

Govt.College,Ropar

Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)

Name Of Department: Chemistry

Class: B.Sc-3<sup>rd</sup> Yr (Sem-5)

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>Metal-ligand Bonding in Transition Metal Complexes.</b> Limitations of valence bond theory, an elementary idea of crystal- field theory
Week 2	crystal field splitting in octahedral, tetrahedral and square planar complexes.
Week 3	factors affecting the crystal-field parameters.
Week 4	<b>Thermodynamic and Kinetic Aspects of Metal Complexes</b> A brief outline of thermodynamic stability of metal complexes
Week 5	factors affecting the stability, substitution reactions of square planar complexes.
Week 6	<b>Magnetic Properties of Transition Metal Complexes</b> Types of magnetic behaviour, methods of determining magnetic susceptibility
Week 7	spin-only formula, L-S coupling, Correlation of $\mu_s$ and $\mu_{eff}$ values, orbital contribution to magnetic moment,
Week 8	application of magnetic moment data for 3d-metal complexes
Week 9	<b>Electronic Spectra of Transition Metal Complexes.</b> Types of electronic transitions, selection rules for d-d transitions
Week 10	spectroscopic ground states, spectrochemical series. Orgel-energy level diagram for $d^1$ and $d^9$ states,
Week 11	discussion of electronic spectrum of $[Ti (H_2 O)_6]^{3+}$ complexion.
Week 12	Revision

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### Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)

Name Of Department: Chemistry

Class: B.Sc-3<sup>rd</sup> Yr (Sem-5)

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>Spectroscopy</b> Nuclear magnetic resonance ( NMR) spectroscopy. Proton magnetic resonance ( <sup>1</sup> H NMR) spectroscopy
Week 2	nuclear shielding and deshielding, chemical shift and molecular structure, spin-spin splitting and coupling constants,
Week 3	areas of signals interpretation of PMR spectra of simple organic molecules such as ethyl bromide, ethanol, acetaldehyde, 1,1,2 tribromoethane, ethyl acetate, toluene and acetophenone.
Week 4	<b>Electromagnetic spectrum: Absorption Spectra</b> Ultraviolet (UV) absorption spectroscopy-absorption laws (Beer-Lambert's law, Molar absorptivity, presentation and analysis of UV Spectra
Week 5	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.
Week 6	<b>Infrared (IR) :</b> Infrared (IR) absorption spectroscopy-molecular vibrations, Hooke's law, Selection rules, intensity and position of IR bands
Week 7	measurement of IR spectrum, fingerprint region, characteristic absorption of various functional groups and Interpretation of IR spectra of simple organic compounds.
Week 8	Problems pertaining to the structure elucidation of simple organic compounds using UV, IR, and PMR spectroscopic techniques
Week 9	<b>Organometallic Compounds</b> Organomagnesium Compounds The Grignard reagents formation, structure and chemical reactions.
Week 10	Organozinc compounds: formation and chemical reactions. Organolithium compounds: formation and chemical reactions
Week 11	<b>Organosulphur Compounds :</b> Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, and sulphonamides.
Week 12	Revision

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**Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)**

Name Of Department: **Chemistry**

Class: **B.Sc-3<sup>rd</sup> Yr (Sem-5)**

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>I. Elementary Quantum Mechanics</b>  Black-body radiations, Planck's radiation law, photoelectric effect, heat capacity of solids.
Week 2	Sinusoidal wave equation Hamiltonian operator, Schrodinger wave equation and its importance,
Week 3	physical interpretation of the wave function, postulates of quantum mechanics, particle in a one dimensional box.
Week 4	Schrodinger wave equation for H-atom, separation into three equations (without derivation),
Week 5	quantum numbers and their importance, hydrogen like wave functions, radial wave functions, angular wave functions.
Week 6	<b>II. Spectroscopy</b>  <b>Introduction :</b> Electromagnetic radiation, regions of spectrum, basic features of different spectrometers, statement of Born-Oppenheimer approximation, degrees of freedom
Week 7	<b>Rotational Spectrum :</b> Diatomic molecules. Energy levels of a rigid rotor (semi-classical principles), selection rules,
Week 8	spectral intensity, determination of bond length, qualitative description of non-rigid rotor, isotope effect
Week 9	<b>Vibrational Spectrum:</b> Infrared spectrum: Energy levels of simple harmonic oscillator, selection rules, pure vibrational spectrum, intensity
Week 10	determination of force constant and qualitative relation of force constant and bond energies,
Week 11	effect of anharmonic motion and isotope on the spectrum, idea of vibrational frequencies of different functional groups
Week 12	Revision

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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)

Name Of Department: Chemistry

Class: B.Sc-3rd Yr(Sem-6)

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>Hard and Soft acids and Bases (HSAB)</b> Classification of acids and bases as a hard and soft, Pearson's HSAB concept
Week2	acid-base strength and hardness and softness. Symbiosis
Week3	theoretical basis of hardness and softness, electronegativity and hardness and softness
Week4	<b>Bioinorganic Chemistry</b> Essential and trace elements in biological processes, metalloporphyrins with special reference to haemoglobin and myoglobin
Week5	Biological role of alkali and alkaline earth metal ions with special reference to $Ca^{+2}$ , Nitrogen fixation.
Week6	<b>Silicones and Phosphazenes</b> Silicones and Phosphazenes as examples of inorganic polymers, Nature of bonding in triphosphazenes.
Week7	<b>Organometallic Chemistry</b> Definition, Nomenclature and classification of organometallic compounds. Preparation, properties,
Week8	bonding and applications of alkyls of Li, Al, Hg, Sn and Ti, a brief account of metal-ethylene complexes
Week9	Homogeneous hydrogenation, mononuclear carbonyls the nature of bonding in metal carbonyls
Week10	The nature of bonding in metal carbonyls
Week11&12	Revision

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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)

Name Of Department: Chemistry

Class: B.Sc-3rd Yr(Sem-6)

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>Heterocyclic Compounds</b> :-Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on mechanism of electrophilic substitution.
Week2	Mechanism of nucleophilic substitution reaction in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.
Week3	Introduction to condensed five and six membered heterocycles.Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fischer indole synthesis,
Week4	Skraup synthesis and Bischler- Napieralski synthesis. Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.
Week5	<b>Synthesis of Polymers</b> :- Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Urea formaldehyde resins, epoxy resins and polyurethanes. Natural and synthetic rubbers.
Week 7	<b>Organic Synthesis Via Enolates</b> :- Acidity of $\alpha$ -hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate. Alkylation and acylation of enamines. Keto-enol tautomerism of ethyl acetoacetate. Alkylation and acylation of enamines.
Week 8	<b>Carbohydrates</b> :- Classification and nomenclature, Monosaccharides, mechanism of osazone formation, Interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses.
Week9	Configuration of monosaccharides. Erythro and threodiastereomers. Conversion of glucose into mannose.Cyclic structure of D (+)-glucose. Mechanism of mutarotation.
Week10	Structures of ribose and deoxyribose. An introduction to disaccharides ( maltose, sucrose and lactose) and polysaccharide starch and cellulose without involving structure determination
Week11	<b>Amino Acids, Peptides, Proteins and Nucleic Acids</b> :-Classification, structure and stereochemistry of amino acids. Acid base behaviour, isoelectric point and electrophoresis. Preparation and reactions of $\alpha$ -amino acids.
Week12	Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination,selective hydrolysis of peptides.Protein denaturation/renaturation

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### Distribution Of Syllabus & Lesson Plan/Teaching Plan (2021-22)

Name Of Department: Chemistry Class: B.Sc-3rd Yr(Sem-6)  
Paper: C (Physical Chemistry)

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

TIME PERIOD	TOPICS TO BE COVERED
Week1	<b>I. Raman Spectrum :</b> Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules
Week2	<b>II. Electronic Spectrum :</b> Concept of potential energy curves for bonding and antibonding molecular orbitals
Week3	qualitative description of selection rules and Franck-Condon principle
Week4	Qualitative description of $\sigma$ , $\pi$ and n M.O. their energy levels and their respective transitions
Week	<b>IV. Solid State</b> Definition of space lattice and unit cell.
Week6	Laws of crystallography-(i) Law of constancy of interfacial angles. (ii) Law of rationality of indices (iii) Law of symmetry elements in crystals
Week7	X-ray diffraction by crystals. Derivation of Bragg's equation. Determination of crystal structure of NaCl, KCl and CsCl (Laue's method and powder method)
Week8	<b>III. Photochemistry</b> Interaction of radiation with matter, difference between thermal and photochemical process. Jablonski diagram depicting various processes occurring in the excited state, qualitative description of fluorescence,
Week9	quantum yield, photosensitized reactions- energy transfer processes (simple examples).
Week10	Basic concepts of Laser and Maser. Photochemistry of vision and colour.
Week11	Revision

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