Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCYC513	Application of Spectroscopic Methods	3	0	0	3

Course Objective
• The subject offers the readers a fundamental understanding of the spectroscopic techniques and their application for structure elucidation of organic molecules.
Learning Outcomes
• At the end of the course the student will be able to interpret spectral data. • Qualify National level Entrance Examinations

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Electronic spectroscopy:** Types of electronic transitions in organic compounds, solvent effects, effect of extended conjugation, Woodward-Fieser rules, **Infrared spectroscopy:** Frequencies of organic functionality, factors affecting the frequencies. Vibrational spectra of ionic, coordination and metal carbonyl compounds. Introduction to Raman spectroscopy.	6L	Students may learn about the electronic transition and calculation of lmax of different compounds. Students learn about the vibrational frequency of different functional groups and the carbonyl group attached to metal. Students may face a lot of questions in different national and international competitive examinations.
2	**Nuclear Magnetic Resonance Spectroscopy:** Principle and theory of NMR spectroscopy. Chemical shift, shielding and deshielding mechanism, spin-spin interaction, coupling and multiplicity, Karplus relationship, First order splitting patterns and structure correlation. Off-resonance decoupling, chemical shift reagents, restricted rotation (DMF, biphenyls, annulenes), long range coupling, NOE effects. Hetero-nuclear coupling, ^{13}C-NMR: Natural abundance and sensitivity, Calculation of ^{13}C. 2D NMR: COSY, NOISY, HETCOR, DEPT.	19L	In this chapter, students should have some idea on the basic principle of NMR and different aspects of NMR. They may learn how to assign the structure of the compounds using 1H, 13C, DEPT, etc.
3	**Mass spectrometry:** Basic principle, base peak, metastable peak, fragmentation processes of organic molecules and deduction of structural information. Cleavage of bonds, Different techniques like CSI, EI, FAB and MALDI etc. for identification of compounds.	10L	This chapter is very much useful to confirm the structure of the organic molecule and corresponding molecular weight.

4	Structure elucidation by spectroscopic techniques.	7L	this portion will be for the structural assignment of the organic molecules.
Total		**42L**	

Text Books:

1. Introduction to Spectroscopy – D. L. Pavia, G.M. Lampman, G. S. Kriz, 4th Edition, Cengage Learning, 2008.

Reference Books:

1. Spectrometric identification of organic compounds, Robert M. Silverstein, Francis X. Webster, David Kiemle, 7th Edition. Wiley, 2005.
2. Spectroscopic methods in organic chemistry - D. H. Williams and I. Flemming, 6th Edition, McGraw Hill, 2011.
3. Organic structure Analysis- Phillip Crews, Rodriguez, Jaspars, Oxford University Press, 1998.
4. Organic Spectroscopy- William Kemp
5. Spectroscopy of Organic Compounds- P. S. Kalsi