**Curriculum Plan of Dr. Kapil Mohan Saini**

**(Odd Semester 2023-2024)**

**Semester-III**

**Name of Paper & Code: CHEMISTRY –DISCIPLINE SPECIFIC ELECTIVE COURSE -5 (DSE-5): Solutions, Colligative properties, Phase Equilibria and adsorption (3 Periods Per Week); UPC: 2173012005**

|  |  |  |  |
| --- | --- | --- | --- |
| **Contents** | **Allocations of Lectures** | **Month wise Schedule to be followed** | **Tutorials/ Assignment/ Presentation** |
| **UNIT-1: Solutions and Colligative Properties**  Dilute solutions; lowering of vapour pressure, Raoult’s law, Henry’s law. Thermodynamic basis of the colligative properties - lowering of vapour pressure, elevation of Boiling Point, Depression of Freezing point and Osmotic pressure and derivation of expressions for these using chemical potential. Application of colligative properties in calculating molar masses of normal, dissociated and associated solutes in solutions, van’t Hoff factor and its applications. Concept of activity and activity coefficients. | 12 | 3rd Week of August – 1st week of September | * Syllabus Overview * Reference Books * Problem Solving |
| **UNIT-2: Phase Equilibria (24 Hours)**  Concept of phases, components and degrees of freedom, derivation of Gibbs Phase Rule for nonreactive and reactive systems; Clausius-Clapeyron equation and its applications to solid-liquid, liquid-vapour and solid-vapour equilibria, phase diagram for one component systems (H2O and S), with applications. A comparison between the phase diagram of CO2 and H2O. Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions (excluding partial miscibility). Binary solutions: Gibbs-Duhem-Margules equation, its derivation and applications to fractional distillation of binary miscible liquids (ideal and non-ideal), Konovalov’s laws, azeotropes, lever rule, partial miscibility of liquids, CST, miscible pairs, steam distillation. Nernst distribution law: its derivation and applications.  Three component systems, water-chloroform-acetic acid system, triangular plots. | 24 | 2nd Week of September – 3rd week of october | - Related Problems,  Assignment |
| **UNIT-3: Surface chemistry (9 Hours)**  Physical adsorption, chemisorption, adsorption isotherms (Langmuir and Freundlich). Nature of adsorbed state. Multilayer adsorption, BET equation derivation, thermodynamic treatment of adsorption-Gibbs equation. | 9 | 4th Week of October -2nd Week of November | Home Register Overview, Class Test,  Related Problems,  Previous Year Qsn Papers discussion |