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

## SEMESTER - IV CHEMISTRY TIME:4HRS/WEEK

CH 4204 (3)  **INORGANIC &PHYSICAL CHEMISTRY** MAX.MARKS:100

w.e.f. 20-21 admitted batch-“20AH” **SYLLABUS**

**OBJECTIVES:**

**COURSE OUTCOMES:** At the end of the course, the student will be able to;

1. Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values
2. Application of quantization to spectroscopy.
3. Various types of spectra and the irusein structure determination.

## UNIT –I COORDINATION CHEMISTRY

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

**INORGANIC CHEMISTRY**

## UNIT –II:

## 1.INORGANICREACTIONMECHANISM:

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transitionstate, intermediate and activated complex. Labile and inert complexes, lig and substitution reactions - SN1 and SN2,Substitutionreactions in square planar complexes, Trans-effect, the ories of trans effect and its applications

## 2.STABILITY OF METAL COMPLEXES:

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

## BIOINORGANIC CHEMISTRY

* Metalions present inbiological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Sodium/K- pump, carbonicanhydrase and carboxypeptidase.
* Excess and deficiency of sometracemetals. Toxicityofmetalions(Hg,Pb,CdandAs), reasons fortoxicity, Use of chelatingagentsinmedicine, Cisplatinasananti-cancerdrug. Iron and its application in bio-systems, Haemoglobin,Myoglobin. Storage and transfer of iron.

## PHYSICAL CHEMISTRY

## UNIT-III: PHASE RULE:

**6Th**Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point , freezing mixtures.

## CH 4204 (3) ::2::

## UNIT-IV: ELECTRO CHEMISTRY

Specific conductance, equivalent conductance and molar conductance- Definition and 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 (elementary treatment only), Application of conductivity measurements- conductometric titrations.

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.

Fuel cells- Basic concepts, examples and applications

## UNIT-V: CHEMICAL KINETICS:

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 (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. 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.

**CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS :**

**CONTINUOUS EVALUATION:**Monitoring the progress of student’s learning Class Tests, Work sheets and Quizzes Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills an d personality Semester-end Examination: critical indicator of student’s learning and teaching methods adopted by teachers throughout the semester.

## LIST OF REFERENCE BOOKS:

1. Text book of physical chemistry by S Glasstone
2. Concise Inorganic Chemistry by J.D.Lee
3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan.
4. Advanced physical chemistry by Gurudeep Raj
5. Principles of physical chemistry by Prutton and Marron
6. Advanced physical chemistry by Bahl and Tuli
7. Inorganic Chemistry by J.E.Huheey
8. Basic Inorganic Chemistry by Cotton and Wilkinson
9. A textbook of qualitative inorganic analysis by A.I. Vogel
10. Atkins,P.W.&Paula,J.deAtkin’sPhysicalChemistryEd.,OxfordUniversityPress 10thEd(2014).
11. Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
12. Mortimer,R. G.PhysicalChemistry3rdEd. Elsevier:NOIDA,UP(2009).
13. Barrow,G.M.PhysicalChemistry

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## SEMESTER - IV CHEMISTRY TIME:2HRS/WEEK

CH 4254 (2) **CONDUCTOMETRIC AND POTENTIOMETRIC TITRIMETRY** MAX.MARKS:50

w.e.f. 20-21 admitted batch-“20AH” **PRACTICAL SYLLABUS**

**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. Apply concepts of electrochemistry in experiments
3. Be familiar with electro analytical methods and techniques in analytical chemistry which study an analyte by measuring the potential ( volts) and/or current ( amperes) in an electrochemical cell containing the analyte

## CONDUCTOMETRIC AND POTENTIOMETRIC TITRIMETRY

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1. **Conductometric titration**- Determination of concentration of HCl solution using standard NaOH solution.
2. **Conductometric titration**- Determination of concentration of CH3COOH Solution using standard NaOH solution.
3. **Conductometric titration**- Determination of concentration of CH3COOH and HCl in a mixture using standard NaOH solution.
4. **Potentiometric titration**- Determination of Fe (II) using standard K2Cr2O7 solution.
5. Determination of rate constant for acid catalyzed ester hydrolysis.

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