Chemistry

Course Code	23BS1102	**Year**	I	**Semester**	I
Course Category	Basic Sciences	**Branch**	**ECE**	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Nil
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	**Interpret** fundamental concepts of chemistry. L2
CO2	**Apply** knowledge of quantum mechanics, materials and energy sources to describe and solve problems. L3
CO3	**Utilize** knowledge of conducting polymers and instrumentation to design and develop new materials. L3
CO4	**Analyze** bonding models, Modern engineering materials, and electrochemical processes to make informed decisions L4
CO5	**Analyze** the applications of polymers and instrumentation methods. L4

Contribution of Course Outcomes towards achievement of Program Outcomes &Strength of correlations (3: High,2: Medium, 1: Low)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO 1	2													
CO 2	3													
CO 3	3													
CO 4		3							1	1				
CO 5		3							1	1				

Syllabus		
Unit No.	**Contents**	**Mapped CO**
1	**Structure and Bonding Models:** Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, particle in one dimensional box, molecular orbital theory – bonding in homo-and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO etc. π-molecular orbitals of butadiene and benzene-calculation of bond order.	CO-1,2,4
2	**Modern Engineering Materials Semiconductors**- Introduction, basic concept, applications. Super Conductors-Introduction, basic concept, applications. **Super capacitors-** Introduction, Basic Concept, Classification and Applications. **Nano materials**-Introduction, classification, properties and applications of Fullerenes, carbon Nano tubes, Graphines and nanoparticles.	CO-1,2,4
3	**Electrochemistry and Applications** Electrochemical cell, Nernst equation, cell potential calculations and numerical problems. potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conduct metric titrations (acid-base titrations). Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – lithium-ion batteries- working of the batteries including cell reactions. Fuel cells- hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).	CO-1,2,4
4	**Polymer Chemistry** Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization with specific examples and mechanisms of polymer formation Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – poly acetylene, poly aniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).	CO-1,3,5

5	**Instrumental Methods and Applications** Electromagnetic spectrum- Absorption of radiation- Beer-Lambert's law. UV- Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification. HPLC: Principle, Instrumentation and Applications.	CO-1,3,5

Learning Resources
Text Books
1. Jain and Jain, Engineering Chemistry, 16th Ed., Dhanpat Rai, 2013. 2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10th Ed., Oxford University Press, 2010.
Reference Books
1. Skoog and West, Principles of Instrumental Analysis, 6th Ed., Thomson, 2007. 2. J.D. Lee, Concise Inorganic Chemistry, 5th Ed., Wiley Publications, Feb.2008 3. Fred W. Billmayer Jr, Textbook of Polymer Science, 3rd Ed.
E-Resources 1. https://nptel.ac.in/courses/103108100 2. https://onlinecourses.nptel.ac.in/noc23_cy19/preview 3. https://nptel.ac.in/courses/118104008