GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)

ORGANIC CHEMISTRY FOR TECHNOLOGISTS

SUBJECT CODE: 2133605

B.E. 3RD SEMESTER

Type of Course: Chemical Technology

Prerequisite: A good fundamental backup of basics of chemistry

Rationale: The main objective of this subject is to make students aware about the basics of organic chemistry and the fundamentals of synthetic chemistry which are very useful in knowing the actual manufacturing process.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks			Practical Marks			
L	T	P	C	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.	Electronic theory: Types of bonds & bond fission process, resonance effect &hyperconjugation, tautomerism. Reaction intermediates: generation, structure & some reactions such as carbocations, carbanions, free radicals &carbenes, electrophile & nucleophile.	8	20
2.	IUPAC nomenclature of different Organic polyfunctional compounds	4	10
3	Friedel – Craft & related reactions, Halogenated compounds, nitroaromatic compounds, aromatic amines, aromatic sulfonic acids, phenols.	4	15
4.	Name reactions in Organic chemistry : Hoffman reaction, Grignard reaction, Diazotization reaction, Hydrogenation reaction, Ozonolysis, Aldol& Cross aldol reaction, Cannizzaro reaction	14	25
5.	Study of individual reactions Allylic rearrangement – Arndt Eister synthesis – Baeyer Villiger reaction Baker- Venkatraman reaction - Benzilic acid rearrangement-Carrol reaction- Curtius rearrangement- Dimorth rearrangement – Favorskii rearrangement - Lossen-Schmidt rearrangement – Pinner reaction – Reformatsky reaction - Robinson Annelation reaction - Witting reaction - Diels-Alder reaction,Birch reduction, Mannich reaction.	14	30

Reference Books:

1. Organic Chemistry, J. McMurry, Brroks / 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
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

Course Outcomes:

At the end of this course students will be able to:

1. To express chemical compound in IUPAC nomenclature.
2. To carry out synthesis of various chemicals in laboratory.
3. To be able to understand industrial processes based on various reaction mechanisms.
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 Practical:

Minimum **5** practicals to be performed and remaining time should be allotted to open-ended projects/study reports/latest outcomes in technology study**:-**

1. In the beginning of the academic term, faculties will have to allot their students at least one Open-ended Project / Study Report /Latest outcome in technology.
2. Literature survey including patents and research papers of fundamental process

- Design based small project **or**
- Study report based on latest scientific development **or**
- Technology study report/modeling/ simulation/collection report **or**
- Computer based simulation/web based application/analysis presentations of basic concept field which may help them in chemical engineering.

3. These can be done in a group containing maximum **three** students in each.
4. Facultiesshouldcultivateproblembasedprojecttoenhancethebasicmentalandtechnical level of students.
5. Evaluation should be done on **approach of the student on his/her efforts** (not on completion) to study the design module of given task
6. In the semester student should perform **minimum** 5 set of experiments and complete **<u>one small openended dedicated project</u>** based on engineering applications. This project along with any performed experiment should be **<u>EVALUATED BY EXTERNAL EXAMINER.</u>**

1.	Safety and Overview of an Synthetic Organic Laboratory
2.	Organic Qualitative analysis of Solids
3	Organic Qualitative analysis of Liquids
4.	Crystallization and checking the purity by TLC
5.	Distillation and checking the purity by Boiling point
6.	Organic qualitative analysis of Ternary mixtures
7.	Organic estimation
8.	Two step organic synthesis
9.	Three step organic synthesis
10.	Techniques like TLC, UV etc.

Open Ended Problem:

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:

- Study of named reactions & their application in industry
- Study of individual reactions & their application in industry
- Literature survey of new technics

Major Equipments:

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

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.