ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER   **CHEMISTRY** TIME:3HRS/WEEK

CH-Ma3-3201(3) **PHYSICAL CHEMISTRY – I** MARKS:100

w.e.f 2024-2025 (23AK Batch) **(SOLUTIONS & ELECTRO CHEMISTRY)**

**SYLLABUS**

**Course Objective:** The objective of the course is to teach the chemistry students the theoretical aspects pertaining to the types of solutions, colligative properties, photochemistry and electrochemistry.

**Course outcomes:** By the end of the course, the student will be able to

1. Understand the behavior of ideal and non-ideal solutions.

2. Determine the molecular mass of non-volatile solutes.

3. Deduce the quantum yield of Photochemical processes

4. Apply the principles of electrical conductivity and

5. Comprehend the applications of emf.

**UNIT- I: Solutions (9 h)**

Classification - Miscible, Partially miscible and Immiscible - Raoult’s Law - Azeotropes- HCl-H2O system and ethanol-water system. Partially miscible liquids-phenol- water system. Critical solution temperature (CST), Effect of impurity on consulate temperature. Immiscible liquids and steam distillation. Nernst distribution law. Calculation of the partition coefficient. Applications of distribution law.

### **UNIT – II: COLLIGATIVE PROPERTIES (9 H)**

Relative lowering of Vapour Pressure, Elevation in boing point depression in freezing point and Osmotic pressure. Determination of molecular mass of non-volatile solute by Ostwald- Walker method, Cottrell’s method, Rast method and Barkeley-Hartley method. Abnormal colligative properties. Van't Hoff factor.

### **UNIT – III: PHOTOCHEMISTRY ( 9H )**

Difference between thermal and photochemical processes, Laws of photo chemistry Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, chemiluminescence - Photosensitized reactions- energy transfer processes (simple example), quenching, Photo stationary state.

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**UNIT – IV: Electrochemistry-I (9 h)**

Conductance, Specific conductance, equivalent conductance and molar conductance - effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf’s method. Debye-Huckel - Onsagar's equation for strong electrolytes (derivation excluded), Application of conductivity measurements- conductometric titrations.

### **UNIT – V: ELECTROCHEMISTRY-II (9 H)**

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal- metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements

-Potentiometric titrations. Fuelcells – Basic concepts, examples and applications.

### **List of Reference books:**

1. Principles of physical chemistry by Prutton and Marron
2. Solid State Chemistry and its applications by Anthony R. West
3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Advanced physical chemistry by Bahl and Tuli
6. Advanced physical chemistry by Gurudeep Raj
7. Principles of physical chemistry by Puri, Sharma and Pathania.

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