



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3153622

Semester – V

Subject Name: Chemical synthesis for Technologists

Type of course: Chemical Technology

Prerequisite: Needs basic knowledge of chemical synthesis.

Rationale: The main objective of this subject is to make students aware about the basics of chemical reactions.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	00	00	100

Content:

Sr. No.	Content	Total Hrs
1	Aromaticity: Characteristics of aromatic compounds, Huckel rule, benzenoid & non-benzenoid compounds, mechanism of aromatic electrophilic substitution reactions. IUPAC nomenclature of aromatic compounds, Isomerism in substituted benzenes & naphthalenes, orienting influence of substituent.	08
2	Stereochemical Concept: Classification of stereoisomers, diastereomers, separation of enantiomers, absolute configuration (R/S, E/Z), projection formula, elements of symmetry, Stereochemical compounds containing two asymmetric carbon atoms. Conformation: conformation around C-C bond in acyclic compounds, structure of cycloalkanes. Geometrical isomerism, Stereoselective & Stereo specific reactions.	07
3	Heterocyclic Components: Introduction-nomenclature-properties-synthesis & reactions involved in five member & six member heterocycles. Heterocycles with one, two or more hetero atoms. Biological importance of heterocycles.	10
4	Study of individual reaction with mechanism : 1. Beckmann rearrangement 2. Meerwein-Ponndorf – Verley reduction 3. Michael reaction 4. Knoevenagel condensation, 5. Leuckart reaction 6. Gabriel synthesis	08
5	Study of individual reaction with mechanism :	08



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	<ol style="list-style-type: none">1. Rosenmund reaction2. Clemmensen reduction mechanism3. Claisen - Dieckmann condensation4. Darzens reaction5. Hydroboration – oxidation reaction6. Pinacol & Benzidine rearrangement	
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Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	15	15	10	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	State the concept of aromaticity and various chemical compounds using IUPAC nomenclature.	10
CO-2	Explain the concept stereochemistry and its importance.	15
CO-3	Apply the knowledge of heterocyclic compounds used as precursor compounds for the design and synthesis of new materials.	20
CO-4	Identify the selection of one reagent over another in terms of efficacy in relation to a particular synthetic problem.	15
CO-5	Prepare the basic practical skills for the synthesis and analysis of organic compounds.	20
CO-6	Interpret reaction pathways and outcomes on the basis of mechanistic understanding.	20

Reference Books:

1. Organic Chemistry, J. McMurry, Brooks / Cole, 5th Ed., 1999
2. Organic Chemistry, T. W. Solomons & C. B. Fryhle, John Wiley & Sons., 7th Ed., 2000
3. Organic Chemistry, G. Marc Loudon, Oxford University Press, 4th Ed., 2002
4. Organic Chemistry, L. G. Wade Jr., Pearson Education, 5th Ed., 2003
5. Organic Chemistry, Volumes I & II, I L Finar, ELBS & Longman Ltd., 5th Ed., 1996
6. Industrial Aromatic Chemistry: Raw materials, processes, products, H. G. Franck & J. W. Stadehofer, Berlin Springer Verlag, 1st Ed., 1988
7. Stereochemistry of Carbon Compounds, E. L. Eliel, McGraw – Hill, 1st Ed, 2003.
8. Stereochemistry: Conformation & Mechanism, P. S. Kalsi, New Age International (P) Ltd., 6th Ed., 2005
9. Stereochemistry & Mechanism through solved problems, P. S. Kalsi, New Age International (P) Ltd., 3rd Ed, 2007
10. Organic Chemistry, Morrison & Boyd, Pearson, 7th Ed, 2011



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11. Name reactions & Reagents in Organic synthesis, B.P.Mundy, M.G.Ellerd and F G Favaloro, John Wiley and Sons, 2005
12. Organic Building Blocks of the Chemical Industry, H HSzmant, John Wiley and Sons, 1989
13. Organic chemistry : Bahl and Bahl
14. Fundamentals of Organic chemistry : Puri& Sharma

List of Open Source Software/learning website:

1. NPTEL
2. MIT Open course lecture available on Internet etc
3. Delnet