

## CONTENT of COURSE

Modules	Topics	Content	Learning Objective	Learning Outcome	Hrs. Assigned
<b>Module 1</b>	Awareness and Expertise on ISO 17025; Safety of Environment; GMP/GLP	Introduction to the principles of ISO/IEC 17025	Management System, SOP guidelines, Preparation, & Change control	SOP, GMP and GLP	Lecture/ Seminar 14 hrs Practical/Project 20 hrs
		Calibration, traceability and uncertainty of measurement			
		Monitoring, witnessing and the human factor in assessments			
		Safety of Environment; GMP/GLP			
<b>Module 2</b>	HPLC	Introduction to the principles of HPLC	Sample processing Sample analysis and documentation	Quantitative and qualitative analysis of Drugs	Lecture/ Seminar 40 hrs Practical/Project 180 hrs
		Instrumentation, working, applications & limitations			
		Hands on practice on the instruments of HPLC			
<b>Module 3</b>	Ultraviolet-Visible Spectroscopy; Polarimetry; HPTLC and Quantification of Natural Products	Introduction to the theory of Ultraviolet-Visible Spectroscopy & factors affecting the spectra.	Sample preparation, Visualisation, Sample analysis, Data interpretation	Quantitative and qualitative analysis of Drugs, Optical rotation	Lecture/ Seminar 20 hrs Practical/Project 40 hrs
		Theory and principle of HPTLC and Polarimetry			
		Instrumentation, working, applications & limitations			
		Hands on practice on Ultraviolet-Visible Spectrophotometer, HPTLC and Polarimeter			
<b>Module 4</b>	Infrared Spectroscopy	Introduction to the theory of IR Spectroscopy & factors affecting the spectra.	Identification of Drugs	Determination of functional groups in molecules	Lecture/ Seminar 02 hrs Practical/Project 12 hrs
		Instrumentation, working, applications & limitations			
		Introduction to Attenuated Total Reflectance			
		Hands on practice on IR Spectrophotometer			
<b>Module 5</b>	Gas Chromatography	Introduction to the theory & principle of Gas Chromatography	Sample processing Sample analysis and documentation	Quantitative and qualitative analysis of Drugs	Lecture/ Seminar 10 hrs Practical/Project 30 hrs
		Instrumentation, working, applications & limitations			
		Introduction to branches of Gas Chromatography			
		Hands on practice on the instrument of Gas Chromatography			

<b>Module 6</b>	Dissolution & Disintegration	Introduction to the theory and Principles of Dissolution & Disintegrator	Developing and evaluating an IVVC of solid dosage form	In vitro drug disintegration and drug release information	Lecture/ Seminar 04 hrs Practical/Project 50 hrs
		Instrumentation, working, applications & limitations			
		Hands on practice on the Dissolution & Disintegrator apparatus			
<b>Module 7</b>	Karl- Fischer Titrator	Introduction to the theory & principle of KF Titration	Understanding the importance of KF and sample handling techniques	Detection of water content	Lecture/ Seminar 02 hrs Practical/Project 12 hrs
		Instrumentation, working, applications & limitations			
		Hands on practice on the Karl-Fischer Titrator			
<b>Module 8</b>	Titrimetric Analysis	Introduction to the theory & principle of various Titrations	Types of solutions, pH, Buffers, Various methods of end-point determination	Qualitative Analysis Assay of Products	Lecture/ Seminar 08 hrs Practical/Project 30 hrs
		Instrumentation, working and applications			
		Hands on practice on the related instruments			
<b>Module 9</b>	Chemical Analysis	Introduction to theory and principles of various methods of chemical analysis	understanding of various methods of chemical detection	Preparation of Solutions, Heavy metal Analysis	Lecture/ Seminar 08 hrs Practical/Project 48 hrs
<b>Module 10</b>	Microbiological Analysis of Drugs and Pharmaceuticals	Introduction to principles of various methods of Microbiological Analysis of Drugs and Pharmaceuticals	Microbiological Assay procedures	Analysis of Antibiotics, Microbiological limits, PET, BET & Sterility	Lecture/ Seminar 24 hrs Practical/Project 60 hrs
<b>Module 11</b>	Statistical Analysis	Introduction to various statistical methods for the evaluation of laboratory data	to design data, analyze data appropriately and interpret and draw conclusions	Accurate and consistent result	Lecture/ Seminar 12 hrs Practical/Project 10 hrs