**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI – Hyderabad Campus**

### SECOND SEMESTER 2022-23

#### Course Handout Part II

Date: 16-01-2023

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further details regarding the course.

Course No: **CHEM F243**

Course Title: **Organic Chemistry-II**

Instructor-in-charge: **Manab Chakravarty**

Instructor: **Arijit Mukherjee**

**1**. **Scope and objective of the course:** Stereochemistry is highly important tomost life-saving drugs, many materials that cater to our essential needs. Hence, this course will familiarize the students with stereochemical concepts and their applications in organic synthesis; important functional group transformations, and pericyclic reactions. Emphasis will be placed not only on the mechanistic and stereoelectronic features but also on how they are utilized in target synthesis.

**2. Text Books:** E. L. Eliel, S. H. Wilen & L. N. Mander, Stereochemistry of Organic Compounds, John Wiley & Sons, 1st Ed., 2004. **(T1)**

Michael B. Smith & Jerry March, Advanced Organic Chemistry, John Wiley & Sons, 6th ed., 2012. **(T2)**

**Reference Books**:

J. Clayden, N. Greeves, S. Warren, P. Wothers, Organic Chemistry, OUP, 1st ed., 2000. **(R1)**

R. T. Morrison, R. Boyd and S. K. Bhattacharjee, Organic Chemistry, 7th ed. **(R2)**

Subrata Sengupta, Basic Stereochemistry of organic molecules, Oxford University press **(R3**)

**3. Course Plan:**

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| **Lec. No.** | Topics to be Covered | Learning objectives | **Text book (topic no.)** |
| 1-2 | Nature of stereoisomers, Enantiomers and Diastereomers | Introduction to stereoisomers; identifying enantiomers and diastereomers; also to understand their difference | **T1**: Ch. 3, pg. 49-69. |
| 3-5 | Symmetry elements, symmetry operators, symmetry and molecular properties. | Introduction to symmetry elements; to identify symmetry elements in molecules; associate molecules with symmetry point groups. | **T1**: Ch. 4, pg. 71-87, 92-97 |
| 6-8 | Relative and absolute configuration, relative configuration and notation, determination of relative configuration | What is meant by relative and absolute configuration? How relative configuration is determined? Rules governing R/S nomenclature (absolute configuration). | **T1**: Ch. 5, pg. 101-112, 117-123, 126-128, 130-144 |
| 9-10 | Introduction, nomenclature, allenes | Chirality in molecules devoid of chiral centers – 1. Why these molecules are considered as chiral? Important examples and their applications. | **T1**: Ch. 14, pg. 1119-24, 1132 |
| 11-13 | Alkylidenecycloalkanes, Spriranes, Biphenyl atropisomersism, Molecules with planar chirality | Chirality in molecules devoid of chiral centers -2. Why these molecules are considered as chiral? Important examples and their applications. | **T1**: Ch. 14, pg. 1133-50, 1166-76 |
| 14-15 | *cis-trans* isomerism, determination of configuration of *cis-trans* isomers by chemical & physical methods | Stereochemistry of alkenes; E-Z nomenclature of alkenes; methods for the determination of configuration. | **T1**: Ch. 9, pg. 539-574 |
| 16-17 | Conformation of unsaturated acyclic and miscellaneous molecules | What is conformation of a molecule? Importance and important examples. Conformation of acyclic molecules; identifying stable and unstable conformations. What are the various interactions leading to stable/unstable conformations? | **T1**: Ch. 10, pg. 597-627 |
| 18-20 | Conformational aspects of the chemistry of six membered ring compounds | Understanding the conformations of cyclic molecules; identifying stable and unstable conformations. What are the various interactions leading to stable/unstable conformations in cyclohexane? | **T1**: Ch. 10, pg. 665-754 |
| 21-26 | Different reaction mechanisms involved in organic transformations such as SN1/SN2/SN’/SNi, neighboring group mechanism E1, E2, E1cB, addition to C=C double bond. | Understand diverse reaction mechanism, ranging from substitution to elimination. Non-classical carbocations, reason for their stability and examples. | **T2** : Ch. 10: 425-519, Ch. 17: 1477-1506, Lecture notes |
| 27-31 | Resolution and stereoselective synthesis | Asymmetric synthesis; common approaches | **R1** : Ch.16, 399-404, Ch.34, 881-904, Lecture notes |
| 32-40 | Types of Pericyclic reactions (electrocyclic, cycloaddition & sigmatropic), correlation diagrams, FMO approach & PMO approach, Woodward-Hofmann rules | Pericyclic reactions; type; mechanism and applications | **R2**: Ch. 20 1032-1048, Lecture notes |

**4. Evaluation Scheme**:

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| --- | --- | --- | --- | --- |
| **Component** | Duration | **Weightage (%)** | **Date & Time** | Remarks |
| Midsem Examination | 90 min | 30 | 14/03 9.30 - 11.00AM | **Closed Book** |
| Class tests\* | 15 min | 20 | Continuous | **Open Book** |
| Assignment/HW/Seminar | - | 10 | Continuous | **Open book** |
| Comprehensive Examination | 3 hrs | 40 | 10/05 FN | **Closed book** |

**5.** **Make-up(s) will be granted only for genuine reasons.**

**6.** **Chamber consultation hours:** To be announced in the class.

**7.** **Notices:** All the notices pertaining to this course will be displayed on **Chemistry Department Notice Board and CMS**.

**8**. **Course Policies:**

(a) **Absences:** Students are responsible for all materials presented in the course as well as for acquiring missed information.

(b) **Electronic Devices: Cell phones must be turned off in class.** All electronic devices must be off during class or exams. This includes laptop computers as well as programmable calculators. You will be allowed only a simple scientific calculator for exams (if required). **9.Academic Honesty and Integrity Policy:**

Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-Charge

CHEM F243