THIRUVALLUVAR UNIVERSITY

MASTER OF PHILOSOPHY

CHEMISTRY

(FT/PT)

(with effect from 2009-2010)

PART I

CORE COURSE I
RESEARCH METHODOLOGY

UNIT-I: RESEARCH METHODOLOGY

Meaning of research - Objectives of research - motivation of research - Types, approaches and significance - Methods versus methodology - Research in scientific methods - Research process - Criteria for good research - Problem encountered by research in India - Funding agencies.

UNIT-II: RESEARCH DESIGN

Research Problem: Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Research design - Needs and features of good design - Different research design - Basic principles of experimental designs.

UNIT-III: DATA COLLECTION AND DOCUMENTATION

Data collection methods - Data types - Processing and presentation of data - Techniques of ordering data - Meaning of primary and secondary data - The uses of computers in research - The library and internet - Uses of search engines - virtual libraries - common software for documentation and presentation.

UNIT-IV: DATA AND ERROR ANALYSIS

Statistical analysis of data - Standard deviation - Correlation - Comparison of sets of data - Chi squared analysis for data - Characteristics of probability distribution - Binomial, Poisson and normal distribution - Principle of least square fittings - Curve fitting - Measurement of errors - Types and sources of errors - Determination and control of errors.

UNIT-V: RESEARCH COMMUNICATION

Meaning of research report - Logical format for writing thesis and paper - Essential of scientific report: abstract, introduction, review of literature, materials and methods and discussion - Write up steps in drafting report - Effective illustrations: tables and figures - Reference styles: Harvard and Vancouver systems.

REFERENCE BOOKS:

1. Research Methodology, Methods and Techniques - C.R. Kothari - Wishwa Prakasam Publications, II Edition.
2. Research: An introduction - Robert Ross - Harper and Row Publications.
3. Research methodology - P. Saravanavel - Kitlab Mahal, Sixth Edition.
4. A Hand book of Methodology of Research - Rajammal P.A. Devadass - Vidyalaya Press
5. Introduction to Computers - N. Subramanian
6. Statistical methods - G.W. Snedecor and W. Cocharan - Oxford and IBH, New Delhi.
7. Research Methodology Methods and Statistical Techniques - Santosh Gupta.
8. Statistical Methods - S.P. Gupta
9. Scientific social surveys and research - P. Young - Asia Publishers, Bombay.
10. How to write and publish a scientific paper - R.A. Day - Cambridge University Press.
11. Thesis and Assignment writing - Anderson - Wiley Eastern Ltd.

PART I

CORE COURSE II

ADVANCED PAPER I

UNIT-I:

Instrumental methods of analysis: Atomic absorption and emission spectroscopy, chromatography including GC and HPLC and electro-analytical methods (Coulometry, cyclic voltammetry, polarography, amperometry, and ion selective electrodes).

UNIT-II:

Spectroscopy:

Principle and applications in structure elucidation:

(i) Rotational: Diatomic molecules; isotopic substitution and rotational constants.
(ii) Vibrational: Diatomic molecules, linear tritomic molecules, specific frequencies of functional groups in polyatomic molecules.
(iii) Electronic: Singlet and triplet states; n p* and P P* transitions; application to conjugated double bonds and conjugated carbonyls-Woodward-Fieser rules; Change transfer spectra.
(iv) Nuclear Magnetic Resonance (1H NMR): Basic principle; chemical shift and spin-spin interaction and coupling constant.
(v) Mass Spectrometry: Parent peak, base peak, metastable peak, McLafferty rearrangement.

UNIT-III:

Applications of UV-visible, IR, NMR and Mass spectrometry in the determination of structures of organic molecules.

UNIT-IV:

Applications of UV-visible, IR, NMR and Mass spectrometry in the determination of structures of inorganic molecules.

UNIT-V:

Symmetry elements; point groups; (ii) optical activity its origin, atomic and conformation asymmetry; (iii) Variation of optical activity with wave length. Optical rotatory dispersion and circular dichroism curves and their application, in determining the configuration and conformation of different compounds. (iv) conformational analysis.

REFERENCE BOOKS:

1. H.H. Willand, L.L. Merrit and J.A.Dean, Instrumental Methods of Analysis - D. Ven. Nostround Co.
2. H.A. Stobel, Chemical Instrumentalism - Addition - Wesley Publishing Co.