GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)
UNIT PROCESSES IN ORGANIC SYNTHESIS
SUBJECT CODE: 2143607
B.E. 4th SEMESTER

Type of Course: Chemical Technology

Prerequisite: Basic knowledge of organic chemistry

Rationale: The objective of this course is to make students aware of synthesis of different organic chemicals such as alkanes, aldehydes, etc. for understanding the industrial manufacturing processes of various chemical compounds.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	0	3	6	70	20	10	20	10	20	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Introduction to various Unit Processes such as Nitration, Amination, Hydrogenation, Halogenations, Oxidation, Reduction, Sulphonation and Sulphation, Hydrolysis, Alkylation ,polymerization etc	8	20
2	Alkanes, Alkenes, Alkylenes&Haloalkanes: Methods of preparation, properties & uses.	8	20
3	Alcohols, Thiols, Ethers &Thioethers: Methods of preparation, properties & uses.	8	20
4	Aldehydes & Ketones, Carboxylic acids & Amines: Methods of preparation, properties & uses.	10	20
5	Heterocyclic chemistry 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	20

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
60	10	10	10	10

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

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. Unit Processes in Organic Synthesis, Groggins, Tata McGraw-Hill Education
2. Organic Chemistry, J. McMurry, Brroks / Cole, 5th Ed.,1999
3. Organic Chemistry ,T. W. Solomons& C. B. Fryhle, John Wiley &Sons.,7th Ed., 2000
4. Organic Chemistry , G.Marc Loudon, Oxford University Press ,4th Ed. , 2002
5. Organic Chemistry, L. G. Wade Jr., Pearson Education,5th Ed. , 2003
6. Organic Chemistry, Volumes I & II, I L Finar, ELBS & Longman Ltd., 5th Ed.,1996
7. Industrial Aromatic Chemistry: Raw materials, processes, products, H. G. Franck & J. W. Stadehofer, Berlin Springer Verlag, 1st Ed., 1988

Course Outcomes:

1. To express the methods of preparation of various unit processes.
2. To carry out synthesis of various chemical compounds
3. To be able to relate industrial method of preparation with laboratory synthesis.
4. To be able to apply this knowledge in future subjects of chemical technology.
5. To build a bridge between theoretical and practical concept used in industry

List of Experiments:

1. Synthesis of polymer
2. Synthesis of Eosin (halogenation)
3. Synthesis of dyes.
4. Synthesis of ester. (esterification)
5. Preparation of ether.
6. Synthesis of m-dinitrobenzene. (nitration)
7. Synthesis of hydrolysis.
8. Study of redox reaction.
9. Preparation of napthol. (sulfonation)
10. Study of reduction reaction.

Major Equipment:

Distillation assembly, TLC chambers, Mechanical stirrers, oil bath, water bath, glasswares.

Open Ended Project fields:-

Students are free to select any area of science and technology based on chemical technology applications to define Projects.

Some suggested projects are listed below:

- Application of unit processes in industry.
- Application of chemical products in industry
- Literature survey of novel methods of preparation.

List of Open Source Software/learning website:

1) Delnet

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.