GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3130407
Semester – III
Chemistry for Biotechnology

Type of course: Basic Science

Prerequisite: Zeal to learn the subject.

Rationale: It is the basic subject for Bio-technology Engineering Students.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Contents:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Hydrocarbons and Organic reactions :** Hydrocarbons and it's classification ,Organic reaction , organic compound,valency,Fission Reaction and reaction intermediates:Free Radical, Carbonium, Carbanion, Carbenes and Nitrenes. Nucleophile and Electrophile. Types of Organic reactions and its mechanism: Especially Nucleophillic and Electrophillic Addition and Substitution reactions. Standard Solutions -Types of solutions, Primary solutions and secondary standard solutions.	6	40
2	**Electron Displacement** : Introduction, Reactive intermediate, Electron displacement effect, inductive effect, Resonance, steric effect, hyper consumption	6	
3	**Introduction to various Unit Processes :** Introduction,Nitration,Amination,Hydrogenation, Halogenations, Oxidation, Reduction, Sulphonation, Hydrolysis, Alkylation and Polymerization.	6	
4	**Carboxylic acid :** Introduction, Preparation and Properties Manufacture Process of Acetic acid, Formic acid, Oxalic acid, Palmitic acid & Stearic acid Derivatives of Carboxylic acids: Acid Amides, Esters, Acid Anhydrides and Acid Chlorides. Mechanism of Esterification and Strengths of Acids.	5	60
5	**Isomerism:**	5	

	somerism and its classification,Optical, Geometrical and Conformational Isomerism:Optical activity, Polarimeter, Specific rotation, Enantiomers, Diasteromers, Optical activity in Lactic and Tartaric acid, R and S configuration of Optically active compound and E and Z designation of Geometrical isomers. Resolution of racemic mixture.		
6	**Pharmaceutical concepts of chemistry:** Introduction, types of drugs –Analgesics, antipyretic ,Anti inflammatory , Steps of drug preparations and drug delivery.	6	
7	**Colour, Dyes and Pigments:** Introduction, Classification of dyes based on Application and Structural representation. Colour and Constitution Theory: Quinonoid, Valence bond and Molecular Orbital theory Application of Dyes and Pigments.	6	
8	**Instrumental Method of Analysis** : Introduction, Chromatography, GC, HPLC, Adsorption Spectroscopy,Lambert, Beer's law & its derivation, Spectroscopy, Calorimetric Analysis, UV Spectroscopy, Infrared, Thermal Methods of Analysis, Thermogravemetric Analysis, Examples, Conductometric Analysis,Polentiometric Analysis, Applications	5	

Reference Books:

1. A Text Book Of Organic Chemistry by P. L. Soni, Sultan Chand & Sons, New Delhi
2. A Text Book of Organic Chemistry by Arun Bahl and B.S. Bahl, Sultan Chand & Sons, New Delhi
3. A Textbook of Organic Chemistry by Raj K Bansal, New Age International, New Delhi
4. Organic Chemistry By Solomons, John Willey & Sons, USA.
5. Organic Chemistry, I. L. Finar Vol. I & II ELBS & Longmans, Green – UK
6. Organic Chemistry By Morrison and Boyd, Pearson Education, Singapore.
7. A Textbook of Organic Chemistry By Francis A Carey, Springer –USA
8. Organic Reaction and their Mechanisms By P S Kalsi, New Age International, New Delhi
9. Atomic Structure and the Chemical Bond By Manas Chanda, Tata Mcgrawhill
10. Heterocyclic Chemistry By Bansal B K, New Age International, New Delhi
11. Organic Chemistry By R L Madan, S. Chand & Company, New Delhi
12. Laboratory Techniques in Organic Chemistry By Ahluwalia V K, I K International, New Delhi
13. Unit Process in Organic Synthesis By P H Groggins, Tata Mc Graw Hill, New Delhi.
14. Vogel's textbook of Qualitative Organic Analysis, by Arthur I Vogel, Revised by Jefferey et al. Publisher: Addison Wessley Longmann Ltd, England

Course Outcome:

After learning the course the students will be able to

Sr. No.	CO statements	Marks %Weightage
CO-1	To build a basic knowledge of the Fundamental structure of Organic molecules	25

CO-2	To analyze scientific concepts and think critically	25
CO-3	To understand and explain the reactions in Organic molecules	25
CO-4	To correlate the same as per their utility in field of Biotechnology	25

LIST OF PRACTICALS:

Organic Estimation by volumetric method

Organic preparations of any two of the following :

1. m-dinitrobenzene from Nitrobenzene.
2. Preparation of various dyes.
3. Preparation of dibenzal aceton.

MAJOR EQUIPMENTS:

- Magnetic Stirrer, Hot plates.
- Laboratory Oven.
- Melting Point Instrument,etc.

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

Students can refer various viedeo lectures available on NPTL, refer soft copies (CD) provided with reference books/text books , etc.