(For Fast learner)
BCHS 0102: Chemical Science

Course : B.Tech 1st yr **Branch : All**

Credits: 04 **Semester I/II** **L–T–P: 3–1–0**

Objective: *The subject intends to provide understanding of the fundamental concepts of Chemistry applicable in Engineering Sciences with the emphasis on the latest technological advancements thereby preparing the students for a rewarding career in science and technology.*

Module No.	Content	Teaching Hours
I	**Chemical Bonding:** M.O. theory and its applications in homo & hetero diatomic molecules. Hydrogen bond, metallic bond and their applications. Semi-conductors. **Stereochemistry:** Types of isomerism (optical and geometrical) chirality, elements of symmetry, diastereomers, optically active compounds, R-S configuration and E-Z geometrical isomers, conformation of ethane and *n*-butane. **Polymers:** Polymerization and its classification. Preparation, properties and uses of polymers: Thermoplastics (Polystyrene, Teflon and Nylon 66), Thermosetting polymer (Bakelite). Biodegradable polymers (PLA, poly β-hydroxy butyrate), molecular weights of polymers, natural rubber and its vulcanization, synthetic rubber (neoprene, Buna-S, Buna-N). **Fuels**: Definition and classification of fuels. Analysis of coal and determination of calorific value by bomb calorimeter. **Synthetic petrol**: Bergius and Fischer Tropschs methods **Lubrication:** Introduction, classification, properties & uses of lubricants. **Ceramics:** Introduction, classification, scope & applications. **Glass:** Preparation, varieties & uses.	24
II	**Water Treatment:** Introduction, hardness and its units, L-S Process, calgon process, zeolite and ion-exchange processes, reverse osmosis, treatment of municipal water, impurities in water, boiler feed water, boiler troubles and remedial measures **Functional materials:** Biomaterials, smart materials (piezoelectric, pyroelectrics & ferroelectrics) and advanced materials **Corrosion**: Introduction, consequences, types, theories of corrosion, (galvanic, pitting, stress, water line, intergranular & soil corrosion) and protection of corrosion. **Spectroscopy:** Elementary ideas and simple applications of UV, visible, infrared and NMR spectral techniques **Chemical Kinetics:** Order and molecularity of reactions, zero order, first and second order reactions. Integrated rate equations. Theories of reaction rates, factors affecting rate of reaction. pH, buffer solution (Henderson-Hasselbalch equation). **Introduction to Nanoscience & Nanotechnology:** Basic concepts of nanoscience and nanotechnology, fullerenes, graphenes, carbonnanotubes, principle and uses of SEM & TEM techniques. Applications of nanomaterials.	24

Text Book:

- Shashi Chawala **"***Theory and Practicals of Engineering Chemistry***"** 4th edition, Dhanpat Rai & Co pvt ltd.

Reference Books:

- Morrison & Boyd "*Organic Chemistry*",6th edition ,Pearson education
- I.L. Finar "*Organic Chemistry*",5th edition, Longmans Green & Co ltd.
- Y.R. Sharma "*Elementary Organic Spectroscopy: Principles and Chemical Applications*"**,** 1st edition, S. Chand and Co. ltd.

- S.S.Dara "*Text book of Engineering Chemistry and Pollution Control*" 2nd edition, S. Chand and Co.ltd.
- Marsh G Fontana "*Corrosion Engineering*" 3rd edition, Tata McGraw hill publishing Co ltd.
- Attkins & Others **"**Inorganic Chemistry" 5th edition, Oxford university press.
- Attkins & Other**s "***Physical Chemistry*" 6th edition, Oxford University press**.**
- Puri, Sharma and Pathania "*Principles of Physical Chemistry***"** 44th edition, Vishal publishing Co. Jalandhar.
- K.J.Laidler "Chemical Kinetics" 3rd edition, Pearson education.
- Malik, Tuli and Madan "*Selected topics in Inorganic chemistry*", 7th edition, S. Chand and Co.ltd.
- T. Pradeep, "*A Textbook of Nanoscience & Nanotechnology*" Tata McGraw Hill, New Dehli, 2012.

Intended Outcome:

- *Knowledge of Chemical Sciences for better appreciation of applications in engineering field.*
- *The students will develop thorough understanding of the fundamental concepts of Chemistry and its applications in the field of various Engineering Sciences such as Electrical, Mechanical, Environmental, Civil and Material Sciences and Technology.*
- *The student's ability to perform experiments, analyze and interpret the data of experiments will be enhanced.*
- *The students will be acquainted with recent technological advancements and thus will be better equipped for a rewarding career in science and technology.*