**Lesson Plan [Academic Session 2023-24]**

**Class: B. Sc First Year [II semester]**

**Subject: Chemistry-II (B23-CHE-201)**

**Dr. Amit Kumar, Assistant Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2024** | **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.  **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. | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2024** | **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.  **Distribution Law:** Nerst distribution law-its thermodynamic derivation, Nerst distribution law after association and dissociation of solute in one of the phases, of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride  **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. | Mid Term Exam on Covalent Bond and Ionic solids  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2024** | **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.  **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. | Assignment of Chemical Kinetics and Distribution Law  Discussion on Assignment  Presentation of Students  Doubt solving sessions |
| **May, 2024** | **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 of Syllabus | Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-2024]**

**Class: B. Sc Second Year [IV semester]**

**Subject: (CH-204) Inorganic Chemistry**

**Dr. Amit Kumar, Assistant Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Chemistry of f-Block elements Lanthanides**: Electronic structure, oxidation states, magnetic properties, complex formation, colour, ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds. | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **February, 2024** | **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. | Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2024** | **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. | Assignment of Chemistry of f-Block elements  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2024** | **Theory of Qualitative and Quantitative Analysis**: Common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates.  **Revision of syllabus** | Presentation of Students  Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic session 2023-2024]**

**Class: B. Sc Third Year [VI semester]**

**Subject: (CH-304) Inorganic Chemistry**

**Dr. Amit Kumar, Assistant Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **January, 2024** | **Acids and Bases**: Arrhenius, Bronsted-lowry, Lux-flood, solvent system and Lewis concept of acids and bases, relative strength of acids and bases, levelling solvents, hard and soft acids and bases (HSAB), Applications of HSAB principle. | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **February, 2024** | **Organometallic chemistry:** Definition, classification and nomenclature of organometallic compounds, preparation, properties and bonding of alkyls of Li, Al, Hg and Sn, concept of hapticity of organic ligand, Structure and bonding in metal-ethylenic complexes, Structure of Ferrocene, classification in metal carbonyls, preparation, properties and bonding in mononuclear carbonyls. | Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2024** | **Bio inorganic chemistry:** Metal ions present in biological system, classification on the basis of action (essential, nonessential, trace, toxic), Metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of Na+ , K+ ,Ca+2, Mg+2 , Fe+2 ions, Cooperative effect, Bohr effect. | Test of Acids and Bases and Organometallic chemistry  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2024** | **Silicones and Phosphazenes:** Nomenclature, classification, preparation and uses of silicones, elastomers, polysiloxane copolymers, poly phosphazenes and bonding in triphosphazene.  **Revision of syllabus** | Presentation of Students  Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2023-24]**

**Multi-Disciplinary Course**

**Subject: Introductory Chemistry-II [B23-CHE-204]**

**Dr. Amit Kumar, Assistant Professor of Chemistry**

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2024** | **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)  **Metal and Non-Metals:** Periodic table, classification of elements, physical and chemical aspects of metals and non-metals, | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions |
| **March, 2024** | **Metal and Non-Metals:** Ore and Minerals of Iron, Copper, Aluminium alloys  **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) | Mid Term Exam  Doubt solving sessions |
| **April, 2024** | **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. | Assignment on Renowned Indian Scientists; Metals and Non-Metals  Discussion on Mid Term Exam  Doubt solving sessions |
| **May, 2024** | Revision of Syllabus |  |