

PAPER CODE: 1SC2030304

TITLE OF PAPER: ORGANIC CHEMISTRY-IV

Course Objective: To impart knowledge and training in chemistry at advanced level, make aware with recent analytical technique, use of reagents and reactions in laboratory, synthesis and study of materials, the exploration of their properties and development of ways to use the mineral life.

Teaching scheme (hours) per week		Credit		Theory Marks		Practical Marks		Total
Theory	Practical	Theory	Practical	University Assessment	Cont. Assessment	University Assessment	Cont. Assessment	
4	-	4	-	40	40	-	-	100

UNIT	DISCRIPTION IN DETAIL	WEIGHTAGE
I	Physical Organic Chemistry Solutions and forces of molecular recognition. Bronsted acid-base chemistry. Lewis acids/bases, electrophiles and nucleophiles. Reactivity, kinetics, and mechanisms. Energy surfaces and transition States. Hammond Postulate. Isotope effects. Hammett plot. Steric and polar effects. Empirical scales of solvent effect. pH and Bronsted relationship. Mechanism and catalysis of proton transfer. General principles of catalysis. Enzyme-catalytic effect and Concept of transition-state stabilization. Investigation of organic reaction mechanisms by physical organic approach. Examples illustrating application to investigation of electrophilic/nucleophilic reactions, and enzyme-catalyzed reactions.	25%
II	Natural product Terpenoids: Classification, structure & chemistry of terpenoids and synthesis of important Farnesol, zingiberene and cadinene. Steroids: Introduction, Structure of Sterols (Cholesterols and Ergosterols) and bile acids. Vitamins and hormones: Classification of vitamins with examples and their deficiency disorders. Classification of hormones.	25%
III	Drug Design Introduction, naming of organic medicinal compounds, literature of medicinal chemistry, development of new drugs, procedure followed in	25%

	drug design, concept of lead compound and lead modification, pro drugs, soft drugs, phase I, II and III clinical trials, structure activity relationship, theories of drug activity : occupational theory, rate theory, induced fit theory, quantitative structure activity relationship, history and development of QSAR. Concept of drug receptors, elementary treatment of drug receptor interactions, physio chemical parameters lipophilicity, partition coefficient, electronic ionization constant, concept of 3-D QSAR.	
IV	Modern Concepts of Organic Chemistry and Green Chemistry a) New Techniques and concepts in organic synthesis. i) Combinatorial synthesis ii) Phase transfer catalysis iii) Tandem synthesis iv) Mosher's method for configuration determination v) Baldwin rules vi) Kahne's glycosidation vii) Methods of oligonucleotide synthesis. b) Green Chemistry: Introduction, principles of green chemistry, Different approaches to green synthesis: Microwave and Ultrasound assisted organic synthesis, Solid phase and aqueous phase Organic synthesis.	25%

Learning Outcomes

Students can understand the atomic and molecular basis of organic chemistry. They can know the impact of organic chemistry on the fields of medicine, pharmacy and its impact on the global economy. They can understand the fundamental principles of molecular structure and shape as they relate to organic molecules and their properties. They can identify organic molecules by functional group: alkane, alkene, alkyne, haloalkane, alcohol, thiol, ether, sulfide, amine, aldehyde, ketone, carboxylic acid and carboxylic acid derivatives.

LIST OF BOOKS:

- 1) E. V. Anslyn and D. A. Dougherty, *Modern Organic Chemistry*, University Science, 2005.
- 2) A. Pross, *Theory and Physical Principles of Organic Reactivity*, John Wiley, 1995.
- 3) A. Rauk, *Orbital Interaction Theory of Organic Chemistry*, John Wiley, 1994.
- 4) F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann, *Advanced Inorganic Chemistry*, 6th edition, Wiley, 1999.
- 5) G. Wilkinson, F. G. A. Stone and E. Abel, *Comprehensive Organometallic Chemistry*, Pergamon, 1980.
- 6) S. Warren, *Designing Organic Synthesis*, John Wiley and Sons, 1980.
- 7) W. Caruthers, *Some Methods of Organic Synthesis*, Cambridge University Press, 1978.
- 8) H. O. House, *Modern Synthetic Reactions*, 2nd Ed., W.A. Benjamin 1972.
- 9) R.O.C. Norman, *Principles of Organic Synthesis*, 2nd Edn., Methuen and Co. Ltd., 1972
- 10) *Organic synthesis* – Michael B. Smith

- 11) **Organometallics inorganic synthesis** – J. M. Swan and D. C. Black (Chapman and Hall)
- 12) **Advanced organic chemistry**, Part B – F. A Carey and R. J. Sundberg, 5th edition (2007)
- 13) **Guidebook to organic synthesis** – R K Meckie, D M Smith and R A Atken
- 14) **Organic synthesis** – Robert E Ireland
- 15) **Strategic Applications of named reactions in organic synthesis** – Laszlo Kurti and Barbara Czako
- 16) Kalsi P. S. **Stereochemistry, conformation and Mechanism**, New Age International Pvt. Ltd.
- 17) Clayden, Greeves, Warren & Wothers, **Organic Chemistry**, Oxford University.
- 18) Carey F. A. and Sundberg R. J. **Advanced Organic Chemistry, Part A and Part B**, Springer.
- 19) March J. **Advanced Organic Chemistry: Reactions, Mechanisms and Structure**, Wiley-India.
- 20) Eliel E. L. and Wilen S. H. **Stereochemistry of Organic Compounds**, John Wiley & Sons.
- 21) Smith M. B. **Organic Synthesis**, McGraw-Hill Science.
- 22) Pine H. S. **Organic Chemistry**, McGraw-Hill.
- 23) Clayden, Greeves, **Warren & Wothers Organic Chemistry**, Oxford University.
- 24) Carey F. A. and Sundberg R. J. **Advanced Organic Chemistry, Part A and Part B**, Springer.
- 25) Norman R. O. C. and Coxon J. M. **Principles of Organic Synthesis**, Nelson Thornes.
- 26) Joule J. A. and Mills K. **Heterocyclic Chemistry**, Wiley-blackwell.
- 27) Warren S. **Organic Synthesis: The Disconnection Approach**, Wiley Student Ed
- 28) Woodward R. B. and Hoffmann R. **The Conservation of Orbital Symmetry**, Academic Press.
- 29) **Medicinal Chemistry**, A. Burger Vols. I to V Ed. M. E. Wolff, John Wiley (1994).
- 30) Goodman & Gilman. **Pharmacological Basis of Therapeutics**, McGraw-Hill (2005).
- 31) S. S. Pandeya & J. R. Dimmock. **Introduction to Drug Design**, New Age International. (2000).
- 32) D. Lednicher. **Strategies for Organic Drug Synthesis and Design**, John Wiley (1998).
- 33) Graham & Patrick. **Introduction to Medicinal Chemistry** (3rd edn.), OUP (2005).
- 34) Medicinal Chemistry — **A molecular and Biochemical Approach**, Thomas Nogrady and Donald F. Weaver
- 35) **Principles of Medicinal Chemistry**, W. O. Foye