K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY I SEMESTER SYLLABUS under CBCS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM- 101: PAPER-I INORGANIC CHEMISTRY –I

UNIT-1: STRUCTURE & BONDING

Structure & Bonding: Applications of VSEPR, Valence Bond and Molecular orbital theories in explaining the structures of simple molecules- role of p and d orbitals in pi bonding.

Application of MO theory to square planar ($PtCl_4^{2-}$) and Octahedral complexes (CoF_6^{3-} , $Co(NH_3)_6^{3+}$).

UNIT-II: INORGANIC CAGE AND RING COMPOUNDS

Inorganic cage and ring compounds – preparation, structure and reactions of boranes, carboranes, metallo carboranes, boron–nitrogen $(H_3B_3N_3H_3)$, phosphorus–nitrogen $(N_3P_3Cl_6)$ and sulphur-nitrogen $(S_4N_4, (SN)_x)$ cyclic compounds.Electron counting in boranes – Wades rules (Polyhedral skeletal electron pair theory).Isopoly and heteropoly acids.

UNIT-III: COORDINATION COMPOUNDS

Coordination compounds: Crystal field theory - crystal field splitting patterns in octahedral, tetrahedral, tetragonal, square planar, square pyramidal and trigonal bipyramidal geometries. Calculation of crystal field stabilization energies. Factors affecting crystal field splitting energies – Spectrochemical series, Jahn - Teller effect, nephelauxetic effect – ligand field theory.Term symbols – Russell – Sanders coupling, derivation of term symbols for various configurations. Spectroscopic ground states.

UNIT- IV: ELECTRONIC SPECTRA OF TRANSITION METAL COMPLEXES

Electronic spectra of transition metal complexes: Selection rules, breakdown of selection rules – Orgel and Tanabe-Sugano diagrams for $d^1 - d^9$ octahedral and tetrahedral transition metal complexes of 3d series – Calculation of Dq, B and β parameters. Charge transfer spectra.

Magnetic properties of transition and inner transition metal complexes – spin and orbital moments – quenching of orbital momentum by crystal fields in complexes. **Books Suggested**:

- 1. Advanced Inorganic Chemistry by F.A. Cotton and G. Wilkinson, IV Edition, John Wiley and Sons, New York, 1980.
- 2. Inorganic Chemistry by J.E. Huheey, III Edition, Harper International Edition, 1983.
- 3. Theoretical Inorganic Chemistry, II Edition by M.C. Day and J. Selbin, Affiliated East-West press Pvt. Ltd., New Delhi.

4. Inorganic Chemistry by Shriver and Atkins, Oxford University Press (1999)

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc., ORGANIC CHEMISTRY I SEMESTER SYLLABUS under CBCS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM-102: PAPER-II ORGANIC CHEMISTRY –I

UNIT-I: STEREO CHEMISTRY

Concept of Chirality: Recognition of symmetry elements and chiral structures (one and more than one chiral centers); D, L and R, S nomenclature, diastereoisomerism; Inter-conversion of Fischer, Newman and Sawhorse projections. Threo and Erythro isomers, - stereo specific and stereoselective synthesis. Asymmetric synthesis. - Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes). Chirality due to helical shape, Crams Rule-concept of dynamic enatiomerism. Recemic Modifications – Nature and formation of recemic modifications – by mixing, by synthesis, by recemization, by chemical tranformations Geometrical isomerism- methods of resolution – E, Z- nomenclature – physical and chemical methods of determining the configuration of geometrical isomers. Stereochemistry of compounds containing nitrogen, sulphur and phosphorous.

UNIT-II: NATURE OF BONDING, AROMATICITY & REACTIVE INTERMEDIATES

Nature of Bonding: Localised and Delocalized covalent bonds, Delocalised chemical bonding conjugation, cross conjugation, hyper conjugation, Tautomerism.

Aromaticity: Concept of Aromaticity, Aromaticity of five membered, six membered rings and fused systems. -Non benzonoid aromatic compounds: - cyclopropenylcation, Cyclobutadienyldication, cyclopentadienyl anion-tropylliumcation and cyclooctatetraenyldianion, Metallocenes, Ferrocene, Azulenes, Fulvenes, Annulenes, Fullerenes, Homoaromaticity, Antiaromaticity and pseudo aromaticity. Generation, Structure, Stability,Detection and Reactivity of Carbocations, Carbanions, Free radicals, Carbenes, Nitrenes and Arynes. Reactive Species: Generation and reactivity of Electrophiles, Nucleophiles, Dienophiles, Ylids,Enophiles.

UNIT-III: REACTIONS & RE-ARRANGEMENTS

(a) Named Reactions:

Aldol, Perkin, Benzoin, Cannizaro, Wittig, Grignard, Reformatsky reaction, Hydroboration, openauer oxidation, clemmensen reduction, Meerwein - Pondorf and verley and Birch reductions. Stork enamine reactions, Michael addition, Mannich Reaction, Diels - Alder reaction, Ene – reaction.

(b) Molecular Re-arrangements:

Introduction, types of molecular re-arrangements.

1. Re-arrangements to Electron deficient carbon atom:

Pinacol-pinacolone, Demjonove, Wagner-Meerwein.

2. Re-arrangements to Electron Deficient Nitrogen atom

Beckmann, Hofmann, Curtius, Claisen-Schimidt&Lossen rearrangements.

3. Re-arrangements to Electron deficient oxygen atom:

Baeyer-Villiger & Dakins rearrangements.

4. Re-arrangements to Electron rich atom:

Favorski & Neber rearrangements.

UNIT-IV: REACTION MECHANISM-I

(a)Addition reactions: Introduction, addition reactions involving electrophiles (Br₂, HBr, HOBr & H_2O/H_2SO_4), Addition reactions involving Nucleophiles, Free radical additions- Kharash peroxide effect. Stereo specificity in addition reactions: Bromination,Dihydroxylation, Hydroboration, hydrogenation &Sharpless asymmetric epoxidation reactions Syn-addition of OsO₄& KMnO₄

(b) Introduction of Nucleophilic substitution reactions:

 SN^1 , SN^2 & SN^i -Mechanisms & stereochemistry-factors affecting the rate of SN^1 & SN^2 reactions such as substrate structure, nature of leaving group, nucleophile & the solvent

(c)Elimination reactions - El, E2 & E1CB. Mechanisms, Stereochemistry & orientation in E2 eliminations, pyrolytic elimination reactions, eliminationversus substitution reactions.

Books Suggested:

- 1. Stereochemistry, P.S. Kalsi, 5th Ed. (New Age International).
- 2. Aromatic Character & aromaticity, G.M.Badger
- 3. Organic reaction mechanism, V.K.Ahluwalia, R.K.Parashar.
- 4. Organic reactions with mechanisms, S.P.Bhutani

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY I SEMESTER SYLLABUS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM- 103: PAPER-III PHYSICAL CHEMISTRY –I

UNIT-I: THERMODYNAMICS-I

Chemical equilibrium- effect of temperature on equilibrium constant-Van't Hoff equation. Partial molar quantity- different methods of determination of partial molar quantity. Chemical potential- Phase rule and its derivation, Gibbs-Duhem equation, Duhem-Margules equation, Classius-Clapeyron equation. Nernst heat theorem. Third law of thermodynamics- Determination of the absolute entropy-Apparent exceptions to Third law of thermodynamics.

UNIT-II: QUANTUM CHEMISTRY

Operators algebra – Commutation of operators, linear operators. Complex functions. Hamiltonian operators. Operators ∇ and ∇^2 .Eigen functions and Eigen values. Degeneracy. Linear combination of Eigen functions of an operator, well behaved functions. Normalized and orthogonal functions. Postulates of Quantum mechanics. Physical significance of wave function. Observables and operators. Measurability of properties. Average value of observable. Time dependent and time independent Schrodinger equation. Applications of Schrodinger wave Equation-Particle in one dimensional and three dimensional box, harmonic oscillator & rigid rotor.

UNIT -III: CHEMICAL KINETICS-I

Theories of reaction rates: Collision theory, steric factor. Theory of Absolute Reaction Rates-Reaction coordinate, activated complex and the transition state. Thermodynamic formulation of reacton rates.

Unimolecular reactions: Lindemann, Lindemann-Hinshel wood, and RRKM theories. Termolecular reactions. Complex Reactions-Rate expressions for opposing, parallel and consecutive reaction (all first order type)

Chain reactions: Dynamic chain, hydrogen-bromine reaction, pyrolysis of acetaldehyde, decomposition of ethane, photochemical reactions- H_2 -Br₂, H_2 -Cl₂ reactions, Autocatalysis, H_2 -O₂ reaction explosion limits.

Fast Reactions: Flow system – Temperature and pressure Jump Methods – Relaxation Techniques.

UNIT - IV: ELECTROCHEMISTRY-I

Reversible cells – Chemical cells and concentration cells – Types of reversible electrodes – Electrode potentials. Reactions in reversible cells – Nernst equation - thermodynamic and kinetic derivation - Concentration cells with and without Liquid junction potential and its determination.Potentiometric transference. Determination of pH, Solubility product titrations _ from EMF measurements. Theory of electrolytic conductance - Debye - Huckel Onsager equation and its verification – Wein effect. Conductometric titrations, Determination of solubility of a sparingly soluble salt.

Books Suggested:

- 1. A text Book of Physical Chemistry (2nd Ed.), S. Glasstone (Macmilan)
- 2. Polymer Chemistry, Gowarikar.
- 3. Chemical Kinetics, K.J. Laidler.
- 4. Atkin's Physical Chemistry, Peter Atkins and Julio de paula.

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY I SEMESTER SYLLABUS under CBCS (EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021) CHEM- 104: PAPER-IV GENERAL CHEMISTRY-I

UNIT-I: POLYMERS

Thermodynamics of polymer dissolution, effect of molecular weight on solubility, solubility of crystalline and amorphous polymer, heat of dissolution, regular solution theory, Hildebrand solubility parameter, Flory-Huggins theory of polymer solutions, conformational entropy, osmotic pressure and viscosity of polymer solutions. Molecular mass- Number and mass average molecular mass, Molecular weight determination by light scattering, ultra-centrifugation and sedimentation equilibrium method.

UNIT-II: MICROWAVE SPECTROSCOPY

Electromagnetic radiation - Interaction of electromagnetic radiation with matter- Absorption and Emission. Quantization of energy- Regions of the electromagnetic spectrum and the mode of interactions with molecules. Representation of spectra. Basic components of a spectrometer. Signal to noise ratio. Intensity and width of spectral lines.

Diatomic molecules- rigid rotator, Selection rules. Intensity of spectral lines. Effect of isotopic substitution-calculation of bond length, intensities, non-rigid rotator, polyatomic molecules- Classification of molecules -Spectra of linear and symmetric top molecules. Stark Effect.

UNIT-III: INFRARED SPECTROSCOPY & RAMAN SPECTROSCOPY

Infrared spectroscopy:Harmonic oscillator, zero point energy, anharmonicity, Mores potential energy diagram, fundamental and overtone transitions, hot bands and combination bands. Vibration-rotation spectroscopy, PQR branches, selection rules, factors affecting the band positions and intensities for IR region.

Raman spectroscopy: Classical and quantum theories of Raman Effect, pure rotational, pure vibrational Raman spectra, selection rules, mutual exclusion principle. Vibrational - rotational Raman spectroscopy.

UNIT-IV: ELECTRONIC SPECTROSCOPY

Line spectra and band spectra, Frank-Condon principle, selection rules for electronic transition, Coarse structure, Band head and shading formation, Fine Spectra, Effect of vibrational spectra on electronic spectra, effect of vibrational-rotational spectra on electronic spectra of homo nuclear and hetero nuclear diatomic molecules.

Books Suggested:

1. Introduction to Quantum Chemistry, A.K.Chandra (Tata Mc Graw Hill).

2. Quantum Chemistry, Iran. Levine (Prentice Hall).

3. Fundamentals of Molecular Spectroscopy-C.N.Banwell (Mc Graw Hill).

4. Molecular structure and Spectroscopy-G.Aruldhas.

5. Atomic structure and chemical bond including molecular spectroscopy-Manas Chanda.

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M.Sc. ORGANIC CHEMISTRY Effective from the academic year 2020-2021 FIRST SEMESTER INORGANIC CHEMISTRY LAB COURSE under CBCS

(Total Marks 100)

I. Inorganic Synthesis: Preparation of - Tetraamminecopper (II) sulphate

- Potassium tris-oxalato ferrate(III) trihydrate

- Tris-thiourea copper (I) sulphate

II. Semimicro qualitative analysis of mixtures containing two cations and two anions of which one is a less familiar cation and one is an interfering anion

Cations : Ammonium (NH_4^+)

- 1st group: Hg, Ag, Pb, Tl, W
- 2nd group: Hg, Pb, Bi, Cu, Cd, As, Sb, Sn, Mo
- 3rd group: Fe, Al, Cr, Ce, Th, Ti, Zr, V, U, Be
- 4th group: Zn, Mn, Co, Ni
- 5th group: Ca, Ba, Sr
- 6th group: Mg,K, Li

RAYALASEEMA UNIVERSITY M.Sc. ORGANIC CHEMISTRY Effective from academic year 2020-2021 FIRST SEMESTER ORGANIC CHEMISTRY LAB COURSE under CBCS

(Total Marks 100)

(1) Laboratory techniques (for demonstration purpose only), Determination of melting point/boiling point, Ordinary distillation, Vacuum distillation/ filtration, Recrystallization, Drying of Organic compounds, TLC analysis, column chromatography.

(II) Systematic qualitative analysis of single organic compound. (Minimum six compounds)

(III) Preparation of single step organic compounds

- 1. Preparation of Aspirin from salicylic acid (Acelytation)
- 2. Preparation of β -naphthylmethylether (Methylation)
- 3. Preparation of 2, 4, 6-Tribromoaniline (Bromination)

Books Suggested:

- 1. Comprehensive Practical Organic Chemistry, Preparation & Quantitative Analysis, V.K.Ahluwalia & Renu Aggarwal.
- 2. Laboratory manual of Organic Chemistry, D.B.Dey & M.V.Sitaraman, T.R.Govindachari.
- 3. Analytical chromatography, Gurdeep R.Chatwal.
- Volges Text book of Practical Organic Chemistry, B.S.Furniss, A.J.Hannaford, P.W.G.Smith, A.R.Tatchell, 5Ed. (Longman Scientific &Technical).

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M.Sc. ORGANIC CHEMISTRY Effective from the academic year 2020-2021 FIRST SEMESTER PHYSICAL CHEMISTRY LAB COURSEunder CBCS

(Total Marks 100)

Any six of the following experiments

- 1. Kinetics of ester hydrolysis
- 2. Determination of equilibrium constant of KI₃ system
- 3. Determination of critical solution temperature of phenol water System
- 4. Effect of neutral salt (NaCl) on the miscibility temperature of phenol water System
- 5. Determination of metal-ligand ratio in $Cu(NH_3)_4^{2+}$
- 6. Verification of Langmuir- Freundlich isotherms for adsorption of acetic acid on the activated charcoal
- **7.** Determination of cryoscopic constant using known solute and determination of molecular weight of unknown nonvolatile solute.
- 8. Determination of Eutectic composition and temperature a binary system
- 9. Determination of distribution coefficient of benzoic acid between water and benzene.

Books Suggested:

1. Unified Practical Chemistry: Prof.A.V.Prasad Rao

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY II SEMESTER SYLLABUS under CBCS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM- 201: PAPER-I INORGANIC CHEMISTRY –II

UNIT-I: METAL CLUSTER COMPOUNDS

Definition – evidences for existence of M-M bonds - conditions favorable for formation of M-M bonds – preparation, structure and bonding of the following metal cluster compounds.

 $\begin{array}{l} Re_{2}Cl_{8}{}^{2\text{-}},\ Mo_{2}Cl_{8}{}^{4\text{-}},\ Re_{2}(RCOO)_{4}X_{2},\ Mo_{2}(RCOO)_{4}(H_{2}O)_{2},\ Cr_{2}(RCOO)_{4}(H_{2}O)_{2},\ Cr_{2}(RCOO)_{4}(H_{2}O)_{2},\ Cr_{2}Cl_{9}{}^{3\text{-}},\ Mo_{2}Cl_{9}{}^{3\text{-}},\ Re_{3}Cl_{9},\ Re_{3}Cl_{12}{}^{3\text{-}},\ Mo_{6}Cl_{8}{}^{4\text{+}},\ Nb_{6}X_{12}{}^{2\text{+}}\ \text{and}\ Ta_{6}X_{12}{}^{2\text{+}}.\end{array}$

UNIT-II: ORGANOMETALLIC COMPOUNDS - 16 and 18 electron rules.

Isoelectronic relationship - Synthesis, structure, bonding and reactions of carbon monoxide, dinitrogen and nitric oxide complexes.

Isolobal relationship – H, Cl, CH₃, $Mn(CO)_5$; S, CH₂, Fe(CO)₄; P, CH, Co(CO)₃ Synthesis, structure, bonding and reactions of metallocenes with special reference to ferrocene.

UNIT-III: METAL LIGAND EQUILIBRIA IN SOLUTION

Step wise and overall formation constants and their interaction – trends in stepwise constants – factors affecting the stability of metal complexes – Pearson's theory of hard and soft acids and bases (HSAB), chelate effect and its thermodynamic origin, determination of stability constants of complexes – spectrophotometric method and pH –metric method.

Reactivity of metal complexes – inert and labile complexes. Explanation of lability on the basis of valence bond and crystal field theories.

UNIT- IV: INORGANIC REACTION MECHANISM

Substitution reactions of metal complexes – D, Id, Ia and A mechanism – Ligand replacement reactions of metal complexes – Acid hydrolysis – factors affecting acid hydrolysis – Anation and Base hydrolysis of Cobalt(III) complexes. Ligand displacement reactions of square planar complexes of platinum (II). Factors affecting square planar substitution – trans effect (theories). Electron transfer reactions of complexes – concept of complementary and non-complementary reactions with examples. Inner and outer sphere mechanisms.

Books suggested:

- 1. Advanced Inorganic Chemistry by F.A. Cotton and R.G. Wilkinson, IV Edition, John, John Wiley and Sons, New York, 1980.
- 2. Inorganic Chemistry by J.E. Huheey, III edition, Harper International Edition, 1983.
- 3. Organometallic Chemistry-A unified approach by A. Singh and R.C. Mehrotra, Wiley Eastern Ltd.
- 4. Inorganic Chemistry by Shriver and Atkins, Oxford University Press (1999)
- 5. Mechanisms of Inorganic reactions in solution by D.Benson, MCgraw Hill, London, 1968.

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY under CBCS II SEMESTER SYLLABUS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM-202: PAPER-II ORGANIC CHEMISTRY –II

UNIT-I: PERICYCLIC REACTIONS

Molecular orbital symmetry, frontier orbitals of ethylene, 1,3-butadiene, 1,3,5hexatriene, allyl system and 2,4-pentadienyl systems, classification of pericyclic reactions, Electrocyclic reactions: Conrotatory and Disrotatory motions in 4n, 4n+2 systems, Cycloadditions: antarafacial and suprafacial additions in 4n (2+2 cyclo addition) and 4n+2 (4+2 cyclo addition) systems, 2+2 addition of ketene, 1,3-dipolar cycloadditions and cheleotropic reactions. Sigmatropic rearrangements – 1,3 and 1,5 suprafacial and antarafacial shifts of H and C, Claisen, Cope and Oxy-Cope rearrangements, Ene reaction, FMO and PMO approach, Woodward-Hoffmann Correlation diagrams and Woodward-Hoffmann selection rules of electrocyclic reactions, cyclo addition reactions and sigmatropic rearrangements.

UNIT-II: REAGENTS IN ORGANIC SYNTHESIS

Anhydrous AlCl₃, Borantrifluoride, N-Bromosuccinimide, Diazomethane, Dicyclohexyl carbodimide, leadtetraacetate, DDQ.

UNIT-III: ORGANOMETALLIC REAGENTS

Preparation & Reactivity of Organomegnesium, Organolithium, Organozinc, Organopalladium (Heck reaction), Organorhodium (Wilkinson's catalyst), Organocopper & Organonickel reagents.

UNIT-IV: METHODS OF ORGANIC SYNTHESIS

(i) Oxidations

Oxidations by using CrO₃, peracids, seliniumdioxide, periodic acid, silver corbonate, ruthiumtetraoxide, manganesedioxide,

(ii) Reductions

Reductions by usingLiAlH₄, NaBH₄, metal ammonia (Birch Reduction), BH₃& AlH₃, tri-n-butyl-tinhydride

Books suggested:

1. Organic synthesis, the disconnection Approach-Stuart Warren

- 2. Photo chemistry & Pericyclic reactions, Jagdambasingh, Jaya singh
- 3. Organic Chemistry, IL Finar ELBS, Vol-II
- 4. Advanced Organic Spectroscopy, Reactions, Mechanisms &

Structure, Jerry March, IVth Edition

5. Reaction Mechanism by Jai Jack Lie (Springer)

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc., ORGANIC CHEMISTRY II SEMESTER SYLLABUS under CBCS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM-203: PAPER-III PHYSICAL CHEMISTRY –II

UNIT - I: THERMODYNAMICS – II

Statistical thermodynamics: Partial molar properties: their significance and determination of partial molar properties, fugacity and its determination. Concept of distribution, thermodynamic probability and most probable Distribution, Ensemble averaging, postulates of ensemble averaging, canonical, grand canonical and micro- canonical ensembles, partition functions, translational, rotational, vibrational and electronic partition functions, Gibbs- Duhem equation, calculation of thermodynamic properties in terms of partition functions, Entropy of monatomic gases (Sackur-Tetrade equation).

UNIT -II: CHEMICAL KINETICS – II

A) Homogeneous catalysis. Mechanism of catalysis. Equilibrium treatment. Steady state treatment. Acid base catalysis: Mechanism of acid base catalysis. Catalysis by enzymes. Influence of P^H. Michaelis Menten law. Influence of temperature. Examples. Decomposition of acetaldehyde catalysed by Iodine. Catalysed decomposition of hydrogen peroxide.

B) Free radicals in chemical reactions. Hydrogen oxygen reaction. Upper and lower explosion limits. Heterogeneous reactions. Bimolecular reactions. Adsorption. Langmuir adsorption isotherm. Electronic theories of chemisorption and heterogeneous catalysis.

C)Introduction to enzyme catalysis. Michaelis - Menten Kinetics – Effect of pH and effect of temperature on the rates of enzyme reactions.

UNIT -III: ELECTRO CHEMISTRY – II

A) Concept of activity and activity coefficient of an electrolyte. The mean ionic activity coefficient. Calculation of mean ionic activity coefficients. Debye Huckel theory of solutions. Debye Huckel Limiting law and its verification.

B) Electrode Polarization-Decomposition potential and over voltage. Influence of C.D. on over voltage. Influence of P^{H} on over voltage, influence of temperature on over Voltage-Theories of over-voltage. Hydrogen over-voltage.

C)Polarography: Theory, classification, principle, Instrumentation of Polarography, DME, HMDE diffusion current, Ilkovic equation, DC-Polarography, AC-Polarography, Controlled Potential Electrolysis, Millicoulometry, Equation for half-wave potentials, for reversible system when oxidant alone, reductant alone and both are present.

UNIT-IV: GROUP THEORY

Symmetry elements and symmetry operations; Point groups; Mathematical requirements for a point group; Schoenflies notation of point groups; assignment of point groups; Group Multiplication table of C_{2V} , C_{3V} and C_{2h} point groups; Reducible and Irreducible representations, Mullikan notation for Irreducible representations, Great orthogonality theorem (without proof), Character tables, Application of character tables for C_{2V} and C_{3V} for prediction of stereochemistry of cis-trans C_{2h} molecules.

Books Suggested:

- 1. A Text Book of Thermodynamics, Rajaram and Kuriakose.
- 2. Thermodynamics for Chemists, Samuel Glasstone
- 3. Chemical Kinetics by K.J.Laidler, McGraw Hill Pub.
- 4. Symmetry and spectroscopy of molecules by K.Veera Reddy.

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M Sc. ORGANIC CHEMISTRY II SEMESTER SYLLABUS under CBCS EFFECTIVE FROM THE ACADEMIC YEAR 2020-2021 CHEM-OC: 204: ENVIRONMENTAL CHEMISTRY-II (OPEN ELECTIVE)

UNIT: I: HYDROSPHERE

UNIT: II: ATMOSPHERE

UNIT: III: ENVIRONMENTAL TOXICOLOGY AND GREEN CHEMISTRY

UNIT: IV: ENVIRONMENTAL MONITORING METHODS

UNIT: I: HYDROSPHERE: 15 Hours

Introduction to Chemical composition of Environment- Bio distribution of elements, Chemical composition of water bodies- lakes, streams, rivers and wet lands, Hydrological cycle. Aquatic pollution, inorganic, organic pesticides, agricultural, industrial and sewage, detergents. oil spills and oil pollutants, Water quality parameters, - DO, COD, BOD. Solids, metals, Contents of Chloride, sulphate, phosphate nitrate and microorganisms. Analytical methods of measuring BOD, DO, COD, Metals (As, Cr, Cd, Hg, Pb, Se) residual chloride and chlorine demand. Purification and treatment of water.

UNIT: II: ATMOSPHERE: 15 Hours

Chemical composition of Atmosphere- particles, ions and radicals and their formation, Chemical and photochemical reactions in atmosphere, smog formation, Oxides of N, C,S and their effects, pollution by chemicals, petroleum and minerals, chlorofuorocarbons, Green House effect, Chemical reaction in ozone depletion, Acid rain, Analytical methods for measuring air pollutants, Air pollution monitoring. Air pollution control methods.

UNIT: III: ENVIRONMENTAL TOXICOLOGY AND GREENCHEMISTRY: 15 Hours

(a) **Toxicological Chemistry:** Introduction to toxicological chemistry, dose response relationship, relative toxicities. Teratogenesis, mutagenesis, carcinogenesis, Immune system effects, Health hazards, Toxic elements and elemental farms, Toxic inorganic compounds, Toxicology of organic compounds, Effect of Toxic chemicals on enzymes, biochemical effects of As, Cd, Hg and Oxides of Sulphur and nitrogen.

(b)Green Chemistry: Definition of Green Chemistry, Principles of Green Chemistry, Experimental systems. This measurement of greenness environmental factor, Historical approach, tools of green Chemistry, Catalysis and bio-catalysis of Green Chemistry, examples of Green Chemistry, Pharmaceutical industry and Green Chemistry, Pesticides, Solvents, Green Chemistry, Sugar and distilleries, wastes and future trends in Green Chemistry.

UNIT: IV: ENVIRONMENTAL MONITORING METHODS:

(a) Monitoring of Air pollutants: Analysis of gaseous pollutants $-SO_2$, H_2S , NO, NO_X , NH_3 , CO, CO₂, Ozone, organic gases and vapours. Continuous monitoring of air pollutants –principles, monitoring instruments, monitoring of SO₂, H2S, NO-NO_X, CO, CO₂, hydrocarbons ozone suspended particulate matter, chemical and photo chemical reactions in atmospheres.

(b) Monitoring of water pollutants: Analysis of polluted water samples using AAS, HPLC and ICP methods

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL **M.Sc. ORGANIC CHEMISTRY** Effective from the academic year 2020-2021 SECOND SEMESTER INORGANIC CHEMISTRY LAB COURSE

(Total Marks 100)

II Quantitative Analysis:

a) Volumetric:	i) Determination of Nickel by EDTA
	ii) Determination of Cu ²⁺ by EDTA
	iii) Determination of Ferrocyanide by Ceric sulphate
	iv) Determination of Fe ²⁺ by NaVO ₃
	v) Determination of Ferric iron by photochemical
reduction	
	vi) Determination of Cu ²⁺ and Zn ²⁺ in a mixture
b) Gravimetric:	i) Determination of Zinc as Zinc pyrophosphate
	ii) Determination of Nickel by DMG.
Books Suggested:	

- - 1. Qualitative Inorganic Chemistry analysis: Vogel
 - 2. Unified Practical chemistry: Prof. A.V.Prasad Rao

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M.Sc. ORGANIC CHEMISTRY Effective from the academic year 2019-2020 SECOND SEMESTER ORGANIC CHEMISTRY LAB COURSE

(Total Marks 100)

(A) Conventional synthesis

1. Beckmann Rearrangement

Preparation of Benzanilide from Benzophenone

2. Diels-Alder reaction

Synthesis of Endo-cis-1,4-endoxo- Δ^5 -Cyclohexene-2,3-Dicarboxylic acid from Furan and Maleic acid (or) Maleic anhydride.

3. Benzil-Benzilic acid rearrangement Preparation of Benzoin acid from Benzil

(B) Green Synthesis

Beckmann Rearrangement
Preparation of Benzanilide from Benzophenone
 Diels-Alder reaction
Synthesis of Endo-cis-1,4-endoxo- Δ⁵-Cyclohexene-2,3-Dicarboxylic acid
from Furan and Maleic acid (or) Maleic anhydride.
 Benzil-Benzilic acid rearrangement
Preparation of Benzoin acid from Benzil

Books Suggested:

 Comprehensive Practical Organic Chemistry, Preparation & Quantitative analysis. V.K.Ahluwalia & Renu Aggarwal.
 Green Chemistry laboratory manual. V K Ahluwalia

2. Green Chemistry laboratory manual- V.K.Ahluwalia.

K.V.R GOVERNMENT COLLEGE FOR WOMEN (A), KURNOOL M.Sc. ORGANIC CHEMISTRY Effective from the academic year 2020-2021 SECOND SEMESTER PHYSICAL CHEMISTRY LAB COURSE

(Total Marks 100)

I. Conductometry

Titration of strong acid vs strong base (HCl vs NaOH) Titration of weak acid vs. strong base (AcOH vs NaOH) Titration of mixture of strong acid and weak acid (HCl -AcOH) vs. strong base (NaOH)

Determination of dissociation constant of acetic acid.

II. Potentiometry

Titration K₂Cr₂O₇ Vs. Fe²⁺

Titration of a strong acid vs. strong base (HCl vs NaOH) using quinhydrone electrode.

Titration of NaVO₃ vs Fe²⁺

III. Spectrophotometry

Beer-Lambert Law

Determination of composition of a complex (Metal to Ligand ratio).

Eg: Fe-orthophenanthroline.

Books Suggested:

Unified Practical Chemistry: Prof.A.V.Prasad Rao