NAME OF DEPTT : **Department of Chemistry**
Course name : Applied Chemistry I (CSE, ECE, EE, DS, VLSI, AI)
Course Code : CH2301
Year : 23-24 (2nd semester)
Credits : 4
L T P : 3 0 2 **Total No. of Lecture-42**

Objective: To teach the fundamentals and applications of Chemical Sciences essential for the development of electrical and electronic materials and technologies. Students will be learning various analytical techniques for the characterizations of electronic organic/inorganic materials.

Lecture wise breakup	***No. of Lectures = 42***

1	**Fundamentals for Applied Chemistry** Molecular orbital theory, Jahn-Teller Effect in Crystal Field Theory, Solid state chemistry: Crystal defects and line imperfections, Reaction mechanism in organic chemistry: Principles and methods of determination, Chemical Kinetics: Langmuir–Hinselwood Mechanism, acid-base equilibria in non aqueous media, Introduction to Computational chemistry and open source softwares	**(10)**
2	**Polymeric Materials** Mechanism and methods of polymerization, structure-activity relationship, Conducting Polymers: types (n- or p- doping) and applications, Polymeric fibre materials	**(6)**
3	**Spectroscopic Methods for structural Analysis:** Principle and applications (UV, IR, NMR, SEM and TEM)	**(9)**
4	**Energy Storage and Sensing Devices:** Fundamentals of Electrochemistry, types of electrodes, Reference electrodes, Ion-selective electrodes, Fuel cells, Batteries (Lithium-ion Batteries and EV Batteries), Renewable energy (Artificial photosynthesis), Solar cells, Sensors for IoT	**(8)**
5	**Chemistry of Electronic and Electrical Materials** Semi-conductor and super conducting Materials, Carbon materials, Optical Materials (OLED), 2D Materials, Magnetic materials.	**(9)**

Outcomes: 1. To be able to apply the fundamentals of chemistry towards developing new Technologies based on new materials.
2. To attain the essential analytical skills and designing of materials for electrical and electronic applications.
3. Application of software as important tools in technological applications.

Books:

1. Concise Inorganic Chemistry, by J. D. Lee, 5th Edition, 2003 (Chapman & Hall).
2. Organic Chemistry by S. M. Mukherji, and S. P. Singh, 2017 (Newagepublishers).
3. Principles of Physical Chemistry by Puri, Sharma and Pathania, 2008 (W.H. Freeman & Co).
4. Atkin's Physical Chemistry by Peter Atkins, Julio de Paula, 7th Edition (Oxford University Press).
5. Principle of Polymerization by G. Odian, 4th Edition, (John Wiley & Sons, Inc.).
6. D. S. Pavia, G.M. Lasmpman and G.S. Kriz: Introduction to Spectroscopy, 4th Edition,(Thomson learning, Indian Edition).
7. Computational chemistry: Introduction to theory and applications of molecular andquantum mechanics: Lewars Errol G. (Springer)
8. NPTEL web lectures: Chemistry of Materials, Engineering Chemistry I & III.

Practicals	
Sr. No.	**Name of Experiment**
1.	To find the strength of the given sodium hydroxide solution by titrating it against standard solution of hydrochloric acid using pH meter.
2.	To determine the ferrous content in the supplied sample of iron ore by titrimetic analysis against standard $K_2Cr_2O_7$ solution using potassium ferricyanide $[K_3Fe(CN)_6]$ as external indicator.
3.	To find the strength of Sodium hydroxide (NaOH) solution by titrating it against 0.1 N hydrochloric acid conductometrically.
4.	Determination of reaction rate constant of acid catalyzed Hydrolysis of Ester.
5.	Verify Beer-Lambert's law for $KMnO_4$ colorimetrically.
6.	Synthesis of Polyaniline based conducting polymer.
7.	To determine the value of rate constant (k) for the inversion of sucrose by polarimeter.
8.	To prepare nickel dimethyl glyoxime complex, $[Ni(DMG)_2]$. Illustrate the structure of the complex using FTIR.
9.	Synthesis of iron oxide nanoparticles and characterization using FTIR.
10.	Predicting the best Molecular docking conformations of a protein with the help of Swiss Dock.

Distribution of marks for the various activities	
Theory Assignment *(Evaluation will be done on the basis of regularity of submission and originality of the assignments given by the instructor during the teaching semester)*	05
Theory Quizzes *(Two Theory quizzes will be conducted; one before mid-sem exams and one before end-sem exams. Average marks of two quizzes will be considered*)	10
Theory Project *(Evaluation will be done on the basis of content, originality, understanding and presentation of the project assigned by the instructor)*	05
Mid Semester Theory Examination	20
End Semester Theory Examination	40
End Semester-Practical	20