IV - SEMESTER

Course Code 10: GENERAL AND PHYSICAL CHEMISTRY

Credits: 03

I. Course outcomes:

At the end of the SEMESTER the student will be able to:

- 1. Correlate and describe the stereochemical properties of organic compounds.
- 2. Explain the biological significance of various elements present in the human body.
- 3. Apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
- 4. Determine the order of a chemical reaction.
- 5. Describe the basic concepts of enzyme catalysis.

II. Syllabus:

UNIT-I Stereo chemistry of carbon compounds (9 h)

Molecular representations - Wedge, Fischer, Newman and Saw-Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation. Chiral molecules- definition and criteria (Symmetry elements)-Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3-dibromopentane.

Unit II Bioinorganic Chemistry (9 h)

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Na / K- pump, carbonic anhydrase and carboxy peptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cisplatin as an anti-cancer drug. Iron and its application in bio-systems, Haemoglobin-transfer of oxygen, Myoglobin-Storage and transfer of iron

Unit III Ionic equilibrium (9 h)

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, Buffer solutions-Henderson's equation. Indicators-theories of acid – base Indicators, selection of Indicators,

Common ion effect Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.

Unit IV Chemical Kinetics-I: (9h)

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (similar and different reactants). Half–life of a reaction. General methods for determination of order of a reaction.

Unit V Chemical Kinetics-II: (9h0

Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

Enzyme catalysis- Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

III. Reference books

- 1) Text book of physical chemistry by S Glasstone
- 2) Concise Inorganic Chemistry by J.D.Lee
- 3) Advanced physical chemistry by Gurudeep Raj
- 4) Advanced physical chemistry by Bahl and Tuli
- 5) Inorganic Chemistry by J.E.Huheey
- 6) Basic Inorganic Chemistry by Cotton and Wilkinson.

IV - SEMESTER

Course Code 10: Physical Chemistry - Volumetric Analysis

Credits: 01

Physical Chemistry - Volumetric Analysis

IV. Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria

3. Learn and identify the concepts of a standard solutions, primary and secondary standards

4. Facilitate the learner to make solutions of various molar concentrations.

V. Syllabus:

Volumetric analysis:

- 1. Estimation of sodium hydroxide using standardised HCl solution.
- 2. Estimation of sodium carbonate and sodium hydroxide present in a mixture.
- 3. Determination of Fe (II) using KMnO₄ with oxalic acid as primary standard. (internal indicator method)
- 4. Determination of Fe (II) using KmnO₄ with oxalic acid as primary standard. (external indicator method)
- 5. Estimation of water of crystallization in Mohr's salt by titrating with KmnO₄

VI. Co-curricular activities and assessment methods :

- **1.** Continuous Evaluation: Monitoring the progress of student's learning
- 2. Class Tests, Worksheets and Quizzes
- **3.** Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality

4. SEMESTER -End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .

VII. List of reference books:

- **1.** A Text Book of Quantitative Inorganic Analysis(3rdEdition) –A.I.Vogel
- 2. Web related references suggested by teacher.