Syllabus of Chemistry CHM 1101

Semester: I Credits: 04

1. **Acids & Bases:**

Properties of Acids & Bases, Conjugate Acid & Base, Strong& weak Acids/Bases , Arrhenius Theory, Bronsted-Lowry Theory, Calculating PH & POH, Lewis concept,

Texts/ References:

- Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
- Brown, Theodore E.; Lemay, H. Eugene; Bursten, Bruce E.; Murphy, Catherine; Woodward, Patrick, 2009.

2. **Solid State:**

Introduction & definition, Bravais Lattice, space lattice (only cubes) , Bragg's Law, bonding in Ionic crystals, Schottky Defect, Frenkel Defect.

Texts/ References:

- Advanced Inorganic Chemistry, by Cotton, F.A., Wilkinson G., Murrillo, C.A. and Bochmann, Wiley, ehichester, 1999.
- Solid State Chemistry By Lesley E. Smart, Elaine A. Moore, 2008.

3. **Reaction Kinetics:**

Reactant concentrations, Temperature, Physical states and surface areas of reactants, Solvent and catalyst properties, Mathematical expression, Units, Instantaneous Rate, Differential & Integrated Rate law, Order and Molecularity, Isolation Method, Differential method, Integral method, Half life method, Using Graphs to Determine Rate Laws, Rate Constants, and Reaction Orders, Half-Lives and Radioactive Decay Kinetics, Activation energy, Arrhenius equation.

Texts/ References:

- Laidler, K.J., Principles of Chemistry, Harcourt, Brace & World, New York, 1966. Moore, W.J., Physical Chemistry, Prentice-Hall, 1962.
- Moeller, T., Inorganic Chemistry, John Wiley, 1982.

4. **Corrosion Chemistry:**

Why Corrosion, Causes of Corrosion, Consequences of corrosion, Dry/ Chemical Corrosion, Wet/Electrochemical corrosion, Galvanic Corrosion, Concentration Cell / Differential aeration corrosion, Waterline corrosion, Pitting Corrosion, Crevice Corrosion, Stress Corrosion Cracking, Corrosion Fatigue, Caustic, Embrittlement, Microbial, Corrosion, Nature of the Metal, Nature of the corroding environment, Design, Materials Selection, Protective Coatings, Use of Inhibitors, Modifying/ Alteration of Environmental, Corrosion Allowances, Cathodic Protection.

Texts/ References:

- Corrosion for Science and Engineering (Trethewey and Chamberlain), 2nd Edition, Pearson Education 1998.
- Corrosion Engineering (Fontana), 3rd Edition, McGraw Hill 1986. Corrosion Engineering (Roberge), McGraw Hill 2008.

5. Polymer Chemistry:

Introduction & Classification of polymers, Addition Polymerization, Condensation Polymerization, Co-polymerization, Preparation properties and technical application of Major Polymers (Polythelene, PVC, Teflon, Nylon6, 6 Bakelite), Introduction to Resin, Types of Resin, Differentiation between thermoplastic & thermosetting Resin, Industrial application of resin.

Texts/ References:

- Engineering Chemistry By P.C. Jain & Monica Jain, 2008.

6. Organic Reactions:

What is a substitution and nucleophilic reaction, Features of nucleophilic substitution reaction, Requirements of SN reaction- a. Nucleophile, b. Substrate, c. leaving group, Mechanism of SN reaction- a. SN1, b. SN2, What is Elimination reaction and how it differs from substitution reaction, Mechanisms of Elimination reaction- a. E2, b. E1, Deduce reaction pathways given the starting materials and the product with not more than two stages.

Texts/ References:

- Engineering Chemistry By B.S. Chauhan,2005

7. Water Chemistry:

Introduction, Sources of water, Impurities present in water, Requirement of boiler feed water, Alkalinity-Definition, Types, Determination, Numerical, Hardness- Definition, Types, Determination, Numerical, Lime and Soda Process, Zeolite Process, Ion Exchange Process, Numericals based on them , Sludge and scale, Caustic embrittlement, Boiler corrosion, Priming and foaming, Carbonate conditioning, Phosphate conditioning, Colloidal conditioning, Calgon conditioning.

Texts/ References:

- Engineering Chemistry By P.C. Jain & Monica Jain, 2008.