**Lesson Plan for Session 2023-24 (Even Semester)**

B. Sc. 1st Year (2nd Semester)

Paper-V (CH-104) 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 | 01/01/24-20/01/24 | **Hydrogen Bonding & Vander Waals Forces**  Hydrogen Bonding – Definition, Types, effects of hydrogen bonding on properties of substances, application Brief discussion of various types of Vander Waals Forces | Assignment |
| 2 | 21/01/24-15/02/24 | **Metallic Bond and Semiconductors**  Metallic Bond- Brief introduction to metallic bond, band theory of metallic bond, Semiconductors- Introduction, types and applications.  **s-Block Elements**  Comparative study of the elements including, diagonal relationships, salient features of hydrides (methods of Preparation excluded), solvation and complexation tendencies including their function in biosystems.  **Chemistry of Noble Gases**  Chemical properties of the noble gases with emphasis on their low chemical reactivity, chemistry of xenon, structure and bonding of fluorides, oxides & oxyfluorides of xenon. | Test of chapter- **Hydrogen Bonding & Vander Waals Forces and Metallic Bond and Semiconductors** |
| 3 | 16/02/24-15/03/24 | **p-Block Elements**Emphasis on comparative study of properties of p-block elements (including diagonal relationship and excluding methods of preparation).  **Boron family ( 13th group)**  Diborane – properties and structure (as an example of electron –deficient compound and multicentre bonding), Borazene – chemical properties and structure Trihalides of Boron – Trends in fewis acid character structure of aluminium (III) chloride.  **Carbon Family (14th group)**  Catenation, pהּ– dהּ bonding (an idea), carbides, fluorocarbons, silicates (structural aspects), silicons– general methods of preparations, properties and uses.  **Nitrogen Family (15th group)**  Oxides – structures of oxides of N,P. oxyacids – structure and relative acid strengths of oxyacids of Nitrogen and phosphorus. Structure of white, yellow and red phosphorus. | Assignment |
| 4 | 16/03/24-05/04/24 | **Oxygen Family (16th group)**  Oxyacids of sulphur – structures and acidic strength H2O2–structure, properties and uses.  **Halogen Family ( 17th group)**  Basic properties of halogen, interhalogens types properties, hydro and oxyacids of chlorine – structure and comparison of acid strength. | Test of p-block elements |
| 5 | 05/04/24 to till Exam | Revision | Test |

(Dr. Rajiv Kumar)

**Lesson Plan for Session 2023-24 (Even Semester)**

B. Sc. 2nd Year (4th Semester)

Paper-V (CH-206) 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 | 01/01/24-20/01/24 | **Amines**  Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabriel-phthalimide reaction, Hofmann bromamide reaction. electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid. | Assignment |
| 2 | 21/01/24-15/02/24 | **Diazonium Salts**  Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO2 and CN groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application. | Test of chapter- **Amines** |
| 3 | 16/02/24-15/03/24 | **Infrared (IR) absorption spectroscopy**  Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds.  **Carboxylic Acids & Acid Derivatives**  Nomenclature of Carboxylic acids, structure and bonding, physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Preparation of carboxylic acids. Reactions of carboxylic acids. Hell-Volhard-Zelinsky reaction. Reduction of carboxylic acids. | Assignment |
| 4 | 16/03/24-05/04/24 | **Carboxylic Acids & Acid Derivatives**  Mechanism of decarboxylation. Structure , nomenclature and preparation of acid chlorides, esters, amides and acid anhydrides. Relative stability of acyl derivatives. Physical properties, interconversion of acid derivatives by  nucleophilic acyl substitution. Mechanisms of esterification and hydrolysis (acidic and basic). | Test of Diazonium salts and IR Spectroscopy |
| 5 | 05/04/24 to till Exam | Revision | Test |

(Dr. Rajiv Kumar)

**Lesson Plan for Session 2023-24 (Even Semester)**

B. Sc. 3rd Year (6th Semester)

Paper-V (CH-306) 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 | 01/01/24-20/01/24 | **Organosulphur Compounds**  Nomenclature, structural features, Methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. Synthetic detergents alkyl and aryl sulphonates. | Assignment |
| 2 | 21/01/24-15/02/24 | **Heterocyclic Compounds**  Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole. Introduction to condensed five and six- membered heterocycles. Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline. | Test of chapter- **Organosulphur Compounds** |
| 3 | 16/02/24-15/03/24 | **Amino Acids, Peptides& Proteins**  Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of α-amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid–phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure.  **Organic Synthesis via Enolates**  Acidity of α-hydrogens, alkylation of diethyl malonate and ethylacetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. | Assignment |
| 4 | 16/03/24-05/04/24 | **Synthetic Polymers**  Addition or chain-growth polymerization. Free radical vinyl polymerization, ionic vinyl polymerization, Ziegler-Natta polymerization and vinyl polymers. | Test of Chapter- **Heterocyclic Compounds** |
| 5 | 05/04/24 to till Exam | Revision | Test |

(Dr. Rajiv Kumar)