

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024

Semester: Semester-I,

Paper No: Paper-1, Course-I ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

Name of the Faculty: Ch. Sujitha & P. Sahithi

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
|----------|---|-------------------|---------------------|----------------|------------------------|----------------|
| | | | Activity | Hours allotted | Activity | Hours allotted |
| Aug-2023 | Unit III: ESSENTIALS OF CHEMISTRY: Definition and Scope of Chemistry - Importance of Chemistry in daily life - Branches of chemistry and significance . | | Teaching | 8 | Assignment | 1 |
| Sep-2023 | PERIODIC TABLE: Significance, Electronic Configuration, Periodic properties like Atomic size and Ionization potential and their trend. Types of chemical changes - Classification of matter. | | Teaching | 8 | Assignment | 1 |
| Oct-2023 | BIOMOLECULES: Classification & Functions of Carbohydrates, Proteins, Fats & Vitamins. | | Teaching | 8 | Assignment | 1 |
| Nov-2023 | Unit IV: APPLICATIONS OF MATHS, PHY. & CHEMISTRY: Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry. | | Teaching | 8 | Assignment | 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-I
Paper No: Paper-II, Course-2 Advances of Mathematical, Physical and Chemical Sciences
Name of the Faculty: Ch. Sujitha & P. Sahithi

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
|----------|---|-------------------|---------------------|----------------|------------------------|----------------|
| | | | Activity | Hours allotted | Activity | Hours allotted |
| Aug-2023 | UNIT III: ADVANCES IN CHEMISTRY: Computer aided drug design and delivery, nano sensors, Chemical Biology. | | Teaching | 8 | Assignment | 1 |
| Sep-2023 | Impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method | | Teaching | 8 | Assignment | 1 |
| Oct-2023 | UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY: Solid waste management, Environmental remediation- Green Technology, Water treatment. | | Teaching | 8 | Assignment | 1 |
| Nov-2023 | Computer aided drug design and delivery, nano sensors, Chemical Biology. | | Teaching | 8 | Assignment | 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-III,
Paper No: Paper-III
Name of the Faculty: Ch. Udaya Bhasakara Rao, D. Suresh

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| Jul & Aug-2023 | Chemistry of Halogenated Hydrocarbons: Alkyl Halides: Methods of preparation and properties, nucleophilic substitution reactions– SN ₁ and SN ₂ mechanisms with stereo chemical aspects. Aryl Halides: Preparation and properties, nucleophilic aromatic substitution; Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions. | | Teaching | 8 | Assignment Quiz | 1 1 |
| Sep-2023 | Alcohols & Phenols: Alcohols: preparation and properties, Bouvet Blanc Reduction; Oxidation Of Diols by Per iodic acid and lead Tetraacetate, Pinacol- Pinacolone Rearrangement; Phenols: Preparation And Properties; Acidity of phenols, Reimer–Tiemann and Kolbe’s–Schmidt Reactions, Fries and Claisen Rearrangement with mechanism; Carbonyl Compounds: Structure, reactivity, preparation and properties; Nucleophilic Addition, Nucleophilic Addition-elimination reactions with ammonia derivatives Mechanisms of Aldol and Benzoin Condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann Haloform Reaction And Baeyer Villiger oxidation, oxidations and reductions (Clemmensen, wolf –kishner, with LiAlH ₄ &NaBH ₄). | | Teaching | 16 | Assignment | 1 |
| Oct-2023 | Active Methylene Compounds: Ethyl acetoacetate: keto-enol tautomerism, preparation by Claisen condensation, | | | | | |

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| | <p>Synthetic applications: Preparation of a) monocarboxylic acids. b) Dicarboxylic acids.c) Reaction with urea Diethyl malonate: preparation from acetic acid.</p> <p>Synthetic applications: Preparation of a) monocarboxylic acids (propionic acid and n-butyric acid). b) Dicarboxylic acids (succinic acid and adipic acid) c) α,β-unsaturated carboxylic acids (crotonic acid). d) Reaction with urea.</p> <p>Carboxylic Acids and their Derivatives : General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituent acidic strength. Preparation And Reactions Of Acid Chlorides, anhydrides, esters and amides; Claisen Condensation, Reformatsky reactions and Curtius Rearrangement Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Hunsdiecker reaction, decarboxylation by Schimidt reaction, Arndt- Eistert synthesis, halogenation by Hell- Volhard- Zelinsky reaction.</p> | | Teaching | 16 | Assignment | 1 |
| Nov-2023 | <p>SPECTROSCOPY:</p> <p>Spectrophotometry: General features of absorption - Beer-Lambert's law and its limitations, transmittance, Absorbance, and molar absorptivity. Single and double beam spectrophotometers. Application of Beer-Lambert law for quantitative analysis of 1. Chromium in $K_2Cr_2O_7$ 2. Manganese in Manganous sulphate</p> <p>Vibrational Spectroscopy: Classical Equation of Vibration, computation of force constant, Harmonic and anharmonic oscillator, Morse Potential curve, vibrational degrees of freedom for polyatomic molecules, Modes of vibrations in diatomic and polyatomic molecules. Selection rules for vibrational transitions, Fundamental Frequencies, overtones and hot bands. Functional group and fingerprint region.</p> | | Teaching | 16 | Assignment | 1 |

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| | <p>Electronic spectroscopy: Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (σ, π, n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore and auxochrome. bathochromic and hypsochromic shifts.</p> | | | | | |
| Dec-2023 | <p>Nuclear Magnetic Resonance (NMR) spectroscopy: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals - spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.</p> <p>Application of Spectroscopy to Simple Organic Molecules Application of visible, ultraviolet and Infrared spectroscopy in organic molecules. Application of electronic spectroscopy and Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.</p> <p>Infrared radiation and types of molecular vibrations, IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on $>C=O$ stretching absorptions).</p> | | Teaching | 8 | Assignment | 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-V
Paper No: Paper-VI Environmental Chemistry
Name of the Faculty: Dr.SB Ronald, Ch.Srinivasa Rao

| MONTH | SYLLABUS | ADDITIONAL INPUTS | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
|----------|---|-------------------|---------------------|----------------|------------------------|----------------|
| | | | ACTIVITY | HOURS ALLOTTED | ACTIVITY | HOURS ALLOTTED |
| Sep-2023 | <p>UNIT-I: INTRODUCTION: Environment Definition – Concept of Environmental chemistry- Scope and importance of environmental chemistry in nowadays – Nomenclature of environmental chemistry – Pollution, Pollutant, Contaminant, Receptor, Sink, Pathway of a pollutant, Threshold limit value (TLV) Segments of environment– Composition and Structure of Atmosphere with temperature profile.</p> | | Teaching | 10 | Assignment | 1 |
| | | | | | Guest lecture | 1 |
| Oct-2023 | <p>Natural resources–Renewable Resources–Solar and biomass energy and Nonrenewable resources – Thermal power and atomic energy – Reactions of atmospheric oxygen and Hydrological cycle.</p> <p>UNIT-II: Air Pollution Definition – Sources of air pollution – Classification of air pollutants – Acid rain – Photochemical smog – Global warming-Green house effect – Formation and depletion of ozone layer– Bhopal gas disaster – Controlling methods of air pollution.</p> | | Teaching | 16 | Assignment | 1 |
| | | | | | Student seminars | 1 |

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| Nov-2023 | <p>Unit III: Chemical Toxicology Toxic chemicals in the environment – effects of toxic chemicals – cyanide and its toxic effects-pesticides and its biochemical effects – toxicity of lead, mercury, arsenic and cadmium. Solid waste management</p> <p>UNIT-IV: Water pollution Unique physical and chemical properties of water – Classification of water pollutants – Dissolved oxygen – BOD, COD, Hardness of water – Methods to convert temporary hard water into soft water. Methods to convert permanent hard water into soft water. Eutrophication and its effects. Waste water treatment- Purification of waste water.</p> | | Teaching | 16 | Assignment | 1 |
| Dec-2023 | <p>UNIT-V: Ecosystem: Concepts–structure–Functions and types of ecosystem– Abiotic and biotic components – Energy flow and Energy dynamics of ecosystem– Food chains – Food web– Tropic levels–Biogeochemical cycles (carbon, nitrogen and phosphorus)</p> <p>Biodiversity Definition – level and types of biodiversity – concept-significance – magnitude and distribution of biodiversity–trends-bio geographical classification of India–biodiversity at national, global and regional level. Necessity of protecting the biodiversity.</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-V
Paper No: Paper-VII Green Chemistry & Nanotechnology
Name of the Faculty: Dr.B. Ananda Kumar, Ch.RVR Prasad

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| Sep-2023 | <p>UNIT-I Green Chemistry: Part- I Introduction-Definition of green Chemistry, Need for green chemistry, Goals of Green chemistry Basic principles of green chemistry. Green synthesis-Evaluation of the type of the reaction</p> <p>i) Rearrangements (100% atom economic), ii) Addition reaction (100% atom economic). Organic reactions by Sonication method: apparatus required and examples of sonochemical reactions (Heck, Hunds dicker and Wittig reactions).</p> | | Teaching | 10 | Assignment | 1 |
| | | | | | Guest lecture | 1 |
| Oct-2023 | <p>UNIT- II Green Chemistry: Part- II Selection of solvent: i) Aqueous phase reactions ii) Reactions in ionic liquids, Heck reaction, Suzuki reactions, epoxidation.iii) Solid supported synthesis</p> <p>A) Supercritical CO₂: Preparation, properties and applications, (decaffeination, drycleaning)</p> <p>B) Green energy and sustainability.</p> | | Teaching | 16 | Assignment | 1 |
| | | | | | Student seminars | 1 |

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| Nov-2023 | <p>UNIT-III Microwave and Ultrasound assisted green synthesis: Apparatus required, examples of MAOS (synthesis of fused anthroquinones, Leukart reductive amination of ketones) - Advantages and disadvantages of MAOS. Aldolcondensation –Cannizzaro reaction- Diels-Alder reactions-Strecker's synthesis</p> <p>UNIT-IV: Green catalysis and Green synthesis: Heterogeneous catalysis, use of zeolites, silica, alumina, supported catalysis - bio catalysis:Enzymes, microbes Phase transfer catalysis (micellar /surfactant) 1. Green synthesis of the following compounds: adipic acid, catechol, disodium menudo acetate(alternative Strecker’s synthesis)</p> <p>2.Microwave assisted reaction in water –Hoffmann elimination – methyl benzoate to benzoic acid –oxidation of toluene and alcohols–microwave assisted reactions in organic solvents. Diels-Alder reactions and decarboxylation reaction. 3.Ultrasound assisted reactions– sonochemical Simmons–Smith reaction (ultrasonic alternative to iodine)</p> | | Teaching | 16 | Assignment | 1 |
| Dec-2023 | <p>UNIT – V: Nanotechnology and Material science</p> <p><u>Nanotechnology:</u> Basic concepts of Nano science and Nanotechnology, Synthetic techniques of nanomaterials -Bottom-up approach and Top down approaches. Classification, properties and application of Nanomaterials.</p> <p><u>Material science:</u> Super conductivity-transition temperature, properties and applications of superconductors, Types of super conductors-difference between type-I and type-II super conductors, Meissner effect, magnetic levitation, Composite materials-particle reinforced composites and fibre reinforced composites.</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-II
Paper No: **Major** COURSE-III: GENERAL & INORGANIC CHEMISTRY
Name of the Faculty: Dr. B. Ananda Kumar, Ch Udaya Bhaskar Rao

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| MAR-2024 | <p><u>Unit I: Atomic Structure and Periodic table</u> Electronic configuration: Bohr theory, dual nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalization of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle). Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. General properties of atoms: size of atoms and ions- atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochow definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect.</p> | | Teaching | 10 | Assignment | 1 |
| | <p><u>UNIT 2: Ionic bond</u> Properties of ionic compounds, factors favoring the formation of ionic compounds- ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔH_f and U_o. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds- polarization and Fajan's rules; effects of polarization-solubility,</p> | | Teaching | 16 | Assignment | 1 |

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| APR-2024 | <p>melting points, and thermal stability of typical ionic compounds.</p> <p><u>UNIT 3: Acids and Bases</u></p> <p>Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system, Nonaqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia.</p> <p>Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pKa, pKb. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.</p> | | | | Student seminars | 1 |
| MAY-2024 | <p><u>UNIT 4: The Covalent Bond</u></p> <p>Valence Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-BeCl₂, BF₃, CH₄, PCl₅, SF₆ –VSEPR model-effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VESPR model-NH₃, H₂O, SF₄, ICl⁻⁴, ICl⁻², XeF₄, XeF₆ Molecular orbital theory- LCAO method, construction of M.O. diagrams for Homo-nuclear and Hetero-nuclear diatomic molecules (N₂, O₂, CO and NO)</p> | | Teaching | 16 | Assignment | 1 |
| JUN-2024 | <p><u>UNIT 5: Metallic and Weak Bonds</u></p> <p>The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.</p> <p>Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vanderwaals forces, ion dipole-dipole interactions.</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-II
Paper No: Major COURSE-IV: INORGANIC CHEMISTRY-I
Name of the Faculty: Dr, SB Ronald, Ch.RVR Prasad

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| MAR-2024 | <p><u>UNIT –I Chemistry of p-block elements–I</u> Group 13: Preparation & structure of Diborane, Borazine and (BN)_x Group14: Preparation, classification and uses of silicones and Silanes. Group 15: Preparation & structure of Phosphonitrilic Chloride P₃N₃C₁₆</p> | | Teaching | 16 | Assignment | 1 |
| APR-2024 | <p><u>Unit II Chemistry of p-block elements–II</u> Group 16: Classification of Oxides, structures of oxides and Oxoacids of Sulphur Group 17: Preparation and Structures of Interhalogen compounds. Pseudohalogens, <u>Unit – III Radioactivity</u> Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan’s displacement law, Law of Radioactivity, Radioactive decay series, Nuclear Reactions- fission and fusion, Applications of radioactivity.</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

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| MAY-2024 | <u>UNIT-IV: Chemistry of d-block elements</u> Characteristics of d-block elements with special reference to electronic configuration, variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series-Latimer diagrams. | | Teaching | 16 | Assignment | 1 |
| JUN-2024 | <u>UNIT-V: Chemistry of f-block elements</u> Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction, consequences of lanthanide contraction, colour, and magnetic properties. Separation of lanthanides by ion exchange method. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides. | | Teaching | 16 | Assignment Student seminars | 1 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024

Semester: Semester-II

Paper No: **Minor** COURSE-III: GENERAL & INORGANIC CHEMISTRY

Name of the Faculty: C h.RVR Prasad, Ch. Sujitha

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
|----------|---|-------------------|---------------------|----------------|------------------------|----------------|
| | | | Activity | Hours allotted | Activity | Hours allotted |
| MAR-2024 | <p>Unit I: Atomic Structure and Periodic table</p> <p>Electronic configuration: Bohr theory, dual nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalization of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle).</p> <p>Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. General properties of atoms: size of atoms and ions- atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electronegativity - Pauling, Mulliken-Jaffe, Allred-Rochow definitions; oxidation states and variable valency; isoelectronic relationship; inert-pair effect.</p> | | Teaching | 10 | Assignment | 1 |
| | <p>UNIT 2: Ionic bond</p> <p>Properties of ionic compounds, factors favoring the formation of ionic compounds- ionization potential, electron affinity, and electronegativity. Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle-enthalpy of formation of ionic compound and stability. Stability of ionic compounds in terms of ΔH_f and U_o. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-</p> | | Teaching | 16 | Assignment | 1 |

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| APR-2024 | <p>polarization and Fajan's rules; effects of polarization-solubility, melting points, and thermal stability of typical ionic compounds.</p> <p>UNIT 3: Acids and Bases</p> <p>Theories of acids and bases: Arrhenius theory, Bronsted-Lowry theory, Lewis theory, the solvent system, Nonaqueous solvents: classification-protonic and aprotic solvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia. Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pKa, pKb. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Soft combinations.</p> | | | | Student seminars | 1 |
| MAY-2024 | <p>UNIT 4: The Covalent Bond</p> <p>Valence Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-BeCl₂, BF₃, CH₄, PCl₅, SF₆ –VSEPR model-effect of bonding and nonbonding electrons on the structure of molecules, effect of electronegativity, isoelectronic principle, illustration of structures by VESPR model-NH₃, H₂O, SF₄, ICl⁻⁴, ICl⁻², XeF₄, XeF₆ Molecular orbital theory- LCAO method, construction of M.O. diagrams for Homo-nuclear and Hetero-nuclear diatomic molecules (N₂, O₂, CO and NO)</p> | | Teaching | 16 | Assignment | 1 |
| JUN-2024 | <p>UNIT 5: Metallic and Weak Bonds.</p> <p>The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.</p> <p>Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, comparison of hydrogen bond strength and properties of hydrogen bonded N, O and F compounds; associated molecules-ethanol and acetic acid; Vanderwaals forces, ion dipole-dipole interactions.</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-IV
Paper No: Paper-IV
Name of the Faculty: Ch. Srinivasa Rao, Dr.D. Suresh

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| MAR-2024 | <p>Organ metallic Compounds: Definition and classification of organometallic compounds on the basis of bond type, Metal Carbonyls:18-electron rule, General methods of preparation of mono and binuclear carbonyls of 3d series. P-acceptor behaviour of carbon monoxide.</p> <p>Carbohydrates: Classification and their biological importance, Monosaccharides: Constitution and absolute configuration glucose and fructose (open chain and cyclic structure), epimers and anomers, mutarotation, osazone formation from glucose and fructose Interconversions of Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose) Kiliani-Fischer synthesis and Ruff degradation</p> | | Teaching | 10 | Assignment | 1 |
| APR-2024 | <p>Amino acids and proteins: Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Essential and Non-essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.</p> <p>Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

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| | <p>isoelectric point.</p> <p>Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating- peptide bond (amide linkage).</p> <p>Heterocyclic Compounds: Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction</p> | | | | | |
| MAY-2024 | <p>(ORGANIC & PHYSICAL CHEMISTRY)</p> <p>Nitro hydrocarbons</p> <p>Nomenclature and classification-nitro hydrocarbons, structure - Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.</p> <p>Amines:Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary amines using Hinsberg's Method And Nitrous Acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamide Reaction,Carbylamine Reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hofmann-elimination reaction and Cope elimination.</p> | | Teaching | 16 | Assignment | 1 |

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| JUN-2024 | <p>Photochemistry: Difference between thermal and photochemical processes, Laws of photochemistry- 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, Photosensitized reactions.</p> <p>Thermodynamics: The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoffs equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies-Criteria for spontaneity.</p> | | Teaching | 16 | Assignment | 1 |
| | | | | | Student seminars | 1 |

DEPARTMENT OF CHEMISTRY
ANNUAL CURRICULAR PLAN

Academic Year: 2023-2024
Semester: Semester-IV
Paper No: Paper-V
Name of the Faculty: Dr SB Ronald & Dr B.Ananda Kumar

| Month | Syllabus | Additional inputs | CURRICULAR ACTIVITY | | CO-CURRICULAR ACTIVITY | |
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| | | | Activity | Hours allotted | Activity | Hours allotted |
| MAR-2024 | <p>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 Theory:- Splitting of d-orbitals in Octahedral, Tetrahedral and Square-planar complexes, Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Jahn-Teller distortion,</p> <p>Inorganic Reaction Mechanism: Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions -SN1 and SN2, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications</p> | | Teaching | 10 | Assignment | 1 |
| | <p>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.</p> <p>Bioinorganic Chemistry: Metal ions present in biological systems, classification of elements according to their action in biological system. biological significance of Na, K, Mg, Ca, Fe</p> | | Teaching | 16 | Assignment | 1 |

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| APR-2024 | and Cl ⁻ . Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cis-platin as an anti-cancer drug. Metalloporphyrins. – Structure and functions of hemoglobin and Chlorophyll. | | | | Student seminars | 1 |
| MAY-2024 | <p style="text-align: center;">(PHYSICAL CHEMISTRY)</p> <p>Phase rule: 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.</p> <p>Electrochemistry: 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.</p> | | Teaching | 16 | Assignment | 1 |
| JUN-2024 | <p>Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conduct metric 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</p> <p>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</p> | | Teaching | 16 | Assignment Student seminars | 1 1 |

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| | 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. | | | | | |
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