DEPARTMENT OF CHEMISTRY				*CLASS: I B.Sc. Botany, Zoology, Microbiology & Biotechnology*				
SEM	**Course type**	**Course Code**	**Course Title**	**Credit**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
I	Part-III Allied	20U1CAC1	Allied Chemistry – I (For I Botany& Zoology)	4	4	25	75	100

Course Objectives: The objectives of this course are to make the student

1. To explain the various atomic models and rules for writing electronic configuration
2. To discuss the types of chemical bonds, classification of organic compounds and organic reactions
3. To classify organic compound based on its functional groups
4. To predict the adsorption process and its applications
5. To examine the types of catalysis and its applications

UNIT-I: ATOMIC STRUCTURE

Introduction to structure of atom- Fundamental particles - proton, neutron and electron - Rutherford and Niels Bohr's model of an atom and their defects - Sommerfeld's modification of atomic structure, quantum numbers – Orbitals: shapes of *s*, *p* and *d* orbitals. - Pauli's exclusion principle - Hund's rule of maximum multiplicity - Aufbau principle - Heisenberg's uncertainty principle.

UNIT-II: CHEMICAL BONDING

Types of chemical Bonds – electrovalent(ionic), covalent, co-ordinate covalent, metallic and Hydrogen bonding.Characteristics of electrovalent and covalent compounds. Valence Bond Theory - Types of overlapping (*s-s*, *s-p* and *p-p* overlapping), Sigma and pi bonds, Hybridization- *sp*, $sp^2$and sp^3hybridization in acetylene,ethylene&methane only.

UNIT-III: INTRODUCTION TO ORGANIC CHEMISTRY

Importance of organic compounds in daily life – Classification of organic compounds. Functional groups – definition – Various functional groups - General formula and examples for the following: Alcohols, Alkyl Halide, Carbonyl compounds (aldehyde and ketone), Carboxylic acids and Amines. Types of organic reactions – Substitution, Addition and Elimination reactions (examples only, not mechanism)

UNIT-IV: SURFACE CHEMISTRY

Definition of adsorption, occlusion, absorption, adsorbent, and adsorbate – Types of adsorption: Physisorption and chemisorption – differences between Physisorption and Chemisorption – various applications of adsorptions – Factors influencing adsorption process- nature of gases, nature of adsorbent, influence of temperature and pressure.

UNIT-V: CATALYSIS

Definition, Characteristics of catalysts - Types of catalyst (Homogeneous catalysis and heterogeneouscatalysis) – Acid and base catalysis – Enzyme catalysis with example only: positivecatalysis, negativecatalysis and auto catalysis – catalytic promoters – catalytic poison-. Intermediate compound formation theory.

Books for Study

1. Puri, B.R., Sharma, L.R. and Pathania, M.S., 2004 (41stEdn.), Principles of Physical Chemistry, S.N. Chand and Co., New Delhi.
2. Bhal, B.S.andArunBahl, 2004, Advanced Organic Chemistry, S. Chand and Co. Ltd., New Delhi.
3. SathyaPrakash, Tuli, Basu&Madan, 1999, Advanced Inorganic Chemistry. Vol. II , 17th Revised Edition, S. Chand and Co. Ltd., Ram Nagar., New Delhi.
4. Puri. B.R., Sharma. L.R., 1989, Principles of Inorganic Chemistry, ShobhanLal Nagin Chand and Co., Jalandar.

Books for Reference

1. Morrison, R.T., and Boyd, R.N., 1999, Organic Chemistry, Prentice-Hall of India, Pvt. Ltd., New Delhi.
2. Sharma, B.K., 1989, Polymer Chemistry, Goel Publishing House, Meerut.
3. Mukhopathyay. R and Datta. S, Engineering Chemistry, New Age international PVL, Publishers, New Delhi.
4. Sharma, B. K., Industrial chemistry, Goel Publishing House, 1994

Web Resources

1. https://byjus.com/jee/atomic-structure/
2. https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Atomic_Theory/Atomic_Structure
3. https://ocw.mit.edu/courses/chemistry/5-12-organic-chemistry-i-spring-2005/syllabus/
4. https://www.khanacademy.org/science/chemistry/chemical-bonds/types-chemical-bonds/v/ionic-bonds-and-coulombs-law?modal=1,
5. https://byjus.com/jee/surface-chemistry/, http://www.ncert.nic.in/ncerts/l/lech105.pdf
6. https://byjus.com/chemistry/catalysis/

Pedagogy

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

Lesson plan

Unit	Descriptions	Staff Name	Hours	Lecture Mode
I	**ATOMIC STRUCTURE**			
	Introduction to structure of atom- Fundamental particles - proton, neutron and electron	-	1	BB
	Rutherford and Niels Bohr's model of an atom and their defects	-	2	BB/PPT
	Sommerfeld's modification of atomic structure, quantum numbers	-	1	BB
	Orbitals: shapes of s, p and d orbitals. .	-	4	BB/PPT
	Pauli's exclusion principle - Hund's rule of maximum multiplicity - Aufbau principle - Heisenberg's uncertainty principle		4	BB/PPT
II	**CHEMICAL BONDING**			
	Types of chemical Bonds – electrovalent(ionic), covalent	-	1	BB/PPT
	co-ordinate covalent, metallic and Hydrogen bonding	-	2	BB
	Characteristics of electrovalent and covalent compounds	-	1	BB
	Valence Bond Theory - Types of overlapping (s-s, s-p and p-p overlapping), Sigma and pi bonds	-	3	BB
	Sigma and pi bonds	-	2	BB
	Hybridization- *sp*, $sp^2$and sp^3hybridization in, acetylene, ethylene & methane only.	-	3	BB
III	**INTRODUCTION TO ORGANIC CHEMISTRY**			
	Importance of organic compounds in daily life – Classification of organic compounds	-	1	BB/PPT
	Functional groups – definition – various functional groups	-	2	BB/PPT
	General formula and examples for the following: Alcohols, Alkyl Halide, Carbonyl compounds (aldehyde and ketone)	-	4	BB/PPT
	Carboxylic acids and Amines. Types of organic reactions – Substitution	-	3	BB/PPT
	Addition and Elimination reactions (examples only, not mechanism)		2	BB/PPT
IV	**SURFACE CHEMISTRY**			
	Definition of adsorption, occlusion, absorption	-	2	BB/PPT
	adsorbent, and adsorbate – Types of adsorption	-	2	BB/PPT
	Physisorption and chemisorption – differences between Physisorption and Chemisorption	-	4	BB/PPT
	various applications of adsorptions – factors influencing adsorption process- nature of gases, nature of adsorbent, influence of temperature and pressure.	-	4	BB/PPT
V	**CATALYSIS**			
	Definition, Characteristics of catalysts - Types of catalyst	-	1	BB/PPT
	(Homogeneous catalysis and heterogeneous catalysis) – Acid and base catalysis	-	4	BB/PPT
	Enzyme catalysis with example only: positive catalysis, negative catalysis	-	3	BB/PPT
	auto catalysis – catalytic promoters	-	2	BB/PPT
	catalytic poison-. Intermediate compound formation theory	-	2	BB/PPT
Total Hours			60	

*BB-Black board/Chalk and Talk

PPT-Power point presentation

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

CLOs	CLO Statement	Knowledge level
CLO1	To discuss atomic models, and occupancy of electrons on various quantum levels.	**K2**
CLO2	To develop the overlapping of orbitals and hybridization of simple molecules	**K3**
CLO3	To find the importance of organic compounds in daily life and to describe the types of organic reactions	**K3**
CLO4	To inspect the types of adsorption and factors affecting the process	**K4**
CLO5	To the characteristics of catalyst and to explicate the types of catalysis	**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	PSO 8	PSO 9
CLO1	1						3		
CLO2	1						2		3
CLO3	1						2		3
CLO4	1								3
CLO5	1						3		2

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

Blue Print

Mapping with Course Learning Outcomes (CLOs)

Units	CLOs	K- Level	Section A		Section B		Section C (Either/or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K- Level	No. of Questions	K- Level		
1	CLO 1	Up to K 2	2	K1& K2	1	K1	2 (K1&K1)	1(K2)
2	CLO 2	Up to K 3	2	K1& K2	1	K1	2 (K2&K2)	1(K3)
3	CLO 3	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
4	CLO 4	Up to K4	2	K1&K2	1	K2	2 (K4&K4)	1(K4)
5	CLO 5	Up to K 3	2	K1&K2	1	K2	2 (K3&K3)	1(K3)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each question			1		2		5	10
Total Marks for each section			10		10		25	30

Distribution of Section-wise Marks with K Levels

K Levels	Section A & B (No Choice)	Section C (Either / or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	9	10	--	19	15.83	42%
K2	11	10	10	31	25.83	
K3	-	20	30	50	41.67	42%
K4	-	10	10	20	16.67	16%
Total marks	20	50	50	120	100.00	100%

Name of the Course Designer:

1. Dr. P. Prasanna