FIRST SEMESTER

CY 102: Engineering Chemistry-I

Subject: Engineering Chemistry-I

Code: CY 102

L-T-P-C: 3-1-0-3/week

Class hours: 4 hours/week

Total no. of classes: 40(approx)

L: Lectures T:Tutorials P:Practicals C:credits

Course content:

Unit I: Solid State Chemistry (Mark=15)

Structure of crystalline solids, powder X-ray diffraction. Electronic structure of solids - metallic conduction.

Semiconductors – preparation, extrinsic and intrinsic semiconductors, solid eletrolytes amorphous solids.

Superconductors: Introduction, types of superconductor, properties, application preparation and structure of 1:2:3 superconductors.

Unit-II: Electrochemistry (Mark=10)

Introduction, Electrode potential, Measurement of electrode potential, Nernst equation Electrochemical series, Galvanic cells, Free energy, Entropy and Enthalpy of cells, Types o electrodes, Commercial cells and batteries, Fuel Cells. Electro-deposition.

Unit-III: Corrosion science (Mark=15)

Introduction, consequences of corrosion, types of corrosion, theories of corrosion, factor affecting rate of corrosion, design and selection of materials – control and prevention o corrosion, corrosion inhibitors.

Unit-IV: Biochemistry and Biotechnology (Mark=15)

Nucleic acids - DNA and RNA - the double helix structure, Genetic code, Chemical basis o heredity.

Enzymes - Classification and catalytic behaviour, enzyme specificity, factors affecting enzyme activity, Co-enzymes: Co-enzymes involved in biological oxidation reduction

Scope and importance of biotechnology, bio-reactors, biotechnological processes, biotechnological applications of enzymes, industrial enzymes, chemical synthesis through biotechnology - production of ethanol, acetic acid and acetone.

Unit-V: Food Chemistry (Mark=10)

Chemical constituents of food – carbohydrates, lipids, proteins, vitamins and minerals, chemical and physical properties of food, food preservation, food additives and food safety, unintentional additives, food adulteration. Soft drinks and alcoholic beverages. Analysis of foods and beverages.

Unit-VI: Polymer Science and Technology (Mark=15)

Classification, functionality, determination of molecular weights, types of polymerization, polymerization techniques, basics of polymer processing methods, structure-property-application of few commodity polymers (eg. PE, PP, PS etc.). Biopolymers-properties and their applications, conducting polymers, engineering plastics.

Unit-VII: Environmental Chemistry (Mark=15)

Introduction, environmental segments, composition of atmosphere, Earth's radiation balance, particles, ions and radicals in the atmosphere, causes of pollution, types of pollution, carbon monoxide and its effects, role of ozone in the atmosphere, global warming

Water pollution: Aquatic environment, classification and sources of water pollution, water quality parameters and standards, measures to control water pollution

Green Chemistry for clean technology: Definition and concept of green chemistry, goals of green chemistry, principles of Green Chemistry and designing a chemical synthesis, examples of green synthesis/reactions, green chemistry in sustainable development

Chemical toxicology: Toxic chemicals in the environment, impact of toxic chemicals, biochemical effects of some metals, bio-warfare agents.

Unit-VIII: Ionic Equilibrium (Mark=5)

Dissociation equlibria of weak electrolytes, Ostwald's dilution law, Henderson-Hasselbach equation and calculation of pK values, uses of buffer solution in chemistry and biology. Measurement of electrical conductivity.

Text Books/Reference books:

1. Advanced Inorganic Chemistry-Cotton et.al. (John Wiley)

2. Inorganic chemistry-Shriver,Atkins,Langford (ELBS)

3.Principles of solid state chemistry-H.V.Keer (New Age International)

4. A textbook of physical chemistry-Negi and Anand (New Age International)

5.Outlines of biochemistry-Cohn and Stumpf

6. Polymer science-Gowarikar (New Age International)

7.Introduction to polymers-RJ Young

8.Environmental chemistry-A.K.De

9. Environmental chemistry-C.Baird ,W.H.Freeman

10. The elements of physical chemistry-P.W.Atkins(Oxford University press)