Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Odd Semester)
Session – (2024-25)

Name of the Teacher: Dr. Nisha Dawra

Department: Chemistry

Class: M. Sc I **Subject:** Inorganic Chemistry

S. No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1	16-08.2024	31.08.2024	VSEPR, Walsh diagrams (tri and tetra-molecules), dπ-pπ bonds, Bent rule and energetics of hybridization, some simple reactions of covalently bonded molecules.	Lecture and group discussion
2	02.09.2024	16.09.2024	Limitations of crystal field theory, molecular orbital theory, Molecular orbital theory for octahedral, tetrahedral and square planar complexes for sigma and π bonding	Lecture
3	17.09.2024	30.09.2024	Stepwise and overall formation constant and their interaction, trends in stepwise constants, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, chelate effect and its thermodynamic origin. Determination of binary formation constants by pH spectrophotometry. Energy profile of a reaction, reactivity of metal complexes.	Lecture
4	01.10.2024	20-10-2024	Inert and labile complexes, kinetic application of valance bond and crystal field theories, kinetics of octahedral substitution. Acid hydrolysis, factors affecting acid hydrolysis, Base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, reactions without metal-ligand bond cleavage	Lecture

5	21.10.2024	18.11.2024	Substitution reactions in square planar complexes, the trans effect, mechanism of substitution reaction, Redox reactions, electron transfer reactions, mechanism of one electron transfer reactions, outer sphere type reactions, Cross reactions and Marcus Hush Theory, inner sphere type reactions	Lecture, PPT
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
31-7-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
31-8-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
30-9-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
26-10-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc.Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Odd Semester)
Session – (2024-25)

Name of the Teacher: Dr. Qudrat Hundal and Dr. Swatika Sharma

Department: Chemistry

Class: M.Sc I **Subject:** Organic Chemistry CH-412

S.No	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1	16-08-2024	31-08-2024	Unit I Nature of Bonding in Organic molecules: Fundamental concepts, Delocalized chemical bonding, conjugation, Cross conjugation, resonance, hyper- conjugation.	Lecture method
2	02-09-2024	16-09-2024	Unit I Nature of Bonding in Organic molecules: Bonding in fullerenes, Tautomerism, Aromaticity in benzenoid and non-benzenoid compd. Alternant and non-alternant hydrocarbons, Huckel's rule. Energy level of π M.O., Annulenes, anti-aromaticity, aromaticity, Homo aromaticity, PMO approach. Bonds weaker than covalent, addition compound, crown ether complexes and cryptands, Inclusion compound, cyclo dextrins, Catenanes & rotaxanes. Effect of structure on reactivity-resonance and field effects, steric effect, quantitative treatment. The Hammett equation and linear free energy relationship, substituent and reaction constants. Taft equation.	Lecture method PPT
3	17-09-2024	30-09-2024	Unit III Aliphatic Nucleophilic substitution: S_N1 and S_N2, Neighbouring group participation. Phase transfer catalysis, ambident nucleophiles, regioselectivity, esterification and ester hydrolysis. S_Ni mechanism, SET mechanism, Factors affecting reactivity in SN reactions. Nucleophilic substitution at an allylic carbon, aliphatic trigonal	Lecture method

			carbon and at a vinylic carbon. Phase transfer catalysis, ambident nucleophiles, regioselectivity, esterification and ester hydrolysis. Aliphatic Electrophilic substitution: SE1, SE2 and SEi. Electrophilic substitution accompanied by double bond shifts, Factors affecting electrophilic substitution reactions.	
4	01-10-2024	15-10-2024	Unit IV Aromatic Electrophilic substitution: Arenium ion mechanism, orientation and reactivity, energy profile diagrams, Nitration, sulphonation, halogenations, Friedel-Crafts reaction and Friedel-Crafts acylation. o/p- ratio. Ipso attack, orientation in other ring systems. Vilsmeier-Haack Reaction, Gatterman-Koch Reaction, Diazonium coupling. Aromatic Nucleophilic substitution: Unimolecular and Bimolecular mechanism. Aromatic Nucleophilic Substitution Reaction via Benzynes. Factors affecting reactivity. Von Richter Rearrangement, Smiles Rearrangement and Sommelet-Hauser Rearrangement.	Lecture method
5	16-10-2024	31-10-2024	Unit II Stereochemistry: Geometrical Isomerism, Conformational Analysis, Conformation of Acyclic systems, cycloalkanes, sugars and decalins. Effect of conformation on reactivity. Steric strain due to undesirable crowding of resolution. Stereospecific and stereoselective synthesis, chirality due to helical shape. Stereochemistry of compounds containing N, S, P	Lecture method
6	1-11-2024	Till exams	Revision and Solution of previous years' question papers	
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
31-08-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
30-09-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				

26-10-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc.Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Odd Semester)

Session – (2024-25)

Name of the Teacher: Dr. Sagarika Dev & Dr. Yesbinder Kaur

Department: Chemistry

Class: M.Sc. I **Subject -**Physical Chemistry

S.No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1	16.08.2024	31.08.2024	Schrodinger wave equation to different systems,	Lecture method
2	02.09.2024	16.09.2024	Approximation method, Variation Theorm, Perturbation Theory, Self-Consistent Field Theory. Concept of distribution, thermodynamic probability & most probable distribution, ensemble averaging, postulates of ensemble averaging, canonical, grand canonical & micro canonical ensembles.	Lecture Method
3	16.09.2024	30.09.2024	Ordinary angular momentum, generalized angular momentum, eigenfunctions for angular momentum, eigen values of angular momentum, using ladder operators, addition of angular-momenta, spin, anti-symmetry and Pauli exclusion principle.	Lecture Method, Group discussion
4	03.10.2024	15.10.2024	Corresponding distribution laws (using Lagrange's method of undetermined multipliers) Partition functions: Translational, Rotational, Vibrational, Electronic partitions functions. Partial molal properties, partial molal free energy, volume &	

			heat content and their significance, determination of these quantities, concept of fugacity and determination of fugacity.	
5	16.10.2024	31.10.2024	Calculation of Thermodynamic properties in terms of partition functions. Heat capacity, behaviour of solids chemical equilibria and equilibrium constant in terms of partition function, F.D. statistics, distribution law and application to metals. Bose Einsteins statistics. Distribution law & application to Helium. Non ideal systems, excess functions for non-ideal solutions, Activity, Activity coeff, Debye huckel theory for activity coeff. electrolyte solutions, determination of activity & activity coeff, ionic strength. Application of phase rule to 3-component system, second order phase transitions.	Lecture Method, Online sources
6	01.11.2024	Till exams	Revision and Solution of previous years' question papers	
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
31-08-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
30-09-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
26-10-2024	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc.Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Even Semester)
Session – (2024-25)

Name of the Teacher: Dr. Rishu

Department: Chemistry

Class: M.Sc I

Su**bject:** Inorganic Chemistry(CH-421)

S. No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1	10 -01- 2025	31-01-2025	Electronic Spectra and Magnetic Properties of Transition Metal Complexes-I: Spectroscopic ground states, correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d1-d9 states), calculations of Dq, B and β parameters, charge transfer spectra, Isopoly and Heteropoly Acids and Salts	Lecture Method, PPT Group Discussion
2	01.02.2025	28.02.2025	Electronic Spectra and Magnetic Properties of Transition Metal Complexes-II: Spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereo chemical information, anomalous magnetic moments, magnetic exchange coupling and spin crossover.	Lecture Method, PPT Group Discussion
3	01.03.2025	28.03.2025	Metal II–Complexes: Metal carbonyls, structure and bonding, vibrational spectra of metal carbonyls for bonding and structure elucidation, important reaction of metal carbonyls. Preparation, bonding structure and important reactions of transition metal nitrosyl, dinitrogen and dioxygen complexes, tertiary phosphine as ligand.	Lecture Method and Group Discussion
4	29.03.2025	19.04.2025	Metal Cluster: Higher boranes, carboranes, metallobranes and	Lecture Method and Group Discussion

			metallocarboranes, metal carbonyl and halide clusters, compounds with metal-metal multiple bonds. Remedial Classes	
31st Jan, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
28th Feb, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
29th, March 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
19th April, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc.Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Even Semester)
Session – (2024-25)

Name of the Teachers: Dr. Madhuri Tanaji Patil

Department: Chemistry

Class: M.Sc I **Subject:** Organic Chemistry 1 (CH-422)

Sr. No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1.	10.01.2025	31.01.2025	**Unit 1:** Reaction Mechanism, Structure and Reactivity: Types of mechanism, types of reactions, thermodynamics and kinetic requirement. Kinetic & thermodynamics control Hammond's postulate, Curtin-Hammett Principle, Potential energy diagrams, method of determining mechanisms, isotope effects. Addition to Carbon-Carbon Multiple Bonds Mechanistic and stereochemical aspects of addition reaction, regio selectivity and chemo selectivity, orientation and reactivity. Addition to cyclopropane ring. Hydrogenation of double and triple bonds, aromatic ring. Hydroboration. Michael reaction. Sharpless asymmetric epoxidation.	Lecture method & Group discussion
2.	01.02.2025	28.02.2025	**Unit 2:** Addition To Carbon-Heteroatom Multiple Bonds Mechanism of metal hydride reduction of saturated and unsaturated carbonyl compounds acids, esters and nitriles. Name reactions viz. Wittig reaction. Mechanism of condensation reactions involving enolates-Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions. Hydrolysis of esters and amides, ammonolysis of esters.	Lecture Method & Group Discussion
3.	1.03.2025	29.03.2025	**Unit 3: Free Radical Reactions** Type of free radical reactions, free radical substitution mechanism at an aromatic substrate, neighbouring group assistance.	

			Reactivity for aliphatic and aromatic substrates at a bridgehead. Reactivity in the attacking radicals. The effect of solvents on reactivity. Allylic halogenation (NBS), oxidation of aldehydes to carboxylic acids, auto-oxidation. Coupling of alkynes and arylation of aromatic compounds by diazonium salts. Sandmeyer reaction. Free Radical Rearrangement. Hundiecker reaction. Elimination Reaction**:** The E2, E1 and E1cB mechanisms and their spectrum, Orientation of the double bond.	Lecture Method & Group Discussion
4.	30.03.2025	19.04.2025	**Unit 4: Pericyclic Reactions** Molecular orbital symmetry, frontier orbitals of ethylene, 1,3-butadiene, 1, 3, 5-hexatriene and allyl system. Classification of pericyclic reactions. Woodward-Hoffmann correlation diagrams. FMO and PMO approach. Electrocyclic reactions conrotatory & disrotatory motions 4n, 4n +2 and allyl system. Cycloadditions-antarafacial suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, 1, 3-dipolar cycloadditions & cheletropic reactions. Sigmatropic rearrangements-Suprafacial and antarafacial shifts of H. Sigmatropic shifts involving carbon moieties, [3, 3]-and [5, 5]- sigmatropic rearrangements. Claisen, Cope and aza-Cope rearrangement. Fluxional tautomerism. Ene reaction.	Lecture Method & Group Discussion

Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
31st Jan. 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
28th Feb. 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
29th March, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
19th April, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc. Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

Mehr Chand Mahajan D.A.V. College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Even Semester)
Session –2024-2025

Name of the Teacher: Dr. Nisha Dawra

Department: Chemistry

Class: M. Sc. I Chemistry **Subject:** Physical Chemistry (CH-423)

S. No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1.	10 -01- 2025	31-01-2025	Unit-1: Chemical Dynamics: Methods of determining rate laws, ionic reactions, kinetic salt effects, steady state kinetics, kinetic & thermodynamic control of reactions, treatments of unimolecular reactions, Dynamic chain (pyrolysis of acetaldehyde composition of ethane), Photochemical (H_2-Cl_2) reactions & oscillatory reactions (Belousov-Zhabotinsky reaction), homogeneous catalysis, kinetics of enzyme reactions, general features of fast reactions, Study of fast reactions by flow method, relaxation method, flash photolysis, and NMR method dynamics of molecular motion, probing the transition state, dynamics of barrier less chemical reactions in solution, Dynamics of unimolecular reaction (Lindemann-Hinshelwood and Rice-Ramsperger-Kassel-Marcus Theories of unimolecular reactions).	Lecture, PPT
2.	01.02.2025	28.02.2025	Unit-2: Non-equilibrium Thermodynamics: Thermodynamic criteria for non-equilibrium states, entropy production and entropy flow, entropy balance equations for different irreversible processes (eg. heat flow, chemical reaction etc.), Transformation of generalized fluxes and forces, non-equilibrium stationary states, phenomenological equators, microscopic reversibility and Onsager's	Lecture, Online sources

			reciprocity relations, electro kinetic phenomenon, Macromolecules: Electrically conducting, fire resistant, liquid crystal polymers, Kinetics of polymerization, Mechanism of polymerization, molecular mass determination (osmometry, viscometry, diffusion & light scattering methods), sedimentation.	
3.	1.03.2025	20.03.2025	Unit 3: Surface Chemistry Adsorption, surface tension, capillary action, Laplace equation, Kelvin equation, Gibb's adsorption isotherm, BET equation. electro kinetic phenomenon, catalytic activity on surfaces. Micelles: Surfactants, classification, micellisation, critical micellisation concentration (CMC), factors affecting CMC, counter ions binding to micelles, thermodynamics of micellization-phase separation, mass action models, solubilization, microemulsions, reverse micelles	Lecture, group discussion and seminar
4.	21.03.2025	19.04.2025	Unit 4: Electrochemistry Electrochemistry of solutions, Debye Huckel Treatment and its extension, ion-solvent interaction, Debye Huckel-Jerum model, Thermodynamics of electrified interface equations, derivation of electro capillarity, Lipmann equations, Methods of determining structures of electrified interface, Guoy-Chapmann, Stern Over potentials. Diffusion, electrical conduction, irreversible thermodynamics for biological system, coupled reactions. Exchange current density, Butler Volmer equation, Tafel plots, Quantum aspects of charge transfer at electrode solutions, quantization of charge transfer, Semiconductor interfaces-theory of double layer of interfaces, effects of light at semiconductor solution interface. Electrocatalysis: Influence of various parameters, H-electrode, polarography, Ilkovic equation, half wave potential and its significance, electrocardiography, corrosion	Lecture, group discussion and seminar

Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
31st Jan. 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
28th Feb. 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
29th March, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans	
19th April, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc. Other Methods adopted by the teacher – Please write the specific teaching method

Lesson Plan

MCM DAV College for Women, Sector – 36A, Chandigarh
Monthly Teaching Plans (Even Semester)
Session – (2024-25)

Name of the Teacher/s: Dr. Sagarika Dev

Department: Chemistry

Class: M.Sc. I **Subject:** Group Theory and spectroscopy

S.No.	Date (Monthly)		Topics to be Covered	Academic Activity Undertaken*
	From	To		
1	10-01-2025	23-01-2025	Symmetry elements & symmetry operation, definitions of group, subgroup, relation between orders of a finite group & its sub groups. Point group symmetry. Classification of molecules rigid rotor model, effect of isotopes; non rigid rotor Stark effect, nuclear and electron spin interaction & effect of external field.	Lecture method, PPT, Videos from NPTEL
2	24.01.2025	15.02.2025	Representations of groups by matrices (representation for the Cn, Cnv, Cnh, Dnh etc. group) character of a representation. The great orthogonality theorem and its importance character tables and their use-in spectroscopy. Infrared Spectroscopy: - Linear Harmonic Oscillator, Vibrational energy of diatomic molecule zero-point energy, force constants & bond lengths	Lecture method, PPT, Videos from NPTEL

			anharmonicity, morse potential energy diagram. Vibrational rotational spectroscopy, P, Q, R, branches. Selection rules Normal modes of vibration, group frequencies, overtones, hot bands, Raman Vibrational: - Classical & quantum theories of Raman effect pure rotational, vibrational and vibrational. Rotational Raman spectroscopy. Coherent anti stokes Raman spectroscopy	
3	16.02.2025	12.03.2025	Nuclear Magnetic Resonance Spectroscopy: - Nuclear spin, nuclear resonance, shielding of magnetic nuclei, chemical shifts deshielding, spin-spin interactions, (ABX, AMX, ABC, A2 B2) spin decoupling. Electron Spin resonance spectroscopy: - Basic values factors affecting 'g' value. Measurements, techniques, applications. Nuclear Quadrupole Resonance spectroscopy: - Quadrupole Nuclear moments, electic field gradient complex constants applications	Lecture Method, Online Sources
4	13.03.2025	05.04.2025	Energy levels, molecular orbital, Frank Condon's Principles, electronic spectra of polyatomic molecules emission spectra; radiative & non radiative decay. Spectra of transition metal complexes; change transfer spectra. Basic Principles Photoelectric Effect, Ionization Process:	Lecture Method, Videos from NPTEL

			Koopman's theorem, photoelectron spectra of simple molecule. Auger electron spectroscopy. Bragg's condition, Miller indices. Debye-Scherrer method for structure analysis. Principal and applications of neutron diffraction and electron diffraction	
5	06.04.2025	Till exam	Revision and Solution of previous years' question papers	
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
31st Jan, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
28th Feb, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
29th, March 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			
Departmental Meeting to Coordinate and Review the Monthly completion of Syllabus as per lesson plans				
19th April, 2025	The teachers have completed the scheduled chapters and topics as shown in the lesson plan			

***Any of these** – (i) Lecture Method; (ii) PPT; (iii) Online Sources; (iv) Group Discussion; (v) Case Studies etc.Other Methods adopted by the teacher – Please write the specific teaching method