GOVERNMENT COLLEGE FOR WOMEN, HISAR
LESSON PLAN
EVEN SEMESTER, SESSION 2024-25
Department of Chemistry

Name of Professor: Prof. Satyender Kumar

Class:- B.Sc-I (Semester-II)

Subject: -
Minor Course (MIC)
Basic Chemistry – II

Paper Code: C24MIC231T

Subject	Month	Syllabus to be covered
Basic Chemistry – II	**Feb. 2025**	**Chemical Kinetics** Concept of reaction rates, Rate equation, Rate law, Law of mass action, Factors influencing the rate of reaction,
Basic Chemistry – II	**March 2025**	**Chemical Kinetics** Order and molecularity of a reaction, Integrated rate expression for zero, first and second order reaction (For equal concentration of reactants), Half-life period of a reaction, Arrhenius equation, Determination of Activation Energy.
Basic Chemistry – II	**April 2025**	**Ionic Solids** General characteristics of ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds..
Basic Chemistry – II	**May 2025**	**Ionic Solids** Statement of Born-Landé equation for calculation of lattice energy (Derivation excluded), BornHaber cycle and its applications, polarizing power and polarizability. Fajan's rules, Ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character, Crystal Defects.

Prof. Satyender Kumar
Professor (Chemistry)

LESSON PLAN
EVEN SEMESTER, SESSION 2024-25
Department of Chemistry

Name of Professor: Prof. Satyender Kumar
Class:- B.Sc-III (Semester-IV)
Subject: - CCL-604(I) Polynuclear Hydrocarbon and UV, IR Spectroscopy

Subject	Month	Syllabus to be covered
CCL-604(I) Polynuclear Hydrocarbon and UV, IR Spectroscopy	**January 2025**	**Polynuclear and heteronuclear aromatic compounds:** Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene and Pyridine.
CCL-604(I) Polynuclear Hydrocarbon and UV, IR Spectroscopy	**February 2025**	**Active methylene compounds:** Preparation: Claisen ester condensation. Keto-enol tautomerism. Reactions: Synthetic uses of ethyl acetoacetate (preparation of non-hetero molecules having upto 6 carbons).
CCL-604(I) Polynuclear Hydrocarbon and UV, IR Spectroscopy	**March 2025**	**Application of Spectroscopy to Simple Organic Molecules** Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, Amax & Emax chromophore, ausochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating Amax of conjugated dienes and a, -unsaturated compounds.
CCL-604(I) Polynuclear Hydrocarbon and UV, IR Spectroscopy	**April 2025**	Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Prof. Satyender Kumar
Professor (Chemistry)

GOVERNMENT COLLEGE FOR WOMEN, HISAR
LESSON PLAN
EVEN SEMESTER, SESSION 2024-25
Department of Chemistry

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-II (Sem-4th)

Subject: -
CCL-404 Inorganic Chemistry-II: Transition Metals & Coordination Chemistry
CCL-405 Physical Chemistry-III: States Of Matter & Chemical Kinetics

Subject	Month	Syllabus to be covered
CCL-404 Inorganic Chemistry-II: Transition Metals & Coordination Chemistry	**January 2025**	**Transition Elements (3d series)** General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu. **Lanthanoids and actinoids** Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).
CCL-404 Inorganic Chemistry-II: Transition Metals & Coordination Chemistry	**February 2025**	**Coordination Chemistry** Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6). Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT.IUPAC system of nomenclature. **Crystal Field Theory** Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of d-orbital splittings. Spectrochemical series. Comparison of CFSE for *Oh* and *Td* complexes. Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.
CCL-405 Physical Chemistry-III: States of Matter &	**March 2025**	**Kinetic Theory of Gases** Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. van der Waals equation of state for real gases. Boyle temperature

Chemical Kinetics		(derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation. Andrews isotherms of CO_2. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. **Liquids** Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).
CCL-405 Physical Chemistry-III: States of Matter & Chemical Kinetics	**April 2025**	**Solids** Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CsCl (qualitative treatment only).Defects in crystals. **Chemical Kinetics:** The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates.Order and molecularity of a reaction. Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants).Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

R Kumar

Dr. Rakesh Kumar
Assistant Professor (Chemistry)

GOVERNMENT COLLEGE FOR WOMEN, HISAR
LESSON PLAN
EVEN SEMESTER, SESSION 2024-25
Department of Chemistry

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-I (Semester-II)

Subject: -
Skill Enhancement Course (SEC)
Chromatographic Techniques, Food and Water Analysis
Paper Code: C24SEC228T

Subject	Month	Syllabus to be covered
Chromatographic Techniques, Food and Water	**March 2025**	**Chromatography:** Definition, Principles of Chromatography, Column chromatography, Paper Chromatography and Thin Layer Chromatography (TLC).
Chromatographic Techniques, Food and Water	**April 2025**	**Analysis of water:** Sources responsible for contamination of water, Water sampling methods, Water purification methods. Determination of adulterants in food items.
Chromatographic Techniques, Food and Water	**May 2025**	Revision of Chromatography and Analysis of water

Rakesh Kumar

Dr. Rakesh Kumar
Assistant Professor (Chemistry)

GOVERNMENT COLLEGE FOR WOMEN, HISAR
LESSON PLAN
EVEN SEMESTER, SESSION 2024-25
Department of Chemistry

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-I (Semester-II)

Subject: -
Discipline Specific Course (DSC)
Chemistry – II
Paper Code: C24CHE201T

Subject	Month	Syllabus to be covered
Chemistry – II	**March 2025**	**Covalent Bond** Valence bond theory approach. Various type of hybridization and shapes of simple inorganic molecules and ions with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements (BeF_2, BF_3, CH_4, PF_5, SF_6, IF_7, SO_4^{2-}, ClO_4-, NO_3-), Valence Shell Electron Pair Repulsion (VSEPR) theory to NH_3, H_3O^+, SF_4, ClF_3, H_2O, $SnCl_2$, ClO^{3-} and ICl^{2-}. **Alkanes** Nomenclature, Classification of carbon atoms in alkanes and its structure. Isomerism in alkanes. Methods of Preparation: Wurtz reaction, Corey-House reaction, Kolbe electrolytic reaction, and decarboxylation of carboxylic acids. Mechanism of free radical halogenation of alkanes: reactivity and selectivity. **Alkenes** Nomenclature of alkenes and its structure. Methods of Preparation: dehydration of alcohols and dehydrohalogenation of alkyl halide with mechanism. The Saytzeff rule and relative stabilities of alkenes. Chemical reactions: electrophilic and free radical additions: addition of halogens, halogen acids, hydroboration–oxidation, ozonolysis.
Chemistry – II	**April 2025**	**Alkynes** Nomenclature, structure and bonding. Methods of Preparation: From Calcium carbide and from acetylene, Chemical reactions: Acidity of terminal alkynes, Cause of acidity, Reactivity of alkenes versus alkynes towards electrophilic addition reaction. **Chemical Kinetics** Concept of reaction rates, Rate equation, Rate law, Law of mass action, Factors influencing the rate of reaction, Order and molecularity of a reaction, Derivation of Integrated rate expression for zero, first and second order reaction (for equal concentration of reactants), Half-life period of a reaction,

		Methods of determination of order of a reaction. Concept of Activation Energy and its calculation from Arrhenius equation.
Chemistry – II	**May 2025**	**Thermodynamics** Definition of various thermodynamic terms: Types of systems, Intensive and Extensive properties. State and path functions. Thermodynamic process. Thermodynamic equilibrium, First law of thermodynamics: concepts of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship. Second law of thermodynamics, Carnot's cycle and its efficiency, Carnot's theorem. Gibbs function (G) and Helmholtz function (A), G as criteria for thermodynamic equilibrium and spontaneity. Concept of entropy. Third law of thermodynamics: Nernst heat theorem, concept of residual entropy

Rakesh Kumar

Dr. Rakesh Kumar
Assistant Professor (Chemistry)

GCW, Hisar
Chemistry Department
Lesson Plan 2024-25
Even Semester

Name- Dr Priyanka

Class- BSc I Med

Paper- VAC (C24VAC111T) (Wed-Thu)

Paper Name- Chemistry in Everyday Life

SNo	Month	Topic
1	**February**	**Soaps and Detergents** Cleansing action of soap, Cleansing action of detergents. **Propellants** Solid propellant, liquid propellants, hybrid propellants.
2	**March**	**Dyes** Cause of exhibition of color, chromophore, auxochrome, classification of dyes. Test
3	**April**	**Types of Medicines** Definition and examples of Antipyretics, Analgesics, Antidepressants, Antiseptics and disinfectants, Antiviral drugs, Antacids.Assignment
4	**May**	Antimalarial, Anesthetics, Tranquilizers, Hypnotics and sedatives, Antiallergic drugs and Histamines. Revision

17/3/25

Name- Dr Priyanka

Class- BA I and B.Com I

Paper- MDC C24MDC204T (Mon-Tue)

Paper Name- Chemistry of Soil and Everyday Compounds (Semester-II)

SNo	Month	Topic
1	**February**	Soil and fertilizers Types of soils, Acidity and alkalinity of soil and its determination.
2	**March**	Types of fertilizers- Chemical and Biofertilizers with examples. Test
3	**April**	Preparation, properties and uses of some common compounds. Baking soda, Baking powder, Washing soda, Plaster of Paris, Gypsum, Glass. Assignment
4	**May**	Revision

17/3/25

Name- Dr Priyanka

Class- B.Sc IIINM and B.Sc III Med

Paper- Semester VI CCL-603(i)

Paper Name- Discipline Specific Course-III(i) ORGANOMETALLICS AND BIOINORGANIC CHEMISTRY (Fri-Sat)

SNo	Month	Topic
1	**January**	Chemistry of 3d metals Oxidation states displayed by Cr, Fe, Co, Ni and Co. A study of the following compounds (including preparation and important properties): Peroxo compounds of Cr, $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, sodium nitroprusside, $[Co(NH_3)_6]Cl_3$, $Na_3[Co(NO_2)_6]$.
2	**February**	Test UNIT-II Organometallic Compounds Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls.
3	**March**	UNIT-III Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals.p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)-(MO diagram of CO can be referred to for synergic effect to IR frequencies). Assignment
4	**April**	UNIT-IV Bio-Inorganic Chemistry A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to Na^+ , K^+ and Mg^{2+} ions: Na/K pump; Role of Mg^{2+} ions in energy production and chlorophyll. Role of Ca^{2+} in blood clotting, stabilization of protein structures and structural role (bones).Revision

17/3/25