

**M.Sc. SEMESTER-III**

**Physical Chemistry**

**CHNN-604 (P)**

**Paper-IV**

**Unit 1: Mass Spectrometry** **25% (15 Hours)**

Introduction ion production E1, C1 FD, ESI and FAB, factors affecting fragmentation, ion analysis, ion abundance, Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, meta stable peak. Me Lafferty rearrangement, nitrogen rule, High resolution mass spectrometry, Examples of mass spectral fragmentation of organic compounds with respect to their structure Determination.

**Unit 2: X-ray Diffraction** **25% (15 Hours)**

Principle, Theory-X-ray spectral lines, X-ray tube emission, Bragg condition, Miller Indices, Laue method, Bragg Method, Debye-Scherrer method of X-ray structural analysis of crystals, index reflections, identification of unit cells from systematic absences in diffraction pattern, structural of simple lattices, X-ray intensities, structure factor and its relation to intensity, structure factor and electron density, chemical analysis using X-ray absorption, X-ray Fluorescence, chemical analysis, X-ray diffraction, Numerical problems.

**Unit 3: The Liquid State & liquid crystals** **25% (15 Hours)**

The gaseous, liquid and solid state, the vacancy theory of liquid, the free volume of a liquid, physical properties of liquid, vapour pressure, surface tension, the Kelvin equation for vapour pressure of a droplet, Excess pressure in a drop, the Laplace equation and the Young-Laplace equation, surface active agents, viscosity, effect of temperature on viscosity, the Reynolds number, Molar refraction, Optical activity, ORD and CD, Structure of Liquids, Questions. Liquid Crystals, Vapour Pressure – Temperature diagrams, Thermography, LCDs and the seven segment cell, Nometric, liquid crystals, cholesteric liquid crystals, Disc shape liquid crystals, Polymorphism in thermotropic liquid crystals, pressure-induced mesomorphism, Molecular arrangements in various states of liquid crystal, Questions.

**Unit 4: Photo electron & Photo acoustic spectroscopy** **25% (15 Hours)**

Introduction, principle, Instrumentation and application of following technique, Photo acoustic spectroscopy(PAS), photo electron spectroscopy, Koopman's THEROM,esca Andchemical information obtianded rom it, Augerelectron Spectroscopy(AES)

**Books:**

1. Spectroscopic method in Organic chemistry. Forth edition D. M. Williams and I.Fleming Tata-McGraw Hill, New Delhi, 1990.
2. Organic spectroscopy, Second Edition, W. Kemp, ELBS Macmillan,1987
3. Application of absorption spectroscopy of Organic Compound J. R. Dyer, Prentice Hall of India, New Delhi, 1984.
4. Spectroscopic identification of Organic Chemistry. Forth Edition R.M.
5. Spectroscopic Methods in Organic Chemistry. Forth Edition D.M. Williams and I. Fleming Tata –McGraw Hill, New Delhi,1990.
6. H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, Instrumental methods of Analysis, HCBS Publishing new Delhi;2004, 7<sup>th</sup> Ed.
7. C.N. Banwell and E.M. McCosh, Fundamentals of Molecular Spectroscopy, Tata –McGraw Hill, New Delhi; 4<sup>th</sup> Ed.
8. R.M. Silverstein, F.X. Webster; Spectroscopic identification of Organic compounds; Wiley-India; 6<sup>th</sup> Ed.
9. P.S. Kalsi; Spectroscopy of Organic compound; New Age International; 2Ed.
10. Principle of Physical chemistry. Puri Sharma Pathania.
- 11.Spectroscopic methods in Organic chemistry4th edition D.M Willaiams an L Fleming Tata MaGraw Hill, New Delhi 1990.