ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAMIV SEMESTERCHEMISTRY5 Hrs/WeekCH 4204 (3)INORGANIC CHEMISTRYMax. Marks: 60w.e.f 2017-2018 ('17AE' Batch)SYLLABUS

OBJECTIVES:

- 1. Knowledge of Transition metals & Inner Transition metals, the former having many differences yet grouped together, contrasting with the latter in which separation of the elements is very difficult. Uniqueness in complex formation and very importantly the catalytic ability, which is still a thrust area for research and development. To draw inspiration to synthesize newer elements and stretch the horizon of science.
- 2. A colourful intriguing field of compounds, whose study posed problems for long time and continue to do so in some areas even today, is the Coordination Chemistry. An evergreen field of growth and flourish is the world of coordination compounds. To get attracted and to find the solutions for the complex issues.
- 3. Knowledge of crystals provides a way of approach for the study of any topic of Chemistry one wants to learn or master.

COURSE:

UNIT – I:

 d –block elements: Introduction, position of transition elements and significance of their name. Electronic configuration and anomalies of electronic configuration in all the three series. Variable oxidation states – reason for variability - Stability of various oxidation states- magnetic properties – para, dia & ferro magenetism and classification of transition elements. Complex forming ability of d-block elements and advantages of complex formation. Colour and formation of interstitial compounds – catalytic activity of the elements and their compounds - reasons for the ability of them to catalyze and applications. General properties such as atomic and ionic radii, ionization energy and metallic properties. Comparative treatment of second and third transition series with their 3d analogues i.e. trends in physical and chemical properties in passing from I to the II and to the III series.

2. **f** – **block elements** :

General discussion, electronic configuration and anomalies in electronic configuration. Ionic size Oxidation states, magnetic properties. Lanthanide contraction – effects of Lanthanide Contraction within the series and on the post lanthanide elements. Rare – earth minerals composition of Cerium group and Yttrium groups in them. Methods of separation of lanthanides Fractional Crystallization, Solvent Extraction, Ion – exchange methods. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

UNIT – II:

3. Coordination Compounds- I :

Introduction and review of early theories, Werner's theory of complex compounds, Sidgwick's concept of coordination, Electronic interpretation and EAN rule - Nomenclature adopting IUPAC rules. Valence bond theory. Geometries of Coordination numbers 4 – tetrahedral and square planar and 6 – octahedral and limitations of Valence bond theory. , crystal filed theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes - low spin and high spin complexes - Crystal Field Stabilization energy.factors affecting crystal-field Stabilization energy, merits and demerits of crystal-field theory.

4. **Coordination Compounds - II**

Structural isomerism – Polymerization Isomerism, Coordination, Ionisation, Hydrate, Ligand and Linkage Isomerism - Stereo Isomerism – Optical Isomerism of Complexes

with Coordination numbers 4 and 6. Geometrical Isomerism of complexes with Coordination numbers 4 and 6. 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. Spectral and magnetic properties of metal complexes Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouymethod.

UNIT – III:

5. Reactivity of metal complexes and Bioinorganic chemistry

Labile and inert complexes, ligand substitution reactions - SN¹ and SN²,substitution reactions of square planar complexes - Trans effect and applications of trans effect. Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl⁻. Metalloporphyrins – Structure and functions of hemoglobin, Myoglobin and Chlorophyll.

6. Solidstate

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry. Definition of lattice point, space lattice, unit cell. Bravis lattices and crystal systems. X-ray diffraction and crystal structure. Bragg's law. Defects in crystals. Stoichiometric and non-stoichiometric defects.

REFERENCE BOOKS:

- 1. Advanced Inorganic chemistry by Gurudeep Raj
- 2. Concise Inorganic Chemistry by J.D.Lee
- 3. Unified Chemistry (Vol.) (B.Sc. I) Y.R.Sharma & Dr. K.Rama Rao Kalyani Publishers, Ludhjana. Fourth Revised and Enlarged Edition (2013, Reprint)
- Unified Chemistry (Vol.2) (B.Sc. II) Y.R.Sharma & Dr. K.Rama Rao Kalyani Publishers, Ludhjana. Fourth Revised and Enlarged Edition (2013, Reprint)
- 5. Unified Chemistry (Vol.2) (B.Sc. III) Y.R.Sharma & Dr. K.Rama Rao Kalyani Publishers, Ludhjana. Fourth Revised and Enlarged Edition (2013, Reprint)
- 6. Advanced Inorganic Chemistry F.A.Cotton & G.Wilkinson Inter Science Publishers, New York.
- Modern Aspects of Inorganic Chemistry IV Edition H.J.Emeleus & A.G.Sharpe ELBS, Great Britain.
- 8. Inorganic Chemistry 20th Edition P.L.Soni Sultan Chand & Sons, New Delhi.
- 9. Man-made Transuranium Elements Glenn T.Seaborg Prentice Hall, N.J.
- 10. Coordination Compounds D.F.Martin & B.B.Martin McGraw-Hill Book Company, New York.
- 11. Coordination Chemistry F.Basolo & R.Johnson-W.A.Benjamin Inc., California.
- Test Book of Physical Chemistry 2nd Edition S.Glasstone Macmillan & Co.Ltd., London.
- 13. Solid State Chemistry and its applications by Anthony R. West

Practical paper - IV

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAMIV SEMESTERCHEMISTRYTIME: 3Hrs/WeekCH 4251 (2)VOLUMETRIC ANALYSIS - IIMarks: 50w. e .f 2017-2018'AE' batchPRACTICAL SYLLABUS

OBJECTIVES: To enable the students to –

- Conduct experiments designed for volumetric analysis
- Interpret experimental/investigative data
- Apply theory-based tools to solve simple chemical problems related to subject areas
- Understand the use of conductometers and apply them to estimate the strength of acids
- 1. Determination of Cu(II) using Na₂S₂O₃ with K₂Cr₂O₇ as primary standard.
- 2. Determination of concentration of HCl conductometrically using standard NaOH solution.
- 3. Determination of concentration of acetic acid conductometrically using standard NaOH Solution.

REFERENCES:

- 1. Vogel's Text Book of Quantitative Inorganic Analysis, IV Edition J.Bassett, R.C.Denny, G.H.Jeffery, J.Mendhan ELBS/Longman, England
- 2. Instrumental methods of chemical analysis B.K.Sharma GOEL Publishing House, Meerut, 26th Edition.
- 3. Practical Monograph prepared by the Department.