TEACHING PLAN: CH-104

SCHOOL: SOBAS		ACADEMIC SESSION: 2023-2024	FOR STUDENTS' BATCH: II SEMESTER
1	Course code	CH-104	
2	Course Title	ORGANIC CHEMISTRY	
3	Credits		
4	Learning Hours	Contact Hours: 54 Practical Teaching: 27 Project, Tutorial and Assessment: 09 Total hours: 90	
5	Course Objective	The purpose of this course is to provide: 1. Broad and balance knowledge in chemistry in addition to understanding of key chemical concepts, principles and theories. 2. To develop students' ability and skill to acquire expertise over solving both theoretical and applied chemistry problems. 3. To provide knowledge and skill to the students' thus enabling them to undertake further studies in chemistry in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship.	
6	Course Outcomes	1. To have sound knowledge in alkenes and their properties. 2. Learn the basics of aromaticity and Huckel's rule. To know preparation and chemical reactions of different aromatic hydrcarbons.. 3. Sound knowledge of dienes and their chemical reactions. 4. Get knowledge about the mechanism of SN1 and SN2 reactions and other various chemical reactions of alkyl and aryl halides.	
7	Outline syllabus:		

7.01	Paper Code	Unit	Introduction	Reference number	Teaching methods
7.02	CH-104 UNIT-I ALKENES	(a)	Nomenclature	IL Finar Solomon	Lecture, Blackboard, PPT, Discussion
		(b)	Preparation	IL Finar Solomon	Lecture, Blackboard, PPT, Discussion
		(c)	Reactions	IL Finar Solomon Peter Sykes	Lecture, Blackboard, PPT, Discussion
7.03	CH-104 UNIT-II ARENES AND AROMATICITY	(a)	Nomenclature	IL Finar Solomon	Lecture, Blackboard, PPT, Discussion
		(b)	Huckel's rule and aromaticity	Solomon IL Finar	Lecture, Blackboard, PPT, Discussion

		(c)	Reactions	Solomon IL Finar Peter Sykes	Lecture, Blackboard, PPT, Discussion
7.04	**CH-104 UNIT-III DIENES AND ALKYNES**	(a)	Nomenclature	Solomon IL Finar	Lecture, Blackboard, PPT, Discussion
		(b)	Preparation	Solomon IL Finar	Lecture, Blackboard, PPT, Discussion
		(c)	Reactions	Solomon IL Finar Peter Sykes	Lecture, Blackboard, PPT, Discussion
7.05	**CH-104 UNIT-IV ALKYL AND ARYL HALIDES**	(a)	Nomenclature	Solomon Finar	Lecture, Blackboard, PPT, Discussion
		(b)	Preparation	Solomon IL Finar	Lecture, Blackboard, PPT, Discussion
		(c)	Reactions	Solomon IL Finar Peter Sykes	Lecture, Blackboard, PPT, Discussion

8	**Course Evaluation**	
8.10	**CA: 20%**	
8.1	**Attendance**	5%
8.12	**Homework**	-
8.13	**Quizzes**	4 Quizzes, 5%
8.14	**Projects**	1 Project, 5%
8.15	**Presentation**	1 Presentation, 5%
8.16	**Any other**	--
8.2	**MTE(IA)**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text books**	*Organic Chemistry: Graham Solomon [Wiley]* *A Guidebook to Mechanism in Organic Chemistry: Peter Sykes [Pearson]* *Organic Chemistry: IL Finar [Pearson]*
9.2	**References**	**Organic Chemistry-Jonathan Clayden, Nick Greeves, and Stuart Warren [OXFORD]**
9.3	**Video References**	https://www.youtube.com/watch?v=8lfUM8g9Aeo https://www.youtube.com/watch?v=9CbkD4JsuYU https://www.youtube.com/watch?v=wOr2iaEmbdo https://www.youtube.com/watch?v=QWbs9gNVoDE https://www.youtube.com/watch?v=zb8ZvJq9ngA https://www.youtube.com/watch?v=lnpX4-BpYVk

Mapping of Outcomes v. Topics

Outcome no. → Syllabus topic↓	1	2	3	4
.Unit I (a)	Y			
. Unit I (b)	Y			
Unit I (c)	Y			
.Unit II (a)		Y		
. Unit II(b)		Y		
. Unit II(c)		Y		
Unit III (a)			Y	
Unit III(b)			Y	
. Unit III(c)			Y	
.Unit IV (a)				Y
Unit IV(b)				Y
Unit IV(c)				Y

QUESTION BANK

UNIT I

Objective:

1. Which among these is not a structural isomer of the compound C_4H_8

a) But-1-ene b) But-2-ene **c) But-3-ene** d) 2-methylpropene

2. Identify the addition reaction which is not undergone by the alkenes

a) Mercuration b) Oxymercuration c) Hydroboration d) Halogenation

3. Which among the following alkenes is used in the manufacturing of plastics

a) Butadiene b) 1,2-butadiene **c) 1,3-butadiene** d) 2-butadiene

4. 4-chlorobut-1-ene is the name of which among the following alkenes

a) $CH_2Cl\text{-}CH_2\text{=}CH\text{-}CH_2$ b) $CH_2Cl\text{-}CH_2\text{-}CH\text{-}CH_2$

c) $CH_2Cl\text{=}CH_2\text{-}CH\text{=}CH_2$ **d) $CH_2Cl\text{-}CH_2\text{-}CH\text{=}CH_2$**

5. Baeyer's reagent is used to detect

a) glucose **b) double bonds** c) aromaticity d) free radical

Subjective:

1. Discuss the nomenclature of alkenes.
2. Discuss the general preparation methods for alkenes.
3. Discuss the mechanism of dehydration of alchols.
4. Discuss the mechanism of dehydrohalogenation of alkyl halides.
5. Discuss Saytzeff's rule with example.
6. Discuss mechanism of electrophilic addition in alkenes.
7. Discuss mechanism of ozonolysis.
8. What are the thermodynamic and kinetically stable products? Explain with example.

UNIT II

Objective:

1. Nitration of benzene is carried out by which of the following reactive species?

a) NO_2^+ b) NO_2^- c) HNO_3 d) NO_3

2. The product formed, when benzene reacts with CH3COCl in the presence of AlCl3 is

a) $C_6H_5CH_3$ b) C_6H_5Cl **c) $C_6H_5COCH_3$** d) C_6H_5COCl

3. Find the reactants other than AlCl3 in Friedel-Craft's alkylation

a) $C_6H_6 + CH_4$ b) $C_6H_6 + NH_3$ **c) $C_6H_6 + CH_3Cl$** d) $C_6H_6 + CH_3COCl$

4. Which among these is not a representative arene compound?

a) Durene **b) Picric chloride** c) Aspirin d) Mesitylene

5. Arenes does not undergo _____

a) Dehydrogenation b) Coupling reaction c) Halogenation d) Cyclo additions

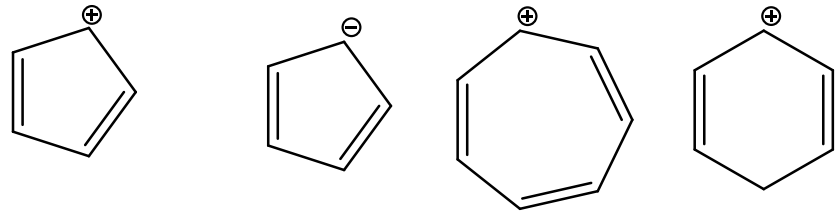
6. Which of the following is not associated with electrophilic aromatic substitution?

a) The formation of nitrobenzene **b) The formation of benzyne**

c) The formation of bromobenzene d) The formation of benzene sulfonic acid

Subjective:

1. What is aromaticity?
2. Discuss Huckel's rule for aromaticity.
3. Compare between the aromatic and anti-aromatic compounds.
4. Discuss the structure of annulenes.
5. What is Friedel-Crafts reaction?
6. Discuss the mechanism of nitration in benzene.
7. Write a short note on: Acylation of benzene.
8. Explain why methyl group in toluene is ortho and para directing in nature.
9. How will you prepare the following compounds from benzene?
   a) Acetophenone b) Toluene c) Chlorobenzene d) Benzene hexa chloride
10. Which of the following have aromatic and why?



UNIT III

Objective:

1. Alkynes are more reactive than alkenes.

a) False b) True

2. Select the incorrect statement regarding terminal alkynes.

a) Methylacetylene is an example of terminal alkynes

b) Terminal alkynes are more acidic when compared with alkenes

c) Terminal alkynes are not as acidic as alkanes

d) These have a replaceable acidic hydrogen atom

3. Majority of the alkynes are not prepared from/by _____

a) Condensation b) Acetylene c) Dehydrohalogenation **d) Hydrogenation**

4. The transformation into carboxylic acids of the alkynes takes place with the help of which among the following reagents?

a) Potassium chlorate **b) Potassium permanganate**

c) Potassium dichromate d) Potassium chloride

5. Which among the following alkynes is used as a rocket fuel?

a) Ethyne **b) Propyne** c) But-1-yne d) Pent-1-yne

Subjective:

1. Discuss the nomenclature of isolated dienes.
2. Discuss the nomenclature of conjugated dienes.
3. How are the dienes classified?
4. Discuss the electrophilic additions to conjugated dienes.
5. Discuss the bonding in alkynes.
6. Discuss the methods of formation of alkynes.
7. Discuss the mechanism of nucleophilic addition to the alkynes.
8. Discuss Kolbe's electrolytic method to prepare acetylene.
9. Alkynes are less reactive than alkenes towards electrophilic addition reaction why?
10. Alkynes are less reactive than alkenes towards electrophilic addition reaction why?

UNIT IV

Objective:

1. Which one of the following possess highest melting point?

a) Chlorobenzene b) o-dichlorobenzene

c) m-dichlorobenzene **d) p-dichlorobenzene**

2. The reaction of tert butyl bromide with sodium methoxide produces mainly

a) isobutene **b) isobutylene** c) tert-butyl methyl ether d)sodium tert butoxide

3. Which of the following is most reactive towards SN_1 reaction?

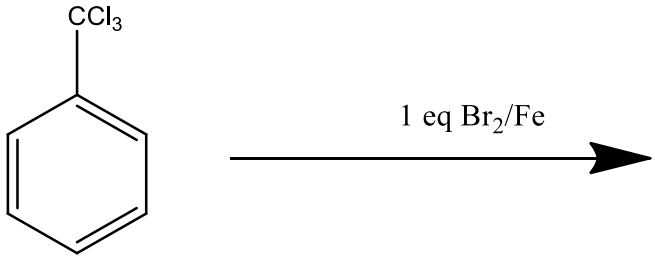
a) $C_6H_5C(CH_3)C_6H_5Br$ b) $C_8H_5CH_2Br$

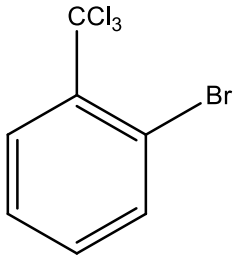
c) $C_6H_5CH(C_6H_5)Br$ d) $C_6H_5CH(CH_3)Br$

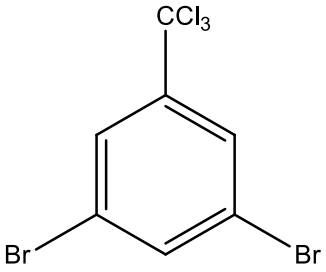
4. CH3CH2CH2Br + NaCN → CH3CH2CH2CN + NaBr, will be fastest in

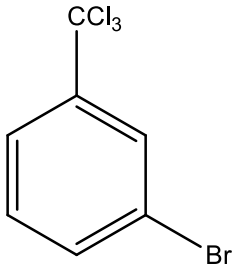
a) ethanol b) methanol **c) N, N-dimethylformamide** d) Water

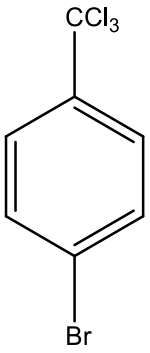
5. What will be the product for the following reaction?



a) 

b) 

c) 

d) 

Subjective:

1. How are the alkyl halides are classified?
2. Discuss the nomenclature of alkyl and aryl halides..
3. What is SN_1 reaction? Discuss the mechanism.
4. Discuss the mechanism of SN_2 mechanism.
5. Discuss the relative reactivities of alkyl, aryl and vinyl halides.
6. Discuss the mechanism of nucleophilic aromatic substitution.
7. Write down the detail mechanism of reaction of halogen acid on alcohols.
8. Explain why aryl halides have low reactivity during nucleophilic substitution reaction.
9. Describe the benzyne mechanism of nucleophilic aromatic substitution.
10. Why aryl halide is less reactive than alkyl halide. Explain.