

## Govt.College,Ropar

### Distribution Of Syllabus & Lesson Plan/Teaching Plan (2022-23)

Name of Department: Chemistry

Class: B.Sc-1<sup>st</sup> Yr (Sem-1)

Paper: A ( Inorganic Chemistry )

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week 1	<b>Atomic Structure</b> Idea of De Broglie matter waves, Heisenberg uncertainty principal, atomic orbitals, Schrodinger wave equation, Significance of $\psi$ and $\psi^2$ quantum numbers
Week 2	radial and angular wave functions and probability distribution curve shapes of s, p, d orbitals. Aufbau and Pauli exclusion principles, Hund's multiplicity rule
Week 3	Electronic configurations of the elements and ions. <b>Periodic Properties</b> Position of element in the periodic table effective nuclear charge and its calculations.
Week 4	trends in periodic table and applications in predicting and explaining the chemical behaviour
Week 5	<b>Chemistry of Noble gases</b> Chemical properties of the noble gases, chemistry of xenon,
Week 6	structure and bonding in xenon compounds.
Week 7	<b>Chemical Bonding - I</b> Covalent Bond-Valence bond theory and its limitations, directional characteristics of covalent bond,
Week 8	various types of hybridization and shapes of simple inorganic molecules and ions. $\text{BeF}_2$ , $\text{BF}_3$ , $\text{CH}_4$ , $\text{PF}_5$ , $\text{SF}_6$ , $\text{IF}_7$ , $\text{SnCl}_4$ , $\text{XeF}_4$ , $\text{BF}_4^-$ , $\text{PF}_6^-$ , $\text{SnCl}_2$ .
Week 9&10	<b>MST</b>
Week 11	<b>Chemical Bonding - II</b> Valence shell electron pair repulsion (VSEPR) theory to $\text{NH}_3$ , $\text{H}_3\text{O}^+$ , $\text{SF}_4$ , $\text{ClF}_3$ , $\text{ICl}_2$ , and $\text{H}_2\text{O}$
Week 12	MO theory, homonuclear (elements and ions of 1st and 2nd row), and heteronuclear ( $\text{BO}$ , $\text{CN}$ , $\text{CO}$ , $\text{NO}$ ), diatomic molecules
Week 13	multicenter bonding in electron deficient molecule (Boranes) percentage ionic character from dipole moment and electronegativity difference
Week 14	Revision

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### Distribution of Syllabus & Lesson Plan/Teaching Plan (2022-23)

Name Of Department: Chemistry

Class: B.Sc-1<sup>st</sup> Yr (Sem-1)

Paper: B ( Organic Chemistry)

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week 1	<b>Structure and Bonding</b> Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bond
Week 2	Van der Waals interactions, resonance, hyperconjugation, aromaticity, inductive and field effects, hydrogen bonding
Week 3	<b>Mechanism of Organic Reactions</b> Curved arrow notation, drawing electron movements with half-headed and double-headed arrows,
Week 4	homolytic and heterolytic bond breaking. Types of reagents of organic reaction. Energy considerations Reactive intermediates-cations, carbanions, free radicals, carbenes, arynes and nitrenes (with examples).
Week 5	Assigning formal charges on intermediates and other ionic species
Week 6	Methods of determination of reaction mechanism (product analysis, intermediates, isotope effect, kinetic and stereo-chemical studies).
Week 7	<b>Alkanes</b> Isomerism in alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids),
Week 8	physical properties and Mechanism of free radical halogenation of alkanes: orientation, reactivity and selectivity.
Week 9&10	<b>MST</b>
Week 11	<b>Cycloalkanes</b> Cycloalkanes--nomenclature, chemical reactions, Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane), theory of strain less rings. The case of cyclopropane ring: banana bonds.
Week 12	<b>Dienes And Alkynes</b> Nomenclature and classification of dienes: isolated, conjugated and cumulated dienes. Structure of allenes and butadiene, methods of formation, polymerization. Chemical reactions-1,2 and 1,4 additions, Diels-Alder reaction.
Week 13	Nomenclature, structure and bonding in alkynes. Methods of formation. Chemical reactions of alkynes, acidity of alkynes. Mechanism of electrophilic and nucleophilic addition reactions hydroboration-oxidation. metal- <u>e uctions</u> , oxidation and polymerization
Week 14	Revision

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**Distribution Of Syllabus & Lesson Plan/Teaching Plan (2022-23)**

Name Of Department: **Chemistry**

Class: **B.Sc-1<sup>st</sup> Yr (Sem-1)**

Paper: **C ( Physical Chemistry)**

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week 1	<b>Mathematical Concepts</b> Logarithmic relations, curve sketching, linear graphs and calculation of slopes, differentiation of functions like $kx$ , $e^x$ , $x^n$ , $\sin x$ , $\log x$ ,
Week 2	maxima and minima, partial differentiation and reciprocity relations. Integration of some useful/relevant functions permutations and combinations.
Week 3	Factorials. Probability . <b>Evaluation of Analytical Data</b> Terms of mean and median, precision and accuracy in chemical analysis, determining accuracy of methods
Week 4	improving accuracy of analysis, data treatment for series involving relatively few measurements, linear least squares curve fitting, types of errors, standard deviation, confidence limits,
Week 5	<b>Liquid State</b> Intermolecular forces, structure of liquids (a qualitative description) Structural differences between solids, liquids and gases Liquid crystals:
Week 6	Difference between liquid crystal, solid and liquid, Classification, structure of nematic and eholestric phases. Thermography and seven segment cell
Week 7	MST
Week 8&9	<b>Gaseous State</b> Postulates of kinetic theory of gases, deviation from ideal behaviour, van der Waals equation of states, the isotherms of van der Waals equation
Week 10	relationship between critical constants and van der Waals constants, the law of corresponding states, reduced equation of state.
Week 11	Molecular velocities: Root mean <u>square</u> , <u>average</u> and most probable velocities. Qualitative discussion of the Maxwell's dis- of molecu:u.--veincities, collision number, mean free path and collision diameter, Liquifacation of gases (based on Joule-Thomson effect).
Week 12	<b>Physical Properties and Molecular Structure</b> Optical activity, polarization-(Clausius-Mossotti equation), orientation of dipoles in an electric field, dipole moment. Induced dipole moment, measurement of dipole moment temperature method and refractivity method
Week 13	Dipole moment and structure of molecules, magnetic properties-paramagnetism, diamagnetism and ferromagnetism.
Week 14	Revision

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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2022-23)

Name Of Department: Chemistry

Class: B.Sc-1<sup>st</sup> Yr (Sem 2)

Paper: A (Inorganic Chemistry)

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week1	<b>Ionic Solids-</b> Concept of close packing, Ionic structures, (NaCl type, Zinc blende, Wurzite, CaF <sub>2</sub> , and antifluorite
Week2	radius ratio rule and coordination number, Limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born-Haber cycle
Week3	solvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule. Metallic bond-free electron, valence bond and bond theories
Week4	<b>S-Block Elements</b> Comparative study, diagonal relationships, salient features of hydrides
Week5	solvation and complexation tendencies including their function in biosystems, an introduction to alkyls and aryls.
Week6	<b>Group No. 13</b> Comparative study (including diagonal relationship) of groups 13 elements, compounds like hydrides, oxides, oxyacids and halides of groups 13;
Week7	hydrides of boron-diborane and higher boranes, borazine, borohydrides.
Week8	<b>p - Block Elements</b> Comparative study (including diagonal relationship) of groups 14-17 elements,
Week9 & 10	<b>MST</b>
Week11	compounds like hydrides, oxides, oxyacids and halides of groups 14-17; fullerenes, carbides,.
Week12	fluorocarbons, silicates (structural principle), tetrasulphur tetranitride, basic properties of halogens, interhalogens and polyhalides.
Week13	Revision test

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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2022-23)

Name Of Department: Chemistry

Class: B.Sc-1<sup>st</sup> Yr (Sem 2)

Paper: B (Organic Chemistry)

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week1	<b>1. Stereochemistry of Organic Compounds</b> 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 erythro diastereomers, meso compounds, resolution of enantiomers, inversion, retention and racemization.
Week2	Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism-determination of configuration of geometric isomers, E & Z system of nomenclature
Week3	geometric isomerism in oximes and alicyclic compounds. Conformational isomerism-conformational analysis of ethane and n-butane
Week4	conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives
Week5	Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Difference between configuration and conformation
Week6	Nomenclature of benzene derivatives. Aromatic nucleus and side chain. Structure of benzene: molecular formula and Kekule structure. Stability and carbon-carbon bond lengths of benzene, resonance structure, pi structure.
Week7	<b>Aromaticity:</b> the Huckel rule, aromatic ions. Aromatic electrophilic substitution-general pattern of the mechanism, role of $\sigma$ and $\pi$ complexes. Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio. Side chain reactions of benzene derivatives.
Week8	Methods of formation and chemical reaction of alkylbenzenes and arylbenzenes.
Week9 & 10	MST
Week11	<b>Alkyl and aryl halides</b> Nomenclature and classes of alkyl halides, methods of formation chemical reactions. Mechanisms of nucleophilic substitution reactions of alkyl halides, $S_N1$ and $S_N2$ reactions with energy profile diagrams.
Week12	Methods of formation of aryl halides, nuclear and side chain reactions. The addition elimination and the elimination-addition mechanisms of nucleophilic aromatic substitution reactions. Relative reactivities of alkyl halides vs allyl, vinyl and aryl halides.
Week13	Revision

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### Distribution Of Syllabus & Lesson Plan/Teaching Plan (2022-23)

Name Of Department: Chemistry

Class: 1<sup>st</sup> Yr (Sem 2)

Paper: C (Physical Chemistry)

Two weeks left for MST tentative and one week for revision /queries for MST

TIME PERIOD	TOPICS TO BE COVERED
Week 1	<b>Colloidal State</b> Definition of colloids, classification of colloids Solids in liquids (sols): properties-kinetic, optical and electrical; stability of colloids protective action, Hardy-Schulze law, gold number.
Week 2	Liquids in liquids (emulsions) types of emulsions, preparation, Emulsifiers. Liquids in solids, (gels) classification, preparation and properties inhibition. General applications of colloids.
Week 3	<b>Chemical Kinetics and catalysis</b> Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction- concentration, temperature, pressure, solvent, light, catalyst. Concentration dependence of rates, mathematical characteristics of simple chemical reactions-zero order,
Week 4	first order, second order, pseudo order, half life and mean life. Determination of the order of reaction-s-differential method, method of integration, method of half life period and isolation method.
Week 5	Radioactive decay as a first order phenomenon. Theories of chemical kinetics,
Week 6	effect of temperature on rate of reaction. Arrhenius equation, concept of activation energy.
Week 7	Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis). Expression for the rate constant based on equilibrium constant and thermodynamic aspects.
Week 8	Catalysis and general characteristics of catalytic reactions. Homogeneous catalysis, acid base catalysis and enzyme catalysis including their mechanisms, Michaelis Menten equation for enzyme catalysis and its mechanism.
Week 9 & 10	<b>MST</b>
Week 11	<b>Solutions, Dilute Solutions and Colligative Properties</b> Ideal and non-ideal solutions, methods of expressing concentration of solutions, activity and activity coefficients. Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis, law of osmotic pressure and its measurement, determination molecular weight from osmotic pressure
Week 12	Elevation of boiling point and depression of freezing point, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.
Week 13	Revision Test

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