

Branch Name:	Bachelor of Pharmacy
Program Code:	PH101
Course Name:	Pharmaceutical Organic Chemistry (Theory)
Course Code:	1BP204T

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)		
Lecture	Tutorial	Practical	Credit	Theory (T)		Total Marks
				Continuous Assessment	University Assessment	
4	-	NA	4	40	60	100

Course Objectives:

The objectives of this course are to:

1. Develop a clear understanding of the chemistry of saturated hydrocarbons.
2. Study the chemistry and reactions of unsaturated hydrocarbons.
3. Understand the chemistry and reaction mechanisms of alkyl halides.
4. Explain the chemistry of aromatic hydrocarbons and their derivatives.
5. Provide an understanding of carbonyl compounds and fundamental organic reaction mechanisms relevant to pharmaceuticals.

Course Outcomes (CO):

CO No.	Upon successful completion of this course, the students will be able to:
1	Describe the chemical reactions and mechanisms of aliphatic saturated hydrocarbons.
2	Explain the reactions and mechanisms of aliphatic unsaturated hydrocarbons.
3	Understand nucleophilic substitution and elimination reactions of alkyl halides.
4	Explain electrophilic aromatic substitution reactions and the effect of substituents.
5	Apply knowledge of carbonyl compounds and reaction mechanisms in pharmaceutical chemistry.

Subject Contents:

Unit. No.	Topic	Total Hours (60 hours)	Weight (%)
1	Aliphatic Saturated Hydrocarbons – Alkanes • Methods of preparation: Wurtz reaction, Kolbe's reaction, Clemmensen reduction, Wolff–Kishner reduction • Chemical reactions of alkanes • Mechanism of free radical substitution (halogenation) • Pharmaceutical applications of alkanes: Liquid paraffin, soft paraffin, hard paraffin Cycloalkanes • Baeyer's strain theory and its limitations	12	20

	Coulson–Moffitt modification Sachse–Mohr theory		
2	Aliphatic Unsaturated Hydrocarbons – - Alkenes - Methods of preparation: - Dehydration of alcohols - Dehydrohalogenation of alkyl halides - Dehalogenation of vicinal dihalides - Wittig reaction - Chemical reactions of alkenes - Mechanism of electrophilic addition reactions - Markovnikov’s and anti-Markovnikov’s rule - Ozonolysis Conjugated Dienes - Stability of conjugated dienes - Mechanism of Diels–Alder reaction Electrophilic and free radical addition reactions 1,2- and 1,4-addition reactions	12	20
3	Alkyl Halides - Nucleophilic substitution reactions: SN1 and SN2 - Mechanism, kinetics, substrate structure, solvent effect, stereochemistry - Elimination reactions: E1 and E2 - Mechanism, kinetics, substrate structure, solvent effect, stereochemistry - Zaitsev’s (Saytzeff’s) rule with examples Comparison of substitution vs elimination reactions	12	20
4	Benzene and Its Derivatives – - - IUPAC nomenclature of mono- and di-substituted benzene derivatives - Structure of benzene - Molecular orbital picture and resonance - Aromaticity and Hückel’s rule - Electrophilic aromatic substitution reactions: - Nitration - Halogenation - Friedel–Crafts alkylation and its limitations - Friedel–Crafts acylation - Sulphonation and desulphonation Effect of substituents on reactivity and orientation	12	20
5	Carbonyl Compounds - Aldehydes and Ketones - Preparation and properties of carbonyl compounds - Nucleophilic addition reactions - Aldol condensation and crossed aldol condensation - Cannizzaro and crossed Cannizzaro reactions - Benzoin and Perkin condensation - Oxidation and reduction reactions Pharmaceutical applications of carbonyl compounds: Chloral, Paraldehyde, Ketoprofen	12	20

References:

1. Morrison, R.T., Boyd, R.N. and Bhattacharjee, S.K., Organic Chemistry. Pearson Education India.
2. Finar, I.L., Organic Chemistry, Vol. I. Pearson Books.
3. Bahl, B.S. and Bahl, A., Textbook of Organic Chemistry. S. Chand & Company.
4. Furniss, B.S., Vogel's Textbook of Practical Organic Chemistry.
5. Organic Chemistry by P.L.Soni
6. Reaction and reaction mechanism by Ahluwalia/Chatwal

List of Open Source Software/learning website: Nil