No	Information of the subject	
1	Unit name:	Organic chemistry
2	Code:	BioT21031
3	Classification:	Core subject
4	Credit value:	3
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	Ten Standard Chemistry, Che 11011 Engineering Chemistry
7	Mode of delivery:	Explain by Drawing structure and equations, Solving problems, computer application, Practical, Quiz, Discussion
8	Assessment system and breakdown of marks:	Fill in the blanks, Multiple choice, short questions,problems, short notes,practical
	Fill in the blanks, Multiple choice, problems , short questions, Short notes	70%
	practical results, practical exam, Animation and viva test	30%
9	Academic staff teaching unit:	Department of Biotechnology
10	Course outcome of unit: After completion of this course, students will be able To rank increasing or decreasing order of boiling points, melting points, and solubility of organic compounds To assign the stereoisomers of compounds To differentiate SN1, SN2, E1, or E2 mechanism the reactions of alkyl halides To write preparation and reaction mechanisms of alcohol, ether, and epoxides To classifythe reactions must be oxidation or reduction To determine the structure of the compounds by using general features of mass spectrometry and IR spectroscopy	
11	Synopsis of unit: All biomolecules are organic compounds; therefore organic chemistry is the core supplements for the biotechnologist and researchers. The valuable information from this subjectwill fulfillthe variable requirements of human.Organic chemistry is the basic for further study of biochemistry that is important for biotechnology. Organic molecules with different functional groups can give different physical and reactive	

	properties. These effects are occurred in nylon production, soap solubility, and solubility of vitamins. The role of stereochemistry occur in chiral drugs productions, determination of odor of leaves, nerve impulse transmission etc. In cells adrenaline are produced by nucleophillic substitution reactions. Both nucleophillic and elimination reactions are used in industrial products productions such as aspirin synthesis, quinine synthesis, pesticide, plastic, and fruit ripening.Bronchodilators from epoxide are used to treat asthma. Oxidation reduction reactions are the main role in biochemical reactions of the cells. Oxidation reduction reactions are applied in green chemistry. Mass spectrometry, and IR methods are very useful for research areas such as protein structure determination, molecular weight identification, and functional group determination.
12	Topic: 3 Introduction to Organic Molecules and Functional Groups 3.1 Functional Groups 3.2 An Overview of Functional Groups 3.3 Intermolecular Forces 3.4 Physical Properties 3.5 Application: Vitamins 3.6 Application of Solubility: Soap 3.7 Application: The Cell Membrane 3.8 Functional Groups and Reactivity 3.9 Biomolecules 5 Stereochemistry 5.1 Starch and Cellulose 5.2 The Two Major Classes of Isomers 5.3 Looking Glass Chemistry—Chiral and Achiral Molecules 5.4 Stereogenic Centers 5.5 Stereogenic Centers in Cyclic Compounds 5.6 Labeling Stereogenic Centers with R or S 5.7 Diastereomers 5.8 Meso Compounds 5.9 R and S Assignments in Compounds with Two or More Stereogenic Centers 5.10 Disubstituted Cycloalkanes 5.11 Isomers—A Summary 5.12 Physical Properties of Stereoisomers 5.13 Chemical Properties of Enantiomers **7** Alkyl Halides and Nucleophilic Substitution 7.1 Introduction to Alkyl Halides 7.2 Nomenclature 7.3 Physical Properties 7.4 Interesting Alkyl Halides 7.5 The Polar Carbon–Halogen Bond 7.6 General Features of Nucleophilic Substitution

	7.7 The Leaving Group 7.8 The Nucleophile 7.9 Possible Mechanisms for Nucleophilic Substitution 7.10 Two Mechanisms for Nucleophilic Substitution 7.11 The SN2 Mechanism 7.12 Application: Useful SN2 Reactions 7.13 The SN1 Mechanism 7.14 Carbocation Stability 7.15 The Hammond Postulate 7.16 Application: SN1 Reactions, Nitrosamines, and Cancer 7.17 When Is the Mechanism SN1 or SN2? 7.18 Vinyl Halides and Aryl Halides 7.19 Organic Synthesis 8 Alkyl Halides and Elimination Reactions 8.1 General Features of Elimination 8.2 Alkenes—The Products of Elimination Reactions 8.3 The Mechanisms of Elimination 8.4 The E2 Mechanism 8.5 The Zaitsev Rule 8.6 The E1 Mechanism 8.7 SN1 and E1 Reactions 8.8 Stereochemistry of the E2 Reaction 8.9 When Is the Mechanism E1 or E2? 8.10 E2 Reactions and Alkyne Synthesis 8.11 When Is the Reaction SN1, SN2, E1, or E2? 9 Alcohols, Ethers, and Epoxides 9.1 Introduction 9.2 Structure and Bonding 9.3 Nomenclature 9.4 Physical Properties 9.5 Interesting Alcohols, Ethers, and Epoxides 9.6 Preparation of Alcohols, Ethers, and Epoxides 9.7 General Features—Reactions of Alcohols, Ethers, and Epoxides 9.8 Dehydration of Alcohols to Alkenes 9.9 Carbocation Rearrangements 9.10 Dehydration Using POCl3 and Pyridine 9.11 Conversion of Alcohols to Alkyl Halides with HX 9.12 Conversion of Alcohols to Alkyl Halides with SOCl2 and PBr3 9.13 Tosylate—Another Good Leaving Group 9.14 Reaction of Ethers with Strong Acid 9.15 Reactions of Epoxides 9.16 Application: Epoxides, Leukotrienes, and Asthma 9.17 Application: Benzo[*a*]pyrene, Epoxides, and Cancer 12 Oxidation and Reduction 12.1 Introduction 12.2 Reducing Agents 12.3 Reduction of Alkenes 12.4 Application: Hydrogenation of Oils 12.5 Reduction of Alkynes 12.6 The Reduction of Polar C–X σ Bonds

	12.7 Oxidizing Agents 12.8 Epoxidation 12.9 Dihydroxylation 12.10 Oxidative Cleavage of Alkenes 12.11 Oxidative Cleavage of Alkynes 12.12 Oxidation of Alcohols 12.13 Green Chemistry 12.14 Application: The Oxidation of Ethanol 12.15 SharplessEpoxidation 13 Mass Spectrometry and Infrared Spectroscopy 13.1 Mass Spectrometry 13.2 Alkyl Halides and the M + 2 Peak 13.3 Other Types of Mass Spectrometry 13.4 Electromagnetic Radiation 13.5 Infrared Spectroscopy 13.6 IR Absorptions 13.7 IR and Structure Determination
14	Main references: Organic Chemistry Second EditionJanice Gorzynski Smith University of Hawai'i at Manoa
5	Additional references: Organic Chemistry Third EditionJanice Gorzynski Smith University of Hawai'i at Ma-noa