

Objectives:

- To study fundamentals of chemistry.
- To make students capable of understanding and learning the concepts of electrochemistry.
- To study basics of organic chemistry
- To study the synthesis, properties and applications of polymers used in our day to day life.
- To study the applications of chemistry in our day to day life.

Credits Earned: 5 Credits**Course Outcomes:** After completion of this course, student will be able to

- Understand the concepts of fundamental of chemistry and organic chemistry.
- Will be aware of the basics of reaction mechanism and structure & stability of reacting constituents.
- Obtain the information regarding the electromotive force and cells.
- Understand the basic of electrochemical reactions and their construction.
- Understand the use of chemistry in our day to day life.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
4	0	2	5	50	30	20	25	25	150

Contents

Unit	Topics	Contact Hours
1	Basic Concepts of Chemistry Introduction, Importance of Chemistry, Nature of matter, classification based on physical state, classification based on chemical structure, Physical quantities, Atomic mass, molecular mass, molar mass and mole concept, Atomic number, atomic mass, isotope, isobar and isotone. Bohr's atomic model, Quantum numbers, shape of s, p, d and f orbitals, rules of electron arrangement in orbitals.	08
2	General Organic Chemistry Introduction, tetravalency of carbon, hybridization, sp, sp ² and sp ³ hybrid orbitals with examples, functional groups, IUPAC nomenclature of organic compounds, inductive effect, main types of organic reactions.	10
3	Solution and their Properties: Solutions, classification of solution, units of concentration, colligative properties, numerical based on concentration and colligative properties, Henry's law, vapour-pressure lowering of solution, Raoult's law.	08
4	Electromotive Force Introduction, Types of electrochemical cells and examples, Half-cell, Reversible and irreversible cell, Convention sign, Types of electrodes, cell reactions, Representation of cell, emf of cell, emf series. Thermodynamic derivation of Nernst equation. Standard cells. Half-cells/electrodes, different types of electrodes (with examples). Standard electrode potential (IUPAC convention) and principles of its determination. Types of cells: electrolytic, galvanic and concentration cells.	12
5	Polymers Introduction, classification of polymers, industrial manufacturing, properties and uses of some important polymers: Polythene, Teflon, Polyacrylonitrile, Polyvinyl chloride, Polystyrene.	10
6	Drugs and Food additives Introduction, drugs, classification of drugs, working mechanism of drugs, therapeutic action of different class of drugs, artificial sweetening agents, food preservatives, antioxidants, food colors	08
Total Hours		56

References:

1. A Textbook of Physical Chemistry; K. L. Kapoor

2. Physical Chemistry; Arun Bahl & J. D. Tuli, S. Chand Publishing.
3. Organic Reactions and their Mechanisms; P. S. Kalsi, New Age International Publishers.
4. Organic Chemistry; R. T. Morrison and R. N. Boyd, 6th Edition, Prentice Hall of India.
8. Principles of Inorganic Chemistry; B. R. Puri, L. R. Sharma, K. C. Kalia, Vallabh Publications, Delhi
9. Organic Chemistry (Volume I, II & III); S. M. Mukherji, S. P. Singh, R. P. Kapoor.
10. Principles of physical chemistry; B.R. Puri, L.R. Sharma, M.S. Pathania.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
50%	30%	20%	-	-	-

List of Experiments suggested:

1. Determine the strength of given acidic solution using standard solution of base.
2. Determination of phenol by iodometric method.
3. To determine molecular weight of a polymer using Ostwald viscometer.
4. Assign IUPAC names to first five members of Alkane and Alkene series.
5. Preparation of (any one) polystyrene, urea formaldehyde, phenol formaldehyde.
6. To Determine the COD of given water sample.
7. To Determine Acid Value of given lubricating Oil.
8. Standardize KMnO₄ solution by preparing standard oxalic acid and to estimate ferrous ions and its Characterization.
9. Standardization of Acid/Base.
10. Virtual lab experiments.

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
4. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory
5. Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
6. All students in the laboratory must wear safety goggles and lab coats during lab session.

Supplementary Resources:

1. <https://www.youtube.com/watch?v=4Vkd9vIW7A&list=PLCzaIJYXP5YeFtzDdDusazLEdAM2XVlrb>.
2. <https://www.youtube.com/watch?v=xDITrdbajAs>.
3. <https://www.youtube.com/watch?v=vZ02XIyflJY&list=PL647Ql0nDrBxkCghRvezGY3Kil8JrNaX6>.
4. <https://www.youtube.com/watch?v=WqFFc3lyQR8&list=PLCzaIJYXP5YcOYkYm1U0DjCyf4ZMbK2-1>.
5. <https://www.youtube.com/watch?v=hML72IJVioA&list=PLCzaIJYXP5YczzI1gDyoaozNSAaE8n88H>.