

Course Code	Course Name	Load Distribution (L T P C)
TCH-101/201	ENGINEERING CHEMISTRY	3 0 2 4

Learning Outcomes: Upon completion of this course the student will be able to:

1. Understand the physical and chemical behaviour due of chemical bonding in molecules.
2. Apply the concepts of organic chemistry to design economically and new methods of synthesis.
3. Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce the environmental pollution. Have the knowledge of the synthesis and applications of polymer science.
4. Apply their knowledge in electrochemistry and for protection of different metals from corrosion.
5. Develop innovative methods to produce soft water for industrial use and potable water at cheaper cost, and identify the structure of organic molecules by spectroscopy.

UNITS	CONTENTS	Contact Hrs
Unit - I	a. ATOMIC AND MOLECULAR STRUCTURE VSPER theory and its application for structures of NH_3 , NH_4^+ , H_2O , H_3O^+ , SO_2 and XeF_4 Molecular Orbital Theory, Formation of homo and heteronuclear diatomic molecules, Hydrogen Bonding and its application Metallic Bonding (Band theory)	6
	b. WATER AND ITS TREATMENT Hardness of water: Causes, Types, Measurement, Boiler troubles: Sludges, Scales and Caustic Embrittlement Softening of water by L-S Process, Zeolite Process and Reverse Osmosis Process, Ion Exchange Process, Calgon Process, Introduction to the membrane concept for the treatment of micro plastics from water Numerical Problems based on L-S Process, Zeolite Process and hardness of water.	6
Unit -II	a. POLYMERS Polymers: Definition, degree of polymerization, functionality of monomer, Classification of polymers with examples, Types of polymerization – addition and condensation polymerization with examples. Mechanism of addition polymerization. Plastics: Definition and characteristics- thermoplastic and thermosetting plastics, preparation, properties, and applications of PVC and Bakelite Fibers: Characteristics of fibers – preparation, properties and applications of Nylon and Dacron. Conducting polymers: Characteristics and Classification of conducting polymers with examples. Mechanism of conduction and applications of conducting polymers. Biodegradable polymers: Concept and advantages – Preparation of Polylactic acid and poly vinyl alcohol and their applications.	9
	b. FUELS Fuels Definition, Classification and Characteristics of a good fuel, Calorific value and its determination by Bomb Calorimeter, Numerical problems on Bomb Calorimeter, Proximate analysis of coal, Cracking of heavy oil residues – thermal and catalytic cracking, knocking,	4

	Composition and uses of Natural gas, CNG, LPG. Bio fuels as alternative sources of energy (biomass, biogas).	
Unit – III	SPECTROSCOPIC TECHNIQUES AND APPLICATION Basic Principles of spectroscopy and its applications : UV-Vis, Infra Red and NMR spectroscopy	7
Unit-IV	ELECTROCHEMISTRY & CORROSION Electrode potential, standard electrode potential, factors affecting the electrode potential of a cell. Nernst equation: Electrochemical series and its application, Electrochemical cell: Daniel cell, Concentration cells, electrolyte concentration cell Numerical problems based on electrode potential and emf of a cell. Corrosion its causes and effects, Theories of corrosion – Chemical & Electrochemical corrosion	5
Unit-V	ORGANIC REACTIONS & SYNTHESIS OF DRUG MOLECULES Aromaticity, Reactions involving Substitution, Addition, Elimination. Synthesis of a commonly used drug molecule	5
	Total	42

Text Books:

1. Jain & Jain “A text book of Engineering Chemistry,” Dhanpat Rai Publishing Company, 15th Edition New Delhi (2008)
2. Sunita Rattan, “ Comprehensive Engineering Chemistry”, S.K. Kataria & Sons Delhi, India, 2nd Edition (2009)
3. Shashi Chawala , “Theory and Practical’s of Engineering Chemistry”, Dhanpat Rai and Company, (Pvt) Ltd 3rd Edition (2012)
4. S.Vairam, Suba Ramesh , “ Engineering Chemistry,” Wiley Publishers, (2014)

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- Thirumala Chary and Laxminarayana, "Engineering Chemistry", Scitech Publishers, Chennai (2016)

Reference Books:

- J.D. Lee, "Concise Inorganic Chemistry", 5th Edition (1996)
- K. L. Kapoor "A text book of Physical Chemistry" Vol. 5, Macmillan India, 1st Edition (2004)
- Prof. K.N. Jayaveera, Dr.G.V.Subba Reddy and Dr.C. Ramachandraiah, "Chemistry for Engineers" McGraw Hill Higher Education Hyd.,(2009)
- William Kemp, "Organic Spectroscopy", Palgrave Foundations, (1991).
- L.E.Foster, "Nanotechnology, Science Innovation & Opportunity", Pearson Education, 2007.
- Y.R. Sharma "Elementary Organic Spectroscopy: Principles and Chemical Applications", 1st Edition,
- F.W.Bill, Meyer, A Text book of Polymer Chemistry, 3rd Edition 2009,

