COURSE-II BCH102 ORGANIC CHEMISTRY- I

Block 1 Fundamental Concepts

Unit 1 Structure and Bonding

Hybridization,Bond length and bond angles, bond energy,Localized and delocalized chemical bond,Van der Waal interactions,Inclusion compounds, clatherates, charge transfer complexes, Resonance, Hyperconjution, Aromaticity,Steric effect, Inductive, resonance/mesomeric, electromeric and field effect),Hydrogen bonding.

Unit 2 Mechanism of Organic reaction

Curve arrow notation,Drawing electron movements with arrows,Half-headed and double headed arrows,Homolytic and heterolytic bond cleavage,Types of reagents,Recapulation of types of reagents.

Unit 3 Reaction Intermediate

Reaction intermediates (with examples Assigning),Carbocations,Carbanions,Free radicals,Carbenes,Nitrenes , Benzynes **,**Formal charge on intermediates and other ionic species.

Block 2 Stereochemistry

Unit 4 Stereochemistry-I

Concept of isomerism. ,Types of isomerism,Optical isomerism , Elements of symmetry,Molecular chirality, enantiomers,Stereogenic centres, Optical activity ,Properties of enantiomers ,Chiral and achiral molecules with two stereogenic centres, Diastereomers,Threo and erythro diastereomers , Meso compound, Resolution of enantiomers,Inversion, retention and racemization,Relative and absolute configuration, Sequence rule D& L and R& S system of nomenclature.

Unit 5 Stereochemistry-II

Geometrical isomerism**,**Determination of configuration of geometrical isomers**,** E & Z system of nomenclature**,** Geometrical isomerism in oximes and acyclic compounds **,**Conformational analysis of ethane and n- butane**,**Conformation of cyclohexane**,**Axial and equatorial bond**,**Conformation of mono substituted cyclohexane**,**Newman projection and Sawhorse formula, Fischer and flying wedge formula. **,**Difference between configuration and conformation.

Block 3 Basic Skeleton: Hydrocarbons

Unit 6 Alkanes

IUPAC nomencleature of branch and unbranched alkanes ,Classification of carbon atoms in alkanes,Isomerism of alkanes,Sources, methods of formation (with special reactions),Kolbe's reaction, Corey-House reaction of alkanes.Mechanism of free radical halogenations of alkanes Orientation, reactivity and selectivity

Unit 7 Cycloalkanes

Cycloalkanes**,** Nomencleature, Methods of formation, Chemical reactions **,**Baeyer's strain theory and its limitations.

Unit 8 Alkenes

Nomenclature of alkenes**,** Isomerism of alkenes**,**methods of preparation**,**Physical properties of alkenes**,**Chemical reaction of alkenes**,**Mechanism involved in hydrogenation**,** Electrophilic and free radical addition**,** Markownikoff's rule, Hydroboration oxidation, Oxymercuration reduction, Ozonolysis **,** Oxidation with $KMnO_4$ and OSO_4**,** Polymerization of alkenes **,**Industrial application of ethylene and propene

Unit 9 Cycloalkenes

Objectives,Methods of formation,Conformation ,Chemical reactions of cycloalkenes.

Unit 10 Diene

Nomenclature and classification of dienes,Isolated, conjugated and cumulated dienes

Structure of allenes and butadienes, Methods of formation,Polymerization.Chemical reactions 1,2 and 1,4 addition,Diels – Alder reaction

Unit 11 Alkynes

Nomenclature and classification,Structure and bonding in alkynes, Methods of formation Physical properties,Chemical reactions of alkynes,Acidity of alkynes,Mechanism of electrophilic and nucleophilic addition reactions, Oxidation and polymerization

Block 4 Aromatic hydrocarbons & Derivatives of Hydrocarbon

Unit 12 Arenes and Aromaticity

Nomenclatures of benzene derivatives,The aryl group,Aromatic nucleus and side chain

Structure of benzene, Molecular formula and Kekule structure,Resonance and MO picture,Aromaticity: the Huckel's rule, aromatic ions,Chemical Reactions of benzene

Aromatic electrophilic substitution, General pattern of mechanism,Role of σ and π complexes

Mechanism of nitration, Halogenations, Sulphonation, Friedel Craft reactions ,Activating and deactivating substituents, Orientation and ortho/para ratio., Reduction of benzene (Birch reduction

Unit 13 Alkyl halides

Nomenclature and classification of alkyl halides, Methods of formation,Chemical reactions, Mechanism of nucleophilic substitution reactions of alkyl halides, SN1 and SN2 and SNI reaction with energy profile diagrams, Elimination reactions

Types of elimination reactions, Polyhalogen compounds-Chloroform, carbon tetra chloride

Unit 14 Aryl halides

Nomenclature and classification of aryl halides**,** Methods of formation of aryl halides**,** Nuclear and side chain reaction**,** Chemical reactions**,** Relative reactivity of alkyl halides vs allyl vinyl and aryl halides**,** Synthesis and uses of DDT and BHC