**Lesson Plan [Academic Session 2022-23]**

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

**Subject: (CH-104) Inorganic Chemistry**

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

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2023** | **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.  **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. | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2023** | **s-block elements**: Comparative study of the elements including diagonal relationship, Anomalous behavior of Li and Be compared to other elements in the same group, salient features of hydrides, oxides, halides, hydroxides (methods of preparation excluded), behaviour of solution in liquid NH3.  **Chemistry of Noble Gases**: General physical properties, low chemical reactivity, chemistry of xenon, structure and bonding in fluorides, oxides and oxyfluorides of xenon. | Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2023** | **p-block elements**: Electronic configuration, atomic and ionic size, metallic character, melting point, ionization energy, electron affinity, electronegativity, inert pair effect and diagonal relationship.  **Boron family (13th group**): Diborane: Preparation, properties and structure (as an example of electron deficient compound and multicenter bonding), Borazine: chemical properties and structure, relative strength of Trihalide of Boron as lewis acids, structure of aluminium (III) chloride.  **Carbon and Nitrogen family (14th and 15th group)**: Catenation, Carbides, fluoro carbons, silicates (structural aspects). Oxides: Structure of oxides of nitrogen and phosphorus, Oxyacids: Structure and relative acid strength of oxy acids of nitrogen and phosphorus, structure of white and Red phosphorus. | Assignment of s block elements and noble gases  Discussion on Assignment  Presentation of Students  Doubt solving sessions  Discussion of Previous Years Questions |
| **May, 2023** | **Oxygen family (16th group)**: Oxy acids of sulphur: structure and acidic strength, Hydrogen Peroxide – properties and uses.  **Halogen family (17th group)**: Inter-halogen compounds (their properties and structures), Hydra and oxy acids of chlorine – structure and comparison of acid strength, cationic nature of Iodine  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic Session 2022-2023]**

**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** |
| **February, 2023** | **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 |
| **March, 2023** | **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 |
| **April, 2023** | **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 |
| **May, 2023** | **Theory of Qualitative and Quantitative Analysis**: Common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic session 2022-2023]**

**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** |
| **February, 2023** | **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 |
| **March, 2023** | **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 |
| **April, 2023** | **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  Presentation of Students  Doubt solving sessions  Discussion of Previous Years Questions |
| **May, 2023** | **Silicones and Phosphazenes:** Nomenclature, classification, preparation and uses of silicones, elastomers, polysiloxane copolymers, poly phosphazenes and bonding in triphosphazene.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

**Lesson Plan [Academic session 2022-2023]**

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

**Subject: (CH-305) Physical Chemistry**

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

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| **Month** | **Topic** | **Academic Activities** |
| **February, 2023** | **Photochemistry:** Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, Stark Einstein law (law of photochemical equivalence), Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes | Introduction of Syllabus; Programme and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **March, 2023** | **Solutions, Dilute Solutions and Colligative Properties**: Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult’s law. Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure. Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point. Applications in calculating molar masses of normal, dissociated and associated solutes in solution. | Assignment of Photochemistry  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **April, 2023** | **Phase Equilibrium**: Statement and meaning of the terms: phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system–Example – water system. Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead. | Doubt solving sessions  Discussion of Previous Years Questions |
| **May, 2023** | **Introduction to statistical mechanics**: Need for statistical thermodynamics, thermodynamic probability, Maxwell Boltzmann distribution statistics, Born oppenheimer approximation, partition function and its physical significance. Factorization of partition function.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |