Semester	**1**
Course	**MAJOR**
Paper Code	**C1CH230112T / C1CH230112P**
Paper Title	Organic Chemistry 1
No. of Credits	**THEORY: 3; PRACTICAL 1**
Theory / Practical / Composite	**COMPOSITE**
Minimum No. of preparatory hours per week a student has to devote	03
Number of Modules	THEORY: 3; PRACTICAL: 1
Syllabus	**Theory: 36 Lectures** *Module 1: Stereochemistry 1* **(12L)** ***Projection of organic molecules****:* Fischer, Sawhorse, Flying-wedge and Newman projection formulae and interconversions. ***Chirality in molecules and optical activity****:* Stereoisomerism, chiral centre, stereogenic centre, molecular chirality, meso-compounds, pyramidal inversion; plane polarised light and polarimeter, optical rotation, specific rotation and molar rotation; racemic compounds, optical purity and enantiomeric excess. Symmetry elements in molecules. ***Configurational nomenclature****:* D/L and *R/S* configuration; *erythro/threo, pref/parf prefixes, syn/anti, E/Z* nomenclature, combination of *R/S*- and *E/Z*- isomerism. *Stereogenicity*, chirotopicity and pseudoasymmetry ***Racemization and Resolution:*** Racemization through cationic, anionic, radical intermediates etc. Resolution of racemic acids, bases and alcohols. ***Module 2: Chemistry of intermediates, polymerization and physical properties*** **(12L)** ***Chemistry of intermediates:*** carbocations (carbenium and carbonium ions), carbanions, carbenes and nitrenes: generation and stability, structure using orbital picture and electrophilic/nucleophilic behavior of reactive intermediates (elementary idea). Chemistry of benzyne: generation and stability, structure using orbital picture and electrophilic & nucleophilic behavior of reactive intermediates (elementary idea). Carbon radicals: structure, generation, stability and reactivity. ***Polymerization:*** Introduction to polymerization, radical, cationic, anionic, backbiting, step growth and chain growth polymerization. ***Physical properties:*** Relative stabilities of isomeric hydrocarbons in terms of heat of hydrogenation, heat of combustion and heat of

	formation. Melting point/boiling point and solubility of common organic compounds in terms of covalent & non-covalent intermolecular forces. ***Module 3: Substitution and Elimination Reactions*** **(12L)** ***Nucleophilic substitution reactions:*** substitution at sp^3 centre: mechanisms (with evidence), relative rates & stereochemical features: S_N1, S_N2, S_N2', S_N1' (allylic rearrangement) and S_Ni; effects of solvent, substrate structure, leaving group and nucleophiles (including ambident nucleophiles, cyanide & nitrite); substitutions involving NGP; [systems: alkyl halides, allyl halides, benzyl halides, alcohols, ethers, epoxides]. ***Elimination reactions:*** E1, E2, E1cB and Ei (pyrolytic *syn* eliminations); formation of alkenes and alkynes; mechanisms (with evidence), reactivity, regioselectivity (Saytzeff/Hofmann) and stereoselectivity; comparison between substitution and elimination; importance of Bredt's rule relating to the formation of C=C.
	Practical: ***Identification of Pure Organic Compound*** Solid compounds: oxalic acid, tartaric acid, citric acid, succinic acid, resorcinol, urea, glucose, cane sugar, benzoic acid and salicylic acid. Liquid Compounds: formic acid, acetic acid, methyl alcohol, ethyl alcohol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform and nitrobenzene. ***Determination of boiling point*** of common organic liquid compounds e.g., ethanol, cyclohexane, chloroform, ethyl methyl ketone, cyclohexanone, acetylacetone, anisole, crotonaldehyde, mesityl oxide, *etc*. [Boiling point of the chosen organic compounds should preferably be less than 160 °C]
Learning Outcomes	**Theory:** To have basic knowledge about the i) Stereochemistry of Organic molecules ii) Reactive intermediates, polymerization and physical properties iii) Aliphatic substitution reactions and elimination reactions **Practical:** Identification of pure solid and liquid organic compounds and determination of boiling point of solid and melting point of liquid organic compounds
Reading/Reference Lists	**Theory:** 1. Clayden, J., Greeves, N. & Warren, S. Organic Chemistry, Second edition, Oxford University Press, 2012. 2. Sykes, P. A guidebook to Mechanism in Organic Chemistry, Pearson Education, 2003. 3. Smith, J. G. Organic Chemistry, Tata McGraw-Hill Publishing Company Limited. 4. Carey, F. A., Guiliano, R. M. Organic Chemistry, Eighth edition, McGraw Hill Education, 2012. 5. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds, Wiley: London, 1994.

	6. Nasipuri, D. Stereochemistry of Organic Compounds, Wiley Eastern Limited. 7. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). 8. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education) 9. Fleming, I. Molecular Orbitals and Organic Chemical Reactions, Reference/Student Edition, Wiley, 2009. 10. James, J., Peach, J. M. Stereochemistry at a Glance, Blackwell Publishing, 2003. 11. Peacock, A. J., Calhoun, A. Polymer Chemistry: Properties and Applications, Hanser Gardner Publications, 2006. 12. Robinson, M. J. T., Stereochemistry, Oxford Chemistry Primer, Oxford University Press, 2005. **Practical:** Nad, Mahapatra, Ghosal-Practical Chemistry	
Evaluation	Theory: 60 Internal: 15 (CIA: 10; Other form of Assessment: 2; Attendance: 3) Semester Exam: 45	Practical: 40 CA: 30; Attendance 2 Semester Exam: 08
Paper Structure for Theory Semester Exam	Answer THREE out of FOUR, 15 marks of each questions.	