

# LJ UNIVERSITY

## LJ INSTITUTE OF PHARMACY

### SEMESTER:I

**Subject Name: Pharmaceutical Organic Chemistry-I**

**Subject Code: BP102TP**

**Scope:** This subject deals with classification and nomenclature of simple organic compounds, structural isomerism, intermediates forming in reactions, important physical properties, reactions and methods of preparation of these compounds. The syllabus also emphasizes on mechanisms and orientation of reactions.

**Objectives:** Upon completion of the course the student shall be able to

1. Write the structure, name and the type of isomerism of the organic compound.
2. Write the reaction, name the reaction and orientation of reactions.
3. Account for reactivity/stability of compounds.
4. Identify/confirm the identification of organic compound.

**Teaching scheme and examination scheme:**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	Theory		Practical	
				External	Internal	External	Internal
3	1	4	8	75	25	35	15

Sr. No.	Course Contents	Hours
1	<b>Fundamentals of organic chemistry</b> Covalent bond, Inductive effect, Hyperconjugation, Resonance, Electromeric effect, Reaction Intermediates including Carbocation, Carboanion, Carbene, Freeradicals. Electrophile, Nucleophile. Structural isomerisms in organic compounds.	10
2	<b>Alkanes, Alkenes and Conjugated dienes:</b> IUPAC nomenclature, hybridization in alkanes, Halogenation of alkanes, uses of paraffins, Stabilities of alkenes, SP hybridization in alkenes, E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's orientation, free radical addition reactions of alkenes, Anti Markownikoff's orientation. Stability of conjugated dienes, Diel-Alder, electrophilic addition, free radical addition reactions of conjugated dienes, allylic rearrangement.	10
3	<b>Alkyl halides:</b> IUPAC nomenclature, SN1 and SN2 reactions - kinetics, order of reactivity of alkyl halides, stereochemistry and rearrangement of carbocations SN1 versus SN2 reactions, Factors affecting SN1 and SN2 reactions. Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform. <b>Alcohols;</b> IUPAC nomenclature, Preparations and Reactions of Alcohol. Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol.	10
4	<b>Benzene and its derivatives:</b> Analytical, synthetic and other evidences in the derivation of structure of benzene, Orbital picture, resonance in benzene, aromatic characters, Huckel's rule.	08

	<b>Reactions of benzene:</b> nitration, sulphonation, halogenation-reactivity, Friedelcrafts alkylation- reactivity, limitations, Friedelcrafts acylation. Substituents, effect of substituents on reactivity and orientation of monosubstituted benzene compounds towards electrophilic substitution reaction Structure and uses of DDT, Saccharin, BHC and Chloramine.	
5	<b>Cyclo alkanes</b> Stabilities: Baeyer's strain theory, limitation of Baeyer's strain theory, Coulson and Moffitt's theory, Sachse Mohr's theory (Theory of strainless rings), preparations and reactions of cyclopropane and cyclobutane only.	07
<b>Total Hours</b>		45

## **Practical**

### **Systematic qualitative analysis of unknown organic compounds like:**

1. Preliminary test: Color, odour, aliphatic/aromatic compounds, saturation and unsaturation, etc
2. Detection of elements like Nitrogen, Sulphur and Halogen by Lassaigne's test
3. Solubility test
4. Functional group test like Phenols, Amides/ Urea, Carbohydrates, Amines, Carboxylic acids, Aldehydes and Ketones, Alcohols, Esters, Aromatic and Halogenated Hydrocarbons, Nitro compounds and Anilides
5. Melting point/Boiling point of organic compounds
6. Identification of the unknown compound from the literature using melting point/ boiling point
7. Preparation of the derivatives and confirmation of the unknown compound by melting point/ boiling point
8. Minimum 5 unknown organic compounds to be analyzed systematically
9. Preparation of suitable solid derivatives from organic compounds
10. Construction of molecular models

### **Recommended Books:**

1. Organic Chemistry by Morrison and Boyd
2. Organic Chemistry by I.L. Finar , Volume-I
3. Textbook of Organic Chemistry by B.S. Bahl & Arun Bahl.
4. Organic Chemistry by P.L.Soni
5. Practical Organic Chemistry by Mann and Saunders.
6. Vogel's text book of Practical Organic Chemistry
7. Advanced Practical organic chemistry by N.K.Vishnoi.
8. Introduction to Organic Laboratory techniques by Pavia, Lampman and Kriz.
9. Reaction and reaction mechanism by Ahluwalia/Chatwal.