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| **Lesson Plan 2023-2024 (ODD SEMESTER)**Sub:- Physical Chemistry CLASS: B.Sc. First YearName:- Ms Bhavana Arora Department:- Chemistry

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| AUG  |  |
| 2nd WEEK | Gaseous States:Maxwell’s distribution of velocities and energies, |
| 3rd WEEK | Calculation of different types of velocities. |
| 4TH WEEK | Introduction to Real gases and Numericals |

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| **SEPT** |  |
| 1ST WEEK | Gaseous States :Deviation of Real gases from ideal behaviour, Derivation of Vander Waal’s Equation of State. |
| 2ND WEEK | Applications in the calculation of Boyle’s temperature |
| 3RD WEEK | Critical Phenomenon:- Critical temperature, Critical pressure, critical volume and their determination. PV isotherms of real gases |
| 4TH WEEK | Continuity of states, The Law of corresponding states. Liquefaction of gases. |
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| **OCT** |  |
| 1ST WEEK | **Liquid States** Structure of liquids. Properties of liquids – surface tension, viscosity vapour pressure and optical rotations and their determination. |
| 2ND WEEK | Test for internal assessment. Diwali Break |
| 3RD WEEK | Solid State Classification of solids, Laws of crystallography – (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements of crystals.  |
| 4TH WEEK | Definition of unit cell & space lattice. Bravais lattices, crystal system. Xray diffraction by crystals. |
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| **NOV**  |  |
| 1ST WEEK | Derivation of Bragg equation. |
| 2ND WEEK | Determination of crystal structure of NaCl, KCl. |
| 3RD WEEK | Difference between solids, liquids and liquid crystals, types of liquid crystals. - Applications of liquid crystals.  |
| 4TH WEEK | Revision  |

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| **Lesson Plan 2022-2023 (ODD SEMESTER)**Sub:- Physical and Organic Chemistry CLASS: B.Sc. Second YearName:- Ms Bhavana Arora Department:- Chemistry

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| **AUG**  |  |
| 1st WEEK | **Alcohols**- nomenclature, methods of preparation by reduction of aldehydes, ketones, carboxylic acids and esters. |
| 2nd WEEK  | Hydrogen bonding. Acidic nature |
| 3RD WEEK | Reactions of alcohols. methods of formation, chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4 ] and pinacol-pinacolone rearrangement.  |
| 4TH WEEK | 2. **Epoxides** Synthesis, Acid and base-catalyzed ring opening , orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides |

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| **SEPT** |  |
| 1ST WEEK | **Phenols** -Nomenclature, structure and bonding. Preparation , physical properties and acidic character. Comparative acidic strengths. |
| 2ND WEEK | Reactions of phenols — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe’s reaction and Schotten and Baumann reactions.. |
| 3RD WEEK |  **Ultraviolet (UV)**  (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts |
| 4TH WEEK | UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of max of simple conjugated dienes and , -unsaturated ketones. Applications of UV Spectroscopy. |
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| **OCT** |  |
| 1ST WEEK | **Carboxylic Acids & Acid Derivatives** –introduction,bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation, Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. Mechanism of decarboxylation. Structure , nomenclature and preparation of acid chlorides, esters, amides and acid anhydrides. Relative s tability o f acyl derivatives. Phys ical properties, interconvers ion of acid derivatives by nucleophilic acyl substitution. Mechanisms of es ter ifica tion and hydrolysis (acidic and basic). |
| 2ND WEEK | **Diwali Break****Thermodynamics-I**Introduction |
| 3RD WEEK | Heat capacities at constant volume and pressure and their relationship. Joule’s law – Joule – Thomson coefficient for ideal gas and real gas: and inversion temperature.**Thermodynamics-II** Calculation of w.q. dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process |
| 4TH WEEK | Temperature dependence of enthalpy, Kirchoffs equation and numericals |
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| **NOV** |  |
| 1ST WEEK | **Chemical Equilibrium** Equilibrium constant , concept of chemical potential, Thermodynamic derivation , Temperature dependence of equilibrium constant; Van’t Hoff reaction isochore, Van’t Hoff reaction isotherm  |
| 2ND WEEK | Le-Chatetier’s principle and its applications Clapeyron equation and Clausius – Clapeyron equation its applications.  |
| 3RD WEEK | **Distributioln Law Nernst distribution law** – its thermodynamic derivation, Modification of distribution law when solute undergoes dissociation, association and chemical combination. |
| 4TH WEEK | Applications of distribution law.Revision |

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| **Lesson Plan 2022-2023 (ODD SEMESTER)**Sub:- Physical Chemistry CLASS: B.Sc. Third YearName:- Ms Bhavana Arora Department:- Chemistry

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| AUG |  |
| 1ST WEEK  | **Quantum Mechanics-I** Black-body radiation |
| 2ND WEEK  | Compton effect |
| 3RD WEEK  | **Quantum Mechanics-I** Black-body radiation Plank’s radiation law, photoelectric effect.  |
| 4TH WEEK  | heat capacity of solids, wave function and its significance |

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| **SEPT** |  |
| 1ST WEEK | Postulates of quantum mechanics ,operators, commutation relations, Hamiltonial and Hermitian operator,Role of operators in quantum mechanics, |
| 2ND WEEK | Determination of wave function & energy of particle in one dimensional box, Pictorial representation and its significance |
| 3RD WEEK | **Physical Properties and Molecular Structure** Optical activity, polarization – (clausius – Mossotti equation). dipole moment, included dipole moment, measurement of dipole moment by different methods.  |
| 4TH WEEK | Dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination. |
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| **OCT** |  |
| 1ST WEEK |  Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetics. |
| 2ND WEEK | Diwali Break and revision |
| 3RD WEEK | **Spectroscopy-I** Electromagnetic radiation, statement of Bornoppenheimer approximation, Degrees of freedom. |
| 4TH WEEK | Numericals and test for internal assessment |
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| **NOV** |  |
| 1ST WEEK | **Rotational Spectrum** - Energy levels of rigid rotator ,selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect.  |
| 2ND WEEK | **Spectroscopy-II** **Vibrational spectrum** Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies |
| 3RD WEEK | anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of functional groups  |
| 4TH WEEK | **Raman Spectrum**: Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selectin rules |