

ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ



# University of Mysore

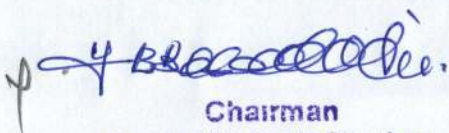
(Estd.1916)

**Ph. D. in CHEMISTRY**



**UNIVERSITY OF MYSORE**  
**Department of Studies in Chemistry**  
**Manasagangotri, Mysuru-570 006**

**Regulations and Syllabus**  
**Ph. D. in CHEMISTRY**



**Chairman**  
**Board of Studies in Chemistry**  
**University of Mysore, Manasagangotri**  
**Mysore-570 006, Karnataka**

**UNIVERSITY OF MYSORE  
GUIDELINES AND REGULATIONS  
LEADING TO  
PH. D. IN CHEMISTRY**

**Programme Details**

Name of the Department	:	Department of Studies in Chemistry
Subject	:	Chemistry
Faculty	:	Science and Technology
Name of the Programme	:	Ph. D.

**PH.D. IN CHEMISTRY**

**COURSE-I: RESEARCH METHODOLOGY AND APPLIED CHEMISTRY**

**Objectives:**

- To learn the use of library for books, periodicals, abstracts and internet in chemical literature search
- To learn the writing of research papers, typing and online submission.
- To understand the structures of the chemical compounds spectroscopy techniques and thermal methods of analysis are used.
- To study different methods of separation techniques and concepts of acids and bases.

**Course outcome:**

- Use of books, periodicals, abstracts and internet in chemical literature search.
- Writing and typing of thesis, research papers and online submission.
- Structural elucidation of compounds using spectroscopic techniques and thermal methods of analysis.
- Separation of compounds using different separation techniques.
- Concepts of acids and bases.

**Pedagogy:**

Teaching through conventional methods such as black board and chalk and modern methods like power point presentation.



## UNIT – I RESEARCH METHODOLOGY

Nature, need, scope of research; Types of research: fundamental and applied

**Tools and Techniques of Research:** Use of library, research books, monograph, periodicals, abstracts, documents, use of internet in chemical literature search.

**Reporting of Research:** Form and style, format, questions, footnotes, bibliographical references, tables, figures, elucidations, typing of thesis, writing research papers/dissertation, submission, hardcopy, online submission, e-submission etc.

## UNIT – II SPECTROSCOPY AND THERMAL METHODS OF ANALYSIS

Principles and applications of UV-Vis, IR, NMR ( $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{19}\text{F}$ ,  $^{31}\text{P}$  and  $^{11}\text{B}$ ), mass, ESR and NQR spectroscopy for the structural elucidation of compounds.

**Two Dimensional NMR Spectroscopy:** COSY, NOSEY, INDOR and SPI, DEPT spectra, CIDNP techniques and MRI.

**Thermal Methods of Analysis:** Principle and applications of TGA, DTA and DSC; Cyclic voltammetry.

## UNIT – III ADVANCED CHEMISTRY

**Statistical Treatment of Analytical Data:** Student's t-test, Confidence interval of the mean, Testing for significance – comparison of the means and two standard deviations.

**Standardization and Calibration:** Comparison with standards – direct comparison and titrations, External standard calibration – the least square method. Figures of merit of analytical methods – sensitivity and detection limit, linear dynamic range.

**Concepts of Acids and Bases:** Bronsted-Lowry, Lux-Flood, Lewis, Hard and soft acids and bases (HSAB).

**Solvent Systems:** Liquid ammonia, acetic acid and sulphuric acid

Periodic properties, catalytic applications, organometallic compounds, metal-metal bonding, spectral and magnetic properties of d- and f-block elements, NMR shift reagents.

### **Separation techniques**

**Purification:** Crystallization, sublimation, fractional crystallization, distillation techniques (simple distillation, steam distillation, distillation under reduced pressure, fractional distillation) Solvent extraction

**Chromatography:** Thin layer chromatography, Column chromatography, Paper chromatography, Gas liquid chromatography, Ion exchange chromatography, High pressure liquid chromatography (HPLC)

**Gel Permeation Chromatography:** Size exclusion chromatography (Gel filtration) with special reference to separation of proteins, carbohydrates and nucleic acids.

**Solid State Chemistry:** Crystal and molecular structure studies of organic and inorganic compounds by x-ray crystallography (single crystals), crystal growth, programmes used to solve structure, structure refinement, CIF, CIF-tab, R-value, WinGX, Platon, Ortep, enCifer, Mercury, CCDC, CSD, Bond-lengths and bond angles, torsion angle, Hydrogen bonding interactions, Packing, Disorder, Polymorphism & pseudopolymorphism.

**Electrochemistry:** Electrochemical oxidation and degradation of organic compounds, synthesis of nano materials by hydrothermal, electrochemical and solgel methods, Applications: Photodegradation, catalytic reactions and electrical, Effect of inhibitors on the rate of corrosion.

**References:**

1. Organic Spectroscopy, William Kemp, English Language Book society, Macmillan, 1987.
2. Application of Absorption Spectroscopy of Organic Compounds, John R. Dyer, Prentice Hall of India Private Ltd., New Delhi, 1974.
3. Spectrometric Identification of Organic Compounds, 4<sup>th</sup> edition, Robert M. Silverstein, G. Clayton Bassler and Terence C. Morrill, John Wiley & Sons, New York, 1981.
4. An Introduction to Practical Organic Chemistry – Robert, Vingrove etc.
5. Fundamentals of Analytical Chemistry, Skoog, West, Hollar and Crouch, 8<sup>th</sup> Ed.
6. Modern Analytical Chemistry by David Harvey, 3<sup>rd</sup> Ed.
7. K. Albert, L. Lehninger, D.L. Nelson, M.M. Cox, Principles of Biochemistry, CBZ publishers, 1<sup>st</sup> edition, New Delhi, 1993.
8. Encyclopedia of Chemical Technology – Kirck-Othmer series.
9. Inorganic Chemistry (4<sup>th</sup> edition): J.E. Huheey, E.A. Keiter and R.L. Keiter.
10. Advanced Inorganic Chemistry (5<sup>th</sup> edition): F.A. Cotton and G. Wilkinson: Wiley
11. An Introduction to X-ray Crystallography, Michael M. Woolfson
12. Crystal Structure Determination, Werner Massa & Robert O. Gould  
Introduction to Electrochemistry by S. Glasstone.

**COURSE-II: REVIEW OF LITERATURE IN THE AREA OF RESEARCH**

**Objectives:**

- To learn the literature survey in the area of research by referring books, periodicals and abstracts  
using library and internet
- To understand the writing and typing of research papers and their online publications.
- To learn the writing of thesis, typing and drawing of figures and structures of the compounds.

**Course outcome:**

- Review of literature in the area of research using library and internet.
- Writing and typing research papers and their online publications.
- Writing and typing of thesis.

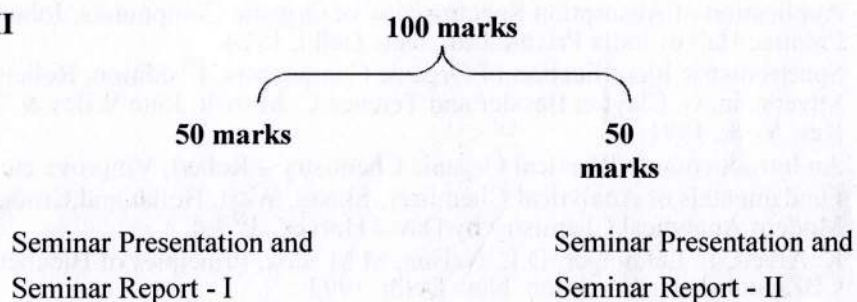
**Pedagogy:**

- Teaching through blackboard and chalk and powerpoint presentation.
- Carryout experiments and data collection.



In Paper – II, a student has to present two seminars (I and II), one during 8<sup>th</sup> week and another during 15<sup>th</sup> week of the course. In seminar I, a student has to highlight his/her broad area of the research work and in seminar II the review of literature, objectives etc should be given. It is stated in the letter No: UOM/DOR/5/Ph.D/2011-12 dated 26/08/2011 [(d) on page 2] that Department Council shall assess the students for Paper – II in the area of research paper. **Since the members in the Department Council of the DOS in Chemistry is very large (17 members), it was resolved that Doctoral Committee members (Guide, Chairman of the department and two senior faculty members) shall assess the same.**

**Paper – II**



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