Semester: I / II

Subject Name: Applied Chemistry

Subject Code: 09GS3102

Objective:

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

Credits Earned: 3 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 use of chemistry in our day-to-day life.
- Identify various electrochemical systems for use in domestic and industrial settings.

Pre-requisite of course: Basic concepts of Chemistry& Mathematics.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	2	3	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.	6
2	**General Organic Chemistry** Introduction, tetravalency of carbon, hybridization, sp, sp2 and sp3 hybrid orbitals with examples, functional groups, IUPAC nomenclature of organic compounds, inductive effect, main types of organic reactions.	8

Contents: Unit	Topics	Contact Hours
3	**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.	8
4	**Polymers** Introduction, classification of polymers, industrial manufacturing, properties and uses of some important polymers: Polythene, Teflon, Poly sacrylonitrile, Polyvinyl chloride, Polystyrene.	6
Total Hours		**28**

Contents : Unit	Topics	Contact Hours
1	Determine the strength of given acidic solution using standard solution of base.	2
2	Organic qualitative analysis of given compounds.	2
3	To determine molecular weight of a polymer using Ostwald micrometer.	2
4	Assign IUPAC names to first five members of Alkane and Alkene series.	2
5	Identification and analysis of the given organic substances.	2
6	Preparation of (Any one) polystyrene, urea formaldehyde, phenol formaldehyde.	2
7	Inorganic qualitative analysis of given compounds.	2
8	Standardize $KMnO_4$ solution by preparing standard oxalic acid and to estimate ferrous ions and its Characterization.	2
9	Standardization of Acid Solution	2
10	Standardization of Base solution.	2
11	Preparation of 0.1M standard solution of oxalic acid.	2
12	Determination of melting point of solid compound	2
13	To study pH of solutions of sodium chloride, ferric chloride.	2
14	Examination of the given compounds through inorganic qualitative analysis.	2
	Total Hours	**28**

Textbook:

1 A Textbook of Physical Chemistry, Arun Bahl & J. D. Tuli, Chand Publishing, 2013

References:

1 Organic Reactions and their Mechanisms, Organic Reactions and their Mechanisms, P. S. Kalsi, New Age International Publishers, 2008

2 Organic Chemistry, 6th edition, Organic Chemistry, 6th edition, R. T. Morrison and R. N. Boyd, Prentice Hall of India., 2001

3 Principles of Inorganic Chemistry, Principles of Inorganic Chemistry, B. R. Puri, L. R. Sharma, K. C. Kalia, Vallabh Publications, 1998

4 Engineering Chemistry, Shikha Agarwal, Cambridge Uni. Press, New Delhi, 2019, ISBN: 978-1-108-72444-9

5 Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Co. (P) Ltd., New Delhi, 2015, ISBN: 93-521-6000-2

Open source software and website:

1. http://www.chemguide.co.uk/atommenu.html
2. http://www.onlinelibrary.wiley.com/
3. https://docslib.org/insulation-materials-science-and-application
4. http://www.presentingscience.com/vac/corrosion/index.htm
5. http://chemcollective.org
6. http://www.chem1.com/

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=xDlTrdbajAs.

2 https://www.youtube.com/watch? v=vZ02XIyflJY&list

3 https://www.youtube.com/watch?v=WqFFc3lyQR8&list=PLCzaIJYXP5YcO YkYm1U0DjCyf4ZMbK2-1.

4 https://www.youtube.com/watch?v=hML72IJVioA&list=PLCzaIJYXP5YczzI 1gDyoaozNSAaE8n88H