P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE

DEPARTMENT OF CHEMISTRY

M.Sc – CHEMISTRY (ORGANIC CHEMISTRY)

II SEMESTER

W.E.F 2022-23 (R22 Regulations)

Title of the Paper: ADVANCED ORGANIC CHEMISTRY

Course Code	**22CH2T2**	Course Delivery Method	Class Room / Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours / Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction :2017-18	Year of Offering:	Year of Revision:	Percentage of Revision: 0%

S.No	COURSE OUTCOMES	PO`S
	After completion of the course, the student will be able to :	
1	Understand the basic and advanced concepts of stereochemistry, conformational analysis, green chemistry, nanochemistry and named reactions.	2,7
2	Apply the concepts related to stereochemistry, conformational analysis, green and nano chemistry in establishing the mechanism of the reaction.	1,2,3
3	Assess that how far the knowledge gained in stereochemistry, green chemistry and nanochemistry is useful in understanding the nature of product.	1,5,6
4	Evaluate the role of stereochemistry, green principles and nano chemistry in establishing the mechanism of a reaction as well as in other areas of chemistry.	1,4,7

Syllabus

Course Details

Unit	Learning Units	Lecture Hours
I	**Named reactions:**Aldol condensation, Benzoin condensation, Cannizzaro condensation, claisen condensation, Dieckmann condensation, Perkin condensation, Stobbe condensation, Reformatsky reaction, Mannich reaction, Reimer-Tiemann reaction, Vilsmeier-Haack reaction, Shapiro reaction, McMurray reaction, Michael addition reaction, Wittig reaction, Stork – Enamine reaction, Acyloin condensation, Robinson ring annulation and Simmon-Smith reaction.	12
II	**Stereo Chemistry-I:** Concept of chirality, Recognition of Symmetry elements. Definition and classification of Stereoisomers, Enantiomer, Diastereomer, Homomer, Epimer, Anomer, Configuration and Conformation, Configurational nomenclature: D,L and R, S nomenclature. Molecular representation of organic molecules: Fischer, Newman and Sawhorse projections and their inter-conversions. Geometrical Isomerism. Cis-trans, E, Z- and Syn and anti nomenclature, Methods of determining configuration of Geometrical isomers using physical, spectral and chemical methods.	12
III	**Stereo Chemistry-II:** Definition of Conformation, Conformational analysis of acyclic molecules – alkanes and substituted alkanes. Conformational analysis of monocyclic molecules – cyclohexane –	12

	chair, boat and twist boat - mono and disubstituted cyclohexanes and conformation around carbon hetero atom bonds having C–O & C–N. Confirmation and intramolecular hydrogen bonding.	
IV	**Green chemistry & Phase transfer catalysis:** Introduction to Green chemistry, Principles and concepts of Green chemistry, Green Catalysis, Biocatalysis, renewable resources, Green Reagents, examples of green reactions-synthesis of Ibuprofen, Clean Fischer-Indole synthesis comparison of the above with conventional methods. Introduction to Microwave organic synthesis: introduction, advantages and disadvantages. Applications: solvents (water and organic solvents), solvent free reactions (Solid state reactions).	12
V	**Chemistry of Nanomaterials**: Introduction, carbon nanotubes: structure of single and multi-walled carbon nanotubes, synthesis-solid and gaseous carbon source-based production techniques, synthesis with controlled orientation. Growth mechanism of carbon nano tubes-catalyst free growth, catalyst activated growth, general properties and applications.	12

Reference Text books:

1. Advanced organic chemistry –Reaction, mechanism and structure, Jerry March, John Wiley.
2. A guide book to Mechanism in organic chemistry, Peter Sykes, Longman.
3. Organic chemistry, I.L. Finar, Vol. I & II, Fifth ed. ELBS, 1975.
4. Stereo Chemistry of carbon compounds – E.L. Eliel.
5. Nano, The Essentials: T. Pradeep, The Mc. Graw Hill & Co.
6. Principles of organic synthesis, R.O.C. Norman and J.M. Coxon, Blakie Academic & Professional.
7. Reaction Mechanism in organic chemistry, S.M. Mukherji and S.P. Singh, Macmillan.
8. Green chemistry Theory and Practice by Paul T. Anastas and John C. Warner, Oxford University press.
9. Methods and reagents for Green chemistry, PietroTundo, Alvise Perosa, Fulvio Zecchini, John Willey& sons Inc.

Course Focus: Employability.

M.Sc. DEGREE EXAMINATION
SECOND SEMESTER

Course Code : 22CH2T2

Paper-II :: Advanced Organic Chemistry

Time: 3 hours **Maximum Marks: 70**

SECTION – A **(5x4M=20M)**

1 (a). Explain Shapiro reaction. (CO-2, L-2)

(Or)

(b). Explain Stobbe condensation. (CO-2, L-2)

2 (a). Write notes on configuration and conformation. (CO-1, L-1)

(Or)

(b). Explain enantiomers with suitable examples. (CO-1, L-1)

3(a). Draw the structures of the cyclohexane boat and twist boat structures. (CO-1, L-1)

(Or)

(b). Discuss conformation and intramolecular hydrogen bonding. (CO-2, L-2)

4(a). Discuss Clean Fischer Indole synthesis. (CO-3, L-3)

(Or)

(b). Write notes on Biocatalysis. (CO-1, L-1)

5(a). Define nano explain. (CO-1, L-1)

(Or)

(b). Write general properties of carbon nano tubes. (CO-1, L-1)

SECTION – B **(5x10M=50M)**

UNIT - I

6.(a) Discuss the mechanism of the following (i) Benzoin condensation. (ii) Reformatsky reaction. (CO-2, L-2)

(Or)

(b) Discuss the definition and mechanism of (i) Wittig reaction (ii) Acyloin condensation. (CO-2, L-2)

UNIT – II

7.(a) Explain the various elements of symmetry with suitable examples. (CO-1,L-1)

(Or)

(b) Discuss the various methods for determination of configuration of geometrical isomers with suitable examples. (CO-1,L-1)

UNIT – III

8.(a) Discuss the conformational analysis of cyclohexane and explain the stabilities.(CO-1, L-1)

(Or)

(b) Write an account of comformation around C – N and C – O hetero atom bonds.(CO-1, L-1)

UNIT - IV

9.(a) Discuss the principles of green chemistry. (CO-2,L-2)

(Or)

(b) Explain the theory, principle and advantages of MicroWave (MW) organic synthesis. (CO-2,L-2)

UNIT - V

10.(a) Explain growth mechanism of carbon nanotubes. (CO-2, L-2)

(Or)

(b) Give an applications of carbon nanotubes. (CO-2,L-2)