

PAPER - II (CHEMISTRY)**CW 02: ADVANCED RESEARCH TECHNIQUES IN CHEMICAL SCIENCES****UNIT - I****Physical Chemistry:**

Areas of ongoing research in the theoretical chemistry and Quantum Chemistry, Electronic Structure Elucidation-Basic knowledge of the useful tools. Chemical Dynamics and its applications in the elucidation of reaction mechanism of simple reactions, Acid-Base and Enzyme catalysis, Chem-informatics and its importance in modern chemical sciences

UNIT - II**Organic Chemistry:**

Basic techniques of Phytochemical research, Isolation and characterization of organic molecules by spectral methods (UV VIS, FTIR, NMR techniques), GC MS, HPLC etc. Knowledge of the research in the synthesis of complex molecules, development of new methods using organometallic reagents, molecular recognition, drug design and drug discovery, Protein Chemistry

UNIT - III**Inorganic Chemistry:**

Methods of research in the area of Synthetic inorganic chemistry, Coordination Chemistry and metal Complexes, metal Complexes in the nature and their importance in the human life. Inorganic polymers, their preparation and characterization, Polymer kinetics, and macrocyclic chemistry of metals

UNIT - IV**Analytical chemistry:**

Principal of Solution Chemistry, Advanced techniques of Spectroscopy, Thermal Analyses {TGA, DTA, etc}, Chromatography, Electroanalytical methods and Diffraction [X-Ray, Electron and neutron] methods and their application in research in chemical sciences, Separation methods - surfaces and interfaces, Environmental Chemistry Basic idea of Research methodology in the areas of air and water research, Sampling techniques, Analyses and removal of pollutants from air and water samples. Spectrophotometric methods, ~~Electro-analytical~~ and AAS techniques and their applications in environmental research

(pHmetry, voltammetry, conductometry, polarography etc.)

UNIT - V**Multidisciplinary research and our Heritage:**

Basic idea of researches going on in the areas of nanochemistry, green chemistry, supramolecular chemistry and Chemistry of super conductors. Awareness of research contributions of at least two pioneer Indian chemists of modern India (Prof. P C Ray, Prof N R Dhar, Prof CNR Rao, Prof, S Ghosh, Prof RC Mehrotra, Prof. RD Tiwari, Prof K. Bahadur, Prof. H L Nigam, Prof RC Kapoor, Prof RP Rastogi, Prof. A K Dey Prof W U Mallick, Prof P T Narsingham, Prof T R Sheshadri Prof SG Tandan etc). and knowledge of some Noble laureates of Indian origin

Semi-conductors

Lashari
06/21/15

Books suggested –

1. Practical Skills in Chemistry, J.R. Dean, A.M. Jones, D Holmes, R Reed, J Weyers and A Jones, Pearson Education Ltd. 2003
2. Experiments and Techniques in Organic Chemistry, D. Casto, C. Johnson and M. Miller, Prantice Hall inc 2007
3. Elementary Practical Organic Chemistry Pt I,II and III, A.I. Vogel CBS Publishers and Distributers
4. Synthesis and Characterisation of inorganic Compounds, W.L. Jolly, PHI
5. Official Methods of Analysis, AOAC, Washington
6. Organic Spectroscopy, William Kemp, ELBS Macmilliam, 1987
7. Modern Analytical Methods, David Harvey, Interscience Pub, /, 1996
8. Separation Methods, M.N. Shastry
9. Instrumental Methods of Analysis, H Willard, D.u. Merritt and J.R.J.A. Deans, CBS Publishers and Distributers.
10. Green Chemistry : Theory and Practice, P.T. Anastas and J.C. Warner, Oxford University Press, 2000
11. Green Chemistry, M. Lancaster, Royal Society of Chemistry, 2002
12. Natural Products : Chemistry, Biochemistry and Pharmacology, G. Bramhachary, Narosa Publishing House, 2009
13. Solvent Extraction in Analytical Chemistry, H. Fraiser, John Wiley, New York, 1958
14. Spectroscopic identification of Organic Compounds, R.M. Silverstein and F.X. Webster John Wiley New York, 2003
15. Physical Methods in Chemistry, R.S. Drago, Affiliated East West Publishers New Delhi, 1998
16. Principles of instrumental Analysis, D.A. Skoog, F.J. Holler and T .A. Neiman, Harcourt Brace & Co., 1998
17. Chemical instrumentation : A Systematic Approach, H.A. Strobel, Addison Wesley, 1973
18. Standard Methods of Analysis of Water and Waste Water, APHA, 1986
19. Spectroscopy, B K Sharma Goel Publishing House, Krishna Prakashan Media Pvt Ltd. Shivaji Road Meerut. 250001. U P.
20. Chromatography: Kamalesh Bhansal, Campus Books International, Prahlad Street, Ansari Road, Darya ganj New Delhi 110002.

➤ *Any other books suggested by Course coordinator/ Course Teacher/ Supervisor concerned may be applied.*

Kanand
06/09/13 *elw*