GONDWANA UNIVERSITY, GADCHIROLI

B.Sc : Part- II (Semester-IV)

SUBJECT - CHEMISTRY

Paper-I (Inorganic Chemistry)

Total Lectures: 48 **Marks:50**

Note: Figures to the right hand side indicate number of lectures.

Unit-I

A) Chemistry Of Lanthanides: Position in periodic table, electronic configuration, oxidation state, atomic and ionic radii, Lanthanide contraction and its consequences, complex forming tendency. Occurrence and isolatic of lanthanides (ion-exchange and solvent extraction methods). [8L]

B) Chemistry Of Actinides: Position in periodic table, chemistry of actinides with respect to electron configuration, oxidation states, atomic and ionic radii. [4L]

Unit-II

A) Coordination Compounds: Distinction among simple salts, double salts and coordination compound, Werner's coordination theory and its experimental verification. Sidwick's electronic interpretation, EAN rule with examples, Nomenclature of coordination compounds. Chelates: classification and their application, Valence bond theory of transition metal complexes. [9L]

B) Isomerism In Coordination Compounds: Structural isomerism and stereoisomerism in coordination compounds. [3L]

Unit-III

A) Gravimetric Analysis: Defination, Theoretical principles underlying various steps involved in gravimetric analysis with reference to estimation of barium as barium sulphate. Co-precipitation and Post Precipitation. (Definition, types and factors affecting) [4L]

B) Hard Acid And Soft Acids And Bases: Classification of acids and bases as hard and soft. Pearson's SHAB Concept and its applications. Acid-base strength of hardness and softness, Symbiosis. Theoretical basis of hardness and softness, electronegativity and hardness and softness. [4L]

C) Green Chemistry: Introduction, goals of green chemistry, significance of green chemistry, basic compounds of green chemistry, atom economy, functional group approaches to green chemistry, industrial applications of green chemistry [4L]

Unit-IV

A)Oxidation And Reduction: Use of redox potential data: Analysis of redox cycle, redox stability in water:- Froast, Latimer and pourba diagram, principle involved in the extraction of the element. [8L]

B) General Principles of Metallurgy: Definition of metallurgy, steps in metallurgy. Ore dressing by gravity separation, froath floatation and electromagnetic separation. Calcination, roasting, smelting and refining of metals. Meaning of terms-hydrometallurgy and pyrometallurgy. [4L]

Semester - IV

Paper-II (Organic Chemistry)

Unit-I

Electromagnetic Spectrum: Absorption Spectra

Ultraviolet(UV) absorption spectroscopy: Principle, Absorption Law(Lamberts-Beer's), Molar Absorptivity, Presentation and analysis of UV spectra, Types of electronic transitions, effect of Conjugation, concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shift.

Infra Red (IR) spectroscopy: Principle, Types of Molecular vibrations, Hooke's law, selection rule, intensity and position of IR band, measurement of IR spectrum (instrumentation), Finger-print region, characteristic absorption of various functional groups and interpretation of IR spectrum of simple organic compounds. [12 L]

Unit-II

A) Carboxylic Acid: Nomenclature, structure and bonding, physical properties: acidity of carboxylic acids, effect of substituent's on acidic strength, preparation and reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction, reduction of carboxylic acids decarboxylation mechanism of decarboxylation. Dicarboxylic acids: succinic acid, phthallic acid. Methods of formation and effect of heat and dehydrating agents. [6L]

B) Carboxylic Acid Derivatives: Structure and nomenclature of acid chloride, esters, amides(urea) and acid anhydride. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution, formation of carboxylic acid derivatives, chemical reaction. Mechanism of esterification and hydrolysis (acidic & basic) [6L]

Unit-III

A) Nitro Compound: Preparation of nitroalkanes and nitroarenes, chemical reactions of nitroalkanes, mechanism of nucleophilic substitution in nitroarenes and their reduction in acidic, neutral and alkaline medium. Picric acid. Halonitroarenes: reactivity. [4L]

B) Amino Compounds: Structure and nomenclature of amines: Separation of mixture of primary, secondary and tertiary amines. Structural features affecting the basicity of amines. Amine salts as phase transfer catalyst, preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of

aldehydic and ketonic compounds, Gabriel-thalimide reaction, and Hoffman-broamamide reaction. Reaction of amine: electrophilic aromatic substitution in aryl amine, reaction of amine with nitrous acid. Diazonium salt: stability & preparation of benzene diazonium chloride, mechanism of diazotization, replacement of diazo group by H, OH, F, Cl, Br, NO_2, CN, groups. Reduction of diazonium salt to hydrazine, coupling reaction and its synthetic applications. [8L]

Unit-IV

A) Quantitative Analysis: Estimation of C, H, N, S & X (Only principle and calculation), Calculation of Empirical and molecular formula. [4L]

B) Organic Synthesis Via Enolates: acidity of α-H, alkylation of diethyl malanoate and ethyl acetoacetate. Synthesis of ethyl acetoacetate (AAE): Claisen condensation, Keto-enol tautomerization of AAE. [4L]

C) Organometallic Compounds: Synthesis, structure and chemical reaction of organo Mg, Zn & Li compounds. [4L]

Semester - IV

Chemistry Practical

Time: 4-5 hrs Total Marks- 30

Inorganic Chemistry: Gravimetric Analysis

1) Estimation of Ba as $BaSO_4$
2) Estimation of Ni as Ni-DMG complex
3) Estimation of Zn as $ZnNH_4PO_4$
4) Estimation of Al or Al_2O_3 in potash alum
5) Estimation of Fe as Ferric oxide in the solution of Mohr's salts.

Organic Chemistry: Identification of an organic compound (having not more than one functional group) through element test, functional group test, determination of M.P./B.P. & Preparation of derivative with M.P. determination

Inorg. Exp. (12 Marks) + Organic Exp. (12Marks) + Viva (3Marks) + Record (3Marks) = 30 Marks

Reference Books:

1) Advanced Inorganic Chemistry Volume I & II by Satyaprakash, Tuli, Basu
2) Selected Topics in Inorganic Chemistry by Malik, Tuli, Madan.
3) Modern Inorganic Chemistry by Madan.
4) Concise Inorganic Chemistry by J.D. Lee *ELBS.*
5) Inorganic Chemistry by J.E. Huheey- *Harper & Row*
6) Fundamental concepts of Inorganic Chemistry by E.S. Gilreath *McGraw Holl book co.*
7) Modern Inorganic Chemistry by W.L. Jolly *McGraw Holl Int.*
8) Chemistry Fact Patterns & Principles by Kneen Rogers and Simpson *ELBS.*
9) Theorotical Principles of Inorganic Chemistry by G.S. Manku *Tata McGraw Hill*
10) Organic Chemistry by Morrison and Boyd, Print ice ha 11.
11) Analytical Chemistry-R. Gopalan-Sultan Chand.
12) Physico Chemical Techniques of Analysis – P.B. Janarthanam Vol – I & II- *Asian Publication*
13) Instrumental Methods of Chemical Analysis _ B.K. Sharma – *Goel Publication*
14) Organic Chemistry by L.G.Wa de. *Print ice hall.*

15) Organic Chemistry Vol. I, II, III by S.M. Mukharji, S.P. Sing and R.P. Kapoor

16) Fundamental of Organic Chemistry by Solomon, *John willey*

17) A Text book of Organic Chemistry by Bahl and Bahl.

18) A Text book of Organic Chemistry by P.L. Soni.

19) A Text book of Organic Chemistry by Tewari Mehrotra.

20) Stereochemistry by P.S. Kalsi.

21) Organic Chemistry by I.L. Finar.

22) A text book of Practical Chemistry for B.Sc. By V.V.Nadkarny, A.N. Kothare and Y.V. Lawande.

23) Advanced practical inoraganic chemistry by O.P. Agarwal.

24) Vogels Text Book of Qualitative Analysis.

25) Synthetic dyes by Gurudeep and Chatwal.

26) Organic chemistry by S.M. Kapoor. vol. II and III

27) Organic chemistry by Morrison and Boyed.

29) Organic chemistry by Arun Bahl and B.S. Bahl.

30) S.Y. B.Sc. Inorganic Chemistry : Semester-IV by Dr. S.B. Rewatkar, Dr. E.L.Ramteke, S.M.Sontakke, Y.P.Thawari, – *Shell Publication, Nagpur.*

31) S.Y. B.Sc. Organic Chemistry : Semester-IV by Y.P.Thawari, S.M.Sontakke, Dr. S.B. Rewatkar, Dr. E.L.Ramteke,– *Shell Publication, Nagpur.*

32) Inorganic chemistry B.Sc. II, Sem – IV Paper – I by Dr. N.E. Kathale, S. V. Madhamshettiwar, Dr. D. B. Patil.

33)S.Y. B.Sc. Practical Chemistry : Semester-IV by Dr. S.B. Rewatkar, Y.P.Thawari, A. B. Dhote, Dr. K. R. Lanjewar – *Shell Publication, Nagpur.(Proposed)*