

Lesson Plan

Name of the Assistant/ Associate Professor:- Renu Mor (1st Sem) , Yashika (2nd Sem)

Class and Section:- B.Sc 2nd year

Subject:- Inorganic Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	1st Semester
	2	
	3	
	4	
August	1	
	2	
	3	D-block element: position, general characteristics, comparison of properties of 3d, 4d and 5d.
	4	Stabilities of oxidation state, structure and properties of transition element compounds.
September	1	Co-ordination compounds introduction.
	2	Isomerism
	3	VBT and it's limitations.
	4	Colour, magnetic property and shape
October	1	IUPAC nomenclature.
	2	CFT
	3	Non - aqueous solvents introduction
	4	Physical property and types.
November	1	General characteristics
	2	Non- aqueous solvents with reference to NH ₃ and liquid SO ₂ .
	3	
	4	
December	1	
	2	
	3	
	4	
January	1	
	2	
	3	
	4	2nd Semester
February	1	
	2	
	3	F-block elements: lanthanides
	4	Separation of lanthanide, lanthanide compounds
March	1	Actanide

	2	Acid based radicals, I identification of acid radicals and base radicals.
	3	Common ion effect and solutions product.
	4	Precipitation reactions and it's type.
April	1	Purification of precipitates.
	2	Test for presece of acid radicals.
	3	Test for presence basic radicals
	4	Miscellaneous test.
May	1	
	2	
	3	
	4	

Lesson Plan

Name of the Assistant/ Associate Professor :- Yashika Garg (1st Sem), Renu Mor (2nd Sem)

Class and Section:- B.Sc 2nd year

Subject:- Physical Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	1st Semester
	2	
	3	
	4	
August	1	
	2	
	3	
	4	Thermodynamics introduction
September	1	Thermodynamics process and Thermodynamics equilibrium
	2	Concept of heat and work. First law of Thermodynamics
	3	Various types of heat capacity and relation between them.
	4	Reversible and irreversible reactions.
October	1	Adiabatic and isotherm reversible reaction, Joule Thomson experiment.
	2	Equilibrium constant and free energy, Concept of chemical. Potential,
	3	Thermodynamic derivation of law of chemical equilibrium.
	4	Temperature dependence of equilibrium constant. Clausius-Clapeyron equation and its applications
November	1	Nernst distribution law its thermodynamic derivation.
	2	Applications of distribution law: Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride.
	3	Others applications of distribution law.
	4	Determination of equilibrium constant of potassium tri-iodide complex and
December	1	Determination of Process of extraction. More stress on numerical problems.
	2	
	3	
	4	
January	1	
	2	
	3	
	4	2nd Semester
February	1	
	2	
	3	
	4	Second law of thermodynamics, Carnot's cycles Carnot's theorem,
March	1	Thermodynamic scale of temperature, Entropy .
	2	Entropy change in physical change, entropy as a criteria of spontaneity and equilibrium.

	3	Third law of thermodynamics
	4	Residual entropy, Gibbs function, Helmholtz function.
April	1	Electrolytic and Galvanic cells. reversible & irreversible cells.
	2	Type of electrodes, Electrode reactions, Nernst equations.
	3	Hydrogenelectrode, referenceelectrodes, standardelectrodepotential,
	4	Concentrationcellswithandwithouttransference, liquidjunctionpotentialandits measurement
May	1	Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode.
	2	Transport number.
	3	
	4	

Lesson Plan

Name of the Assistant/ Associate Professor:- Renu Mor (1st Sem), Yashika (2nd Sem)

Class and Section:- B.Sc 2nd Year

Subject:- Organic Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	
	2	
	3	
	4	
August	1	
	2	
	3	
	4	Monohydric alcohols nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters.
September	1	Hydrogen bonding. Acidic nature. Reactions of alcohols, .
	2	Dihydric alcohols nomenclature, Methods of formation, chemical reactions of vicinal glycols,
	3	Oxidative cleavage [Pb(OAc) ₂ and HIO ₄] and pinacol-pinacolone rearrangement.
	4	Phenols: Nomenclature, structure and bonding.
October	1	Preparation of phenols, physical properties and acidic character. Comparative acid strength of alcohols and phenols.
	2	Reactions of phenol electrophilic aromatic substitution. Mechanisms of Fries rearrangement. ions.
	3	Claisen rearrangement, Reimer-Tiemann reaction, Kolbe's reaction and Schotten-Baumann reaction
	4	Epoxides: Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening,
November	1	Absorption laws (Beer-Lambert law), molar absorptivity.
	2	Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts.
	3	UV spectra of conjugated enes and enones, Applications of UV Spectroscopy in organic compounds.
	4	Carboxylic Acids & Acid Derivatives.
December	1	Nomenclature of Carboxylic acids, structure and bonding, physical
	2	Properties, acidity of carboxylic acids, effects of substituents on
	3	
	4	
January	1	

	2	
	3	
	4	
February	1	
	2	
	3	Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands.
	4	Applications of IR spectroscopy in structure elucidation of simple organic compounds
March	1	Amines: physical properties. Separation of a mixture of primary, secondary and tertiary amines.
	2	Reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds.
	3	Name reactions
	4	Diazonium Salts: Mechanism of diazotisation, structure of benzene diazonium chloride.
April	1	Aldehydes and Ketones: Nomenclature and Synthesis of aldehydes and ketones .
	2	Properties, Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions reactions.
	3	Condensation with ammonia and its derivatives. Wittig reaction. Mannich reaction. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones,
	4	Name reactions.
May	1	
	2	
	3	
	4	

Lesson Plan

Name of the Assistant/ Associate Professor:- Yashika Garg (1st Sem), Renu Mor (2nd Sem)

Class and Section:- B.sc 3rd Year

Subject:- Inorganic Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	1st Semester
	2	
	3	
	4	
August	1	
	2	
	3	
	4	Metal- Ligand Bonding in Transition Metal complexes Limitations of VBT.
September	1	CFT in octahedral, Tetrahedral and Square planer.
	2	Thermodynamics and Kinetic Aspects of metal complexes
	3	Thermodynamic stability of metal complexes and factors affecting the stability,
	4	Irving William Series, Substitution reactions of square planer compounds Transeffect.
October	1	Magnetic properties of Transition metal complexes
	2	Magnetic susceptibility, Method of determining magnetic susceptibility,
	3	Orbital contribution to magnetic moments,
	4	Correlation of μ , and e_{eff} values, Orbital contribution to magnetic moments.
November	1	Application of magnetic moment data for 3d metal complexes.
	2	Selection rules for d-transition, Spectroscopic ground states, Spectrochemical series
	3	Electronic spectra of Transition metal complexes, d-d transition.
	4	Orgel energy level diagram for d and d states.
December	1	Spin Only formula and L-S coupling.
	2	Discussion of electronic ion. spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]$ complex
	3	
	4	
January	1	
	2	
	3	
	4	2nd Semester
February	1	
	2	
	3	Acids and Bases: Arrhenius, Bronsted-lowry, Lux-flood, Solvent system
	4	Lewis concept of acids and bases, relative strength of acids and bases,
March	1	Levelling solvents, Hard and soft acids and bases (HSAB), Applications of HSAB principle.

	2	Classification and nomenclature of organometallic compounds, preparation,
	3	Properties and bonding of alkyls of Li, Al, Hg and Sn, Concept of hapticity of organic ligand,
	4	Structure and bonding in metal-ethylene complexes, Ferrocene
April	1	metal carbonyls, Preparation, properties and bonding.
	2	Bio inorganic chemistry: haemoglobin and myoglobin. Biological role of Na, K, Ca, Mg, Fe ⁺ ions, Cooperative effect, Bohr effect.
	3	Silicones and Phosphazenes Nomenclature, classification, preparation and uses of silicones,
	4	Elastomers, polysiloxane copolymers, polyphosphazenes and bonding in triphosphazene
May	1	
	2	
	3	
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Lesson Plan

Name of the Assistant/ Associate Professor:- Renu Mor (1st Sem) Yashika Garg (2nd Sem)

Class and Section:- B.Sc 3rd year

Subject:- Organic Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	1st Semester
	2	
	3	
	4	
August	1	
	2	
	3	
	4	Organic Synthesis via Enolates
September	1	Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism.
	2	Molecular orbital picture and aromatic characteristics. of pyrrole, furan, thiophene and pyridine.
	3	Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution.
	4	Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole
October	1	Five and six-membered heterocycles. Preparation and reactions of indole,
	2	Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline.
	3	Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis.
	4	Structure and nomenclature of peptides and proteins. Classification of proteins.
November	1	Peptide structure determination, end group analysis, selective hydrolysis of peptides
	2	Classical peptide synthesis, solid-phase peptide synthesis. Structures of peptides and proteins.
	3	Synthetic polymer introduction
	4	Free radical vinyl polymerization, ionic vinyl polymerization and vinyl polymers. polymerization, Ziegler-Natta
December	1	Addition or chain-growth polymerization. Condensation or step-growth polymerization.
	2	Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers.
	3	

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January	1	
	2	
	3	
	4	2nd Semester
February	1	
	2	
	3	
	4	
March	1	
	2	
	3	NMR Spectroscopy Principle of nuclear magnetic spectrum, number of signals,
	4	Peak resonance, the PMR areas, equivalent and nonequivalent proton positions of signals and chemical shift,
April	1	Shielding and deshielding of protons, proton counting, splitting of signals and coupling constants,
	2	Magnetic equivalence of protons. Discussion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide etc.
	3	PMR spectroscopy for structure determination of organic compounds.
	4	Carbohydrates: Classification and nomenclature, osazone formation, conversions.
May	1	Configuration of monosaccharides. Erythro and threo diastereomers.
	2	Disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose).
	3	Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions.
	4	

Lesson Plan

Name of the Assistant/ Associate Professor:- Yashika Garg (1st Sem), Renu Mor (2nd Sem)

Class and Section:- B.sc 3rd year

Subject:- Physical Chemistry

Session:- 2023-2024

Month	Week	Topics
July	1	
	2	
	3	
	4	
August	1	
	2	
	3	
	4	Black-body radiation. Plank's radiation law, photoelectric effect. Postulates.
September	1	Quantummechanicaloperators, commutationrelations, Hamiltonianoperator
	2	Hermitianoperator, averagevalueofsquareofHermitianasapositivequantity, Roleofoperators
	3	Toshowquantummechanicallythatpositionandmomentumcannotbepredicatedsimultaneously.
	4	Determinationofwavefunction&energyofaparticleinonedimensionalbox.
October	1	Optical activity, polarization, dipoles in an electric field,
	2	Dipolemoment, induceddipolemoment, measurementofdipole.
	3	Refractivitymethod, dipolemomentandstructureofmolecules,
	4	Magneticpermeability, magnetic susceptibilityanditsdetermination.
November	1	Applicationofmagneticsusceptibility, magneticproperties Paramagnetism, diamagnetismandferromagnetism.
	2	Electromagnetic radiation, regions of spectrum, statement approximation, Degrees of freedom.. of Born-oppenheimer
	3	Rigid rotator , rotational spectra of diatomic molecules, spectral intensity distribution.
	4	Maxwell-Boltzmandistributiondeterminationofbondlengthandisotopeeffect.
December	1	Harmonic oscillator, pure vibrational spectrum of diatomic molecules.
	2	Determinationofforceconstant ,ideaofvibrationalfrequenciesofdifferentfunctionalgroups.
	3	Raman Spectrum
	4	
January	1	
	2	
	3	

	4	
February	1	
	2	
	3	Statistical thermodynamics, thermodynamic probability, Maxwell Boltzmann distribution.
	4	Bornoppenheimer approximation, partition function Factorization of partition function.
March	1	Photochemistry: thermal and photochemical processes.
	2	Laws of photochemistry: Grotthus-Draper law, Stark-Einstein, Jablonski diagram
	3	Qualitative description of fluorescence, phosphorescence, non-radiative processes
	4	Quantum yield, photosensitized reactions-energy transfer processes.
April	1	Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult's law.
	2	Colligative properties
	3	Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point.
	4	Applications in calculating molar masses of normal, dissociated and associated solutes in solution.
May	1	Phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule,
	2	Phase equilibria of one component system-Example water system
	3	Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead.
	4	

Signature

Lesson Plan

Name of the Assistant/ Associate Professor.....Ms.Yashika

Class and Section:..B.Sc 1st Year.....

Subject:..Chemistry.....

Session:..2023-2024.....

Month	Week	Topics
July	1	
	2	
	3	
	4	
August	1	Introduction-Atomic Structure, Dual behaviour of matter and radiation.
	2	De Broglie's relation, Heisenberg's uncertainty principle, concept of atomic orbitals.
	3	Significance of quantum numbers, radial and angular wave functions.
	4	Effective nuclear charge, Slater's rules, Revision and Test.
September	1	Classification of periodic table, Atomic and ionic radii, ionisation energy, electron affinity.
	2	Calculation of root mean square velocity, average velocity, and most probable velocity. Collision diameter, collision number, collision frequency
	3	Concept of Critical temperature, critical pressure, critical volume, relationship between critical constants and Van der Waal's constants.
	4	Revision and Test
October	1	Localized and delocalized chemical bond, Van der Waals interactions. Concept of resonance and its applications,
	2	hyperconjugation, inductive effect, Electromeric effect and their comparison.
	3	Curved arrow notation, homolytic and heterolytic bond fission. Types of reagents: electrophiles and nucleophiles.
	4	Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization and Pericyclic reactions. Reactive intermediates: Carbocations, carbanions, free radicals, carbenes
November	1	Revision and Test, Structure of liquids
	2	surface tension, refractive index, viscosity, vapour pressure and optical rotation.
	3	Classification of solids, Law of constancy of interfacial angles, law of rational indices.
	4	Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices.
December	1	X-ray diffraction, Bragg's law, Laue method, Rotating crystal method, Powder method.

	2	Revision and Test
	3	
	4	
January	1	
	2	
	3	
	4	
February	1	
	2	
	3	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.
	4	Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF ₂) size effects, radius ratio rule and its limitations, Concept of Lattice energy.
March	1	Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule.
	2	Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction.
	3	Nernst distribution law – its thermodynamic derivation, Nernst distribution law after association and dissociation of solute in one of the phases.
	4	Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes.
April	1	Wurtz reaction, Kolbe reaction, Corey- House reaction and decarboxylation of carboxylic acids, physical properties. Mechanism of free radical halogenation of alkanes: reactivity and selectivity.
	2	Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism.
	3	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.
	4	Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Van der Waals forces.
May	1	Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators). Semiconductors – Introduction, types, and applications.
	2	Revision and Test
	3	

Signature

Lesson Plan

Name of the Assistant/ Associate Professor: Nisha

Class and Section: B.Sc 3rd (Non Medical)

Subject: Physics (Paper 1) 1. Quantum Mechanics and Laser
2. Solid State and Nanotechnology

Session: 2023- 2024

Month	Week	Topics
July	1	
	2	
	3	
	4	
August	1	Semester - 5th
	2	
	3	
	4	Boundary between Classical and Quantum , Photoelectric effect , Compton effect .
September	1	Frank Hertz experiment, De broglie Hypothesis , Davisson Germer experiment ,G.P Thomson experiment .
	2	Phase velocity, Group velocity, Heisenberg 's uncertainty Principle, Gamma Ray Microscope, Electron diffraction from slit .
	3	Derivation of Schrodinger Wave equation , Eigen value, Eigen function and significance , Orthogonality of function .
	4	Normalisation of function, Concept of observable and operator , Expectation value of Dynamical Quantities .
October	1	Probability current Density , Numerical Problems .
	2	Free Particle in one Dimensional box, Nodes and Antinodes, Zero point energy, One dimensional step potential $E > V_0$.
	3	ONE Dimensional Step Potential $E < V_0$, Tunneling effect, Linear Harmonic oscillator .
	4	Quantization of energy for oscillator, Zero point Energy, wave equation of Harmonic oscillator .
November	1	Property of Laser (Intensity, Directionality) Property of Laser (Coherence, Monochromaticity) .
	2	Einstein's coefficients and possibility of amplification , Momentum transfer , Life time of a level.
	3	Kinetic of optical absorption, population inversion, resonance cavity .
	4	Laser pumping , threshold condition for laser action, line broadening mechanism, Homogeneous line broadening
December	1	Inhomogeneous , line broadening, working of He- Ne and Ruby laser.
	2	Construction and working of semiconductor laser , application of laser .
	3	
	4	
January	1	



	2	
	3	
	4	
February	1	Semester - 6th
	2	
	3	Unit I: Crystal Structure I :- Crystalline and glassy forms, liquid crystals , crystals structure, periodicity , lattice and basic crystal translational vectors and axes .
	4	Unit cell and primitive cell, winger seitz primitive cell .Unit cell and Primitive Cell, Winger Seitz primitive Cell, symmetry operations for a two dimensional crystal, Bravais lattices in two and three dimensions.
March	1	Crystal planes and Miller indices, Interplaner spacing, Crystal structures of Zinc Sulphide, Sodium Chloride and Diamond. Unit II: Crystal Structure II :- X-ray diffraction.
	2	X-ray diffraction, Bragg's Law and experimental X-ray diffraction methods. K-space and Reciprocal lattice and its physical significance, Reciprocal lattice vectors.
	3	Reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c. Unit III: Super conductivity Historical introduction, Survey of superconductivity,
	4	Super conducting systems, High Tc Super conductors, Isotopic Effect, Critical Magnetic Field, Meissner Effect, London Theory and Pippards' equation, Classification of Superconductors (type I and Type II), BCS Theory of Superconductivity,
April	1	Flux quantization, Josephson Effect (AC and DC), Practical Applications of superconductivity and their limitations, power application of superconductors.
	2	Numerical Problem ,Their limitations, Power application of superconductors.
	3	Unit IV: Introduction to Nano Physics Definition, Length scale, Importance of Nano-scale and technology.
	4	History of Nan- technology, Benefits and challenges in molecular manufacturing. Molecular assembler concept, Understanding advanced capabilities.
May	1	Vision and objective of Nano-technology, Nanotechnology in different field, Automobile, Electronics.
	2	Nano-biotechnology, Materials, Medicine , Numerical Problem.
	3	
	4	

