

MASTER OF PHILOSOPHY

CHEMISTRY

(FT/PT)

(For the Students admitted in the Academic Year 2021-2022)

PART I: CORE COURSE 1

RESEARCH METHODOLOGY

UNIT-I: LITERATURE SURVEY

Print: Sources of information-Primary, Secondary, Tertiary sources - Journals-Journal abbreviations-Abstracts-Current titles-Reviews-Monographs –Dictionaries -Textbooks - Introduction to Chemical Abstracts and Beilstein - subject index, Substance Index, author index, Formula Index and other indices with examples.

Digital: Web resource - E-Journal – Journal access – TOC alerts – Hot articles – Citation index – Impact factor – H-Index – Search engines, Scirus, Google Scholar, ChemIndustry, Wiki – Databases, ChemSpider, SciFinder, Scopus and SCI journals websites.

UNIT-II: CHEMICAL SAFETY AND ETHICAL HANDLING OF CHEMICALS

Safe working procedure and protective environment, protective apparel, emergency procedure and first aid, laboratory ventilation, Safe storage and use of hazardous chemicals, procedure for working with substances that pose hazards, flammable or explosive hazards, procedures for working with gases at pressures above or below atmospheric – safe storage and disposal of waste chemical, recovery, recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, in incineration and transportation of hazardous chemicals.

UNIT-III: PROPOSAL, PAPER AND THESIS WRITING

- (i) Thesis and dissertations, style and conventions in writing, selection of topic.
- (ii) The general format – page and chapter format – use of quotations – foot note – tables and figures, results and discussions – applicability of the findings to common usage – referencing – abbreviations used etc.
- (iii) Rough drafting of the article – Title, Abstract, introduction, literature review problem and time limitation, Experimental methods, Results and discussions, Foot notes, Figures, Data presentations, Tables, Sign convention followed – Bibliography, conclusions and recommendation.

UNIT-IV: DATA COLLECTION AND DOCUMENTATION

Statistical analysis of data – 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 error – types and sources of errors – Determination and control of errors.

UNIT-V: RESEARCH ETHICS

Definition – Academic honesty and integrity – Intentional and Unintentional plagiarism – Forms of Plagiarism – how to avoid plagiarism.

REFERENCE BOOKS:

1. Research methodology, methods and techniques – C.R. Kothari – Wishwa Prakasam publications, II Edition.
2. Research: An introduction – Harper and Row Publications.
3. Research methodology – p. Saravanel – 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. Cochran – oxford and IBH, New delhi.
7. Research methodology methods and statistical techniques – Santosh Gupta.
8. Scientific social survey and research – P. Young – Asia publishers, Bombay.
9. How to write and publish a scientific paper – R.A. Day – Cambridge university press.
10. Thesis and assignment writing – Anderson – Wiley Eastern Ltd.
11. J. March, Advanced organic chemistry; Reactions, mechanisms and Structure', 6th Ed., Wiley – Intescience, 2007.

PART I: CORE COURSE 2

ADVANCED CHEMISTRY

UNIT-I:

Instrumental methods of analysis: Atomic absorption spectroscopy, chromatography including GC and HPLC and electro-analytical methods (Coulometry, cyclic voltammetry, polarography), Determination of surface area using BET and cyclic voltammetry, Electrochemical impedance spectroscopy.

UNIT-II:

Organic Spectroscopy:

Structural determination of organic molecules using UV-Visible, Infrared (IR), Nuclear Magnetic Resonance (^1H and ^{13}C NMR) and Mass spectrometry (No Basics).

UNIT-III:

Materials characterization:

Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), X-ray Diffraction (XRD), Fluorescence Spectrometry, Differential Scanning calorimetry (DSC), Thermogravimetric Analysis (TGA) and Gel permeation chromatography (GPC).

UNIT-IV:

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

UNIT-V:

Symmetry elements; (i) point groups; (ii) optical activity its origin, atomic and conformation asymmetry; (iii) Variation of optical activity with wave length. Optical rotator 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. Willard, L.L. Merrit and J.A. Dean, Instrumental Methods of Analysis D. Ven. Nostrand Co.
2. H.A. Stobel, Chemical instrumentalism – Addition- Wesley publing Co.

3. D.A. Skoog and D.M. West fundamentals of Analytical Chemistry, Holt Rinehart and Winston publications, IV Edn, 2004.
4. G.D. Christian and J.E.O Reilly, Instrumental Analysis, Allyn and Bacon Inc, II Edn., 1986
