(a) Literature Search and
(b) Instrumentation method based on

1. Fluorescence and phosphorescence methods, Raman Spectra, NMR Spectra, 10 articles on recent advances – Talanta, Analytical Chemistry, Chemical Education etc. [25Marks]

2. X-Ray Spectroscopy, Radio Chemical Methods, ORD, CD, Thermal analysis, 10 articles on recent advances – Talanta, Analytical Chemistry, Chemical education etc. [20Marks]

References:

Research Papers

1. The acronyms used in the world of spectroscopy, microscopy and diffractometry – Compilation and classification – Spectro Chemicals Acta- vol.:36, PP 5- 1989


3. Raman spectroscopy 20 years later – Chemical Tech. – 1990


5. Time Resolved Spectroscopy using FTIR International Laboratory, vol.:62


12. Separation of Ga, In & Tl by extraction with n-octyl aniline in CHCl₃
13. Corrosion measurements by potential step chromo amperometry

Reference Books:
2. Organic spectroscopy- William Kemp (ELBS)

Paper-II (50 Marks)

(I) Stereo chemistry and confirmation (13 Marks) [11 Marks]

[08 Marks]


[05 Marks]

References:
1. Stereo Chemistry of carbon compounds
   - Ernest L. Eliel

2. Stereo Chemistry of organic compounds
   -- Nasipuri

(II) Electro Chemistry – (Industrial)
(13 Marks)  
[11 Hours]

1. Organic electro synthesis – Basic principles and parameters available - the hydro
dimerization of Acrylonitrile mechanism – Monsanto process – developments from the early Monsanto process – The new Monsanto process – Mechanism – other hydro dimerization reaction – Advantages and drawbacks. [05 Marks]


References:
1. Industrial electrochemistry – By Derek Pletcher[Chapman & Hall]
2. Organic electrochemistry – By Baiser M.M.

(III) Quantum Chemistry
[12 marks ]
1. Orbital – Interpretation of Atomic orbital – Schrodinger’s wave equation. Time
dependant equation- Eigen values and Eigen functions - Normalization and
orthogonality-Degeneracy – Forbidden transitions – Application of wave
mechanics - particles in one and three dimensional box – The Sapce wave
function for the electron in the Hydrogen atom.

References:

2. Quantum Chemistry – An introduction -- By Walter Kauzmann

(Acadamic press)

(IV) Polymer Chemistry
[ 12 marks ]


3. Measurement of viscosity and normal stresses, Newtonian and non-Newtonian and visco- elastic fluids. Physical and chemical modification of polymers- Block & Graft polymers, High temperature polymers, polymers for biomedical application. [4 Marks]

References:

1. Polymer Chemistry – By F.Billemeyer
2. Gowarikar V.R.Viswanathan N.V. and Sreedhar J. -Polymer Science (New age international publishers)
1. Energy and the electromagnetic spectrum – Absorption of electromagnetic radiation by organic molecules-
   Infrared spectroscopy- Molecular vibrations – factors influencing vibrational frequencies- instrumentation – sampling techniques - applications of infrared spectroscopy – Indentify by finger printing- Identification of functional groups-
   Quantitative infrared analysis- Molar absorptivity- Attenuated Total Reflectance (ATR) and multiple internal reflectance (MIR) – Laser- Raman spectroscopy-
   Fourier transform infrared spectroscopy – IR spectroscopy problems.


3. C-13 NMR Spectroscopy- Natural Abundance of $^{13}\text{C}$ N.M.R. spectra- resolution-

References:
   Clayton Bassler and Torence C. Morril. (John Wiley and Sons)
3. Fundamentals of molecular spectroscopy
   - By C.N. Banwell (McGraw – Hill 1972)
4. Introduction to molecular spectroscopy
   - By G.M. Barrow (McGraw – Hill )

2. Carbohydrates [25 marks ]

1. Mono saccharides – Reactions and confirmations – Ring structure of mono saccharides – Deoxy surgars – Muta rotation and mechanism of muta rotation -
   preparation of forms of a sugar – Glycosides – Hudson’s lactone rule – Hudson’s
isorotation rule – methods for determining the size of sugar rings – pyranoses and furanose structure.


References:

2. Chemistry of carbohydrates – By Pigment and Goepp (Academic Press)
3. Newer aspects of the stereochemistry of carbohydrates – By Ferrier and Overend

**Paper III – [Elective] INORGANIC CHEMISTRY**

**{50 MARKS}**

1. **Co-ordination Chemistry** { 25 marks }

1. Chemistry of Transition Elements – Co-ordinations chemistry of transition metal ions – stability constants of complexes and their determinations – stereochemistry of co-ordination compounds – ligands field theory – splitting of
Spin crossover in co-ordination compounds – Interpretation of electronic spectra
including charge transfer spectra, spectro- chemical series – nephelaxelic series –
Taube sugano diagram.

References:
1. Advanced Inorganic Chemistry-
   -By Cotton & Wilkinson
2. Inorganic Chemistry – Principle, Structure and reactions
   -By James Huheey
3. Introduction to Ligand field theory
   -By B.N.Figges

2. Group Theory {25 marks}
1. Molecular symmetry and the symmetry groups – symmetry elements and
   operations – symmetry planes and Reflections proper axes and proper rotations –
   Equivalent symmetry elements and equivalent atoms – the symmetry point
   groups – symmetry classification of molecules – classes of symmetry operations.
2. Representation of groups – the great orthogonality Theorem and its
   consequences – representation of cyclic groups – group theory and quantum
   mechanics – wave functions as bases for irreducible representations. The direct
   product projection operators.

References:
1. Group theory and Chemistry
   -By David and Bishop
2. Introduction to Ligand field Theory
   -By Carl J. Ballhausen
3. Chemical Applications of Group Theory
   -By F.A. Cotton
4. Group Theory for chemists
   -By George Davidsen

PAPER III – [Elective] PHYSICAL CHEMISTRY
[50 MARKS]

Corrosion (25Marks)

1. Basic principles of corrosion – thermodynamics and electrode kinetic
   considerations – acidic, basic and neutral solutions – corrosion by oxygen –
   corrosion by soils – Aerobic and anaerobic micro organisms – oxidation of
   metals and alloys – mechanism of various growth laws – study of oxide films.

References:
1. An introduction to metallic corrosion  -- By Ulick R. Evans

2. Electrochemistry {25 marks } [20 Hours]

References:
1. Principles and Applications of Electrochemistry  
   -- By H. Jermain Creilghton.  {John Wiley & Sons }
2. Comprehensive Treatise of Electrochemistry  
   -- Vol.: 1&2-By J.O.M. Bockris, Brian. F. Conway & Ernest Yeager
3. Modern aspects of electrochemistry  
   -- By B.E. Conway and J.O’M. Bockris [Plenum press]
Articles on recent advances – Talanta – analytical chemistry, chemical education etc.:

3. Reciprocal derivative constant current stripping analysis – Talanta – vol:35 PP 861-867
4. Extreme trace analysis of the elements – methods and problems of sample treatment separation and enrichment – Talanta – (A-B) – vol:19 PP 1489-1521
7. Polarographic procedures without removal of oxygen and other approaches to make the determinations more rapidly – Talanta – Vol.:20 PP 1139-1152
8. Thin layer Chromatography in the heavy organic industries – Talanta Vol.: 20 PP 1231-1260
9. The application of gas Chromatography to food analysis Talanta – Vol.: 26 PP 1065-1099


[50 marks ]

Recent Advance ments

1. Green Chemistry
2. Disconnection approach
3. Phase transfer catalysis