Semester	**1**
Course	**MINOR**
Paper Code	**B1CH230112T / B1CH230112P**
Paper Title	**GENERAL CHEMISTRY 1**
No. of Credits	**4**
Theory / Practical / Composite	**THEORY: 3; PRACTICAL: 1**
Minimum No. of preparatory hours per week a student has to devote	THEORY: 3; PRACTICAL: 1
Number of Modules	THEORY: 3; PRACTICAL: 1
Syllabus	**Group A** **Module 1: Fundamentals of Organic Chemistry and Stereochemistry** **Fundamentals of Organic Chemistry (4 Lectures)** Electronic effects: Inductive effect, resonance and hyperconjugation; nucleophiles and electrophiles; Concept of acids and bases. reactive intermediates: carbocations, carbanions and free radicals. **Addition, Nucleophilic Substitution and Elimination Reactions (4 Lectures)** Nucleophilic substitutions: S_N1, S_N2 reactions, NGP, effect of solvents, substrate and nucleophile. Eliminations: E1 and E2 reactions (elementary mechanistic aspects); Saytzeff and Hofmann eliminations; elimination vs substitution. **Stereochemistry (4 Lectures)** Stereoisomerism, concept of chirality and optical activity, meso compounds. Projection methods: Fischer, Sawhorse, Newman projections and their interconversion; Configurational nomenclature: D/L, R/S and E/Z. **Group B** **Modele 2: Chemical Thermodynamics (12 L)** 1. Definition of systems, surroundings and types of systems (isolated, closed and open). 2. Extensive properties and intensive properties. 3. Concept of Thermodynamic equilibrium, concept of temperature. 4. Concept of heat and work, reversible work, irreversible work and maximum work. 5. First law of Thermodynamics, internal energy as a state function, properties of state function and path function. 6. Definition of isothermal and adiabatic processes. 7. Joule's experiment and its consequences. 8. Joule-Thomson experiment and enthalpy as a state function. 9. Calculation of work done, heat changes for isothermal and adiabatic changes involving ideal gas.

	10. Concept of Entropy as a state function, Entropy changes in various Physical processes. **Module 3: Chemical Kinetics** 1. Rate of a reaction, rate law 2. Temperature fluctuation and reactivity in gaseous phase 3. Crude approximation: all binary collision leads to product. 4. Calculation of binary collision frequency and collision number in gaseous state. 5. Refinement: concept of activation energy and Boltzmann distribution to introduce the effect of activation energy in the rate law 6. Rate constant and its variation with temperature: Arrhenius equation 7. Order of a reaction 8. Integrated rate laws and characteristic plots 9. Half-life and its significance 10. Determination of order of a reaction 11. Rate expression for complex reactions 12. Unimolecular reaction and reaction mechanism 13. Multi-step reactions 14. Rate determining step 15. Steady state approximation 16. Further refinement: steric requirements (Basic qualitative overview)
	Practical: Analytical Chemistry Practical. 1. Standardization of NaOH using oxalic acid. 2. Standardization of HCl/acetic acid using standardized NaOH. 3. Estimation of carbonate and hydroxide present together in mixture. 4. Estimation of carbonate and bicarbonate present together in a mixture. 5. Estimation of NH_4^+ by formol titration.

<table>
<tr><td>Learning Outcomes</td><td colspan="2">Theory:
To have basic knowledge about the
1. Fundamental aspects of organic chemistry and chemistry of reactive intermediates
2. Stereochemistry of Organic molecules
3. Aliphatic substitution reactions and elimination reactions
4. Fundamental aspects of chemical thermodynamics.
Practical:
To have basic knowledge about analytical chemistry experiments related to acid-base titrations</td></tr>
<tr><td>Reading/Reference Lists</td><td colspan="2">1. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education)
2. Sykes, P. A guidebook to Mechanism in Organic Chemistry, Pearson Education, 2003.
3. Nasipuri, D. Stereochemistry of Organic Compounds, Wiley Eastern Limited.
4. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Robinson, M. J. T., Stereochemistry, Oxford Chemistry Primer, Oxford University Press, 2005.
6. Atkins, P. W. & Paula, J. de Atkins' Physical Chemistry, Oxford University Press
7. Castellan, G. W. Physical Chemistry, Narosa
8. McQuarrie, D. A. & Simons, J. D. Physical Chemistry: A Molecular Approach, Viva Press
9. Levine, I. N. Physical Chemistry, Tata McGraw-Hill.
10. Mortimer, R. G. Physical Chemistry, Elsevier.
11. Ball, D. W. Physical Chemistry, Thomson Press.</td></tr>
<tr><td>Evaluation</td><td>Theory: 60
Internal: 15 (CIA: 10; Other form of Assessment: 2; Attendance: 3)
Semester Exam: 45 (Gr. A: 15; Gr. B: 30)</td><td>Practical: 40
CA: 38, Attendance: 2</td></tr>
<tr><td>Paper Structure for Theory Semester Exam</td><td colspan="2">Gr. A: Attempt ONE out of TWO questions of 15 marks each.
Gr. B: Attempt TWO out of THREE questions of 15 marks each.</td></tr>
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