**Lesson plan for session 2023-24 (odd semester) Department of Chemistry**

**SUBJECT:- INORGANIC CHEMISTRY FACULTY:-Dr. RITU MALIK**

**COURSE:- B.Sc 1st Semester NON-MEDICAL SUBJECT CODE:- CH-101**

**(SECTION A+B+C)**

**July/AUGUST**

**UNIT 1**

Atomic Structure

Idea of de Broglie matter waves, Heisenberg uncertainty principle. Numerical, atomic orbitals, quantum numbers, radial and angular

wave functions and probability distribution curves, shapes of s, p, d orbitals.

**SEPTEMBER**

**UNIT 2**

Periodic Properties

General principles of periodic table: Aufbau and Pauli exclusion principles, Hund’s multiplicity rule.

Electronic configurations of the elements, effective nuclear charge, Slater’s rules.

Atomic and ionic radii, ionization energy, electron affinity -definition, methods of

determination or evaluation, trends in periodic table (in s &p block elements). Electronegativity -definition, methods of determination or evaluation, trends in periodic table (in s &p

block elements).

PRESENTATION (unit1 and unit 2 )

ASSIGNMENT (unit 1 and unit 2)

SOLVE LAST YEAR QUESTION PAPERS

**OCTOBER**

**UNIT 3**

Covalent Bond

Valence bond theory and its limitations, directional characteristics of covalent bond, various types of

hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PFs, SF6,IF7 SO4-2,

CIO4- )

Valence shell electron pair repulsion (VSEPR)s theory to NH3, H3O+, SF4, CIF3, ICI2- and H2O.

MO theory of heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy.

percentage ionic character from dipole moment and electronegativity difference.

ASSIGNMENT Unit 3

TEST of unit 1 and 2

**NOVEMBER**

**UNIT 4**

Ionic Solids

Ionic structures (NaCl, CsCl , ZnS(Zinc Blende), CaF2) radius ratio effect and coordination number.

limitation of radius ratio rule, lattice defects, semiconductors, 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.

**DECEMBER**

TEST of unit 3 and 4

ASSIGNMENT (unit4)

REVISION

SOLVE LAST YEAR QUESTION PAPERS

**Lesson Plan (2023-24 /Odd Semester)**

Name of the Teacher- Mrs. Sonam Baghel (SEC A+B) ,POOJA YADAV(SEC C)

Class – B.Sc. Non-Medical 1st Semester

Subject- Organic Chemistry

Subject code - CH-103

|  |  |  |
| --- | --- | --- |
| Month | Topics to be covered | Assignments/Test |
| August 2023 | Introduction of Subject, Course Objectives and syllabus; discussion of examination pattern and lesson plan with students | - |
| September 2023 | **Mechanism of Organic Reactions**  Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates: carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (formation, structure & stability). Assigning formal charges on intermediates and other ionic species. | Assignment on topic taught |
| October 2023 | **Alkanes**  IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties.  **Cycloalkanes**  Nomenclature, Synthesis of cycloalkanes and their derivative – photochemical (2+2) cycloaddition reactions, dehalogenation of dihalides, pyrolysis of calcium and barium salts of dicarboxylic acids, Baeyer’s strain theory and its limitations, theory of strainless rings. | Group Discussion |
| November 2023 | **Structrure and Bonding**  Localized and delocalized chemical bond, van der Waals interactions, resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison **Stereochemistry - II**  Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and eryth ro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. | Class test |
| December 2023 | **Stereochemistry - II**  Relative and absolute configuration, sequence rules, R & S systems of nomenclature. Geometric isomerism determination of configuration of geometric isomers. E & Z system of nomenclature, Conformational isomerism conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds,Newman projection and Sawhorse formulae, Difference between configuration and conformation. | Group Discussion and Doubt clearing sessions |
| January 2024 | Examination |  |
|  |  |  |

**Reference Books:**

1. **Modern Organic Chemistry, BSc part 1, Semester 1, by Dr. J.M. Seghal.**
2. **Pradeep’s Organic Chemistry, Vol. 1, Semester 1, by Dr. S.N. Dhawan.**

***Lesson-Plan for Session: 2023-24*.**

**B.sc. Non-Medical, 1st semester**

**Physical Chemistry (Theory) CH-102**

**Faculty: *Pooja Singh(Section-A and B), Pinku(Section-C)***

***August***

**Gaseous States**

Maxwell’s distribution of velocities and energies (derivation excluded) Calculation of root mean square velocity, average velocity and most probable velocity. Collision diameter, co llision number, col lision frequency and mean free path. Deviation of Real gases from ideal behaviour. Derivation of Vander Waal’s Equation of State, its application in the calculation of Boyle’s temperature (compression factor) . Explanation of behaviour of real gases using Vander Waal’s equation.

Assignment on Gaseous State.

***September***

Critical Phenomenon: Critical temperature, Critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal’s equation, relationship between critical constants and Vander Waal’s constants. Critical compressibility factor. The Law of corresponding states. Liquefaction of gases.

Assignment on Liquefaction of gases.

***October***

**Liquid States**

Structure of liquids. Properties of liquids – surface tension, viscosity vapour pressure and optical rotations and their determination.

Test of Gaseous State.

Assignment on Liquid State.

***November***

**Solid State**

Classification of solids, Laws of crystallography – (i) Law of constancy of interfacial angles (ii) Law of rationality of indices (iii) Law of symmetry. Symmetry elements of c rysta ls. Definition of unit cell & space lattice. Bravais lattices, crystal system.

Test of Liquid State.

Assignment on Solid State.

***December***

**Solid State**

X-ray diffraction by crystals. Derivation of Bragg equation. Determination o f crystal structure o f NaCl, KCl. Liquid crystals: Difference between solids, liquids and liquid crystals,types of liquid crystals. Applications of liquid crystals.

Test of Liquid crystals.

Assignment on crystal structure o f NaCl, KCl.

**Reference Books:**

1. **Modern Physical Chemistry, BSc part 1, Semester 1, by Dr. S.Kiran.**
2. **Pradeep’s Physical Chemistry, Vol. 1, Semester 1, by Dr. S.C. Kheterpal.**
3. **JBD Physical Chemistry, BSc part 2, Semester 3, by M.S.Khanna.**

**Lesson Plan Odd Semester 2023-2024**

Subject: Inorganic Chemistry Subject Code: CH101 + 180-CU-103661

Faculty: **Deepak Kumar**

Course: BSc **1st Semester** Medical ABC + Biotechnology

**August**

Atomic Structure - Idea of de Broglie matter waves, Heisenberg uncertainty principle,

Atomic orbitals, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals, Periodic Properties

General principles of periodic table: Aufbau and Pauli exclusion principles, Hund's multiplicity rule.

**September**

Electronic configurations of the elements, effective nuclear charge, Slater’s rules

1st Assignment, Discussions on Numericals and sample problems

Atomic and ionic radii, ionization energy, electron affinity and electronegativity – definition, methods of determination or evaluation, trends in periodic table (in s & p block elements).

Covalent Bond

**October**

Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6,IF7 SO42-, ClO4- ) Valence shell electron pair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICI2- and H2O, MO theory of heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference, 2nd Assignment, Problems Discussion

**November**

Ionic Solids - Ionic structures (NaCl, CsCl, ZnS(Zinc Blende), CaF2 radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy (mathematical derivation Excluded) and Born-Haber cycle, solvation energy and its relation with solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule.

**Lesson Plan ( 2023-24 /Odd Semester)**

Name of the Teacher- Sudesh Kumari

Class – B.Sc Medical+ Biotech 1st Semester

Subject- Organic Chemistry

|  |  |  |
| --- | --- | --- |
| Month | Topics to be covered | Assignments/Test |
| July  2023 | Introduction of Subject and syllabus; discussion of examination pattern and lesson plan with students | - |
| August 2023 | **Mechanism of Organic Reactions**  Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Energy considerations. Reactive intermediates: carbocations, carbanions, free radicals, carbenes, arynes and nitrenes (formation, structure & stability). Assigning formal charges on intermediates and other ionic species. | Assignment on topic taught |
| September 2023 | **Alkanes**  IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties.  **Cycloalkanes**  Nomenclature, Synthesis of cycloalkanes and their derivative – photochemical (2+2) cycloaddition reactions, dehalogenation of dihalides, pyrolysis of calcium and barium salts of dicarboxylic acids, Baeyer’s strain theory and its limitations, theory of strainless rings. | Group Discussion |
| October 2023 | **Structrure and Bonding**  Localized and delocalized chemical bond, van der Waals interactions, resonance: conditions, resonance effect and its applications, hyperconjugation, inductive effect, Electromeric effect & their comparison **Stereochemistry - II**  Concept of isomerism. Types of isomerism. Optical isomerism, elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centres, diastereomers, threo and eryth ro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization. | Class test |
| November 2023 | **Stereochemistry - II**  Relative and absolute configuration, sequence rules, R & S systems of nomenclature. Geometric isomerism determination of configuration of geometric isomers. E & Z system of nomenclature, Conformational isomerism conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds,Newman projection and Sawhorse formulae, Difference between configuration and conformation. | Group Discussion and Doubt clearing sessions |
| December 2023 | Examination |  |
|  |  |  |

**Lesson Plan for Chemistry Syllabus B. Sc. Pass + Biotech 1st sem**

Paper Code – CH-102 and BT-105

Academic Year – 2022-23, Odd semester

Teaching faculty – Ms. Bhagyashree Date

|  |  |
| --- | --- |
| Month | Topics |
| Aug-Sept. ‘22 | **Gaseous States**   * 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. * 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, compressibility factor * Explanation of behaviour of real gases using Van der Waal’s equation |
| Oct. ‘22 | * **Critical Phenomenon**: * Critical temperature, Critical pressure, critical volume and   their determination. PV isotherms of real gases Andrew's experiment, continuity of states,   * Isotherms of Van der Waal’s equation, relationship between critical constants and Van der   Waal's constants. Critical compressibility factor.   * The Law of corresponding states. Reduced equation of States * Liquefaction of gases - Linde's and Claude's process   **Liquid States**   * Structure of liquids. Properties of liquids. |
| Nov. ‘22 | **Assignment - Assignment on Gaseous state**   * **Surface tension -** Factors affecting surfaces tension - surfactants, temperature, Concept of Parachor. Measurement - Capillary rise method and Stalagmometer - drop no. method, drop weight method, * **Viscosity -** Measurement usingOstwald viscometer, types of viscosity, Reynolds no. Rheochor, Dunstan’s Rule * **Vapour pressure** Factors affecting vapour pressure, Trouton's rule, Guldberg's rule, Barometric method, dynamic method, Clausius Clapeyron equation * Optical rotations and their determination.   **Solid State**   * Classification of solids, Laws of crystallography – (i) Law of constancy of interfacial   angles (ii) Law of rationality of indices (iii) Law of symmetry.   * Symmetry elements of crystals. Definition of unit cell & space lattice. |
| Dec. '22 | * Bravais lattices, crystal system. X-ray diffraction by crystals. Derivation of Bragg equation. * Determination o f crystal structure of NaCl, KCl. * Liquid crystals: Difference between solids, liquids and liquid crystals,types of liquid crystals. |

References

**Pradeep’s Physical Chemistry, Vol. 1, Semester 1, by Dr. S.C. Kheterpal.**

**Modern Physical Chemistry, BSc part 1, Semester 1, by S. Kiran.**

**Class: B.Sc. (Hons) Zoology SEMESTER - I**

**Teacher Name: Dypsy Khapra**  **Max Marks: 40**

**Paper: 104 CHEMISTRY August (2023-2024)**

**Gaseous States**

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. Deviation of Real gases from ideal behaviour. Derivation of Vander Waal’s Equation of State, its application in the calculation of Boyle’s temperature (compression factor) Explanation of behaviour of real gases using Vander Waal’s equation.

**Critical Phenomenon:** Critical temperature, Critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal’s equation, relationship between critical constants and Vander Waal ”s constants. Critical compressibility factor. The Law of corresponding states. Lequifaction of gases.

**Structure and Bonding :** Localized and delocalized chemical bond, resonance effect and its applications.

**September**

**Stereochemistry of Organic Compounds**: Concept of isomerism. Types of isomerism.

Optical isomerism , elements of symmetry, molecular chirality, enantiomers , optical activity, chiral and achiral molecules with two stereo genic centres, diastereomers,

Relative and absolute configuration, sequence rules, R & S systems of nomenclature.

Geometric isomerism  determination of configuration of geometric isomers. E & Z system of nomenclature,

Alkanes and Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, methods of formation (with special reference to Wurtz reaction, Kolbe reaction). Cycloalkanes  nomenclature, synthesis of cyclo alkanes , dehalogenation of -dihalides

October

**Atomic Structure**

Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge, Slater’s rules.

**Covalent Bond**

Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7, SO42- , ClO4-) Valence shell electron pair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICI2- and H2O. MO theory of heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

**November**

**Liquid States**

Properties of liquids – surface tension, viscosity and their determination.

**Solid State**: Difference between solids, liquids and liquid crystals, types of liquid crystals. Applications of liquid crystals.

**Mechanism of Organic Reactions**

Curved arrow notation, drawing electron movements with arrows, half-headed and double-headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions. Reactive intermediates -carbocations,

carbanions, free radicals.

Reference books –

1.Modern inorganic chemistry B.Sc. part 1 by Dr. S.P. Jauhar

2.Modern physical chemistry B.Sc. part 1 by S. Kiran

3.Modern organic chemistry B.Sc. part 1 by Dr. J.M. Sehgal

### Pinku (Department of Chemistry)

### Lesson plan B. Sc Ist Semester Botany (Hons.) Chemistry (theory) for session 2022-23,

# August 2023:-

**Structure and Bonding**

Localized and delocalized chemical bond, resonance effect and its applications

**Stereochemistry of Organic Compounds**

Concept of isomerism, types of isomerism.**,** Optical isomerism, elements of symmetry, molecular chirality, enantio mers, optical activity, chiral and achiral molecules with two stereogenic centres, diastereomers, relative and absolute configuration, sequence rules, R & S systems of nomenclature.

Geometric isomerism, determination of configuration of geometric isomers. E & Z system of nomenclature.

**Alkanes and Cycloalkanes**

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atoms in alkanes. Isomerism in alkanes, methods of formation (with special reference to Wurtz react ion, Kolbe react ion).

Cycloalkanes, nomenclature, synthesis of cycloalkanes, dehalogenation of dihalides.

**September 2023:-**

**Gaseous States:** 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. Deviation of Real gases from ideal behaviour.

Derivation of Vander Waal’s Equation of State, its application in the calculation of Boyle’s temperature (compression factor) Explanation of behaviour of real gases using Vander Waal’s equation.

**Critical Phenomenon:** Critical temperature, Critical pressure, critical volume and their determination. PV isotherms of real gases, continuity of states, the isotherms of Vander Waal’s equation, relationship between critical constants and Vander Waals constants. Critical compressibility factor. The Law of corresponding states. Liquifaction of gases.

# October 2023:-

**Test of Stereochemistry of Organic Compounds**

**Atomic Structure:** Idea of de Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule. Electronic configurations of the elements, effective nuclear charge, Slater’s rules.

#### Covalent Bond

Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7 SO 2-, ClO4-) Valence shell electron pair repulsion (VSEPR) theory to NH3, H3O+, SF4, CIF3, ICI2- and H2O. MO theory of heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electronegativity difference.

4

**November 2023:-**

**Liquid States:** Properties of liquids – surface tension, viscosity and their determination.

**Solid State:** Liquid crystals: Difference between solids, liquids and liquid crystals, types of liquid crystals. Applications of liquid crystals.

#### Mechanism of Organic Reactions

#### Curved arrow notation, drawing electron movements with arrows, half-headed and double- headed arrows, homolytic and heterolytic bond breaking. Types of reagents – electrophiles and nucleophiles. Types of organic reactions.

Reactive intermediates, carbocations, carbanions, free radicals.

**Reference Books:**

1. **Modern Inorganic Chemistry, BSc part 1, Semester 1, by Dr. S.P. Jauhar.**
2. **Modern Organic Chemistry, BSc part 1, Semester 1, by Dr. J.M. Seghal.**
3. **Modern Physical Chemistry, BSc part 1, Semester 1, by S. Kiran.**
4. **Pradeep’s Organic Chemistry, Vol. 1, Semester 1, by Dr. S.N. Dhawan.**
5. **Pradeep’s Inorganic Chemistry, Vol. 1, Semester 1, by Dr. K.K. Bhasin.**
6. **Pradeep’s Physical Chemistry, Vol. 1, Semester 1, by Dr. S.C. Kheterpal.**

**Subject : Applied Chemistry**

**Class :B.Sc (Home Science)**

**Semester: 1st sem**

**Faculty : Ms. Payal Arora**

**Applied chemistry (theory)for session 2023-24**

**July & August 2023:**

**Unit-I**

**1. Concept of element, mixture and compound, atomic and molecular masses, mole concept and molar masses, normality, molarity and mass percentage. Simple numerical problems based on them.**

**2. Subatomic particles: Electrons, Protons and Neutron, Atomic No,. Atomic weight, Bohr’s model.**

**Discussion of previous years question**

**September 2023:**

**Unit-II**

**1. Modern periodic law and periodic table, Electronic configuration of elements (Na, Mg, C, N, O, F, Cl, H). Periodic properties : Atomic size Ionisation energy, election affinity and electronegativity. Chemical Bonding: Ionic, Covalent, coordinate, H bonding.**

**2. Concept of Acids, Bases and salts, pH and pH scale. Numerical based on pH. Buffer solutions.**

**Assignment of unit 1st**

**October 2023:**

**Unit-III**

**Carbon and its characteristics- Tetravalency catenation, isomerism, electronegativity, Tendency form multiple bonds, organic compounds.functional groups,IUPAC nomenclature of aliphatic compounds.classification of carbon atoms in alkanes.**

**Assignment of unit 2nd**

**Test of unit 1 and 2nd on**

**November 2023:**

**Unit -IV**

**Soaps and synthetic detergents ,advantages and disadvantages**

**Synthetic polymers: structure and uses of following polymers (PVC ,Teflon PAN nylon 6,6 )polyester**

**Chemical composition in cosmetics – creams ,perfume ,talcom powder, deodrants,lipstic ,nailpolish shampoo and hair dye**

**Paint varnishes their composition and uses**

**Previous years paper discussion**

**Doubt clearing session.**

**Lesson plan for session 2022-23 (odd semester) Department of Chemistry**

**LESSON PLAN 2022 ODD SEMESTER**

**SUBJECT:- INORGANIC CHEMISTRY FACULTY:-Dr RITU MALIK**

**COURSE:- B.Sc 3rd Semester NONMEDICAL SUBJECT CODE:- CH-301**

**(SECTION A+B+C )**

**24 JULY/AUGUST**

**UNIT 1**

Chemistry of Elements of Ist transition series:

Definition of transition elements, position in the periodic table.

General characteristics & properites of Ist transition elements,. Structures & properties of some

compounds of transition elements-TiO2:, VOCl2, FeCl3, CuCl2 and Ni (CO)4

**SEPTEMBER**

**UNIT 2**

Chemistry of Elements of IInd & IIIrd transition series

General characteristics and properties of the IInd and IIIrd transition elements, Comparison of properties of 3d elements with 4d & 5d elements with reference only

To ionic radii, oxidation state, magnetic and Spectral properties and stereochemistry

PRESENTATION (unit 1 and 2)

TEST (UNIT 1and 2)

SOLVE LAST YEAR QUESTION PAPERS

**OCTOBER**

**UNIT 3**

Coordination Compounds

Werner’s coordination theory, effective atomic number concept, chelates, Nomenclature of coordination compounds, isomerism in coordination compounds,

Valence bond theory of transition metal complexes

ASSIGNMENT (unit 3)

SOLVE LAST YEAR QUESTION PAPERS

**NOVEMBER**

**UNIT 4**

Non-aqueous Solvents

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-

aqueous solvents with reference to liquid NH and liquid SO₂

ASSIGNMENT(unit4)

DECEMBER

TEST (UNIT3 and 4)

REVISION

SOLVE LAST YEAR QUESTION PAPERS

***Lesson-Plan for Session: 2023-24.***

**B.sc. Non-Medical, 3rd semester**

**Physical Chemistry (Theory)**

**Faculty: *Khushbu Jain***

***24 July to August***

**Thermodynamics-I**

Definition of thermodynamic terms: system,surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule’s law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature.

Assignment on Inversion temperature and Joule-Thompson Coefficient.

***September***

**Thermodynamics-II**

Calculation of w.q. dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Temperature dependence of enthalpy, Kirchoffs equation. Bond energies and applications o f bond energies.

Assignment on Kirchoff’s equation.

***October***

**Chemical Equilibrium**

Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van’t Hoff reaction isochore, Van’t Hoff reaction isotherm. Le-Chatetier’s principle and its applicationsClapeyron equation and Clausius – Clapeyron equation its applications.

Assignment on Le Chatlier’s Principle.

Test of Thermodynamics-l.

***November***

**Dis tributioln Law**

Nernst distribution law – its thermodynamic derivation, Modification of distribution law when solute undergoes dissociation, association and chemical combination.

Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride. (ii) Determination of equilibrium constant of potassium tri-iodide complex and process of extraction.

Test of Chemical Equllibrium.

Assignment on Distribution Law.

**Reference Books:**

1. **Modern Physical Chemistry, BSc part 2, Semester 3, by S. Kiran Kavya.**
2. **Pradeep’s Physical Chemistry, Vol. 1, Semester 3, by Dr. S.C. Kheterpal.**
3. **JBD Physical Chemistry, BSc part 2, Semester 3, by M.S.Khanna and Dr. Gurcharan Dass.**

**3rd Semester**

**Organic Chemistry**

**Name of Faculty:- Mrs. Pinku**

**Class :- B.Sc (Non med) A+B+C**

24th July to August

Alcohols

Monohydric alcohols nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding.

**Group discussion:- August 2023**

September

Acidic nature.Reactions of alcohols. Dihydric alcohols — nomenclature, methods of formation,chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4 ] and pinacol-pinacolone rearrangement.

**Test of unit :- September 2023**

2. Epoxides

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides

**Unit discussion :- At the end of unit**

October

Phenols

Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols,resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe’s reaction and Schotten and Baumann reactions.

**Problem solving and lesson test :-October 2023**

November

Ultraviolet (UV) absorption spectroscopy

Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of max of simple conjugated dienes and , -unsaturated ketones.Applications o f UV Spectroscopy in structure elucidation of simple organic compounds.

**Numerical problem Discussion :- November 2023**

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. Mechanism of decarboxylation.

**Lesson test :- November 2023**

December

Structure, nomenclature and preparation of acid chlorides, esters, amides and acid anhydrides. Relative s tability of acyl derivatives. Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Mechanisms of es terification and hydrolysis (acidic and basic).

**Problem Discussion:- December 2023**

**Lesson test :- December 2023**

**Lesson Plan Odd Semester 2023**

Course: B. Sc 3rd Semester Medical ABC + Biotechnology

Subject: Inorganic Chemistry Subject Code: CH-301 Faculty: Deepak Kumar

**July / August**

Coordination Compounds, Werner's coordination theory

Effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes

**September**

Non-aqueous Solvents

Physical properties of a solvent, types of solvents and their general characteristics, reactions in non-aqueous solvents with reference to liquid NH3 and liquid SO2

1st Assignment and Discussion of Problems

**October**

Elements of Ist transition series: Definition of transition elements, position in the periodic table, General characteristics & properties of Ist transition elements. Structures & properties of some compounds of transition elements – TiO2, VOCl2 , FeCl3 , CuCl2 and Ni(CO)4

2nd Assignment and Discussion of Problems

**November**

Chemistry of Elements of IInd & IIIrd transition series General characteristics and properties of the IInd and IIIrd transition elements Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and Spectral properties and stereochemistry

***Lesson-Plan for Session: 2022-2023.***

**B.sc. Medical + Biotech, 3rd semester**

**Physical Chemistry (Theory)**

**Faculty: *Pooja Singh CH-302 &***

***July-August***

**Thermodynamics-I**

Definition of thermodynamic terms: system,surrounding etc. Types of systems, intensive and extensive properties. State and path functions and their differentials. Thermodynamic process. Concept of heat and work. Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule’s law – Joule – Thomson coefficient for ideal gass and real gas: and inversion temperature.

Assignment on Inversion temperature and Joule-Thompson Coefficient.

***September***

**Thermodynamics-II**

Calculation of w.q. dU&dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Temperature dependence of enthalpy, Kirchoffs equation. Bond energies and applications o f bond energies.

Assignment on Kirchoff’s equation.

***October***

**Chemical Equilibrium**

Equilibrium constant and free energy, concept of chemical potential, Thermodynamic derivation of law of chemical equilibrium. Temperature dependence of equilibrium constant; Van’t Hoff reaction isochore, Van’t Hoff reaction isotherm. Le-Chatetier’s principle and its applicationsClapeyron equation and Clausius – Clapeyron equation its applications.

Assignment on Le Chatlier’s Principle.

Test of Thermodynamics-l.

***November***

**Dis tributioln Law**

Nernst distribution law – its thermodynamic derivation, Modification of distribution law when solute undergoes dissociation, association and chemical combination.

Test of Chemical Equllibrium.

Assignment on Distribution Law.

***December***

**Dis tributioln Law**

Applications of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride. (ii) Determination of equilibrium constant of potassium tri-iodide complex and process of extraction.

Test and Numericals on distribution law.

**Reference Books:**

1. **Modern Physical Chemistry, BSc part 2, Semester 3, by S. Kiran Kavya.**
2. **Pradeep’s Physical Chemistry, Vol. 1, Semester 3, by Dr. S.C. Kheterpal.**
3. **JBD Physical Chemistry, BSc part 2, Semester 3, by M.S.Khanna and Dr. Gurcharan Dass.**

**3rd Semester**

**Organic Chemistry**

**Name of Faculty:- SONAM BAGHEL**

**Class :- B.Sc ( Med) A+B+C & Biotech**

**Subject code:- CH-303 & BT-**

July -August

Introduction of Subject, Course Objectives and syllabus; discussion of examination pattern and lesson plan with students

**Alcohols**

Monohydric alcohols nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding.

**Group discussion:- 31 August 2022**

September

Acidic nature.Reactions of alcohols. Dihydric alcohols — nomenclature, methods of formation,chemical reactions of vicinal glycols, oxidative cleavage [Pb(OAc)4 and HIO4 ] and pinacol-pinacolone rearrangement.

**Test of unit :- 20 September 2022**

**2. Epoxides**

Synthesis of epoxides. Acid and base-catalyzed ring opening of epoxides, orientation of epoxide ring opening, reactions of Grignard and organolithium reagents with epoxides

**Unit discussion :- At the end of unit**

October

**Phenols**

Nomenclature, structure and bonding. Preparation of phenols, physical properties and acidic character. Comparative acidic strengths of alcohols and phenols,resonance stabilization of phenoxide ion. Reactions of phenols — electrophilic aromatic substitution, Mechanisms of Fries rearrangement, Claisen rearrangement, Reimer-Tiemann reaction, Kolbe’s reaction and Schotten and Baumann reactions.

**Problem solving and lesson test :- 31 October 2022**

November

. **Ultraviolet (UV) absorption spectroscopy**

Absorption laws (Beer-Lambert law), molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation. Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated enes and enones,Woodward- Fieser rules, calculation of max of simple conjugated dienes and , -unsaturated ketones.Applications o f UV Spectroscopy in structure elucidation of simple organic compounds.

**Numerical problem Discussion :- 15 November 2022**

.**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. Mechanism of decarboxylation.

**Lesson test :- 30 November 2022**

December

Structure, nomenclature and preparation of acid chlorides, esters, amides and acid anhydrides. Relative s tability of acyl derivatives. Phys ical properties, interconvers ion of acid derivatives by nucleophilic acyl substitution. Mechanisms of es ter ifica tion and hydrolysis (acidic and basic).

**Problem Discussion:- 19 December 2022**

**Lesson test :-26 December 2022**

**Lesson-Plan for Session: 2023-2024**

**B.sc. Zoo (H.), 3rd Semester**

**Chemistry (Theory)**

**Faculty: Dr. Sudesh Kumari**

**24 July-August 2023**

**Inorganic Chemistry**

* Definition of transition elements, position in the periodic table.
* General characteristics & properties of d-block elements, Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and spectral properties.
* Werner's theory of coordination compounds, effective atomic number concept, chelates, nomenclature of coordination compounds.
* Isomerism in coordination compounds
* Valence bond theory of transition metal complexes and its limitations.
* An elementary idea of crystal-field theory, crystal field splitting in octahedral and tetrahedral complexes, factors affecting the crystal-field parameters.

#### September 2023

**Physical Chemistry**

* Definition of thermodynamic terms: system, surrounding etc. Types of systems, intensive and extensive properties. State and path functions. Concept of heat and work.
* Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy.
* Heat capacity, heat capacities at constant volume and pressure and their relationship.
* Calculalion of w, q, dU and dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.
* Kirchoffs equation, Concept of entropy – entropy as a state function, entropy as a funcion of P, V & T.

**October 2023**

**Organic Chemistry**

* Monohydric alcohols: nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature.
* Dihydric alcohols: Nomenclature, methods of formation, chemical reactions of vicinal glycols.
* Phenols: Nomenclature, structure and bonding. Preparation of phenols.
* Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion.
* Mechanisms of Fries rearrangement, Claisen rearrangement, Schotten and Baumann reactions.
* Epoxides:Synthesis of epoxides, acid and base-catalyzed ring opening of epoxide.

**November 2023**

#### Ultraviolet (UV) absorption spectroscopy: Absorption law.

#### Molar absorptivity, presentation and analysis of UV spectra, types of electronic transitions, effect of conjugation.

#### Concept of chromophore and auxochrome. Bathochromic, hypsochromic, hyperchromic and hypochromic shifts.

#### Carbxylic Acids & Acid Derivatives: Nomenclature, structure and bonding.

* Effects of substituents on acid strength.
* Hell-Volhard-Zelinsky reaction. Mechanism of decarboxylation. Relative stability of acyl derivatives.
* Interconversio n of acid derivatives by nucleophilic acyl substitution.
* Mechanisms of esterification and hydrolysis ( acidic and basic).

**Reference Books:**

1. **Modern Inorganic Chemistry, BSc part 11, Semester 3, by Dr. S.P. Jauhar.**
2. **Modern Organic Chemistry, BSc part 11, Semester 3, by Dr. J.M. Seghal.**
3. **Modern Physical Chemistry, BSc part 11, Semester 3, by S. Kiran.**
4. **Pradeep’s Organic Chemistry, Vol. 11, Semester 3, by Dr. S.N. Dhawan.**
5. **Pradeep’s Inorganic Chemistry, Vol.11, Semester 3, by Dr. K.K. Bhasin.**
6. **Pradeep’s Physical Chemistry, Vol. 11, Semester 3, by Dr. S.C. Kheterpal.**

***Lesson-Plan for Session: 2022-2023***

**B.sc. Bot(H), 3rd semester**

**Chemistry(Theory)**

**September**

**Inorganic Chemistry**

**Chemistry of d- Block Elements**

Definition of transition elements, position in the periodic table, General characteristics & properties of d-block elements, Comparison of properties of 3d elements with 4d & 5d elements with reference only to ionic radii, oxidation state, magnetic and spectral properties.

#### Coordination Compounds

Werner's coordination theory, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

#### Metal-ligand Bonding in Transition Metal Complexes

Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field splitting in octahedral and tetrahedral complexes, factors affecting the crystal-field parameters.

#### October

**Physical Chemistry**

**Thermodynamics :** Definition of thermodynamic terms:system,surrounding etc Types of systems, intensive and extensive properties. State and path funct ions and their different ials.Thermodynamic process.Concept of heat and work.

Zerot h Law of t her modynamics, Fir st law of t her modynamics: statement, definit ion of internal energ y and enthalp y. Heat capacity, heat capacities at constant volume and pressure and their relationship. Calculalion of w. q. d U & dH for the expansio n of ideal gases under isothermal and adiabatic condit ions for reversible process, Kirchoffs equation.

Concept o f entropy – entro py as a state function, entropy as a func ion of P, V & T.

Test of d- block elements.

**November and December**

**Organic Chemistry**

**Alcohols**

Monohydric alcohols nomenclature, methods of formation by reduction of aldehydes, ketones, carboxylic acids and esters. Hydrogen bonding. Acidic nature.

Dihydric alcohols — nomenclature, methods of forma ion, chemical reactions of vicinal glyco ls.

#### Phenols

Nomenclature, structure and bonding. Preparat ion of phenols, Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion. Mechanisms of Fries rearrangement, Claisen rearrangement, and Schotten and Baumann reactions.

#### Epoxides

Synthesis o f epoxides. Acid and base-catalyzed ring opening of epoxides,

#### Ultraviolet (UV) absorption spectroscopy

Absorption laws (Beer-Lambert law), mo lar absorpt ivit y, presentation and analysis of UV spectra, t ypes o f e lectronic transit io ns, e ffect of conjugat ion. Concept of chro mophore and auxochrome. Bat hochro mic, hypsochro mic, hyperchro mic and hypochro mic shifts.

#### Carb xylic Acids & Acid Derivatives

Nomenclature of Carboxylic acids, structure and bonding acidity of

Nomenclature of Carboxylic acids, structure and bonding acidity of carboxylic acids, effects of substituents on acid strength. Hell-Volhard- Zelinsky reaction. Mechanism of decarboxylat ion. Relative stabilit y o f acyl derivatives. interconversio n of acid derivatives by nucleophilic acyl subst itution.Mechanisms of esteificat ion and hydr lysis ( acidic and basic).

Revision

**Reference Books:**

1. **Modern Inorganic Chemistry, BSc part 11, Semester 3, by Dr. S.P. Jauhar.**
2. **Modern Organic Chemistry, BSc part 11, Semester 3, by Dr. J.M. Seghal.**
3. **Modern Physical Chemistry, BSc part 11, Semester 3, by S. Kiran.**
4. **Pradeep’s Organic Chemistry, Vol. 11, Semester 3, by Dr. S.N. Dhawan.**
5. **Pradeep’s Inorganic Chemistry, Vol.11, Semester 3, by Dr. K.K. Bhasin.**
6. **Pradeep’s Physical Chemistry, Vol. 11, Semester 3, by Dr. S.C. Kheterpal.**

**Lesson plan for session 2022-23(odd semester)**

**Department of Chemistry**

**Subject: Inorganic Chemistry (theory)**

**Class: B.Sc. Pass Course (Non-Medical)**

**Semester: 5th sem**

**Faculty: Neeru Singal**

**Paper (Theory): 180PA503331A**

**24th July to August 2023:**

**Metal-ligand bonding in transition metal complexes**

Limitations of valance bond theory, an elementary idea of crystal field theory, crystal field splitting in octahedral, tetrahedral and square planer complexes, factors affecting the crystal field parameter.

**September 2023**

### Thermodynamic and Kinetic Aspects of Metal Complexes

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes of Pt(II).

**Assignment given of this chapter.**

**October 2023**

**Magnetic properties of transition metal complexes**

Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of µs and µeff values, orbitalcontribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Test of Metal-ligand bonding in transition metal complexes.

**November 2023**

**Electronic spectra of transition metal complexes**

Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion.

Full syllabus test.

**Reference Books:**

1. **Modern inorganic Chemistry, BSc part 3, Semester 5, by Dr. S.P.Jauhar.**
2. **Pradeep’s inorganic Chemistry, Vol. 3, Semester 5, by Dr. K.K. Bhasin.**

**B.sc. Non- Medical, 5th semester(2023-2024)**

**Organic Chemistry(Theory)**

**Faculty: Dypsy Khapra**

***July-August***

**NMR Spectroscopy-I**

Principle of nuclear magnetic resonance, the PMR spectrum,number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons, proton counting ,splitting of signals and coupling constants, magnetic equivalence of protons.

***September***

**NMR Spectroscopy-II**

Discuss ion 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.

Assignment on Chemical Shift.

***October***

**Carbohydrates-I**

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 threodiastereomers. Conversion of glucose in to mannose. Formation of glycos ides, ethers and esters.

Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism ofmutarotation. Structures of ribose and deoxyribose.

Assignment on NMR Spectroscopy-ll.

Test of NMR Spectroscopy.

***November***

**Carbohydrates-II**

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.

Revision.

**Reference Books:**

1. **Modern Organic Chemistry, BSc part 3, Semester 5, by Dr. J.M. Seghal.**
2. **Pradeep’s Organic Chemistry, Vol. 3, Semester 5, by Dr. S.N. Dhawan.**

**5th Semester**

**Physical Chemistry**

**Name of Faculty:- Mrs. Khushbu Jain**

**Class :- B.Sc (Non med) A+B+C**

**Subject code:- CH-502**

22Aug to 31 Aug

Quantum Mechanics-IBlack-body radiation, Plank’s radiation law, photoelectric effect, heat capacity of solids, Compton effect,wave function and its significance of Postulates of quantum mechanics ,

September

mechanical operator, commutation relations, Hamiltonial operator, Hermitian operator, average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a partic le in one dimensional box, Pictorial representation and its significance.

**Problem solving Numerical Analysis and Lesson test :-27 September 2022**

October Section-BPhysical Properties and Molecular Structure

Optica l activity, polarization – (clausius – Mossotti equation). Orientation of dipoles in an electric field, dipole moment, included dipole moment, measurement of dipole moment, temperature method and refractivity method, dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination.Applica tion of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetics.

**Problem solving and lesson test :- 31 October 2022**

November Section-C

Spectroscopy-I

Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Bornoppenheimer approximation, Degrees of freedom.

Rotational SpectrumDiatomic molecules. Energy levels of rigid rotator (semi-classical principles), selection rules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution), determination of bond length, qualitative description of non-rigid rotor, isotope effect.

Spectroscopy-II

Vibrational spectrumInfrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity, determination of force constant and qualitative relation of force constant and bond energies, effects of anharmonic motion and isotopic effect on the spectra., idea of vibrational frequencies of different functional groups.

**Problem solving and Numerical Analysis:- 28 November 2022**

December

Raman Spectrum:Concept of polarizibility, pure rotational and pure vibrational Raman spectra of diatomic molecules, selectin rules, Quantum theory of Raman spectra.

**Problems from entire syllabus and numerical discussion:- 22 December 2022**

**Test of entire syllabus of physical chemistry :- 30 December 2022**

**Lesson plan for session 2023-24(odd semester)**

**Subject : inorganic chemistry**

**Class :B.Sc .pass course(medical + biotech)**

**Semester: 5th sem**

**Faculty :Pooja yadav**

**Paper XV(Theory)CH(301)**

**inorganic chemistry (theory)for session 2023-24**

**AUGUST- SEPTEMBER 2023:**

**UNIT-1**

**Metal-ligand bonding in transition metal complexes**

Limitations of valance bond theory,an elementary idea of crystal field theory ,crystal field splitting in octahedral ,tetrahedral and square planer complexes,factors affecting the crystal field parameter

**OCTOBER 2023**

**UNIT-III**

**Magnetic properties of transition metal complexes**

Types of magnetic material ,magnetic susceptibility,methods of determining magnetic susceptibility,spin only formula,correlation of Us and Ueff values orbital contribution to magnetic moment ,application of magnetic moment data for 3-D metal complexes

test of unit 3rd

Assignment of unit 1st.

**UNIT -IV**

**ELECTRONIC SPECTRA OF TRANSITION METAL COMPLEXES**

Basis of electron absorption spectroscopy,term symbols and coupling schemes ,L-S coupling

**November 2023**

**ELECTRONIC SPECTRA OF TRANSITION METAL COMPLEXES**

Determination of spectroscopic ground state term,hole formulation ,spectrochemical series

Test of unit 1st

Discussion of previous years questions

**December 2023**

**UNIT-II**

### Thermodynamic and Kinetic Aspects of Metal Complexes

A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes of Pt(II).

Discussion of previous years question papers

Test of unit II and IV

**Name of the Teacher- Ms. Payal Arora, Neeru Singal**

**Class – B.Sc Medical 5th Semester**

**Subject- Organic Chemistry**

**Subject code – 180PA503331C**

|  |  |  |
| --- | --- | --- |
| Month | Topics to be covered | Assignments/Test |
| July 2023 | **NMR Spectroscopy – I**  Introduction of Spectroscopy and nuclear spin quantum number, NMR active and inactive nuclei | - |
| August 2023 | **NMR Spectroscopy – I**  Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons. | Assignment on NMR Spectroscopy |
| September 2023 | **NMR Spectroscopy – II**  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 | Group Discussion |
| October 2023 | **Carbohydrate – I**  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 in to mannose. Formation of glycos ides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. | Class test on Carbohydrates |
| November 2023 | **Carbohydrate – II**  An introduc tion to disaccharides (maltose, sucrose and lactose) and polysaccharides of starch and cellulose.  **Organometallic Compounds**  Organomagnesium compounds : Grignard reagent-formation, structure and chemical reactions.  Organozinc compounds: formation and chemical reactions  Organolithium compounds: formation and chemical reactions | Group Discussion and Doubt clearing sessions |
| December 2023 | Examination |  |
|  |  |  |

**Class: B. Sc. Medical and Biotech Vth Semester**

**Paper (Theory) Physical Chemistry**

**Faculty: Payal Arora, Neeru Singal**

**Subject code : 180PA503331B and 180CU503651**

**24 July to 31 August**

Spectroscopy-I

Introduction: Electromagnetic radiation, regions of spectrum, basic features of

spectroscopy, statement of Born Oppenheimer approximation, Degrees of freedom.

Rotational Spectrum

Diatomic molecules. Energy levels of rigid rotator (semi-classical principles),

selection rules, spectral intensity distribution using population distribution

(Maxwell-Boltzmann distribution), determination of bond length, qualitative

description of non-rigid rotor, isotope effect.

**September**

Spectroscopy-II

Vibrational spectrum

Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules,

pure vibrational spectrum, intensity, determination of force constant and qualitative

relation of force constant and bond energies, effects of anharmonic motion and

isotopic effect on the spectra., idea of vibrational frequencies of different functional

groups.

Raman Spectrum:

Concept of polarisibility , pure rotational and pure vibrational Raman spectra of

diatomic molecules, selectin rules, Quantum theory of Raman spectra.

Test

**October**

Quantum Mechanics

Black-body radiation, Plank’s radiation law, photoelectric effect, heat capacity of

solids, Compton effect, wave function and its significance of Postulates of quantum

mechanics , quantum mechanical operator, commutation relations, Hamiltonian

operator, Hermitian operator, average value of square of Hermitian as a

positive quantity, Role of operators in quantum mechanics, To show quantum

mechanically that position and momentum cannot be predicated simultaneously,

Determination of wave function & energy of a particle in one dimensional box,

Pictorial representation and its significance.

**November**

Physical Properties and Molecular Structure

Optical activity, polarization – ( Clausius – Mossotti equation). Orientation of dipoles

in an electric field, dipole moment, included dipole moment, measurement of dipole

moment-temperature method and refractivity method, dipole moment and structure of

molecules, Magnetic permeability, magnetic susceptibility and its determination.

Application of magnetic susceptibility, magnetic properties – para magnetism,

diamagnetism and ferro magnetics.

Reference books –

1.Modern physical chemistry by S. Kiran

2.JBD physical chemistry by M.S. Khanna

Name of the Teacher- Ms. Payal Arora, Neeru Singal

Class – B.Sc Biotechnology 5th Semester

Subject- Organic Chemistry

Subject code - CH-180-CU-503661

|  |  |  |
| --- | --- | --- |
| Month | Topics to be covered | Assignments/Test |
| August 2023 | **NMR Spectroscopy – I**  Introduction of Spectroscopy and nuclear spin quantum number, NMR active and inactive nuclei | - |
| September 2023 | **NMR Spectroscopy – I**  Principle of nuclear magnetic resonance, the PMR spectrum, number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons. | Assignment on NMR Spectroscopy |
| October 2023 | **NMR Spectroscopy – II**  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 | Group Discussion |
| November 2023 | **Carbohydrate – I**  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 in to mannose. Formation of glycos ides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. **Carbohydrate – II**  An introduc tion to disaccharides (maltose, sucrose and lactose) and polysaccharides of starch and cellulose. | Class test on Carbohydrates |
| December 2023 | **Organometallic Compounds**  Organomagnesium compounds : Grignard reagent-formation, structure and chemical reactions.  Organozinc compounds: formation and chemical reactions  Organolithium compounds: formation and chemical reactions | Group Discussion and Doubt clearing sessions |