DEPARTMENT OF CHEMISTRY				CLASS: I B.Sc. Chemistry				
SEM	Course type	Course Code	Course Title	Credits	Contact Hours/week	CIA	Ext	Total
II	Part-III-Core	20U2CMC3	General Chemistry – III	3	3	25	75	100

Course Objectives: The objective of this course is to make the student

1. to explain the preparation and properties of aliphatic compounds
2. to outline the importance of aliphatic hydrocarbons
3. to discuss the synthesis, reactions and stability of alicyclic compounds
4. to identify the significance of alicyclic compounds
5. to discuss the gas laws, various types of molecular velocities and explain the behavior of real gas

Unit-I: Aliphatic Compounds-I

Alkanes - preparations, physical properties, reactions, reactions with radical mechanism for substitution reaction - cracking - Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes - mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation, ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by $KMnO_4$ and polymerization.

Unit-II: Aliphatic Compounds-II

Application in the synthesis of following molecules - *cis* and *trans* 2-butene, propanal and 1-methyl cyclohexanol. Alkynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH, hydroboration - dimerisation and cyclisation - acidity of terminal alkynes.

Unit-III: Alicyclic Compounds-I

Cycloalkanes: Preparation (small, medium & large ring compounds) - reactions - cycloaddition, dehalogenation, pyrolysis of calcium salt of dicarboxylic acid - Wurtz reaction- stability of cycloalkanes - Baeyer's strain theory. Cycloalkenes: Preparation and reactions of cycloalkenes.

Unit-IV: Alicyclic Compounds-II

Alicyclic compounds-Preparation of conjugate dienes - reactions - 1,2 and 1,4 addition, polymerization and Diels-Alder reaction - Application in the synthesis of following molecules: *trans* 2-chlorocyclopentanol, *trans*-2 methylcyclopentanol, *cis* and *trans* 1,2 cyclohexanediol, cyclohexene

Unit-V: Gaseous State

Ideal gas: Kinetic theory of gases - derivation of gas laws – Maxwells distribution of molecular velocities - Types of molecular velocities - Expansivity and compressibility – collision diameter – collision frequency – collision number - mean free path. Behaviour of real gas – Deviation from ideal behaviour - van der Waals' equation of state – Virial equation of state – critical constants of gas.

Books for Study

1. ArunBahl and B.S. Bahl, A Text Book of Organic Chemistry, 22ndedn, S Chand & Company, 2016.
2. M.K. Jain and S. C. Sharma, Modern Organic Chemistry, Vishal Publishing Co, 2015.
3. B.R.Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 47th edition, Vishal Publishing Co, 2016.

Booksfor Reference

1. K. S. Tewari and N. K. Vishnoi, A Text Book of Organic Chemistry, 4thedition, Vikas Publishing House Pvt. Ltd, 2017.
2. I.L. Finar, Organic Chemistry Vol-1& 2, 6thedn, Pearson Education Asia, 2004.
3. Bhupinder Mehta and Manju Mehta, Organic Chemistry, 2nd edition, PHI Learning Pvt. Ltd, 2015.
4. N. Tewari, Advanced Organic Reaction Mechanism, 3rd Edition, Books &Allied (P) Ltd, 2011.
5. N. Kundu and S.K. Jain Physical Chemistry, S. Chand & Company Ltd.2000.

Web Resources

1. https://nptel.ac.in/courses/104/106/104106119/
2. https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_General_Chemistry_(Petrucci_et_al.)/26%3A_Structure_of_Organic_Compounds/26.1%3A_Organic_Compounds_and_Structures%3A_An_Overview
3. https://brilliant.org/wiki/structural-representations-of-organic-compounds/

Pedagogy

1. Chalk-Talk class room activities
2. Group Discussion
3. Seminar/Assignment
4. Quiz through ICT- Mode

Lesson Plan

Unit	Descriptions	Staff Name	Hours	Lecture Mode
I	**Aliphatic Compounds-I**			
	Alkanes - preparations, physical properties, reactions, reactions with radical mechanism for substitution reaction – cracking	-	2	BB
	Alkenes: Preparation from alcohol, haloalkane, dihaloalkanes and alkynes - reactions of alkenes	-	2	BB
	Mechanisms involved in addition of hydrogen, halogen, hydrogen halide, hypohalous acid, water, hydroboration, hydroxylation	-	3	BB/PPT
	Ozonolysis and epoxidation - peroxide effect - allylic substitution, oxidation by $KMnO_4$ and polymerization	-	2	BB/PPT
II	**Aliphatic Compounds-II**			
	Application in the synthesis of following molecules - cis and trans 2-butene, propanal and 1-methyl cyclohexanol.	-	3	BB/PPT
	Alkynes: preparation, reactions - addition of hydrogen, halogen, hydrogen halide, water, HCN, CH_3COOH,	-	4	BB
	Hydroboration - dimerisation and Cyclisation - acidity of terminal alkynes.	-	2	BB
III	**Alicyclic Compounds-I**			
	Cycloalkanes: Preparation (small, medium & large ring compounds) - reactions - cycloaddition, dehalogenation,	-	3	BB/PPT
	pyrolysis of calcium salt of dicarboxylic acid - Wurtz reaction-stability of cycloalkanes - Baeyer's strain theory.	-	3	BB/PPT
	Cycloalkenes: Preparation and reactions of cycloalkenes.	-	3	BB/PPT
IV	**Alicyclic Compounds-II**			
	Preparation of conjugate dienes - reactions - 1,2 and 1,4 addition, polymerization and Diels-Alder reaction	-	3	BB/PPT
	Application in the synthesis of following molecules - trans 2-chlorocyclopentanol, trans-2 methylcyclopentanol,	-	3	BB/PPT
	is and trans 1,2 cyclohexanediol, yclohexene.	-	3	BB/PPT
V	**Gaseous state**			
	Ideal gas: Kinetic theory of gases - derivation of gas laws – Maxwells distribution of molecular velocities	-	2	BB/PPT
	Types of molecular velocities - Expansivity and compressibility	-	2	BB/PPT
	collision diameter – collision frequency – collision number - mean free path.	-	1	BB/PPT
	Behaviour of real gas – Deviation from ideal behaviour - Vander Waals equation of state – Virial equation of state – critical constants of gas.	-	4	BB/PPT
	Total Hours		45	

*BB-Black board/Chalk and Talk

PPT-Power point presentation

Course Learning outcomes: After successful completion of this course, the student will be able

	CLO statement	Knowledge level
CLO1	To prepare and study the properties and reactions of aliphatic compounds.	K3
CLO2	To apply aliphatic compounds for the synthesis of various molecules	K3
CLO3	To organize the knowledge on synthesis, reactions, and importance of alicyclic compounds.	K4
CLO4	To explain the behavior of gases	K2
CLO5	To solve the problems regarding molecular velocities.	K3

PO and CLO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5
CLO1	3	2			
CLO2	3	2			
CLO3	3	2			
CLO4	3	2			
CLO5	3	2			

PSO and CLO Mapping:

	PSO – 1	PSO - 2	PSO - 3	PSO - 4	PSO - 5	PSO - 6	PSO - 7
CLO1				3		2	2
CLO2				3		3	3
CLO3				3		3	3
CLO4	3						
CLO5	3						

3-Advance application; 2-Intermediate level;1-Basic level