**Lesson Plan for Session 2022-23 (Odd Semester)**

B. Sc. 1st Year (1st Semester)

Paper-I (CH-101) Inorganic Chemistry (Theory)

Name of Assistant Professor: Dr. Rajiv Kumar

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| Sr. No. | Time Periods | Topics/Chapters to be covered | Topic of Assignment/ Tests to be given to students |
| 1 | 22/08/22-31/08/22 | **Atomic Structure:** Idea of de Broglie matter waves, Heinsenberg’s uncertainty principle, Atomic orbitals, quantum numbers. | Assignment |
| 2 | 01/09/22-30/09/22 | **Atomic Structure:** Probability distribution curves, radial wave functions, Shapes of s, p, d, f orbitals, Aufbau and Pauli exclusion principles, Hund’s multiplicity rule, Electronic configuration, Effective nuclear charge, Slater’s rules.  **Periodic table and atomic properties:** Periodic table and atomic properties, Classification of periodic table into s, p, d, f blocks, Atomic and ionic radii, Ionisation energy, definition, methods of determination or evaluation, ionisation energy trend in periodic table (in s and p-block elements), Electron affinity definition, methods of determination or evaluation, Electron affinity trend in periodic table (in s and p-block elements), Electronegativity definition, methods of determination or evaluation, Electronegativity, trend in periodic table (in s and p-block elements), Pauling , Mulliken electronegativity scale, Allred Rachow and Mulliken Jaffe’s electronegativity scale,Sanderson’s electron density ratio. | Test of chapter- **Atomic Structure** |
| 3 | 01/10/22-31/10/22 | **Covalent Bond:** Valence bond theory and its limitation, Directional characteristics of covalent bond, Hybridisation and shapes of molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7, SO4-2, ClO4-1, NO3-1), Valence shell electron pair repulsion theory, Molecular orbital theory, Bond energy, bond angle, bond length and dipole moments. | Assignment on topic **Periodic table and atomic properties** |
| 4 | 01/11/22-30/11/22 | **Ionic Solids:** Ionic structures (NaCl, CsCl, ZnS, CaF2), size effects, radius ratio rule and its limitations, Madelung constant, Stoichiometric and Non stoichiometric defects in crystals, Lattice energy and Born-Haber cycle, Solvation energy and its relation with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan’s rule | Test of **Covalent Bond** |
| 5 | 01/12/22 to till exam | Revision | Test of **Ionic Solids** |

(Dr. Rajiv Kumar)

**Lesson Plan for Session 2022-23 (Odd Semester)**

B. Sc. 2nd Year (3rd Semester)

Paper-X (CH-203) Organic Chemistry (Theory)

Name of Assistant Professor: Dr. Rajiv Kumar

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| Sr. No. | Time Periods | Topics/Chapters to be covered | Topic of Assignment/ Tests to be given to students |
| 1 | 22/08/22-31/08/22 | **Alcohols:** Monohydric alcohols- Nomenclature, Methods of formation, Acidic nature, Physical and Chemical Properties Dihydric alcohols- Nomenclature, Methods of formation, Physical and Chemical Properties, Oxidative cleavage, Pinacol-pinacolone rearrangement | Assignment |
| 2 | 01/09/22-30/09/22 | **Phenols:** Nomenclature, Methods of formation, Physical Properties and acidic character, Aromatic electrophilic substitution reactions, Mechanism of Claisen and Fries rearrangement, Reimer-Tiemann, Kolbe’s and Schotten-Baumann reactions.  **Epoxides:** Nomenclature, Methods of formation, Physical and Chemical Properties, Acidic and basic catalysed ring opening of epoxides, Orientation of epoxides, reactions with Grignard reagents. | Test of chapter- **Alcohols** |
| 3 | 01/10/22-31/10/22 | **Ultraviolet (UV) Absorption Spectroscopy:** Absorption laws, Molar absorptivity, Analysis of UV Spectra, Types of electronic excitations, effects of conjugation, Chromophores and auxochromes, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts, Woodward-Fieser rules for calculation of λmaxof simple conjugated dienes and α,β-unsaturated ketones, Applications of UV.  **Aldehydes and Ketones:** Nomenclature, Methods of formation, Physical and Chemical Properties, Comparison of reactivity of Aldehydes and Ketones | Assignment on **alcohols, phenols and epoxides** |
| 4 | 01/11/22-30/11/22 | **Aldehydes and Ketones:** Machanism of nucleophilic addition reactions, Benzoin, aldol, Perkin and Knoevenagel condensations, Condensations with ammonia and its derivatives, Wittig reaction, Mannich reaction, Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV, Clemmensen, Wolf-Kishner, LiAlH4 and NaBH4 reduction | Test of **Ultraviolet (UV) Absorption Spectroscopy** |
| 5 | 01/12/22 to till exam | Revision | Testof **Aldehydes and Ketones** |

(Dr. Rajiv Kumar)

**Lesson Plan for Session 2022-23 (Odd Semester)**

B. Sc. 3rd Year (5th Semester)

Paper- XVII (CH-303) Organic Chemistry (Theory)

Name of Assistant Professor: Dr. Rajiv Kumar

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| Sr. No. | Time Periods | Topics/Chapters to be covered | Topic of Assignment/ Tests to be given to students |
| 1 | 22/08/22-31/08/22 | **Nuclear Magnetic Resonance:** Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak  areas, equivalent and non-equivalent protons positions of signals and chemical shift, shielding and deshielding of protons, | Assignment |
| 2 | 01/09/22-30/09/22 | **Nuclear Magnetic Resonance:** proton counting, splitting of signals and coupling  constants, magnetic equivalence of protons. Discussion of PMR spectra of the molecules:  ethyl bromide, n-propyl bromide, isopropyl bromide, 1, 1-dibromoethane, 1, 1, 2- tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone. Simple problems on PMR spectroscopy for structure determination of organic compounds | Test of chapter- **Nuclear Magnetic Resonance** |
| 3 | 01/10/22-31/10/22 | **Carbohydrates:** Classification and nomenclature. Monosaccharides, mechanism of osazone  formation, interconversion of glucose and fructose, chain lengthening and chain  shortening of aldoses. Configuration of monosaccharides. Erythro and threo  diastereomers. Conversion of glucose into mannose. Formation of glycosides, ethers and  esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure  of D (+)-glucose and D(-)-fructose. Mechanism of mutarotation.  Structures of ribose and deoxyribose. | Assignment on **Carbohydrates** |
| 4 | 01/11/22-30/11/22 | **Carbohydrates:** An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.  **Organometallic Compounds:** Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions. Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions. | Test of **Carbohydrates** |
| 5 | 01/12/22 to till exam | Revision | Testof **Organometallic Compounds** |

(Dr. Rajiv Kumar)