

Lesson plan (2022-23)
 Teachers name - Rachna
 Class - B.Sc (Non-medical)
 Sem. - 1st (odd)

Subject - Electricity, magnetism & Electromagnetic Theory

Week 1-2 Gradient of a scalar and its physical significance, Line, surface, volume integral of vector, Flux, divergence, curl of vector field, Gauss's divergence, Stoke's theorem, Physical significance of divergence, curl and of vector field, Test

Week 3-5 Derivation of electric field \vec{E} from potential as gradient, Derivative of Laplace and Poisson equations, electric flux, Gauss's law, Mechanical force of charged surface Energy per unit volume, Test

Week 6-7 Magnetism: Magnetic induction, Magnetic flux, Solenoidal nature of vector field of induction, Properties of \vec{B} . i) $\nabla \cdot \vec{B} = 0$ (ii) $\nabla \times \vec{B} = \mu_0 \vec{J}$, Revision Assignment Allot

Week 8-10 Electronic theory of dia and paramagnetization, Domain theory of ferromagnetism, Cycle of magnetization - Hysteresis loop, Energy dissipation Hysteresis loss and important of Hysteresis curve, Assignment taken.

Week 11-13 Revision lec., Maxwell equations and their derivations Displacement current vector and scalar potentials Boundary conditions at interface between two different media, test, doubt class.

Week 14-15 Propagation of electromagnetic wave (Basic idea) Poynting vector and Poynting theorem. wave equation in free space, nature and characteristic of electromagnetic waves, test.

Week 16-17 Revision lec., Alternating, direct current, mean value, root mean square value of alternating current, measurement of A.C, Alternating current circuit (theory), test.

Week 18-19 Operator \vec{J} , A.C circuit with resistance, A.C circuit with inductance, A.C circuit with capacitance, A.C circuit Resistance & inductance, A.C circuit with resistance and capacitance, A.C circuit with capacitance and inductance, A.C circuit Resistances.

Lesson plan

Teacher name - Rachna

Class - B.Sc (Non-medical)

Sem. - IInd

Subject - Properties of Matter & Kinetic Theory of Gases

Session (2022-23)

Week 1-2	Rotation of rigid body, Moment of inertia, Torque, angular momentum, kinetic energy of rotation. Theorem of perpendicular and parallel axis (with proof). Moment of inertia of solid sphere, hollow sphere, spherical shell, test.
Week 3-5	Solid cylinder, hollow cylinder and solid bar of rectangular cross section, Fly wheel, Moment of inertia of an irregular body, Acceleration of a body rolling down on an inclined plane, test.
Week 6-7	Elasticity, Stress and strain, Hooke's law, Elastic constant and their reactions, Poisson's ratio, Torsion of cylinder and twisting couple, Determination of co-efficient of modulus of rigidity for the material of wire by Maxwell's needle, test.
Week 8-10	Bending of beam (Bending moment and its magnitude) Cantilever and Centrally loaded beam, test, Determination of Young's modulus for the material of the beam and elastic constants for the material of the wire by Searle's method, test.
Week 11-13	<u>Kinetic theory of Gases-1</u> : Assumption of kinetic theory of gases, Pressure of an ideal gas (with derivation), Kinetic interpretation of temperature, Ideal gas equation, Degree of freedom, Law of equipartition of energy, and its application for specific heat of gases test.
Week 14-15	Real gases, Van der Waal's equation, Brownian motion (qualitative), test <u>Kinetic theory of Gases-2</u> : Maxwell's distribution of speed and velocities (derivation) req. test.
Week 16-17	Experimental verification of Maxwell's law of speed distribution, Most probable speed, test & Numericals.
Week 18-19	Average and r.m.s speed. Mean free path, transport of energy and momentum, diffusion of gases, test, Revision

Lesson plan

Teacher name - Rachna

Class - B.Sc (non-medical) Sem - ~~old~~ IIIrd

Subject - Wave and optics - I

Session - (2022-23)

Week 1-2

Interference-I: Interference by division of wave-front: Young's double slit experiment, coherent source conditions of interference, Fresnel's biprism and its applications to determine the wavelength of Na light.

Week 3-5

Revision lecture, Fresnel's biprism application to thickness of mica sheet, Lloyd's mirror, Difference between Bi-prism and Lloyd mirror fringes, phase change on reflection (Stoke's law) test.

Week 6-7

Interference-II Interference by division of amplitude: plane parallel thin film, production of colours in thin films. Classification of fringes in films. test, Revision, test

Week 8-10

Interference due to transmitted light and reflected light, wedge shaped film, Newton's rings, Interferometers: Michelson's interferometer and its applications to i) standardization of meter, ii) determination of wavelength, test.

Week 11-13

Diffraction-I: Huygen's - Fresnel's theory of diffraction, Fresnel's half period zones, zone plate, difference between convex lens & a zone plate, Revision, test Assignment allot.

Week 14-15

Assignment taken, Difference b/w interference and diffraction of light, Classification of Diffraction, Diffraction at a straight edge, diffraction at rectangular slit, diffraction at a circular aperture analytical treatment of diffraction at circular aperture test.

Week 16-17

Diffraction-II (Fraunhofer's Class), Fraunhofer diffraction at single slit analytical treatment of intensity distribution in the diffraction pattern at single slit, Fraunhofer diffraction at double slit, difference between single slit and double slit diffractions, test.

Week 18-19

Plane diffraction grating, diffraction at 'N' slits, width of principal maxima, Absent spectra, dispersive power of grating, Comparison of Grating & prism Spectra, Resolving power of grating, test, Revision.

Lesson Plan

Teacher Name: Rachna

CLASS : B.Sc (Non-medical) sem-IVth
 Subject : Wave and optics - II
 Session : (2022-23)

Week - 1-2	<u>Polarization</u> : Polarization by reflection, refraction and scattering, Malus law, phenomenon of double refraction, Huygen's wave theory of double refraction (Normal and Oblique incidence). Analysis of polarized light, test.
Week 3-5	Nicol prism, Quarter wave plate and half wave plates, production and detection of i) Plane polarized light ii) Circularly polarized light and iii) Elliptically polarized light optical activity. Fresnel's theory of optical rotation, test.
Week 6-7	Specific rotation, polarimeters (half shade and Biquad ²) <u>Fourier analysis</u> : Fourier theorem and Fourier series, evaluation of Fourier co-efficients, importance and limitation of Fourier theorem, even and odd functions, test.
Week 8-10	Fourier series of function $f(x)$ between i) 0 to 2π ii) $-\pi$ to π iii) $-L$ to L , complex form of fourier series test, application of Fourier theorem for analysis of complex waves: Solution of triangular and rectangular waves, half and full wave rectifier outputs, Parseval identity for Fourier series, test.
Week 11-12	Fourier integral. <u>Fourier transforms</u> : Fourier transform and its properties, Application of Fourier transform i) for evaluation of integrals ii) for solution of ordinary differential equations (iii) to following function i) $f(x) = e^{-x/2}$ ii) $f(x) = \begin{cases} 1, & x < a \\ 0, & x > a \end{cases}$, test.
Week 13-14	<u>Geometrical optical - I</u> : Matrix methods in parallel optics, effect of translation and refraction and reflection, derivation of thin lens and thick lens formulae, test unit plane, nodal planes, system of thin lenses.
Week 15-16	<u>Geometrical optical - II</u> : Chromatic, spherical, coma, astigmatism and distortion aberrations and their remedies, test. <u>Fiber optics</u> : Optical fiber, critical angle of propagation.
Week 17-18	Mode of propagation, acceptance angle, Fractional refractive index change, Numerical aperture, Types of optics fiber, Normalized frequency, pulse dispersion, attenuation, applications. Fiber optics, communication, Advantages, test, Revision.

Lesson plan

Teacher name - Rachna

Class - B.Sc (Non-medical) sem. - IIth

Subject - Nuclear Physics

Session - (2022-23)

Week 1-2	Nuclear structure & properties of Nuclei: Nuclear composition, mass, binding energy, systematics of nuclear binding energy, nuclear stability, Nuclear size, spin, parity, statics, magnetic dipole moment, quadrupole moment Revision lec., test
Week 3-5	Determination of mass by Bain-Bridge. Bain Bridge and Jordon mass spectrograph. Determination of charge by Mosley law, Determination of size of nucleus by Rutherford Back scattering, test
Week 6-7	<u>Nuclear radiation decay process</u> :- Alpha-disintegration & its theory. Energetics of alpha-decay. Origin of continuous β -spectrum, types of β -decay and energetics of β -decay, nature of γ -rays. Energetics of γ -rays, test.
Week 8-10	<u>Radiations interaction</u> : Interaction of heavy, charged particles: Energies loss of heavy charged particle. Range formula and straggling of α -particles. Geiger-Nuttal law. Interaction of light charged particles. Energy loss of β -particles. Range of e^- , absorption of β -particles. Interaction of γ -ray: Passage of γ -radiations, revision
Week 11-13	test, electron-positron annihilation. Absorption of γ -rays and its application. <u>Nuclear Accelerators</u> : ionization chamber, proportional counter, G.M counter, Scintillation counter and semiconductor detector, Revision, test.
Week 14-15	<u>Nuclear Reactions</u> : Nuclear reactions, Elastic scattering, Inelastic scattering, Nuclear disintegration, photonuclear reaction, Radiative capture Direct-reaction, Heavy ion reaction and spallation reactions, test.
Week 16-17	Conservation laws, Q-value and reaction threshold. <u>Nuclear Accelerators</u> : Linear accelerator, Tandem accelerator, cyclotron, Betatron accelerator, Revision test.
Week 18-19	<u>Nuclear Reactors</u> : Nuclear Reactors, General aspects of Reactor design, Nuclear fission and fission reactors, (Principle, construction, working and uses. Revision, test.

Lesson plan

Teacher's name - Rachna

Class - B.Sc (Non-medical)

Sem - VIth

Subject - Atomic and molecular spectroscopy

Session (2022-23)

Week 1-2	Introduction of early observations, emission and absorption spectra, atomic spectra, wave no., spectrum of H-atom in Balmer series, Bohr atomic model (Bohr's postulates), spectra of Hydrogen atom, explanation of spectral series in absorption spectra, effect of nuclear motion on line spectra, variation in Rydberg constant, test.
Week 3-5	Shortcomings of Bohr's theory. Wilson Sommerfeld quantization rule, de-Broglie interpretation of Bohr quantization law, Bohr's corresponding principle, Sommerfeld's extension of Bohr's model. Sommerfeld relativistic correction, shortcomings of Bohr-Sommerfeld theory, vector atom model, space quantization, electron spin, coupling of orbital, test.
Week 6-7	spin angular momentum, spectroscopic terms and their notation, quantum no's associated with vector atom model, transition probability and selection rule. <u>Vector atom model</u> : Orbital magnetic dipole moment, behaviour of magnetic dipole in external magnetic field; <u>Larmor's precession and theorem</u> , Penetrating and non-penetrating orbits, test.
Week 8-10	Penetrating orbits in the classical model, quantum defect, spin orbit interaction energy of the single valence e ⁻ , spin orbit interaction for penetrating and non-penetrating orbits, quantum mechanical, relativity correction, Hydrogen fine spectra, Main features of alkali spectra & their theoretical interpretation, term series and limits, Rydberg-Ritz combination principle, Absorption spectra of alkali atoms.
Week 11-12	Observed doublet fine structure in the spectra of alkali metals and its interpretation, intensity rules for doublets, comparison of Alkali spectra and H-spectrum test. <u>Vector atom model</u> : Essential feature of spectra of Alkaline-earth elements, vector model for two valence e ⁻ atom, application of spectra. <u>Coupling schemes</u> : LS coupling, jj coupling interaction energy in LS coupling, Lande interval rule test.
Week 13-14	Pauli principle and periodic classification of elements, interaction energy in JJ coupling, equivalent and non-equivalent electrons, Two valence electron system - spectral terms of non-equivalent and equivalent electrons, comparison of spectral terms of L-S and J-J coupling, Hyperfine structure of spectra lines, test.
Week 15-16	isotope effect, nuclear spin. <u>Atom in external field</u> : Zeeman effect. Experimental setup for studying Zeeman effect, Explanation of normal Zeeman effect, Explanation of anomalous Zeeman effect, Zeeman pattern D ₁ and D ₂ lines of Na-atom, Paschen-Back effect of a single valence electron system, weak field Stark effect of H-atom.
Week 17-18	test, General consideration of molecular physics, Electronic states of diatomic molecules, Rotational Spectra, vibrational Spectra, Rotator Model of diatomic molecule, Raman effect, Electronic spectra, test, Revision.

Lesson Plan

Teacher Name - Poonam

CLASS - B.Sc I

Subject - Inorganic & Physical (Section A)

Session - (2022-23)

week 1-2	Atomic Structure → de Broglie, Heisenberg uncertainty principle, Quantum no, ψ, ψ^2 , shapes - s, p, d, f, Aufbau and Pauli exclusion Principle, electronic configuration, Slater Rule, Application, Revision Lec. Test →
weeks 3-5	Periodic table and atomic Properties → Classification of periodic Table → s, p, d, f block, atomic radii, Ionic radii, ionisation energy, electron affinity, electron negativity Trend in periodic Table, electronegativity scale. Test
week 6-7	Covalent Bond → VBT & its Limitation, hybridisation shapes, VSEPR Theory. MOT [N_2, O_2, CO, NO] Bond energy, Bond angle, Bond length, dipole moments Assignment to Allot & Revision
week 8-10	Large ionic character for dipole moment. Revision Lec. Assignment taken, Test of chapter. <u>Ionic Solid</u> :- Ionic structure Radius Ratio Rule its limitation stoichiometric and non stoichiometric defect, lattice energy, Born Haber cycle. Solvation energy, Polarising power, Fajan Rule - Test taken
week 11-13	<u>Physical Chemistry</u> → <u>Gaseous State</u> → Kinetic Molecular Theory of gases, Maxwell's distribution of velocity, calculation of root mean square, velocity average velocity, mean free path, collision number, collision frequency
week 14-15	frequency van der Waals equation, application, Boyle temp, Revision lecture <u>Critical Phenomenon</u> → Critical temp, critical pressure, critical volume Continuity of state, Relationship between critical constant and van der Waals constant. Law of corresponding states Test for chapter
week 16-17	<u>Liquid</u> → Revision class for inorganic chemistry transition <u>Numerical problems of Physical Chemistry</u> <u>Solid State</u> → Revision class for Physical Chemistry
week 18-19	Law of Rational Equivalents, <u>Crystal Structure</u> , <u>Seven crystal system and Bravais lattice</u> , <u>Miller indices</u> , <u>Unit cell</u> , <u>Space lattice</u> , <u>Bragg's law</u> , <u>Laue method</u> , <u>rotating method</u> , <u>Powder method</u> . Test <u>Revision of chapters</u> . Test.

Lesson Plan

Teacher Name → Poonam

Class: B.Sc I

Subject: Inorganic, Physical, section B
Session (2022-23)

Week 1-2	Hydrogen bonding and van der Waals forces → H. bonding - Definition type, effect of H-bonding, Brief discussion of various types of van der Waals forces. Metallic Bond Introduction
Week 3-5	Idea of valence bond → theories, Semiconductor → Introduction, types and application. Test. S-Block → Comparative study, diagonal relationship, Lithium & Beryllium, hydride, oxide, halides, behaviour of liquid NH_3 . Revision
Week 6-7	Chemistry of Noble gases → Physical properties; low chemical reactivity, chemistry of Xenon, structure, Test.
Week 8-10	P-Block elements → Electronic configuration, radii, metallic character, M.Point, I.E, EA, electronegativity, inert pair effect. Test. Boron family → Diborane, Borazine. Revision
Week 11-12	Carbon family and Nitrogen family → Catenation, Carbide, silicate, oxide →, oxyacids, Revision, Test Oxygen family → Oxyacid, H_2O_2
Week 13-14	Halogen family → interhalogen, oxyacid, acidic strength. Physical chemistry → Electrochemistry → Conductance, Variation with concentration, Arrhenius theory of ionisation, Ostwald dilution
Week 15-16	Debye Hückel Onsager equation. Application of Kohlrausch law; Application of conductivity measure - degree of dissociation, Solubility product,
Week 17-18	Definition of pH, Buffer solution, Henderson-Hassel equation. Revision class. Sessional Test. Doubt class.

Lesson Plan
 Teacher Name Poonam
 Class : B.Sc II
 Subject : Physical Chemistry & Inorganic sec B
 Session (2022-23)

Week 1-2	<p><u>Thermodynamic</u> → System, Surrounding, Intensive properties, Extensive properties, State & path function, Thermodynamic Processes, Thermodynamic equilibrium, first law, Heat capacity</p>
Week 3-5	<p>Joule Thomson, Calculation of w, q, du, dh for expansion of ideal gas under isothermal, adiabatic for reversible process. Revision class. — Test. Assignment ALOT</p>
Week 6-7	<p><u>Chemical Equilibrium</u> → Equilibrium constant and free energy, μ, Thermodynamic Derivation of Chemical equilibrium Clausius-Clapeyron equation and application — Test. Doubt class. Assignment taken.</p>
Week 8-10	<p><u>Distribution Law</u> → Nernst Law - Application of distribution law → degree of hydrolysis, Determination of equilibrium constant of potassium triiodide complex. Process of extraction.</p>
Week 11-13	<p>Numerical problem → Revision class, Sessional Test. <u>Inorganic Chemistry</u> → Coordination Compound → Werner Theory, EAN, chelate, nomenclature, isomerism, VBT.</p>
Week 14-15	<p>Revision class, Test, <u>Non-aqueous solvent</u> → Physical properties, type of solvent, General characteristics, reaction in non-aqueous solvent → $4NH_3, H_2SO_4$</p>
Week 16-17	<p>Revision class, Test. Seminar Representation. — Revision classes.</p>
Week 18-19	<p>Numerical Problems. — do — — do —</p>

Lesson Plan

Teacher Name Poonam

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Class B.Sc II
 Subject: Inorganic, Physical Section A.
 Session (2022-23)

Week 1-2	Lanthanides → electronic structure, oxidation state, magnetic properties, complex formation, occurrence, separation of Lanthanide, Ln compound, Revision class. Test
Week 3-5	Actinides, characteristic of Ac, chemistry of separation of Np, Pu, Am from U, transuronic element, comparison b/w Ln, Ac and d-block element. Revision class, Test. Assignment class.
Week 6-7	Theory of qualitative and quantitative Analysis → various group of basic and acidic radical, Assignment
Week 8-10	Chemistry of interference of radical, common ion effect, solubility product, Theory of precipitation, Co-precipitation, post ppt, Purification of ppt. Assignment Taken.
Week 11-12	Revision class. Sessional Test. Physical chemistry → Thermodynamic → Second law of Thermodynamic, Carnot Theorem, concept of entropy
Week 13-14	Third law of Thermodynamic, Nernst heat theorem. Residual entropy, Gibbs & function, Helmholtz function (A), G as criteria for equilibrium.
Week 15-16	variation of G with P, v and T. Revision class. Test. Numerical Problem. Revision class
Week 17-18	— Test — — Test —

LESSON PLAN

Teacher Name / Moonam

CLASS - B.Sc III

Subject - Inorganic Chemistry, Physical Chemistry (A)
 Session - (2022-23)

Week 1-2	Metal-ligand Bonding in Transition metal complex \rightarrow Limitation of VBT, CFT, CFSE for oh, td, SP, factor affecting CFSE. Limitation of CFSE. Revision class. TEST.
Week 3-5	Thermodynamic and kinetic Aspect of Metal complex \rightarrow Thermodynamic stability of metal complex, factor affecting stability. Substitution reaction of s.p. Complex of Pt Transition metal. Allotment of Assignment
Week 6-7	Test - Magnetic Properties of Transition metal complex \rightarrow Type of magnetic material, magnetic susceptibility. Spin only formula. L-S coupling, Correlation of μ_{obs} & μ_{eff} : Assignment taken
Week 8-10	Application of magnetic moment for 3d Sessional Test. Electronic spectra of Transition metal complex \rightarrow Selection rule for d-d Transition, spectroscopic ground state
Week 11-13	Spectrochemical series, Orgel level diagram for d^1 & d^9 Discussion of electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion. Test.
Week 14-15	Physical chemistry: \rightarrow Quantum mechanics \rightarrow Black body Radiation, Planck's radiation law, Photoelectric effect, Heat capacity, Compton effect, wave function & significance. Quantum mechanical operator, commutation relation.
Week 16-17	Hamiltonian operator, Hermitian operator, Role of operator in QM. To show quantum mechanically that position and momentum cannot be predicted simultaneously. Determine the wave function & energy of particle in 1D.
Week 18-19	Pictorial Representation and its significance. Revision classes. Test.

Lesson Plan
Teacher Name: Poojyam

12

CLASS ; B.Sc III

Subject : Inorganic & Physical Chemistry Section B

Session : (2022-23)

Week 1-2	Acid & Bases → Arrhenius, Bronsted Lowry, Lux Flood, Solvent System and Lewis Concept of Acid & bases, relative strength of Acid and bases, levelling solvent, hard and soft acid and bases (HSAB), Application of HSAB. Revision class.
Week 3-5	Test. Organometallic Chemistry → Definition, Classification, nomenclature of organometallic compound, Preparation, properties, & bonding of Alkyl of Li, Al, Hg, Sn, hapticity. Structure and bonding in metal ethylenic complex. Structure of ferrocene.
Week 6-7	metal carbonyl → Preparation, Properties, Revision class. Assignment alot. Bio inorganic chemistry → metal ion present in biological system, metalloporphyrins with reference to Hb & Mb
Week 8-10	Biological role of Na^+ , K^+ , Ca^{2+} , Mg^{2+} , Fe^{2+} ions, Co-operative effect, Bohr effect, Revision class, Test Assignment Assignment Taken.
Week 11-13	Silicones and Phosphazenes → Nomenclature, classification, preparation and uses of silicones, elastomer, polysiloxane copolymer, Poly Phosphazene and bonding.
Week 14-15	Test. Physical Chemistry → Solution, Dilute solution and colligative Properties → ideal & non-ideal solution; Dilute solution, Raoult law, colligative properties
Week 16-17	Thermodynamic Relation b/w T_b & T_f . Abnormal molar masses. Revision class. Phase equilibrium → Phase, component & degree of freedom, Gibbs phase Rule, one component system,
Week 18-19	Phase equilibrium for two component system, desilverisation of lead. Revision class, Test.

Lesson Plan.

Teacher Name. Poonam 13

CLASS : BSc I

Subject : Organic & Physical (Sec-13)

Session (2022-23)

Week 1-2	<u>Structure and Bonding</u> :- Introduction, Bond energy, localised and delocalised chemical Bond, vanderwall attractive force affecting vanderwaal's forces. <u>Test</u> vanderwall radii, vanderwall repulsion. Resonance and resonance effect.
Week 3-5	Resonance energy, condition for resonance, Hyperconjugation or no-bond resonance, inductive effect, over transmission effect, electromeric effect, Relative stability of alkenes, Boiling point & m.p. of compound. <u>Test</u>
Week 6-7	<u>Structure and Bonding Test</u> , <u>Stereochemistry</u> → Introduction, Isomerism, Types of Isomerism, structural isomers, Types stereoisomerism, types of stereoisomers. optical isomerism optical activity. element of symmetry, enantiomers & diastereom. <u>Assignment</u> Allot <u>Revision</u> .
Week 8-10	Chiral, achiral molecule, with stereogenic centre, Inversion, retention, racemization. Relative & absolute configuration. R & S confi. e.g. E & Z system. Geometrical isomers. Limitations of ^o Cis/trans. Conformations :- ethane, butane. staggered eclipsed. Newmann Proj. & sawhorse, conformation of cyclohexane. <u>Diff. blue conformation</u> .
Week 11-13	<u>Assignment</u> taken. <u>Mechⁿ of organ Rxⁿ</u> → Notations of arrows, Bond fission, Types of Reagents and Rx ⁿ . Reactive Intermediate. <u>Alkane & Cycloalkanes</u> → IUPAC, isomerism, methods of formation. Reactivity & selectivity, Nomenclature, Synthesis of cycloalkanes. <u>Bayre's strain Theory</u> , <u>Theory of strainless Rings</u> . <u>Test</u> .
Week 14-15	<u>Liquid state</u> → structure of liquid, Properties of liquid → surface tension, vapour pressure etc. <u>Solid state</u> → Classification of solid, Law of constancy.
Week 16-17	Law of Rational indices, miller indices, Idea of symmetry. seven crystal system and Bravais lattice, Bragg's law, Laue method, rotating method, powder method. <u>Test</u> .
Week 18-19	• Revision By chapters. • Sessional.

Lesson Plan

Teacher Name - POONAM

14

Class - Bsc II

Subject - Organic & Inorganic (Sec A)

Session (2022-23)

Week 1-2	<u>Alcohols</u> → Monohydric alcohol, Nomenclature, Methods of formation. Hydrogen bonding. Acidic nature. Reaction of alcohol. Dihydric alcohol - Nomenclature.
Week 3-5	Methods of formation. Chemical rxn of vicinal glycols. Oxidative cleavage of pinacol - pinacolone rearrangement. <u>Phenols</u> → Nomenclature, structure and bonding. Prep ⁿ of phenol. Physical properties & acidic character. Acidic strength of Alcohol.
Week 6-7	Acidic strength of phenol, Resonance stabilization. Electrophilic aromatic substitution of phenol. Naming reactions. <u>Epoxides</u> → Synthesis of epoxide, acid base catalysed of Rx ⁿ , Reaction of Grignard and organolithium reagent with epoxide.
Week 8-10	<u>UV spectroscopy</u> → Beer Lambert law, molar absorptivity, UV Types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. change in intensity and position of absorption band, Woodward Fieser Rule. Application of UV.
Week 11-13	Assignment Taken. <u>Carboxylic acid and Acid Derivatives</u> → Nomenclature of acid and Derivatives, Physical properties. acidity of carboxylic acids. Preparation of carboxylic acid. Reaction of carboxylic acid. Stability of acyl derivatives - Mech ⁿ of esterification and Hydrolysis.
Week 14-15	<u>Inorganic Chemistry</u> → d-Block → Transition elements. General characteristics and properties of d-block elements. Comparison of 3d with 4d & 5d elements. Stability of oxidation states. Structure and properties of TiO ₂ , VOCl ₂ , FeCl ₃ , CuCl ₂ , Ni(OH) ₂ .
Week 16-17	Test, Revision of Organic Chemistry.
Week 18-19	Revision of Organometal Chemistry. Revision of Inorganic Chemistry. Sessional.

Lesson Plan

Teacher Name - Poonam

15

CLASS : Bsc III

Subject : Organic & Physical (Sec B)

Session : (2022-23)

Week 1-2	<u>NMR Spectroscopy</u> & Principle of NMR, PMR spectrum, no. of signals, peak areas, equivalent, non-equivalent protons, chemical shift, shielding, deshielding of protons, proton coupling, splitting, coupling constants, magnetic equivalence of proton Test.
Week 3-5	Discussion of PMR spectra. <u>Carbohydrates</u> : Classification. Monosaccharides, osazone formation, interconversion of glucose & fructose, chain lengthening, chain shortening - Epimers. Erythro and threo. Test. Assignment allot.
Week 6-7	Formation of glycosides, cyclic structure, mutarotation structure of ribose and deoxyribose. Saccharides, and polysaccharides. Test Assignment Taken.
Week 8-10	<u>Organometallic Compounds</u> - Organomagnesium compounds, organozinc compounds, organolithium compounds. Their formation and chemical rx ⁿ . Test.
Week 11-13	<u>Physical Chemistry</u> → <u>Spectroscopy</u> → Electromagnetic spectrum, Born oppenheimer approximation. Degree of freedom. <u>Rotational Spectroscopy</u> → Energy level of rigid rotator. Selection Rules, energy, spectra of diatomic molecules.
Week 14-15	<u>Vibrational Spectroscopy</u> → pure vibration spectrum, determination of force constant and qualitative relative of force constant and bond energy. <u>Raman Spectroscopy</u> → polarizability. Raman spectra of diatomic molecules.
Week 16-17	Selection Rules. Quantum Theory. Numericals. Test. Revision of Spectroscopy. More Practice on Numericals.
Week 18-19	Revision of Organic Chemistry. Revision of Physical Chemistry (Sessional).

Lesson Plan

Teacher Name - Poonam

16

CLASS : BSc I

Subject : Organic & Physical (Sec. A)

Session : (2022-23)

Week 1-2	<u>Alkenes</u> → Naming, Mech. of dehydration of alcohol and dehydrohalogenation of alkyl halide. The Saytzeff Rule, Hoffmann elimination, Physical and chemical properties. Relative stability of alkenes.
Week 3-5	<u>Arenes and Aromaticity</u> → Naming, Aromaticity, Huckel Rule, aromatic, non-aromatic, antiaromatic, Aromatic electrophilic substitution reaction. Energy profile Diagram. Activity, deactivating and orientation. Test.
Week 6-7	<u>Dienes And Alkynes</u> → Naming, classification of dienes, structure of butadiene. Chemical reactions. Naming of Alkynes. Method of formation. Chemical reactions, acidity of alkynes. Mechanism of electrophilic and Nucleophilic addition rxn.
Week 8-10	<u>Hydroboration-oxidation of alkynes</u> - Test. <u>Alkyl and Aryl halide</u> → Nomenclature and classes of alkyl halide, methods of formation, chemical reactions. Mech ⁿ and stereochemistry of Nu [⊖] substitution Rx ⁿ of alkyl halide - S _N ² and S _N ¹ Rx ⁿ .
Week 11-12	Formation and rx ⁿ of aryl halide. The addition elimination and elimination addition in aromatic substitution reaction. Relative reactivities of alkyl halide as allyl, vinyl and aryl halides. <u>Physical Chemistry</u> → Rate of reaction, rate of
Week 13-14	equation, Types, factor influencing the rate of a reaction. Concentration, temperature, pressure solvent, light catalyst. Order of rx ⁿ , integrated rate law of zero order, first order second order & third order. Half life period of a rx ⁿ .
Week 15-16	Effect of temp. on the rate rx ⁿ - Arrhenius eq. Theories of reaction rate - simple collision theory for unimolecular collision. Transition state. Theory of Bimolecular rxn. Test.
Week 17-18	Revision of Organic chemistry. Revision of Physical chemistry. Sessionals.

Lesson Plan.

Teacher Name Poonam

17

CLASS : BSc II

Subject : Organic & Sec-B. (Physical)

Session : (2022-23)

Week 1-2	<u>IR Spectroscopy</u> → Molecular vibrations, Hook's law, measurement of IR spectra, fingerprint region, characteristic absorption of various func ⁿ gp and interpretation of organic compound. Applications of IR. Test.
Week 3-5	<u>Amines</u> → structure & Nomenclature. Physical properties. Separation of 1°, 2°, 3° amines. Basicity of amines. Preparation of alkyl and aryl amines. Electrophilic substitution in aryl amines. Rx ⁿ with amines with nitrous acid.
Week 6-7	<u>Diazonium Salts</u> → Mech ⁿ of diazotisation, structure of Benzene diazonium chloride. Assignment allot. Synthetic application. <u>Aldehyde And Ketones</u> → Nomenclature. Synthesis of aldehydes. Physical properties. Comparison of aldehyde and ketones. Mechanism of Nu ⁻ add ⁿ . Naming Rx ⁿ . Revision of Naming Rx ⁿ . Test of Diazonium salts.
Week 8-10	<u>Physical Chemistry</u> . <u>Electrochemistry</u> → Electrolytic and Galvanic cells. Calculation of ΔG, ΔH & K. Types of reversible electrodes. Electrode reactions, Nernst equation, Standard Hydrogen electrode. Reference electrode, Standard E Pot.
Week 11-12	Concentration cell with & without transference. Daniel junction potential and its measurement. Application of E-MF measurement in solubility and potentiometric titration using glass electrode.
Week 13-14	Numerical problems. Test Revision of Organic Chemistry. Revision of Physical Chemistry.
Week 15-17	Revision Test. Doubt classes. Sessional.

Lesson Plan
Teacher Name - POONAM

18

CLASS ; Bsc III

Subject ; Organic & Physical (sec-B)

Session ; (2022-23)

Week 1-2	Organic synthesis via enolates \rightarrow acidity of α -H, alkylation of diethylmalonate and ethylacetoacetate. Synthesis. Test. <u>Heterocyclic Compound</u> . \rightarrow Molecular Orbital Picture.
Week 3-5	Aromatic character of pyrrole, furan, thiophene and pyridine. Synthesis, Chemical Reaction, Comparison of Basicity of pyridine, piperidine and pyrrole. Test. Assignment Allot.
Week 6-7	Preparation of Indole, quinoline and isoquinoline. And their reactions. Assignment Taken. Test. <u>Amino Acid, peptides & proteins</u> \rightarrow Acid base behaviour, Isoelectric point, electrophoresis - Preparation
Week 8-10	Classification of proteins. Analysis, Classical and solid phase synthesis - primary & secondary structures. <u>Synthetic Polymers</u> : Addition chain growth polymerisation.
Week 11-12	Ziegler Natta polymerisation. Polyesters, polyamides, Natural and synthetic rubbers. Test. <u>Physical Chemistry</u> \rightarrow <u>Solutions, Dilute solution and Colligative properties</u> \rightarrow Ideal and non ideal solution.
Week 13-14	Raoult's law, Colligative properties, Thermodynamic deviation b/w amount of solute and elevation in boiling and depression in freezing point, Abnormal molecular mass. <u>Phase Equilibrium</u> \rightarrow Phase Component. Test.
Week 15-16	Degree of freedom, Gibbs phase rule, Phase equilibria of one component system and two component system, desilverisation of lead. Test.
Week 17-18	Revision of organic & physical Sessional

Lesson Plan (Physics)

Teacher Name: Mamta

19

Class: B.Sc. (Non-Medical) Sem. I

Subject: Classical Mechanics and theory of Relativity

Session (2022-23)

Week 1-2	Mechanics of single and system of particles, Conservation law of linear momentum, Angular Momentum, Mechanical energy for a particle & a system of particles, Centre of mass and equation of motion. Revision Lec., Test.
Week 3-5	Constrained motion, Degrees of freedom & Generalized Co-ordinates; Transformation equations, Generalized Displacement, velocity, Acceleration, momentum, force & Potential. Revision Lec., Test
Week 6-7	Hamilton's variational principle, Lagrange's equation of motion from Hamilton's principle, linear harmonic oscillator, simple pendulum, Atwood's machine. Assignment Allot, Revision
Week 8-10	Revision Lec. Assignment taken, test of chapter. <u>Theory of Relativity</u> : - Frame of Reference, limitation of Newton's law of motion, Inertial frame of reference, Galilean transformation, frame of reference with acceleration.
Week 11-13	<u>Classical relativity</u> - Galilean invariance, transformation equation for frame of reference, Accelerated frame of reference, Rotating frame of reference, effect of centrifugal & Coriolis force due to Earth's rotation. Revision Lec., Test.
Week 14-15	Fundamental frame of reference, Michelson-Morley's experiment, concept of Einstein's Relativity. Revision Lec., Test. <u>Application of theory of Relativity</u> : - Special theory of Relativity
Week 16-17	Lorentz co-ordinate and Physical significance of Lorentz invariance, length contraction, Time Dilation, Twin Paradox, velocity addition theorem, variation of mass with velocity, Revision Lec. Test
Week 18-19	Mass energy equivalence, Transformation of rel. momentum and energy, Relation between rel. momentum & energy, mass, vel., momentum & energy of zero rest mass. Revision Lec., Test.

Lesson Plan

Teacher Name: Mamta

20

Class: B.Sc IT (Non-Medical) Sem: II

Subject: Semiconductor Devices.

Session: (2022-23)

Week 1-2	<u>Semiconductors</u> : Energy bands in solids, Intrinsic - extrinsic semiconductor, Hall effect, p-n junction diode, Zener & Avalanche breakdown, Zener diode as a voltage regulator, LED, Revision Lec., Test.
Week 3-5	Photoconduction in semiconductors, Photodiode, solar cell, p-n junction as a rectifier, Half wave & full wave rectifiers, Filters, Revision Lec., Test.
Week 6-7	<u>Transistor</u> : - Junction transistor, Working of NPN & PNP transistor, Common base, Common emitter, Common collector characteristics, Assignment Alot, Test.
Week 8-10	Assignment taken, Revision Lec., Advantages & disadvantages of CE configuration, D.C. load line Transistor biasing, Revision Lec., Test.
Week 11-12	<u>Transistor Amplifier</u> : - Amplifiers, classification of Amplifiers, coupling in Amplifiers, Resistance-Capacitor (R-C) coupled amplifiers, Revision Lec., Test.
Week 13-14	Feedback in amplifiers, Advantage of negative feedback, Emitter follower, Distortion in amplifiers., Revision Lec., Test.
Week 15-16	<u>Oscillators</u> : - Oscillators, Principle of oscillation, Classification of oscillators, condition of self sustained oscillation. Revision Lec. Test.
Week 17-18	Tuned collector common emitter oscillator, Hartley oscillator, C.R.O. (Principle & working) Revision Lec., Seminar (Representation.)

Lesson Plan

Teacher Name - Mamta

21

Class : B.Sc. (Non-Medical) sem : III

Subject : Computer Programming and Thermodynamics

Session : (2022-23)

Week 1-2	<u>Computer Programming</u> :- Computer organization, Binary representation, Algorithm development, Flow charts and their interpretation, Fortran Preliminaries : Integer and floating point arithmetic expression, built in functions, executable and non-executable statements, Revision Lec. Test
Week 3-5	Input & output statements, Formats, IF, DO and GOTO statements, Dim. arrays, Statement function and function subprogram. <u>Applications of FORTRAN Programming</u> : Algorithm flow chart and programming for print out of natural numbers, Range of set of given numbers, Ascending and descending order, Revision Lec. Test
Week 6-7	Mean and standard deviation, Least square fitting of curve, Roots of quadratic equation, Product of two matrices, Numerical integration (Trapezoidal rule and Simpson $\frac{1}{3}$ rule. Assignment Allot, Revision.
Week 8-10	Assignment taken, test of chapter <u>Thermodynamics - I</u> : Thermodynamic system and zeroth law of thermodynamics. First law of thermodynamics and its limitations, reversible & irreversible process, Second law of thermodynamics.
Week 11-13	Carnot theorem, Absolute scale of temperature, Joule's free expansion, Joule Thomson effect, experiment conclusion & explanation, analytical treatment of Joule Thomson effect. Revision Lec. Test.
Week 14-15	Entropy, calculation of entropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas, Nernst heat law (third law of thermodynamics), Liquefaction of gases, Solidification of H ₂ below 4K, Revision Lec. Test.
Week 16-17	Cooling by adiabatic demagnetization. <u>Thermodynamics II</u> : Derivation of Clausius - Clapeyron and Clausius latent heat equation & their significance, specific heat of saturated vapours, phase diagram and triple point of a substance.
Week 18-19	Maxwell thermodynamical relation, thermodynamical fn ⁿ : Internal energy (U), Helmholtz fn ⁿ , Entropy, Enthalpy, Gibbs fn ⁿ and relation b/w them. Application of Maxwell Relation, Clausius - Clapeyron & Clausius theorem, Revision Lec. Test.

Lesson Plan

Teacher Name: Mamta

22

Class: B.Sc. IInd

Sem. IV

Subject: Statistical Physics

Session: (2022-23)

Week 1-2	<u>Statistical Physics</u> : - I microscope & macroscopic systems, events - mutually exclusive, Probability, Statistical Probability, Probability theorem, Combination possessing minimum Probability, Revision Lec. Test.
Week 3-5	Micro and macrostates, thermodynamical Probability Constraints & Accessible states, statistical fluctuation, Entropy and Probability. Revision Lec., Test.
Week 6-7	<u>Statistical Physics</u> : - II Postulates of Statistical Physics, phase space, M.B. statistics applied to an ideal gas, Assignment Allot, Revision Lec.
Week 8-10	Assignment taken, test, Speed distribution law & velocity distribution law, Average speed, r.m.s. speed, avg. & r.m.s. velocity, most probable energy Revision Lec., Test.
Week 11-14	<u>Quantum Statistics</u> : - Need for quantum Statistics Box - Einstein energy, Application of B.E. Statistics Planck's radiation law B.E. gas. Revision Lec. Test
Week 13-14	Fermi-Dirac energy distribution, F.D. gas & degeneracy, zero point energy, M.B. distribution as a limiting case of B.E. & F.D.
Week 15-16	<u>Theory of specific heat of solid</u> : - Dulong and Petit's law, Specific heat at low temperature, Einstein theory of heat Revision Lec. Test
Week 17-18	Criticism of Einstein theory, Debye model of specific heat of solids, Comparison of Einstein and Debye theories, Revision Lec. Numerical class, Seminar.

Lesson Plan

Teacher Name - Mamta

23

Class: B.Sc. (Non-Medical) Sem: V

Subject: Quantum And LASER Physics.

Session: (2022-23)

Week 1-2	<u>Quantum Physics</u> : Overview, scale of quantum physics, boundary between classical and quantum phenomena, Photoelectric effect, Compton effect, Frank-Hertz experiment, de-Broglie hypothesis, Davisson and Germer experiment, phase velocity, group velocity & relation, Heisenberg's uncertainty principle.
Week 3-5	Wave-particle duality, Gamma Ray microscope, Derivation of T-D time dependent Schrodinger wave equation, Time-independent Schrodinger wave eq ⁿ , eigen values, eigen fn., wave fn. & its significance, Revision Lec., Test.
Week 6-7	Orthogonality and Normalization of fn., operator, expectation value of dynamical quantity, Probability current density. <u>Application of Schrodinger wave equation</u> : Free particle in one dimension, One dim. step potential, Assignment Allot
Week 8-10	Assignment taken, Test of chapter, Doubt class. One dim. potential barrier, solution of Schrodinger equation for harmonic oscillator. Revision Lec. Test.
Week 11-13	<u>LASER Physics - I</u> : Absorption and emission of radiation, main features of a Laser, Einstein's co-efficient and possibility of amplification. Revision Lec., Test.
Week 14-15 16	Line shape fn., Line Broadening mechanisms, A necessary condition for laser emission, resonance cavity, Laser pumping, Revision Lec., Test.
Week 16-17	<u>LASER Physics - II</u> He-Ne Laser, RUBY Laser (principle, construction & working), optical properties of semiconductor, Revision Lec. test.
Week 18-19	Semiconductor Laser (Principle, construction & working), Applications of LASER in the field of medicine & industry, Revision Lec., test.

Lesson Plan

Teacher Name: : Mamta

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Class : B.Sc.

Sem: VI

Subject : Solid State and Nano Physics

Session : (2022-23)

Week 1-2	<u>Crystal Structure I</u> : Crystalline and glassy forms, liquid crystals, crystal structure, periodicity, lattice and basis, unit cell and primitive cell, wings seitz primitive cell, Revision lec., Test
Week 3-5	Symmetry operations for a two dim. crystal, Bravais lattices in two and three dimension, Miller Planes, Interplaner spacing, crystal structure of ZnS and sodium chloride, Diamond, Revision lec., Test
Week 6-7	<u>Crystal Structure 2</u> :- X-Ray diffraction, Bragg's law, k -space, reciprocal lattice, Assignment Allet, Revision lec., Test
Week 8-10	Assignment taken, Reciprocal lattice vector, reciprocal lattice to a simple cubic lattice, b.c.c. and f.c.c., Revision lec., Test.
Week 11-12	<u>Superconductivity</u> : Sweeney of superconductivity superconducting system, High T_c super conductors Isotopic effect, Meissner effect, Revision lec., Test
Week 13-14	London theory and Pippard's equation, Flux quantization, Josephson effect (AC and DC) Power application of superconductors, Revision lec., Test
Week 15-16	<u>Nano Physics</u> :- Definition, Importance of Nano-scale and technology, History of Nano-technology Benefits in molecular manufacturing, Revision lec., Test
Week 17-18	Molecular assembler, Vision and objective of Nano-Technology, Nanotechnology in different field, Automobile, Electronics, Nano-biotechnology, Seminars