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

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

**Subject: CC-1 [CHEMISTRY-1] [B23-CHE-101]**

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

|  |  |  |
| --- | --- | --- |
| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Atomic Structure:** Dual behaviour of matter and radiation**,** de Broglie’s relation, Heisenberg’s uncertainty principle, concept of atomic orbitals, significance of quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ2, shapes of s, p, d, f orbitals, Rules for filling electrons in various orbitals, effective nuclear charge, Slater’s rules.  **Periodic table and Atomic properties:** Classification of periodic table, definition of atomic and ionic radii, ionisation energy, electron affinity and electronegativity, trend in periodic table (in s and p-block elements), Pauling, Mulliken, Allred Rachow and Mulliken Jaffe’s electronegativity scale, Sanderson’s electron density ratio. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September, 2023** | **Gaseous States:** Kinetic Theory of Gases, Maxwell’s distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded), Deviation of Real gases from ideal behaviour, Derivation of Van der Waal’s Equation of State, its application in the calculation of Boyle’s temperature (Compression factor)  **Critical Phenomenon:** Concept of Critical temperature, critical pressure, critical volume, relationship between critical constants and Van der Waal’s constants (Derivation excluded). | Doubt solving sessions  Assignment on various topics of Atomic Structure  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Structure and Bonding:** Localized and delocalized chemical bond, Van der Waal’s interactions, Concept of resonance and its applications, hyperconjugation, inductive effect, Electrometric effect and their comparison.  **Mechanism of Organic Reactions:** Curved arrow notation, homolytic and heterolytic bond fission. Types of reagents: electrophiles and nucleophiles. Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerisation and Pericyclic reactions, Reactive intermediates: Carbocations, carbanions, free radicals, carbenes, (structure & stability). | Mid Term Exam  Discussion on Mid Term Exam  Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **Liquid States:** Structure of liquids, Properties of liquids: surface tension, refractive index, viscosity, vapour pressure and optical rotation.  **Solid State:** Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg’s law, a simple account of Laue method, rotating crystal method and powder pattern method.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

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

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

**Subject: (CH-201) Inorganic Chemistry**

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

|  |  |  |
| --- | --- | --- |
| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Chemistry of d-Block elements**  Definition of transition elements, position in the periodic table, General characteristic properties of d-Block elements, Comparison of properties of 3d elements with 4d and 5d elements with reference only to ionic radii, oxidation state, magnetic and spectral properties and stereo chemistry. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September, 2023** | **Chemistry of d-Block elements**  Stability of various oxidation states and E.M.F (Latimer and Frost diagrams), Structure and properties of some compounds of transition elements- TiO2, VOCl2, FeCl3, CuCl2 and Ni(CO)4.  **Coordination Compounds:** Werner’s theory of coordination compounds, effective atomic number, chelates, nomenclature of coordination compounds, Isomerism in coordination compounds. | Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Coordination Compounds:** Valence bond theory of transition metal complexes.  **Non-aqueous solvents:** Physical properties of solvents, types of solvents and their general characteristics | Sessional Test of ‘Chemistry of d-block elements’  Discussion on Test  Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **Non-aqueous solvents:** Reactions in non-aqueous solvents with reference to liquid NH3 and liquid SO2.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

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

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

**Subject: (CH-301) Inorganic Chemistry**

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

|  |  |  |
| --- | --- | --- |
| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Metal-Ligand Bonding in Transition Metal complexes:** Limitations of valence bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planer complexes, factors affecting the crystal field parameters. | Introduction of Syllabus and Course outcomes  Doubt solving sessions  Discussion of Previous Years Questions |
| **September, 2023** | **Thermodynamics and Kinetic Aspects of metal complexes:** A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, Irving William Series, substitution reactions of square planer complexes of Pt [II], Trans effect. | Test to identify Slow and Advanced Learners  Doubt solving sessions  Discussion of Previous Years Questions |
| **October, 2023** | **Magnetic properties of Transition metal complexes:** Types of magnetic materials, magnetic susceptibility, method of determining magnetic susceptibility, spin only formula, L-S coupling, correlation of µs and µeff values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes. **Electronic spectra of Transition metal complexes:** Selection rules for d-d transition, spectroscopic ground states, spectrochemical series. | Assignment on Metal Ligand Bonding in Transition Metal complexes  Discussion on Assignment  Doubt solving sessions  Discussion of Previous Years Questions |
| **November, 2023** | **Electronic spectra of Transition metal complexes:** orgel energy level diagram for d1 and d9states, discussion of electronic spectrum of [Ti(H2O)6]+3 complex ion.  **Revision of syllabus** | Doubt solving sessions  Discussion of Previous Years Questions |

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

Subject: MDC-I [Introductory Chemistry-I] [B23-CHE-104]

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

|  |  |  |
| --- | --- | --- |
| **Month** | **Topic** | **Academic Activities** |
| **August, 2023** | **Atomic Structure and Bonding**  Introduction, Elementary introduction of atomic structure and chemical bonding, Representation of elements/ atoms, Lewis structure, electronic configurations (1-30) | Introduction of Syllabus and Course outcomes |
| **September, 2023** | **Carbon and Its Compounds**  Introduction, Tetravalency of Carbon, allotropes of carbon and their properties, hydrocarbons (1-5), nomenclature (linear compounds), Applications of hydrocarbons. | Assignment on various topics of Atomic Structure  Discussion on Assignment  Doubt solving sessions |
| **October, 2023** | **Polymers**  Introduction, elementary idea of synthetic and natural polymers, Homo polymers and copolymers, uses and properties (Natural rubber, Vulcanized rubber, Polyethene, PVC, Styrene, Teflon, PAN, Nylon-66) | Mid Term Exam  Discussion on Mid Term Exam  Doubt solving sessions |
| **November, 2023** | **Food Preservatives**  Elementary idea of natural and synthetic food preservatives, rancidity, uses and properties, different food preservation processes (pickle, Jam), artificial sweeteners, uses and properties | Doubt solving sessions  Discussion of Previous Years Questions |