Give a note on the Principle, working, Ion selective Electrodes and Application of potentiometry.
Thermal Techniques	Give the Principle, Instrumentation and applications : DSC/DTA/TGDTA