

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.Pharm

## PHARMACEUTICAL CHEMISTRY

SEMESTER: II

**Subject Name: ADVANCED ORGANIC CHEMISTRY -II**

**Subject Code: MPC202T**

**Scope:** The subject is designed to provide in-depth knowledge about advances in organic chemistry, different techniques of organic synthesis and their applications to process chemistry as well as drug discovery

**Objectives:** Upon completion of this course the student should be able to

1. The principles and applications of Green chemistry
2. The concept of peptide chemistry.
3. The various catalysts used inorganic reactions
4. The concept of stereochemistry and asymmetric synthesis

Sr No	Course Contents	Total Hrs
1	Green Chemistry: a) Introduction, principles of green chemistry b) Microwave assisted reactions: Merit and demerits of its use, increased reaction rates, mechanism, superheating effects of microwave, effects of solvents in microwave assisted synthesis, microwave technology in process optimization, its applications in various organic reactions and heterocycles synthesis c) Ultrasound assisted reactions: Types of sonochemical reactions, homogenous, heterogeneous liquid-liquid and liquid-solid reactions, synthetic applications d) Continuous flow reactors: Working principle, advantages and synthetic applications	12
2	Chemistry of peptides: a) Coupling reactions in peptide synthesis b) Principles of solid phase peptide synthesis, t-BOC and FMOC protocols, various solid supports and linkers: Activation procedures, peptide bond formation, deprotection and cleavage from resin, low and high HF cleavage protocols, formation of free peptides and peptideamides, purification and casestudies, site-specific chemical modifications of peptides c) Segment and sequential strategies for solution phase peptide synthesis with any two casestudies d) Side reactions in peptide synthesis: Deletion peptides, side actions initiated by proton abstraction, protonation, over activation and side reactions of individual amino acids	12
3	Photochemical Reactions Basic principles of photochemical reactions. Photo-oxidation, photo-addition and photo-fragmentation Pericyclic reactions Mechanism, Types of pericyclic reactions such as cyclo addition, electrocyclic reaction and sigma trophic rearrangement reactions with examples	12

4	<p>Catalysis:</p> <ol style="list-style-type: none"> <li>Types of catalysis ,heterogeneous and homogenous catalysis, advantages and disadvantages</li> <li>Heterogeneous catalysis – preparation, characterization, kinetics, supported catalysts, catalyst deactivation and regeneration, some examples of heterogeneous catalysis used in synthesis of drugs.</li> <li>Homogenous catalysis, hydrogenation, hydroformylation, hydrocyanation, Wilkinson catalysts, chiral ligands and chiral induction, Ziegler-Natta catalysts, some examples of homogenous catalysis used in synthesis of drugs</li> <li>Transition-metal and Organo-catalysis in organic synthesis: Metal-catalyzed reactions</li> <li>Biocatalysis: Use of enzymes in organic synthesis, immobilized enzymes/ cells in inorganic reaction.</li> <li>Phase transfer catalysis-theory and applications</li> </ol>	12
5	<p>Stereochemistry &amp; Asymmetric Synthesis</p> <ol style="list-style-type: none"> <li>Basic concepts in stereochemistry – optical activity, specific rotation, racemates and resolution of racemates, the Cahn, Ingold, Prelog(CIP) sequence rule, meso compounds, pseudo asymmetric centres, axes of symmetry, Fischers D and L notation, cis-trans isomerism, E and Z notation.</li> <li>Methods of asymmetric synthesis using chiral pool, chiral auxiliaries and catalytic asymmetric synthesis, enantiopure separation and Stereo selective synthesis with examples</li> </ol>	12

#### REFERENCES:

- “Advanced Organic chemistry, Reaction, mechanisms and structure”, J March, John Wiley and sons, New York.
- “Mechanism and structure in organic chemistry”, ES Gould, Hold Rinchart and Winston, New York.
- “Organic Chemistry” Clayden, Greeves, Warren and Wothers., Oxford University Press 2001.
- “Organic Chemistry” Vol I and II. I.L.Finar. ELBS, Sixth ed., 1995.
- Carey, Organic chemistry, 5th edition (Viva Books Pvt .Ltd.)
- Organic synthesis-the disconnection approach, S. Warren, Wiley India
- Principles of organic synthesis, ROC Norman and J M Coxan, Nelson thorns
- Organic synthesis- Special techniques VK Ahluwalia and R Aggarwal, Narosa Publishers.
- Organic reaction mechanisms IV edtn, VK Ahluwalia and RK Parashar, Narosa Publishers.