

TENTATIVE LESSON PLAN (SEMESTERS)

SESSION: 2023-24

Name of the Teacher: Ms. Nisha Pruthi

Department: Chemistry

Subject/Course: Organic Chemistry

Programme: B. Sc-II (Non-Medical & Medical)

Semester: Fourth (4th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	<i>Infrared (IR) absorption spectroscopy Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, Measurement of IR spectrum, fingerprint region, Characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds Discussion and problems taken</i>	February
2.	<i>Amines Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. Discussion and problems taken</i>	March
3.	<i>Diazonium Salts Introduction to diazonium Salts & definition, Mechanism of diazotisation, structure of benzene diazonium chloride Replacement of diazo group by H, OH, F, Cl, Br, I, NO₂ and CN groups, Reduction of diazonium salts to hydrazine, coupling reaction and its synthetic application Discussion and problems taken Class test</i>	April
4.	<i>Aldehydes and Ketones Nomenclature and structure of the carbonyl group, Synthesis of aldehydes and ketones, Advantage of oxidation of alcohols Physical properties, Comparison of reactivities of aldehydes and ketones, Mechanism of nucleophilic additions to carbonyl group Condensation with ammonia and its derivatives, Wittig reaction, Mannich reaction, Oxidation of aldehydes, Baeyer–Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, Wolff- Kishner, LiAlH₄ and NaBH₄ reductions. Assignment Discussion and problems taken Revision of chapters of Organic Chemistry</i>	May

Name of the Teacher: Ms. Pushpa Dhanda

Department: Chemistry

Subject/Course: Physical Chemistry

Programme: B.Sc-II (Non-Medical & Medical)

Semester: Fourth (4th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	<i>Thermodynamics Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycles and its efficiency, Carnot's theorem, Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium. Third law of thermodynamics:</i>	February
2.	<i>Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, Gas criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T.</i>	March
3.	<i>Electrochemistry Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (ΔG, ΔH & K). Types of reversible electrodes – metal- metal ion, gas electrode, metal –insoluble salt- anion and redox electrodes. Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential.</i>	April
4.	<i>Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transference, liquid junction potential and its measurement. Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. Numerical problems</i>	May

SESSION: 2023-24

Name of the Teacher: Ms. Reetu

Department: Chemistry

Subject/Course: Inorganic Chemistry

Programme: B.Sc-II (Non-Medical & Medical)

Semester: Fourth (4th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	Chemistry of f-Block elements Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour, ionic radii, Lanthanide contraction, Occurrence, separation of lanthanides, Lanthanide compounds Assignment 1 st	February
2.	Actinides: General characteristics of actinides Chemistry of separation of Np, Pu and Am from uranium, Transuranic elements, Comparison of properties of Lanthanides and actinides with transition elements Class test	March
3.	Theory of Qualitative and Quantitative Analysis Chemistry of analysis of various groups of basic and acidic radicals Chemistry of identification of acid radicals in typical combination Chemistry of interference of acid radicals including their removal in the analysis of basic radicals Revision Assignment 2 nd	April
4.	Common ion effect, Solubility product, Theory of precipitation, Co-precipitation, Post precipitation, Purification of precipitates Revision of all Chapters	May

Name of the Teacher: Ms. Suman Rani

Department: Chemistry

Subject/Course: Organic Chemistry

Programme: B.Sc-III (Non-Medical & Medical)

Semester: Sixth (6th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	<i>Heterocyclic compounds Molecular orbital structure, Aromatic characteristics of pyrrole, furan, thiophene, Aromatic characteristics of thiophene & pyridine, Comparison of aromaticity of benzene, pyrrole, furan and thiophene</i>	February
2.	<i>Preparation of pyrrole and electrophilic substitution reaction of pyrrole, Preparation of furan and electrophilic substitution reaction of furan, Preparation of thiophene and electrophilic substitution reaction of thiophene, Molecular orbital structure of Pyridine, Preparation methods of Pyridine Electrophilic substitution reactions of pyridine, Nucleophilic substitution reaction of pyridine Comparison of basicity of pyridine, pyrrole and piperidine, Preparation & reaction of indole, quinoline and isoquinoline, Fischer Indole synthesis and skraup synthesis, Bischler napieralski synthesis, Mechanism of electrophilic substitution of indole, Quinoline and isoquinoline</i>	March
3.	<i>Organic synthesis via enolates, Acidity of hydrogen, alkylation of diethylmalonate and ethylacetoacetate Synthesis of ethylacetoacetate, claisen condensation, keto-enol tautomerism of ethyl acetoacetate, lkylation of 1-3dithianes, Acylation of enamines Class Test ASSIGNMENT: 1 AMINOACIDS, PEPTIDES AND PROTEINS Classification, structure and stereochemistry of aminoacods, Acid base behavior, Isoelectric point, Electrophoresis, Preparation and reaction of aminoacids, Structure and nomenclature of peptides and protein, Peptide structure determination, End group analysis, selective hydrolysis of peptides, Classical peptide synthesis, Solid phase peptide synthesis, Structure of peptides and proteins</i>	April
4.	<i>ASSIGNMENT :2 Denaturation and renaturation, Nucleic acid introduction, ribonucleosides and ribonucleotides, Double helical structure SYNTHETIC POLYMER Addition or chain growth polymerization, Free radical polymerization, Ionic vinyl polymerization, Ziegler natta polymerisation and vinyl polymers, Condensation polymerization, Polysters and polyamides, Phenol formaldehyde resin, Natural and synthetic rubber Revision</i>	May

Name of the Teacher: Ms. Savita Rani

Department: Chemistry

Subject/Course: : Inorganic Chemistry

Programme: B.Sc-III(Non-Medical & Medical)

Semester: Sixth (6th)

Unit	Name of Topic/Contents	Tentative Dates/Days
5.	<i>Organometallic Chemistry</i> Definition, nomenclature and classification of organometallic compounds. Preparation, properties, and bonding of alkyls of Li, Al, Hg and Sn, a brief account of metal-ethylenic complexes, mononuclear carbonyls and the nature of bonding in metal carbonyls. Assignment 1 st	February
6.	<i>Acids and Bases, HSAB Concept</i> Arrhenius, Bronsted- Lowry, the Lux- Food, Solvent system and Lewis concepts of acids and bases, relative strength of acids and bases, Concept of Hard and Soft Acids and bases. Test	March
7.	<i>Bioinorganic Chemistry</i> Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of alkali and alkaline earth metal ions with special reference to Ca ²⁺ . Nitrogen fixation. Assignment 2 nd	April
8.	<i>Silicones and Phosphazenes</i> Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes. Silicones and phosphazenes their preparation, properties, structures and uses.	May

Name of the Teacher: Ms. Monika

Department: Chemistry

Subject/Course: Physical Chemistry

Programme: B.Sc-III (Non-Medical) Sec-A

Semester: Sixth (6th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes, laws of photochemistry: Grotthus-Drapper Law, Stark- Einstein law	February
2.	Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non radiative process, quantum yield, photosensitized reaction with simple examples Phase equilibrium Statement and meaning of the terms phase, component, degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system- water system Phase equilibria of two component system solid liquid equilibria, simple eutectic examples Pb-Ag system, desilverisation of lead Assignment 1 st	March
3.	Introduction to Statistical mechanics Need of statistical thermodynamics, thermodynamic probability, Maxwell boltzman distribution statistics, Born – oppenheimer approximation, partition function and its physical significance factorization of partition function Assignment 2 nd Solution, dilute solution and colligative properties Ideal and non ideal solutions, methods of expressing concentration of solutions, dilute solutions, Raoult's law colligative properties: relative lowering of vapour pressure(ii) elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure. Test	April
4.	Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point. Application in calculating molar masses of normal. Dissociated and associated solutes in solution Revision	May

Name of the Teacher: Ms. Monika

Department: Chemistry

Subject/Course: Chemistry-II

Programme: B.Sc-I (Life Science)

Semester: Second (2nd)

Unit	Name of Topic/Contents	Tentative Dates/Days
1.	<p>Covalent Bond Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N_2, O_2) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond.</p> <p>Ionic Solids Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF_2) size effects, radius ratio rule and its limitations, Concept of Lattice energy, Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.</p>	February
2.	<p>Chemical Kinetics Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction, integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation.</p> <p>Distribution Law Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, application of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride</p>	March
3.	<p>Alkanes and Cycloalkanes Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strainless rings.</p> <p>Alkenes Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism. The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration-oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.</p>	April
4.	<p>Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Van der Waals forces.</p> <p>Metallic Bond and semiconductors Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (Conductors, Semiconductors, Insulators). Semiconductors – Introduction, types, and applications.</p> <p>Revision</p>	May

Name of the Teacher: Ms. Poonam

Department: Chemistry

Subject/Course: Physical Chemistry

Programme: B.Sc-III (Non-Medical Sec-B) & Medical

Semester: Sixth (6th)

Unit	Name of Topic/Contents	Tentative Dates/Days
1	Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes, laws of photochemistry: Grotthus-Drapper Law, Stark- Einstein law	February
2	Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non radiative process, quantum yield, photosensitized reaction with simple examples Phase equilibrium Statement and meaning of the terms phase, component, degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system- water system Phase equilibria of two component system solid liquid equilibria, simple eutectic examples Pb-Ag system, desilverisation of lead Assignment 1 st	March
3	Introduction to Statistical mechanics Need of statistical thermodynamics, thermodynamic probability, Maxwell boltzman distribution statistics, Born – oppenheimer approximation, partition function and its physical significance factorization of partition function Assignment 2 nd Solution, dilute solution and colligative properties Ideal and non ideal solutions, methods of expressing concentration of solutions, dilute solutions, Raoult's law colligative propertues: relative lowering of vapour pressure(ii) elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure. Test	April
4	Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point. Application in calculating molar masses of normal. Dissociated and associated solutes in solution Revision	May

Name of the Teacher: Ms. Sushma Rani

Department: Chemistry

Subject/Course: Chemistry-II

Programme: B.Sc-I (Physical Science)

Semester: Second (2nd)

Unit	Name of Topic/Contents	Tentative Dates/Days
1	<p>Covalent Bond Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N₂, O₂) and heteronuclear (CO and NO) diatomic molecules, dipole moment and percentage ionic character in covalent bond.</p> <p>Ionic Solids: Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF₂) size effects, radius ratio rule and its limitations, Concept of Lattice energy, Born-Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.</p>	February
2	<p>Chemical Kinetics Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction, integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation.</p> <p>Distribution Law : Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases, application of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride</p>	March
3	<p>Alkanes and Cycloalkanes Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity.</p> <p>Nomenclature of Cycloalkanes, Baeyer's strain theory and its limitations, theory of strainless rings.</p> <p>Alkenes: Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism. The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration-oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.</p>	April
4	<p>Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Van der Waals forces.</p> <p>Metallic Bond and semiconductors Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (Conductors, Semiconductors, Insulators). Semiconductors – Introduction, types, and applications. Revision</p>	May

Name of the Teacher: Ms. Renu

Department: Chemistry

Subject/Course: Introductory Chemistry-II

Programme: MDC

Semester: Second (2nd)

<i>Unit</i>	<i>Name of Topic/Contents</i>	<i>Tentative Dates/Days</i>
1	<i>Renowned Indian Scientists Brief Biography of Renowned Indian Scientists (Hargobind Khurana, Dr. P.C. Ray, Sir C.V. Raman, Dr. A.P.J. Abdul Kalam, C. N. R. Rao, Dr. Vikram Sara Bhai, Dr. Homi Jahangir Bhabha, Dr. J.C. Bose, Dr. S. N. Bose)</i>	February
2	<i>Metal and Non-Metals Periodic table, classification of elements, physical and Chemical aspects of metals and non-metals, Ore and Minerals of Iron, Copper, Aluminium, Alloys Test Assignment</i>	March
3	<i>Physical Properties of Matter Classification of matter, properties, uses, ideal gas equation, Real gas equation, some important compounds (Baking soda, Washing soda, Plaster of paris, Gypsum, Glass)</i>	April
4	<i>Soil and Fertilizers Green revolution, soil types of soil and their components for Fertility, grow condition, pH, irrigation, biofertilizers, Chemical fertilizers and their uses, Acid rain.</i>	May

Name of the Teacher: Ms. Renu

Department: Chemistry

Subject/Course: Minor Chemistry-II

Programme: B.Sc-I (Physical Science & Life Science)

Semester: Second (2nd)

Unit	Name of Topic/Contents	Tentative Dates/Days
1	<i>Gaseous State</i> <i>Kinetic theory of gases, Calculation of root mean square velocity, average velocity, and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (derivations excluded).</i>	February
2	<i>Periodic table and Atomic properties</i> <i>Atomic properties: Atomic and Ionic radii, Ionisation energy, Electron affinity and Electronegativity definition, trend in periodic table, Effective nuclear charge, Slater's rules.</i> <i>Assignment</i>	March
3	<i>Ionic Solids</i> <i>Stoichiometric and Non-stoichiometric defects in crystals, Lattice energy and Born- Haber cycle, Solvation energy and its relationship with solubility of ionic solids. Polarizing power and Polarisability of ions, Fajan's rule.</i> <i>Test</i> <i>Structure and Bonding in Organic Compounds</i> <i>Localized and delocalized chemical bond, Van der Waal's interactions, Resonance: conditions and resonance effect</i>	April
4	<i>Structure and Bonding in Organic Compounds</i> <i>Hyperconjugation, Inductive effect, Electromeric effect & their comparison.</i>	May

Name of the Teacher: Mr. Ankit

Department: Chemistry

Subject/Course: Introductory Chemistry-II

Programme: MDC

Semester: Second (2nd)

Unit	Name of Topic/Contents	Tentative Dates/Days
1	<i>Metal and Non-Metals</i> <i>Periodic table, classification of elements, physical and chemical aspects of metals and non-metals, Ore and Minerals of Iron, Copper, Aluminium, Alloys</i>	February
2	<i>Physical Properties of Matter</i> <i>Classification of matter, properties, uses, Ideal gas equation, Real gas equation, Some important compounds (Baking soda, Washing soda, Plaster of Paris, Gypsum, Glass)</i> <i>Assignment</i>	March
3	<i>Mid-Term Exam</i> <i>Soil and Fertilizers</i> <i>Green revolution, Soil: types of soil and their components for fertility, grow condition, pH, Irrigation, Biofertilizers, Chemical fertilizers and their uses, Acid rain.</i> <i>Renowned Indian Scientists</i> <i>Brief Biography of Renowned Indian Scientists (Hargobind Khurana, Dr. P.C. Ray, Sir C.V. Raman)</i>	April
4	<i>Renowned Indian Scientists</i> <i>Brief Biography of Renowned Indian Scientists (Dr. A.P.J. Abdul Kalam, C. N. R. Rao, Dr. Vikram Sara Bhai, Dr. Homi Jahangir Bhabha, Dr. J.C. Bose, Dr. S. N. Bose)</i>	May