CH-903 Advanced Spectroscopy

Credit Hours: 3-0

Prerequisite: **Nil**

Course Objectives

To enable the students with different specialization to understand theory, instrumentation and principles of NMR and its use as a tool for structure elucidation of unknown molecules

Course Outcomes

Students will be acquainted with various types of spectroscopic techniques for characterization of materials and their application/s in the industry and research.

Course Contents

Theory, instrumentation, continuous wave (CW) spectrometers, Fourier transform (FT) spectrometers, the chemical shift and shielding, local diamagnetic effect, magnetic anisotropic effect, spin-spin splitting (n+1) rule, the origin of spin-spin splitting, equivalent and non-equivalent protons, Spin-Spin coupling, integral and integration curve, Pascal's triangle, coupling constants and factors influencing the coupling constant, gated decoupling, ^{1}HBB decoupling, ^{1}H off-resonance decoupling, INETP and DEPT experiments, interpretation of spectra, ^{13}CNMR; ^{13}C chemical shifts, correlation charts, calculations of ^{13}C chemical shifts, spin-spin splitting of carbon-13 signals, Nuclear over Hauser enhancement (NOE), 2D-NMR Techniques, theory and presentation of 2D spectra. Homo and hetero-nuclear 2D *J*-resolved NMR spectroscopy. 2D shift-correlated NMR spectroscopy: H,H-COSY, H,C-COSY, NOESY, HMBC, HMQC and TOCSY Experiments.

Recommended Books

1. R.M. Silverstein, F.X. Webster and D.J. Kiemle, Spectrometric Identification of organic Compounds, John Wiley & Sons Inc., USA (2005).

2. H. Friebolin,. Basic one and two-dimensional NMR Spectroscopy, John Wiley & Sons Inc. New York (2006)
3. Atta-ur-Rahman, Muhammad I C, (1996). Solving Problems with NMR Spectroscopy, Academic Press.