Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		Organic Chemistry (DSE) Code: CHEM 101TH (Paper 1)		
August	1st	**Atomic Structure:** Review of Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.	Lecture	Discussion
	2nd	**Atomic Structure:** Schrodinger wave equation and meaning of various terms in it. Significance of ψ and ψ2 . Radial and angular nodes and their significance.	Lecture	Discussion
	3rd	**Atomic Structure:** Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals.	Lecture	Assignment
	4th	**Atomic Structure:** Significance of quantum numbers, Shapes of s, p and d atomic orbitals, nodal planes. Rules for filling electrons in various orbitals, Electronic configurations of the atoms.	Lecture	Discussion
September	1st	**Atomic Structure:** Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations. Slater rules and applications.	Lecture	Q/Ans.
	2nd	**Chemical Bonding and Molecular Structure Ionic Bonding:** General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds.	Lecture	Discussion
	3rd	**Chemical Bonding and Molecular Structure Ionic Bonding:** Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.	Lecture	Assignment
	4th	**Chemical Bonding and Molecular Structure Ionic Bonding:**Covalent bonding-VB Approach:Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.	Lecture	Discussion
October	1st	**Chemical Bonding and Molecular Structure Ionic Bonding:** Concept of resonance and resonating structures in various inorganic and organic compounds. MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals, nonbonding combination of orbitals.	Lecture	Discussion
	2nd	**Chemical Bonding and Molecular Structure Ionic Bonding:** MO treatment of homonuclear diatomic molecules up to Ne (including idea of s-p mixing) and heteronuclear diatomic molecules such as CO, NO and NO+. Comparison of VB and MO approaches.	Lecture	Discussion
	3rd	**Fundamentals of Organic Chemistry:**Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation.Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.	Lecture	Assignment
	4th	**Fundamentals of Organic Chemistry:**Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule.	Lecture	Discussion
November	1st	**Stereochemistry:** Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer projections.	Lecture	Discussion
	2nd	**Stereochemistry:** Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds).	Lecture	Discussion
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
	1st	**Stereochemistry:**Threo and erythro; D and L; cis - trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for	Lecture	Discussion

		uptotwo C=C systems).		
December	2nd	**Aliphatic Hydrocarbons:** Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. **Alkanes:** (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation	Lecture	Discussion
	3rd	**Alkenes:** (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO4) and trans-addition (bromine), Addition of HX (Markownikoff's and antiMarkownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation.	Lecture	Discussion
	4th	**Alkynes:** (Upto 5 Carbons) Preparation: Acetylene from CaC2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. **Reactions:** Formation of metal acetylides, addition of bromine and alkaline KMnO4, ozonolysis and oxidation with hot alkaline KMnO4.	Lecture	Discussion
February				
	2nd	**Presentations by students**		
	3rd	**Presentations by students**		
	4th	Revision, question/answer & class test		
March	1st			

Ms. Deepali Gupta

Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		Organic Chemistry (DSE) Code: CHEM 102TH (Paper 2)		
August	1st	**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.	Lecture	Discussion
	2nd	**Kinetic Theory of Gases:** van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation. Andrews isotherms of CO2. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions.	Lecture	Discussion
	3rd	**Kinetic Theory of Gases:** 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. Viscosity of gases and effect of temperature and pressure on coefficient of viscosity (qualitative treatment only).	Lecture	Assignment
	4th	**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).	Lecture	Discussion
September	1st	**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.	Lecture	Q/Ans.
	2nd	**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.	Lecture	Discussion
	3rd	**Chemical Kinetics:**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).	Lecture	Assignment
	4th	**Aromatic hydrocarbons:** Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).	Lecture	Discussion
October	1st	**Alkyl Halides:** (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions.	Lecture	Discussion
	2nd	**Alkyl Halides:** Preparation: from alkenes and alcohols.	Lecture	Discussion
	3rd	**Reactions:** hydrolysis, nitrite & nitro formation, nitrile &isonitrile formation, Williamson's ether synthesis. Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions.	Lecture	Assignment
	4th	**Reactions (Chlorobenzene):** Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides	Lecture	Discussion
November	1st	**Alcohols:** Preparation: Preparation of 1o , 2o and 3o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.	Lecture	Discussion
	2nd	**Reactions:** With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO4, acidic dichromate, conc. HNO3). Oppeneauer oxidation Diols:	Lecture	Discussion

		(Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement.		
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**Phenols:** (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer - Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction.	Lecture	Discussion
	2nd	**Ethers (aliphatic and aromatic):** Cleavage of ethers with HI.	Lecture	Discussion
	3rd	**Aldehydes and ketones (aliphatic and aromatic):** (Formaldehye, acetaldehyde, acetone and benzaldehyde) Preparation: From acid chlorides and from nitriles.	Lecture	Discussion
	4th	**Reactions:** Reaction with HCN, ROH, NaHSO3, NH2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.	Lecture	Discussion
February				
	2nd	**Presentations by students**		
	3rd	**Presentations by students**		
	4th	Revision, question/answer & class test		
March	1st			

Ms. Deepali Gupta

Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		(DSC) Code: CHEM 201TH (Paper 1)		
August	1st	**Solutions:** Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions.	Lecture	Discussion
	2nd	**Solutions**: Distillation of solutions. Lever rule. Azeotropes. Partial miscibility of liquids: Critical solution temperature; effect of impurity on partial miscibility of liquids.	Lecture	Discussion
	3rd	**Solutions**: Nernst distribution law and its applications, solvent extraction.	Lecture	Assignment
	4th	**Phase Equilibrium**: Phases, components and degrees of freedom of a system, criteria of phase equilibrium. Gibbs Phase Rule and its thermodynamic derivation.	Lecture PPT	Discussion
September	1st	**Phase Equilibrium**: Derivation of Clausius – Clapeyron equation and its importance in phase equilibria. Phase diagrams of one-component systems (water and sulphur) and two component systems involving eutectics, congruent and incongruent melting points (lead-silver, NaCl-H2O and Mg-Zn only).	Lecture/ PPT	Q/Ans.
	2nd	**Phase Equilibrium**: Phase diagrams of two component systems involving eutectics, congruent and incongruent melting points (lead-silver, NaCl-H_2O and Mg-Zn only).	Lecture/ PPT	Discussion
	3rd	**Conductance:** Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions.	Lecture/ PPT	Assignment
	4th	**Conductance**: Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility.	Lecture	Discussion
October	1st	**Conductance**: Applications of conductance measurements: determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid base).	Lecture PPT	Discussion
	2nd	**Carbohydrates**: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose.	Lecture PPT	Discussion
	3rd	**Carbohydrates**: Mutarotation, ascending and descending in monosaccharide. Structure of disaccharides (sucrose, maltose, lactose) and polysaccharides (starch and cellulose) excluding their structure elucidation.	Lecture PPT	Discussion
	4th	**Functional group approach** for the following reactions (preparations & reactions) to be studied in context to their structure. Carboxylic acids (aliphatic and aromatic) - Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Hell – Vohlard - Zelinsky Reaction. Carboxylic acid derivatives (aliphatic): (Upto 5 carbons) -	Lecture	Discussion
November	1st	**Functional group approach** for the following reactions (preparations & reactions) to be studied in context to their structure. Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their inter conversion. Reactions: Comparative study of nucleophilicity of acyl derivatives. Reformatsky Reaction, Perkin condensation	Lecture	Discussion
	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	**Mid term Test**		

	4th	**Mid term Test**		
Dec ember	1st	**Functional group approach** for the following reactions (preparations & reactions) to be studied in context to their structure. Amines and Diazonium Salts Amines (Aliphatic and Aromatic): (Upto 5 carbons - Preparation: from alkyl halides, Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction. Reactions: Hofmann vs. Saytzeff elimination, Carbylamine test, Hinsberg test, reaction with HNO2, Schotten – Baumann Reaction.	Lecture PPT	Discussion
	2nd	**Functional group approach** for the following reactions (preparations & reactions) to be studied in context to their structure. Electrophilic substitution (case aniline): nitration, bromination, sulphonation. Diazonium salts: Preparation: from aromatic amines. Reactions: conversion to benzene, phenol, dyes.	Lecture PPT	Discussion
	3rd	**Electrochemistry** Reversible and irreversible cells. Concept of EMF of a cell. Measurement of EMF of a cell. Nernst equation and its importance.	Lecture PPT	Discussion
	4th	**Electrochemistry** Reversible and irreversible cells. Calculation of equilibrium constant from EMF data. Concentration cells with transference and without transference. Liquid junction potential and salt bridge.	Lecture PPT	Discussion
February	Winter Break			
	2nd	**Electrochemistry** pH determination using hydrogen electrode and quinhydrone electrode.	Lecture	Discussion
	3rd	Revision, question/answer & class test	Revisio n	Class Test
	4th	Presentations by students		
March	1st			

Dr. Preeti Saluja

Unit wise teaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		CHEMISTRY OF MAIN GROUP ELEMENTS , CHEMICAL ENERGETICS AND EQUILIBRIA (DSE) **Code: CHEM 202**		
August	1st	**Hydrogen:** Unique position of Hydrogen in the periodic table, isotopes, ortho and para hydrogen, Industrial production, Hydrides and their chemistry, Heavy water, Hydrogen bonding, Hydrates.	Lecture	Discussion
	2nd	**S-Block Elements:** Periodicity of elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling Scale).	Lecture	Discussion
	3rd	General characteristics of s-block elements like density, melting points, flame colouration and reducing character, solvation and complexation tendencies and solutions of metals in liquid ammonia.	Lecture and PPT	Assignment
	4th	**Noble Gases**: Occurrence of noble gases, History of discovery of noble gases and isolation of noble gases form air. Preparation properties and structure of important compounds of noble gases-flourides of xenon.	Lecture	Q/Ans.
Septembe r	1st	Important compounds of noble gases-oxides, oxyflorides of xenon (valence bond structure only). Krypton difloride and clatherate compounds of noble gases.	Lecture and PPT	Discussion
	2nd	**Chemical Energetics:**Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry.	Lecture and PPT	Discussion
	3rd	Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution.	Lecture and PPT	Assignment
	4th	Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.	Lecture	Discussion
October	1st	Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.	Lecture and PPT	Discussion
	2nd	**Ionic Equilibria**: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases.	Lecture	Discussion and Presentation
	3rd	pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions.	Lecture and PPT	Assignment
	4th	Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.	Lecture and Revision	Discussion
November	1st	**Chemical Equilibrium:** Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔGo ,Le Chatelier's principle. Relationships between Kp, Kc and Kx for reactions involving ideal gases.	Lecture and PPT	Discussion and presentation
	2nd		Revision	Class Test
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**P- Block Elements:**Comparative studies including diagonal relationship of group 13 and 14 elements. Borohydrides, Hydrides, oxide and oxy-acids and halides of boron, borax, Borazine.	Lecture	Discussion
	2nd	**Carbon family :**Allotropic forms of carbon, fullerenes, carbides of calcium and silicon.	Lecture and PPT	Discussion
	3rd	**Nitrogen family:** Hydrides, oxides, oxoacids and halides of nitrogen. Allotropic forms of phosphorous.	Lecture and Revision	Discussion

	4th	Hydrides, halides, oxides and oxyacids of phosphorous.	Lecture	Discussion
February				
	2nd	**Halogens:** Basic properties of halogen and inter halogen compounds**.**	Lecture and Revision	Discussion
	3rd	Pseudohalogens and poly halides.	Lecture	presentation
	4th	Revision, question/answer & class test		
March	1st			

Dr.Anuradha Kapil

Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		(SEC) Code: CHEM 203TH (Paper 1)		
August	1st	**Introduction:** Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements.	Lecture	Discussion
	2nd	**Introduction:** Presentation of experimental data and results, from the point of view of significant figures.	Lecture	Discussion
	3rd	**Analysis of soil:** Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators.	Lecture	Assignment
	4th	**Analysis of soil:** a. Determination of pH of soil samples. b. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration.	Lecture PPT	Discussion
September	1st	**Analysis of water:** Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods.	Lecture/ PPT	Q/Ans.
	2nd	**Analysis of water:** a. Determination of pH, acidity and alkalinity of a water sample.	Lecture/PPT	Discussion
	3rd	**Analysis of water:** b. Determination of dissolved oxygen (DO) of a water sample.	Lecture/ PPT	Assignment
	4th	**Analysis of food products:** Nutritional value of foods, idea about food processing and food preservations and adulteration. a. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc. b. Analysis of preservatives andcolouring matter.	Lecture	Discussion
October	1st	**Analysis of food products:** a. Identification of adulterants in some common food items like coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.	Lecture PPT	Discussion
	2nd	**Analysis of food products:** b. Analysis of preservatives andcolouring matter.	Lecture PPT	Discussion
	3rd	**Chromatography:** Definition, general introduction on principles of chromatography, paper chromatography, TLC etc.	Lecture PPT	Discussion
	4th	**Chromatography:** a. Paper chromatographic separation of mixture of metal ion (Fe3+ and Al3+). b. To compare paint samples by TLC method.	Lecture	Discussion
November	1st	**Chromatography:** Ion-exchange: Column, ion-exchange chromatography etc. Determination of ion exchange capacity of anion / cation exchange resin (using batch procedure if use of column is not feasible).	Lecture	Discussion
	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**Analysis of cosmetics:** Major and minor constituents and their function a. Analysis of deodorants and antiperspirants, Al, Zn, boric acid, chloride, sulphate.	Lecture PPT	Discussion
	2nd	**Analysis of cosmetics:** b. Determination of constituents of talcum powder: Magnesium oxide, Calcium oxide, Zinc oxide and Calcium carbonate by complexometric titration.	Lecture PPT	Discussion
	3rd	**Analysis of cosmetics:** a. To study the use of phenolphthalein in trap cases. b. To analyze arson accelerants. c. To carry out analysis of gasoline.	Lecture PPT	Discussion
	4th	**Analysis of cosmetics:** c. To carry out analysis of gasoline.	Lecture PPT	Discussion
February	Winter Break			

	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	Revision, question/answer & class test	Revision	Class Test
	4th	Presentations by students		
March	1st			

Dr.PreetiSaluja

Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		FUEL CHEMISTRY & CHEMISTRY OF COSMETICS & PERFUME (SEC) CHEM 204		
August	1st	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value.	Lecture	Discussion
	2nd	Coal Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal.gas, producer gas and water gas—composition and uses.	Lecture	Discussion
	3rd	Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification).Coal liquefaction and Solvent Refining.	Lecture and PPT	Assignment
	4th	Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.	Lecture	Presentation
Septembe r	1st	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum	Lecture and PPT	Discussion
	2nd	Non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.	Lecture and PPT	Presentation
	3rd	Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene.	Lecture and PPT	Assignment
	4th	Lubricants: Classification of lubricants, lubricating oils (conducting and non-conducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.	Lecture	Discussion and Presentation
October	1st	A general study including preparation and uses of the following: Hair dye, hair spray and shampoo.	Lecture and PPT	Discussion and Project
	2nd	Suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams).	Lecture	Discussion and Presentation
	3rd	Antiperspirants and artificial flavours.	Lecture and PPT	Assignment and Presentation
	4th	**Cosmetic Chemistry** : Benefits and side effects.	Lecture and PPT	Discussion and Project
November	1st	Revision	Questions /answers	Discussion and Project
	2nd	Revision	PPT	Project
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	Essential oils and their importance in cosmetic industries	Lecture	Discussion
	2nd	Eugenol, Geraniol, sandalwood oil and eucalyptus.	Lecture and PPT	Discussion and Presentation
	3rd	Rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.	Lecture and Revision	Discussion
	4th	Revision	PPT	Presentation
February				
	2nd	Revision	PPT	Discussion

	3rd	Revision	PPT	Discussion
	4th	Revision, question/answer & class test		
March	1st			

Dr. Anuradha Kapil

Unit wise teaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		Organic Chemistry (DSE) Code: CHEM 301TH (Paper 1)		
August	1st	**Polynuclear Hydrocarbons**: Structure,Synthesis and reactions of naphthalene, anthracene & phenanthrene	Lecture	Discussion
	2nd	**Polynuclear Hydrocarbons:** Relative reactivity of these compounds at various positions	Lecture	Discussion
	3rd	**Synthetic Dyes:** Colour and constitution, classification of dyes, chemistry and synthesis of methyl orange, congo red	Lecture	Assignment
	4th	**Synthetic Dyes**: Chemistry and synthesis of malachite green, crystal violet, phenolphthalein, fluorescein, alizarin and indigo.	Lecture PPT	Discussion
September	1st	**Heterocyclic Compounds**: Classification and nomenclature, Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene, pyridine	Lecture/ PPT	Q/Ans.
	2nd	**Heterocyclic Compounds**: Synthesis & reactions of pyrrole, furan, thiophene and pyridine. Mechanism of nucleophilic substitution of pyridine. Comparision of basicity of pyridine, piperdine and pyrrole	Lecture/ PPT	Discussion
	3rd	**Heterocyclic Compounds**: Preparation, and properties of indole, quinoline, iso-quinoline with special reference to Fisher indole ,skraup synthesis and Bischler-Napieralski synthesis,Mechanism of electrophilic substitution of indole, quinoline, iso-quinoline	Lecture/ PPT	Assignment
	4th	**Application of UV&IR Spectroscopy**: Electromagnetic radiations, electronic transitions, chromophore, auxochrome	Lecture	Discussion
October	1st	**Application of UV&IR Spectroscopy**: bathochromic & hypsochromic shifts, **A**ppl. of electronic spectroscopy.	Lecture PPT	Discussion
	2nd	**Application of UV&IR Spectroscopy**: Woodward rules for calculation of lamda max. of conjugated dienes, alpha, beta unsaturated compounds.	Lecture PPT	Discussion
	3rd	**IR Spectroscopy:** Infra red radiations and types of Molecular vibrations, functional group and finger print region	Lecture PPT	Assignment
	4th	**IR Spectroscopy:** IR spectra of alkanes, alkenes and simple alcohols,	Lecture	Discussion
November	1st	**IR Spectroscopy:** IR spectra of aldehydes, ketones, carboxylic acids, and their derivatives	Lecture	Discussion
	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**NMR Spectroscopy:** Principle of nmr, no. of signals, peak areas, equivalent/non-eqivalent protons, position of signals, chemical shift,	Lecture PPT	Discussion
	2nd	**NMR Spectroscopy:** shielding/de-shielding of protons, proton counting, splitting of signals and coupling constants, magnetic equivalence of protons,	Lecture PPT	Discussion
	3rd	**NMR Spectroscopy:** discussion of PMR spectra of molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1.1-dibromoethane, 1,1,2-tribromoethane, ethanol, toluene, acetaldehyde, acetophenone.	Lecture PPT	Discussion
	4th	**NMR Spectroscopy:** Simple problems on PMR spectroscopy for structural determination of organic compounds	Lecture PPT	Discussion
February				
	2nd	**Presentations by students**		
	3rd	**Presentations by students**		
	4th	Revision, question/answer & class test		
March	1st			

Dr. Kanika Sharma

Unit wise teaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		Organic Chemistry (DSE) Code: CHEM 304TH (Paper 2)		
August	1st	**Transition Elements (3d series):** oxidation states displayed by Cr,Fe,Cu,Ni and Co. Preparation & properties of per oxo compds. of Cr, potassium dichromate, potassiumpermanganate,pot.ferrocyanide,sodiumnitroprusside,hexaamminecobalt(III) chloride,sodium cobaltinitrite.	Lecture	Discussion
	2nd	**Transition Elements (3d series):** General group trends with special reference to electronic configuration,variable oxidation states, colour, magnetic& catalytic properties, ability to form complexes.	Lecture	Discussion
	3rd	**Transition Elements (3d series):** Stability of various oxidation states (Latimer diagrams) for Mn, Fe, Cu	Lecture	Assignment
	4th	**Lanthanides and Actinides**: Electronic Configuration, oxidation states, colour, magnetic Properties.	Lecture PPT	Discussion
September	1st	**Lanthanides and Actinides**: lanthanide contraction, and separation of lanthanides and actinides.	Lecture/ PPT	Q/Ans.
	2nd	**Coordination Chemistry**: VBT, Inner and outer complexes of Cr, Fe, Co, Ni And Cu (coordination number 4 and 6), drawbacks of VBT	Lecture/ PPT	Discussion
	3rd	**Coordination Chemistry**: Structural & stereoisomerism in complexes, IUPAC nomenclature of coordination compounds.	Lecture/ PPT	Assignment
	4th	**Organometallic Compounds**: classification, structure of methyl lithium, Zeiss salt, ferrocene	Lecture	Discussion
October	1st	**Organometallic Compounds:** EAN rule applied to carbonyls.	Lecture PPT	Discussion
	2nd	**Organometallic Compounds:** preparation, structure, bonding, properties of mono & polynuclear carbonyl compounds of 3d metals,	Lecture PPT	Discussion
	3rd	**Organometallic Compounds:** MO diagram of CO w.r.t synergic effect (VB approach, MO diagram) to IR frequencies.	Lecture PPT	Assignment
	4th	**Crystal Field Theory:** crystal field effect, octahedral, tetrahedral symmetry,	Lecture	Discussion
November	1st	**Crystal Field Theory:** weak field, strong field effect, CFSE & its calculation for tetrahedral & octahedral complexes.	Lecture	Discussion
	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**Crystal Field Theory:** factors affecting crystal field splitting, spectrochemical series, comparison of CF splitting for octahedral and tetrahedral complexes	Lecture PPT	Discussion
	2nd	**Crystal Field Theory:**, Tetragonal distortion & Jahn-teller distortion. Square planar coordination	Lecture PPT	Discussion
	3rd	**Acids and Bases**: Arrhenius, bronsted and Lowry, Lewis, Lux-flood and solvent system concept of acids and bases	Lecture PPT	Discussion
	4th	**Acids and Bases**: Classification of acid and bases as hard and soft, HSAB principle, Relative strength of acids & bases, effect of substituent and solvent on their strength	Lecture PPT	Discussion
February	Winter break			
	2nd	**Presentations by students**		
	3rd	**Presentations by students**		
	4th	Revision, question/answer & class test		
March	1st			

Dr. Kanika Sharma

Unit wise teaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		DSE Code: CHEM 307TH (Paper 1)		
August	1st	**Chemical Technology**: Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction,	Lecture	Discussion
	2nd	**Chemical Technology**: separation by absorption and adsorption	Lecture	Discussion
	3rd	**Chemical Technology**: An introduction into the scope of different types of equipment needed in chemical technology,	Lecture	Assignment
	4th	**Chemical Technology**: including reactors, distillation columns, extruders, pumps, mills, emulgators.	Lecture PPT	Discussion
September	1st	**Chemical Technology**: Scaling up operations in chemical industry.	Lecture/ PPT	Discussion
	2nd	**Chemical Technology**: Introduction to clean technology.	Lecture/ PPT	Discussion
	3rd	**Society:** Exploration of societal and technological issues from a chemical perspective	Lecture/ PPT	Assignment
	4th	**Society:** Chemical and scientific literacy as a means to better understand topics like air and water (and the trace materials found in them that are referred to as pollutants)	Lecture	Discussion
October	1st	**Society:** energy from natural sources (i.e. solar and renewable forms), from fossil fuels and from nuclear fission	Lecture PPT	Discussion
	2nd	**Society:** materials like plastics and polymers and their natural analogues	Lecture PPT	Discussion
	3rd	**Society:** proteins and nucleic acids	Lecture PPT	Assignment
	4th	**Society:** molecular reactivity and interconversions from simple examples like combustion to complex instances like genetic engineering and the manufacture of drugs.	Lecture	Discussion
November	1st	**Business Basics:** Key business concepts: Business plans, market need, project management and routes to market.	Lecture	Discussion
	2nd	Revision, question/answer & class test	Revision	Class Test
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	**Chemistry in Industry**: Current challenges and opportunities for the chemistry-using industries	Lecture PPT	Discussion
	2nd	**Chemistry in Industry**: role of chemistry in India and global economies.	Lecture PPT	Discussion
	3rd	**Making money:** Financial aspects of business with case studies	Lecture PPT	Discussion
	4th	**Intellectual property**: 31 Concept of intellectual property, patents.	Lecture PPT	Discussion
February				
	2nd	**Presentations by students**		
	3rd	**Presentations by students**		
	4th	Revision, question/answer & class test		
March	1st			

Ms.Deepali Gupta

Unit wiseteaching Plan **Session 2023-24**

Month	Week	Topics	Teaching Method	Student Activity
		PESTICIDE CHEMISTRY & PHARMACEUTICAL CHEMISTRY (SEC) CHEM 308		
August	1st	General introduction to pesticides (natural and synthetic), benefits and adverse effects.	Lecture	Discussion
	2nd	Changing concepts of pesticides, structure activity relationship.	Lecture and PPT	Discussion
	3rd	Synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion).	Lecture and PPT	Assignment
	4th	Synthesis and technical manufacture and uses of representative pesticides in the following classes:Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).	Lecture	Presentation
Septembe r	1st	Drugs & Pharmaceuticals Drug discovery, design and development; Basic Retrosynthetic approach.	Lecture and PPT	Discussion
	2nd	Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, antiinflammatory agents (Aspirin, paracetamol, Ibuprofen).	Lecture and PPT	Presentation
	3rd	Antibiotics (Chloramphenicol); antibacterial and antifungal agents (Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir).	Lecture and PPT	Assignment
	4th	Central Nervous System agents (Phenobarbital, Diazepam),Cardiovascular (Glyceryl trinitrate), antilaprosy (Dapsone).	Lecture	Discussion and Presentation
October	1st	HIV-AIDS related drugs (AZT- Zidovudine).	Lecture and PPT	Discussion and Project
	2nd	Fermentation Aerobic and anaerobic fermentation.	Lecture	Discussion and Presentation
	3rd	Production of ethyl alcohol and citric acid.	Lecture and PPT	Assignment and Presentation
	4th	Production ofAntibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin.	Lecture and PPT	Discussion and Project
November	1st	Revision	Questions /answers	Discussion and Project
	2nd	Revision	PPT	Project
	3rd	**Mid term Test**		
	4th	**Mid term Test**		
December	1st	Production ofLysine and Glutamic acid.	Lecture	Discussion
	2nd	Production ofVitamin B2, Vitamin B12 and Vitamin C.	Lecture and PPT	Discussion and Presentation
	3rd	Revision	Lecture and Revision	Discussion and presentation
	4th	Revision	PPT	Presentation

February				
	2nd	Revision	PPT	Discussion
	3rd	Revision	PPT	Discussion
	4th	Revision, question/answer & class test		
March	1st			

Dr. Anuradha Kapil