

Course: Discipline Specific Elective

Semester	6
Paper Number	HCHDS6032T (60 MARKS) & HCHDS6032P (40 MARKS)
Paper Title	DSE 3: ORGANIC CHEMISTRY
No. of Credits	Theory-04, Practicals-02
Theory/Composite	Composite
No. of periods assigned	Th: 4 Pr: 3
Name of Faculty member(s)	Dr. Ankur Ray Prof. Dipankar Das
Course description/objective	<p>Theory: The students will learn</p> <ul style="list-style-type: none"> i) Advanced Pericyclic reactions ii) Applications and versatility of the Reagents in Organic Synthesis <p>Practical: Various Organic synthesis</p>
Syllabus	Annexure DSE 3
Texts	
Reading/Reference Lists	<p>Theory:</p> <ol style="list-style-type: none"> 1. Clayden, J., Greeves, N. & Warren, S. <i>Organic Chemistry</i>, Second edition, Oxford University Press, 2012. 2. Keeler, J., Wothers, P. <i>Chemical Structure and Reactivity – An Integrated approach</i>, Oxford University Press. 3. Sykes, P. <i>A guidebook to Mechanism in Organic Chemistry</i>, Pearson Education, 2003. 4. Smith, J. G. <i>Organic Chemistry</i>, Tata McGraw-Hill Publishing Company Limited. 5. Carey, F. A., Giuliano, R. M. <i>Organic Chemistry</i>, Eighth edition, McGraw Hill Education, 2012. 6. Eliel, E. L. & Wilen, S. H. <i>Stereochemistry of Organic Compounds</i>, Wiley: London, 1994. 7. Nasipuri, D. <i>Stereochemistry of Organic Compounds</i>, Wiley Eastern Limited. 8. Morrison, R. N. & Boyd, R. N. <i>Organic Chemistry</i>, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education). 9. Finar, I. L. <i>Organic Chemistry (Volume 1)</i>, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education) 10. Fleming, I. <i>Molecular Orbitals and Organic Chemical Reactions</i>, Reference/Student Edition, Wiley, 2009. 11. James, J., Peach, J. M. <i>Stereochemistry at a Glance</i>, Blackwell Publishing, 2003. 12. Robinson, M. J. T., <i>Stereochemistry</i>, Oxford Chemistry Primer, Oxford University Press, 2005. <p>Practical: Vogel's qualitative Organic Analysis Nad, Mahapatra, Ghosal-Practical Chemistry Calcutta University hand book Recent Journals</p>

Evaluation	Theory: 60 marks	Practical: 40 marks (Continuous Assessment)
	CIA: 10 End-Sem: 50	Internal Assessment Exams: 30 Viva (End Sem): 8 Attendance: 2
Paper Structure for the End Sem Theory Exam (50 marks)	6 (SIX) Questions (each of 10 marks) will be set and the students will have to answer any 5 (FIVE). Each of the Questions (10 marks) will consist of 2 or 3 parts (of 2/ 3/ 4/ 5)	

DSE-3: Organic Chemistry

(Credits: Theory-04, Practicals-02)

Theory: 60 Lectures

(A) Advanced Pericyclic reactions (16 L)

- Mechanistic explanation of electrocyclic reactions with symmetry property
- Analysis of electrocyclic reactions with symmetry property according to Woodward and Hoffmann's correlation diagram. Construction of correlation diagram
- Application of Perturbational molecular orbital (PMO) method to cycloaddition reactions:
- Huckel-Mobius method. Selection rules.
- Mechanistic explanation of electrocyclic reactions with PMO method, selection rules.
- Application of PMO method in the [1, j]-sigmatropic rearrangement.
- Cheletropic reactions and mechanistic explanation of cheletropic reactions with FMO approach.
- Mechanistic explanation of 'Ene' and 'Group-transfer' reactions with FMO approach.
- Pericyclic reactions under polar conditions

(B) Advanced heterocyclic reactions (10 L)

- Reactions and synthesis of 1,2- and 1,3-azoles: imidazoles, thiazoles, oxazoles, pyrazoles, isoxazoles, Benzimidazoles.
- Heterocyclic compounds containing a ring-junction nitrogen: Indolizines, aza-indolizines etc.
- Heterocyclic compounds containing more than two atoms: azoles: 1,2,3-triazole, 1,2,4-triazole, tetrazoles; Synthesis and reactions

Applications and versatility of the Reagents in Organic Synthesis (26L)

- Reducing agent: Reduction of dissolving metals, Raney Ni, Wilkinson's catalyst, LiAlH_4 , DIBAL, organic reducing agents.
- Oxidation and oxidizing agents: Oxidation with H_2O_2 , $\text{Pb}(\text{OAc})_4$, HIO_4 , OsO_4 , KMnO_4 .
Oxidation of alpha – carbon with SeO_2 , HNO_2 , $\text{Br}_2 + \text{Me}_2\text{SO}$.
Oxidation with SET agents (FeCl_3 , Ag_2O).

Oxidation of primary alcohol with DMSO , pyridine –N-oxide and oxidation of aldehyde, oxidation with Mn(VII), Mn(IV), Cr(VI) , co-reagents.

Oxidation γ^3 -hypervalent iodanes [PhI(OAc)₂, PhIO etc]

3. Diversity of reagent in organic synthesis:
 - a. N, S, P yields.
 - b. Organo silicon and organo borane reagents.
 - c. BF₃, NBS.

PRACTICALS- DSE-3 LAB: Organic synthesis

(60 Lectures)

1. Separation by column chromatography
2. Extraction of curcumin from turmeric
3. Synthesis of methyl benzoate
4. Diels-Alder reaction between cyclopentadiene and maleic anhydride
5. Water mediated Wittig reaction
6. Benzoin to benzil synthesis
7. Benzil-Benzilic acid rearrangement
8. Synthesis of β -phenylhydroxylamine
9. Darzen Glycidic ester formation in water

