

SHIVAJI UNIVERSITY, KOLHAPUR

Pre Ph.D. Coursework for PHARMACY

Paper-II

Unit I

[20 mks]

UV-Visible Absorption Spectroscopy: Spectra of isolated chromophores, Auxochromes, Bathochromic shift, Hypsochromic shift, Hyperchromic and hypochromic effect.

Choice of solvents and solvent effect, Woodward's Fieser, Fieser Kuhn and Nelson rule, Spectral correlation with structures of compounds and Qualitative and quantitative analysis applications of UV-Visible spectrophotometry.

Infrared Spectroscopy: Sample handling, Instrumentation of Dispersive and Fourier - Transform IR Spectrometer, Factors affecting vibrational frequencies, Interpretation of spectra of compounds and Applications of IR spectroscopy to drug product and excipient analysis.

Spectrofluorimetry: Theory of Fluorescence, Factors affecting fluorescence, Quencher Instrumentation and Applications of fluorescence spectrophotometer.

Unit II

[20 mks]

¹H and ¹³C NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent Requirement in NMR, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, coupling constant, Nuclear magnetic double resonance, Brief outline of principle of FT-NMR, Interpretation of spectra of compounds for structure elucidation.

Unit III

[20 mks]

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, Applications of mass spectroscopy to structural elucidation of compounds.

Unit IV

[20 mks]

Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications of the following:

Paper chromatography, Thin Layer chromatography, Ion exchange chromatography, Column chromatography, Gas chromatography, High Performance Liquid chromatography, HPTLC.

Hyphenated techniques: Principle, instrumentation and applications of LC-MS/MS, GC-

MS/MS, HPTLC-MS, strategies and techniques employed for the qualitative and quantitative evaluation of impurities, degradation products, drug-drug and drug-excipient interaction products, metabolites, phytochemicals and trace components.

Unit V:

[20 mks]

Analytical and Bioanalytical methods validation using ICH Guidelines.

In-vitro bioassays: MTT assay, XTT assay, flow cytometry, RIA (Radio immuno assay), ELISA, bioluminescence assays, bioassays for antimicrobials.

References:

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Douglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation - P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series
8. Handbook of Pharmaceutical Analysis by Lena Ohannesian, Antony J. Streeter
9. HPLC for Pharmaceutical Scientists, Edited by Yuri Kazakevich and Rosario LoBrutto
10. Vogel HG, Drug Discovery and Evaluation, Springer, Germany.2008.
11. Wu G Assay development: fundamentals and practices. Wiley, New York (2010).