Raffles University

Neemrana, Alwar, Rajasthan- 301705

School of Pharmacy

Course: Pharmaceutical Organic Chemistry-I BP202T	**Number of Prescribed Hours: 60**
Academic Year: 2023-24 **Programme: B. Pharmacy**	
Name of Faculty: Dr. Chennu MM Prasada Rao	**Year/Semester: I Year II Sem**

TEACHING PLAN: Pharmaceutical Organic Chemistry-I

SCHOOL: (SOP) School of Pharmacy		**ACADEMIC SESSION: 2023-24 (Even Sem)**		**FOR STUDENTS' BATCH:**	**2023-2027**	
1	**Course No.**	**BP202T**				
2	**Course Name**	**Pharmaceutical Organic Chemistry-I**				
3	**Credits**	**4 (3 Lectures+1Tutorial)**				
4	**Learning Hours**	**Theory hours** 45 **Tutorial** 15 **Total hours** 60				
5	**Course Objective**	1. The students will be well acquainted with the Knowledge about structure, name and the type of isomerism of the organic compound and reaction, name the reaction and orientation of reactions. 2. Understand reactivity/stability of compounds, reactivity/stability of compounds				
6	**Course Outcomes**	1.Knowledge of the classification, nomenclature, structure and the type of isomerism of the organic compound 2.Understanding of important physical properties, reactions (and underlying mechanisms) and methods of preparation of various functional groups 3.Account for reactivity/stability of compounds and intermediates forming in reactions 4.Identify/confirm the identification of organic compound. 5.Explain the structure and uses of various organic compounds				
7	**Outline syllabus:**					

7.01	**Paper Code**	**Unit**	**Introduction**	**Lectures hours**	**Book tile**	**Page No**	**Mode of Teaching**
	BP202T	Unit I Classification, nomenclature and isomerism	Unit-1: Classification of Organic Compounds Common and IUPAC systems of nomenclature of organic compounds (up to 10 Carbons open chain and carbocyclic compounds) Structural isomerism in organic compounds	10	Text book of organic chemistry by Bhal and Arun bhal	150 - 179	BB, PPt, Videos, Animations ,Charts
7.02		Unit II Alkanes*, Alkenes* and Conjugated dienes	SP3 hybridization in alkanes, Halogenation of alkanes, uses of paraffins. Stabilities of alkenes, SP2 hybridization in alkenes E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations, Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1 and E2 reactions. Ozonolysis, electrophilic addition reactions of alkenes, Markownikoff's	14	Text book of organic chemistry by Bhal and Arun bhal	199 - 233	BB, PPt, Videos, Animations ,Charts

			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				
		Unit III Alkyl halides and alcohols	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 **Alcohols*-** Qualitative tests, Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	14	Text book of organic chemistry by Bhal and Arun bhal	293 - 318	BB, PPt, Videos, Animations ,Charts
7.03		Unit IV Carbonyl compounds (Aldehydes and ketones)	Nucleophilic addition, Electrometric effect, aldol condensation, Crossed Aldol condensation, Cannizzaro reaction, Crossed Cannizzaro reaction, Benzoin condensation, Perkin condensation, qualitative tests, Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate, Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde.	10	Text book of organic chemistry by Bhal and Arun bhal	410 - 447	BB, PPt, Videos, Animations ,Charts
		Unit V Carboxylic acids. Aliphatic Amines	Acidity of carboxylic acids, effect of substituents on acidity, inductive effect and qualitative tests for carboxylic acids ,amide and ester Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid	12	Text book of organic chemistry by Bhal and Arun bhal	448 - 473 & 575 - 597	BB, PPt, Videos, Animations ,Charts
8	**Course Evaluation**						
8.1	**Continuous Mode 10M (25%)**						
8.11	**Attendance**	4M (10%)					
8.12	Quiz, assignment open book test, field work, group discussion and seminar	6 Assignments and 3M (7.5%)					

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8.13	Student – Teacher interaction	3M (7.5%)		
8.3	**End-term examination: 75%**			
9	**Text Books & References**			
9.1	**Text 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.Sterochemistry by Kale		
9.2	**References**	4. Organic Chemistry by P.L.Soni 5. Practical Organic Chemistry byMann 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 Ahluwaliah/Chatwal.		
9.3	**Video References**	**https://www.youtube.com/watch?v=BRCc8BrUMwI** https://nptel.ac.in/courses/104/103/104103071/ http://www.freebookcentre.net/chemistry-books-download/Basics-of-Organic-Chemistry-and-Mechanism.html https://organicchemistrydata.org/links/ https://www.organic-chemistry.org/ https://www2.chemistry.msu.edu/faculty/reusch/VirtTxtJml/intro1.htm		

Course Outcome Mapping with Programme Outcomes

CO's/PO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	M	M	S		L	M	M	L		M	S
CO2	M	M	S	S	L	M	M	L		M	S
CO3	M	M	S	S	L	M	M	L		M	S
CO4	M	M	S	S	L	M	M	L		M	S
CO5	M	M	S	S	L	M	M	L		M	S

	Course Content & Lecture Schedule				
S.No	**Unit**	**Topic No**	**Name of the Topic**	**Lecture No**	**Mode of Delivery**
	1	**T1**	Classification of organic compounds	L1	BB,PPT
		T2	Classification of organic compounds with suitable structures	L2	BB,PPT

		T3	Common and IUPAC systems of nomenclature of organic compounds	L3	BB,PPT ,VIDEOS
		T4	Common and IUPAC systems of nomenclature of organic compounds	L4	BB,PPT
			Tutorial-01	L5	BB,PPT
		T5	Structural isomerism in organic compounds	L6	BB,PPT
		T6	Types of chemical reaction with suitable examples	L7	BB,PPT
		T7	Types of chemical reaction with suitable examples	L8	BB,PPT
			Tutorial-02	L9	BB,PPT
		T8	Types of chemical reaction with suitable examples	L10	BB,PPT
		T9	Introduction, hybridization, reactions of alkanes	L11	BB,PPT
		T10	Free radical substitution reaction and mechanism of methane	L12	BB,PPT
			Tutorial-03	L13	BB,PPT
		T11	Carbocations: introduction formation, stability	L14	BB,PPT
		T12	Stabilities of alkenes, SP2 hybridization in alkenes	L15	BB,PPT
	2	**T13**	E1 and E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations,	L16	BB,PPT
		T14	E2 reactions – kinetics, order of reactivity of alkyl halides, rearrangement of carbocations	L17	BB,PPT
		T15	Saytzeffs orientation and evidences. E1 verses E2 reactions, Factors affecting E1, and E2 reactions.	L18	BB,PPT

			Tutorial-04	L19	BB,PPT
		T16	Ozonolysis, electrophilic addition reactions of alkenes,	L20	BB,PPT
		T17	Reaction and mechanism of Markownikoff's	L21	BB,PPT
		T18	Reaction and mechanism of anti Markownikoff's	L22	BB,PPT
			Tutorial	L23	BB,PPT
		T19	Stability of conjugated dienes,	L24	BB,PPT
		T20	Diel-Alder, electrophilic addition of conjugated dienes	L25	BB,PPT
			Tutorial-05	L26	BB,PPTs
		T21	free radical addition reactions, allylic rearrangement of conjugated dienes,	L27	BB,PPT
			Tutorial-06	L28	BB,PPT
		T22	Classification, method of preparation of alkyl halides reaction of alkyl halides	L29	BB,PPT
		T23	SN2 reaction: kinetics, order of reactivity of alkyl halides stereochemistry and Factors affecting SN2 reactions	L30	BB,PPT
			Tutorial-07	L31	BB,PPTs
	3	**T24**	SN1 reaction: kinetics, order of reactivity of alkyl halides , stereochemistry and Factors affecting SN1reactions	L32	BB,PPT
		T25	Structure and uses of ethylchloride, Chloroform, trichloroethylene , Structure and uses of tetrachloroethylene, dichloromethane, tetrachloromethane and iodoform.	L33	BB,PPT
			Tutorial-08	L34	BB,PPT

		T26	Classification, method of preparation of alcohols	L35	BB,PPT
		T27	Qualitative tests of alcohols	L36	BB,PPT
		T28	Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol,	L37	BB,PPT
			Tutorial-09	L38	BB,PPTs
		T29	Structure and uses of Cetosteryl alcohol, Benzyl alcohol, Glycerol, Propylene glycol	L39	BB,PPT
		T30	Classification, method of preparation of carbonyl compounds , Reactions of carbonyl compounds	L40	BB,PPT
		T31	Nucleophilic addition of carbonyl compounds Electromeric effect	L41	BB,PPT
		T32	Tutorial-10	L42	BB,PPT
		T33	Reaction , mechanism involved in aldol condensation, Crossed Aldol condensation	L43	BB,PPT ,VIDEOS
		T34	Reaction, mechanism involved in Cannizzaro reaction, Crossed Cannizzaro reaction,	L44	BB,PPT VIDEOS
	4		Tutorial-11	L45	BB,PPTs
		T35	Reaction, mechanism involved in Benzoin condensation, Perkin condensation,	L46	BB,PPT
		T36	qualitative tests for carbonyl compounds , Structure and uses of Formaldehyde, Paraldehyde	L47	BB,PPT
			Tutorial-12	L48	BB,PPT
		T37	Structure and uses of Acetone,Chloral hydrate	L49	BB,PPT
		T38	Structure and uses of Hexamine, Benzaldehyde , Structure and uses of Vanilin, Cinnamaldehyde.	L50	BB,PPT

		T39	Classification, method of preparation of carboxylic compounds Acidity of carboxylic acids	L51	BB,PPT
			Tutorial-13	L52	BB,PPT
		T40	effect of substituents on acidity of carboxylic acid , inductive effect on acidity of carboxylic acid	L53	BB,PPT
		T41	Qualitative tests for carboxylic acids ,amide and ester	L54	BB,PPT ,AV
			Tutorial-14	L55	BB,PPTs
	5	**T42**	Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid,	L56	BB,PPT
		T43	Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid	L57	BB,PPT
			Tutorial-15	L58	BB,PPT
		T44	Basicity, effect of substituent on Basicity of aliphatic amines	L59	BB,PPT
		T45	Qualitative test for of aliphatic amines Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine	L60	BB,PPT
				60	

QUESTION BANK

Unit-I

1. Classification of organic compounds with suitable examples?
2. Classify the functional groups?
3. Define Alicyclic and acyclic compounds with examples?
4. Write increasing order of priority of functional groups?
5. Explain in details about the isomerism?

6. Define and explain on structural isomerism with suitable examples?

Unit-II

7. Describe and write on hybridization, halogenation of alkanes
8. Explain on hybridization, halogenation of alkenes
9. Elaborate in about stability of alkenes
10. Write about reaction, mechanism kinetics, Factors effecting of E2 Reaction?
11. Write about reaction, mechanism kinetics, Factors effecting of E1 Reaction?
12. Write about reaction, mechanism of Markownikoff's reaction?
13. Write about reaction, mechanism of anti Markownikoff's reaction?
14. Write a note on Stability of conjugated dienes?
15. Write a note on free radical addition reactions of conjugated dienes?
16. Write about allylic rearrangement in conjugated dienes?

Unit-III

17. Define classify the alkyl halides with suitable examples?
18. Write about primary and secondary and tertiary alkyl halides with suitable examples?
19. Write a note kinetics, order of reactivity of stereochemistry and rearrangement factors affecting alkyl halides in SN^2 reactions?
20. Write a note kinetics, order of reactivity of stereochemistry and factors affecting alkyl halides in SN^1 reactions?
21. Describe Structure and uses of ethylchloride, Chloroform, trichloroethylene, tetrachloroethylene?
22. Explain structure and uses of dichloromethane, tetrachloromethane and iodoform
23. Write a note on Qualitative tests of alcohols?
24. Write a about Structure and uses of Ethyl alcohol, Methyl alcohol, chlorobutanol, Cetosteryl alcohol,
25. Write a about Structure and uses of Benzyl alcohol, Glycerol, Propylene glycol?

Unit-IV

26. Classify the carbonyl compounds?
27. Describe the nomenclature and structure of carbonyl compounds?
28. Write a note in Nucleophilic addition and mechanism of carbonyl compounds?
29. Describe reaction and mechanism involved in aldol condensation,
30. Describe reaction and mechanism involved in Crossed Aldol condensation,
31. Describe reaction and mechanism involved in Cannizzaro reaction,
32. Describe reaction and mechanism involved in Crossed Cannizzaro reaction?
33. Write a note on reaction and mechanism involved in Benzoin condensation, Perkin
34. Condensation?
35. write a note on qualitative tests for carbonyl compounds?
36. Write a about Structure and uses of Formaldehyde, Paraldehyde, Acetone, Chloral hydrate?
37. Write a about Structure and uses of Hexamine, Benzaldehyde, Vanilin, Cinnamaldehyde?

Unit-V

38. Define and classify the carboxylic acids?
39. Write note on acidity of carboxylic acids?
40. Describe the effect of substituents in acidity of carboxylic acid?
41. Write a note on aliphatic amines?
42. Explain the basicity if aliphatic amines?
43. Describe the effect of substituents in basicity of aliphatic amines?
44. Write note on Qualitative test carboxylic acids?
45. Write note on Qualitative test aliphatic amines?
46. Write the Structure and Uses of Acetic acid, Lactic acid, Tartaric acid, Citric acid, Succinic acid. Oxalic acid, Salicylic acid, Benzoic acid, Benzyl benzoate, Dimethyl phthalate, Methyl salicylate and Acetyl salicylic acid
47. Write Structure and uses of Ethanolamine, Ethylenediamine, Amphetamine

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PROJECTS (To be given to group of students)

1. Practice the IUPAC Nomenclatures on the Organic compounds?
2. Demonstrate the models for the structural models using the Molecular models
3. Perform the synthesis of organic molecules using the SN^1 and SN^2 reactions?
4. Perform the synthesis of organic molecules using the elimination reactions?
5. Perform the synthesis of organic molecules using the nucleophilic addition reactions?
6. Perform the synthesis of organic molecules using the dehydration Alcohols?
7. Complete a MOOC certification program on Organic synthesis in NPTEL, Coursera and Udemy