

Course Structure

Chemistry

(B) Minor Courses to be offered by the Department for students of other Departments of Science

Sl. No.	Sem	Type of Course	Name of Course	Credits	Marks
1.	I	MIC-1 (T)	Inorganic Chemistry : Atomic Structure & Chemical Bonding. Organic Chemistry : Fundamentals of Organic Chemistry, stereochemistry & aliphatic hydrocarbons.	2	100
		MIC-1 (P)	Inorganic Chemistry Lab : Volumetric analysis Organic Chemistry Lab : Detection, Purification & Separation of Organic Compounds.	1	100
2.	II	MIC-2 (T)	Physical Chemistry : States of Matter & Ionic Equilibrium	2	100
		MIC-2 (P)	Physical Chemistry Lab : Determination of S.T. Viscosity & Molecular weight.	1	100
3.	III	MIC-3	Organic Chemistry I: Basics and Hydrocarbons	3	100
4.	IV	MIC-4	Physical Chemistry II: Chemical Thermodynamics and its Applications	3	100
5.	V	MIC-5	Inorganic Chemistry II: s- and pBlock Elements	3	100
6.	V	MIC-6	Organic Chemistry II: Oxygen Containing Functional Groups	3	100
7.	VI	MIC-7	Physical Chemistry III: Phase Equilibria and Electrochemical Cells	3	100
8.	VI	MIC-8	Inorganic Chemistry III: Coordination Chemistry	3	100
9.	VII	MIC-9	Organic Chemistry III: Heterocyclic Chemistry	4	100
10.	VIII	MIC-10	Physical Chemistry IV: Conductance & Chemical Kinetics	4	100

Sub Total = 32

Note: The Department may reduce the syllabus of the Minor Courses as per the credit distribution. The Department concerned may also decide practical courses.

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SEMESTER – I

MIC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding and Fundamentals of organic Chemistry

Course Objective

The Objective of CBCS based four year undergraduate Programme (FYUGP) in Chemistry Hons for Semester I & II, Specially for Major & Minor course is to provide the clear conception and understanding about theory and practical course mentioned in the syllabus.

MIC-1 (T) : Inorganic Chemistry Atomic Structure and Chemical Bonding (Theory: 2 credits)		
Unit	Topics to be covered	No. of Lectures
1	<p>Atomic Structure: Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.</p> <p>Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s. Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s).</p> <p>Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configuration, Hund's, Pauli's and Aufbau's principle.</p>	06
2	<p>Chemical Bonding and Molecular Structure</p> <p><i>Ionic Bonding:</i> General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.</p> <p><i>Covalent bonding:</i> VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds.</p>	06
Section B: Organic Chemistry-1 (30 Periods)		
3	<p>Fundamentals of Organic Chemistry</p> <p>Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.</p> <p>Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals.</p> <p>Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.</p>	04
4	<p>Stereochemistry</p> <p>Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; <i>cis - trans</i> nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).</p>	04
TOTAL		20

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Suggested Readings :

1. Advanced Inorganic Chemistry, F.A. Cotton, G. Wilkinson.
2. Concise Inorganic Chemistry, J.D. Lee, Blackwell Science, 2001.
3. Inorganic Chemistry, J.E. Huheey, E.A. Keiter and R.I. Keiter, Pearson Education Asia, 2000.
4. Inorganic Chemistry, ELBS 2nd Edition, D.F. Shriver, P.W. Atkins and C.H. Langford. Oxford University Press 2002.
5. Principles of Inorganic Chemistry. B.R. Puri, L.R. Sharma, Jauhar S.P., S.N. Chand & Co.
6. Inorganic Chemistry, 3rd Edition (ISE) A.G. Sharpe Addison Wesley.

Reference Books:

7. □ J. D. Lee: *A new Concise Inorganic Chemistry*, E L. B. S.
8. □ F. A. Cotton & G. Wilkinson: *Basic Inorganic Chemistry*, John Wiley.
9. □ Douglas, McDaniel and Alexander: *Concepts and Models in Inorganic Chemistry*,
10. John Wiley.
11. □ James E. Huheey, Ellen Keiter and Richard Keiter: *Inorganic Chemistry: Principles of Structure and Reactivity*, Pearson Publication.
13. □ T. W. Graham Solomon: *Organic Chemistry, John Wiley and Sons.*
14. □ Peter Sykes: *A Guide Book to Mechanism in Organic Chemistry*, Orient Longman.
15. □ E. L. Eliel: *Stereochemistry of Carbon Compounds*, Tata McGraw Hill.
16. □ I. L. Finar: *Organic Chemistry (Vol. I & II)*, E. L. B. S.
17. □ R. T. Morrison & R. N. Boyd: *Organic Chemistry*, Prentice Hall.
18. □ Arun Bahl and B. S. Bahl: *Advanced Organic Chemistry*, S. Chand

MIC-1(P): Inorganic and Organic Chemistry Lab

(Practical : 1 Credit)

Practical- 1. Inorganic Chemistry Practical

- a. Preparation and standardization of solutions.
- b. Permanganometry / dichrometry.
- c. Acidimetry / Alkalimetry.

Practical- 2. Organic Chemistry Practical

Organic Practical : Detection of elements, separation and purification of Organic Compounds.

Suggested Readings :

1. Practical inorganic chemistry : Shikha Gulati and J. L. Sharma
2. Practical Chemistry : Dr O.P. Pandey , D.N. Bajpayi & ,Giri.
3. Quantitative Chemical analysis: A.I. Vogel, Prentice Hall Publication.
4. Text book of practical Organic Chemistry: A.I. Vogel, Prentice Hall Publication.
5. Practical Organic Chemistry, F.G. Mann & B.C. Saunders, Orient long man.

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