

4.7.2 T PHARMACEUTICAL ANALYSIS -V
(3hrs/week), CREDIT: 03

Sr. No.	Topic	Hrs.
The following topics to be discussed with special reference to quality control and assurance of the pharmaceuticals, its scope and importance in the pharmaceutical industry along with suitable examples		
SECTION-I		
01	Gas Chromatography: Theory, instrumentation, sample handling, columns, detectors, derivatisation and quantitation (area normalization, percent area, Internal standard and External standard method) and applications	10
02	Infrared Spectroscopy: Origin of IR spectra, Molecular vibrations, fundamental bands, Vibrational frequency, Fermi resonance, Important spectral regions. FTIR: Theory, Instrumentation, sample handling, different attachments used in recording FTIR. Analysis and Interpretation of organic compounds based on FTIR Spectra	14
SECTION-II		
03	Introduction to Near Infrared (NIR) & Raman spectroscopy with respect to theory, instrumentation and applications.	04
04	High performance Liquid Chromatography (HPLC): Theory, instrumentation and applications, Isocratic & Gradient types, Pumps, Columns, Detectors, Tubings, Degassing techniques, Quantitation techniques including Area normalization, percent area, Internal and external standard methods, Trouble shooting in brief and System suitability testing, UPLC: Introduction and advantages over HPLC.	12
05	Introduction, principle, and applications of Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM)	05

4.8.3 T PHARMACEUTICAL ANALYSIS -VI
(3hrs/week), CREDIT: 03

Sr. No.	Topic	Hrs.
The following topics to be discussed with special reference to quality control and assurance of the pharmaceuticals, its scope and importance in the pharmaceutical industry along with suitable examples.		
SECTION-I		
01	Nuclear Magnetic Resonance (NMR) Spectroscopy: Theory, Chemical shift, Shielding-deshielding, Spin-Spin Coupling (Splitting), Coupling Constant, Chemical and Magnetic Equivalence, Double resonance, Shift reagents, Solvents, Factors, affecting chemical shift, Anisotropy, Instrumentation, application and simple structure determination. Introduction to C13 NMR	15
02	Electron Spin Resonance (ESR): Introduction, principle and instrumentation.	02
03	Ion Exchange Chromatography: Theory, instrumentation and applications.	04
SECTION-II		
04	Introduction to Automated methods of Analysis: Flow injection analysis.	04
05	Flash Chromatography: Theory, instrumentation and applications.	03
06	Super Critical Fluid Chromatography: Theory, instrumentation and applications.	05
05	Mass spectrometry: Introduction, theory, instrumentation, resolution, Different Methods/techniques of ionization (EI, CI, FAB, ESI and MALDI) and their Applications. Introduction to GC-MS, LC-MS and MS-MS	12