

Govt. College, Ropar

Distribution Of Syllabus & Lesson Plan/Teaching Plan (2020-21)

Name Of Department: Chemistry

Class: B.Sc-2nd Yr (Sem-3)

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	Chemistry of Elements of First Transition Series Characteristic properties of d-block elements. Properties of the elements of the first transition series,
Week 2	their simple compounds <u>and</u> complexes illustrating relative stability of their oxidation state
Week 3	Coordination number and geometry.
Week 4	Chemistry of Lanthanide Elements Electronic structure, oxidation states and ionic radii
Week 5	lanthanide contraction, complex formation, occurrence and isolation of lanthanide compounds
Week 6	Chemistry of Elements of Second and Third Transition Series General characteristics,
Week 7	comparative treatment with their 3d-analogues in respect of ionic radii, oxidation states
Week 8	Magnetic behaviour, spectral properties & stereochemistry
Week 9	Chemistry of Actinides Elements General features and chemistry of actinides,
Week 10	chemistry of separation of Np, Pu and Am from U, similarities between the later actinides and the later lanthanides
Week 11	Magnetic behaviour, spectral properties & stereochemistry
Week 12	Revision

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Paper: B (Organic Chemistry)

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TIME PERIOD	TOPICS TO BE COVERED
Week1	I. Alcohols Classification and nomenclature. Monohydric Alcohols-nomenclature, methods of formation by reduction of aldehydes, ketone, carboxylic acids and esters.
Week2	Hydrogen bonding, Acidic nature, Reactions of alcohols.
Week3	Dihydric alcohols-nomenclature, methods of formation, chemical reactions of vicinal glycols-nomenclature, methods of formation
Week4	chemical reaction of vicinal glycols, oxidative cleavage with [Pb (OAc) ₄ and HIO ₄] and Pinacol-Pinacolone rearrangement.
Week5	II.- Phenols Nomenclature, structure and bonding. Preparation of Phenols, physical properties and acidic character
Week6	Comparative acidic strengths of alcohols and phenols, resonance stabilization of phenoxide ion
Week7	Reactions of phenols-electrophilic aromatic substitution, acylation and carboxylation
Week 8	Mechanisms of Fries rearrangement. Gatterman synthesis, Hauben. Hostch reaction. Lederer-Mianasse reaction and Reimer-Tiemann reaction.
Week 9 & 10	III. Aldehydes and Ketones Nomenclature and structure of the carbonyl group, Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1,3- dithianes, synthesis of ketones from nitrites and from carboxylic acids. Physical properties, Mechanism of nucleophilic addition to carbonyl group with particular emphasis of Benzoin, Aldol, Perkin and Knoevenagel condensations,
Week11	Condensation with ammonia and its derivatives, Wittig reaction, and Mannich reaction. Use of acetals as protecting group. Oxidation of aldehydes, Baeyer-Villiger oxidation of ketones, Cannizzaro reaction, MPV (Meerwein Ponderoff Vorley) reaction, Clemmensen, Wolff-Kishner, LiAlH ₄ and NaBH ₄ reductions.
Week12	Halogenation of enolizable ketones. An Introduction to α , β unsaturated aldehydes and ketones, Michael addition.
Week13	Revision

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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2020-21)

Name Of Department: Chemistry

Class: B.Sc-2nd Yr (Sem-3)

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	Thermodynamics-I Definition of thermodynamics terms: system, surroundings. Types of systems, intensive and extensive properties. State and path functions and their differentials,
Week2	Thermodynamic processes, Concept of heat and work, elementary idea of thermochemistry
Week3	First Law of Thermodynamics : statement, definition of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship.
Week4	Joule's law. Joule Thomson coefficient and inversion temperature
Week5	Calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process.
Week6	Thermodynamics-II- (Part-a) Second law of thermodynamics: need for the law, different statements of the law. Carnot cycle and its efficiency,
Week7	Carnot theorem. Thermodynamic scale of temperature.
Week 8	Thermodynamics-II- (Part-b) Concept of entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change. Clausius inequality, entropy as a criterion of spontaneity and equilibrium. Entropy change in ideal gases mixing of gases.
Week 9 & 10	I. Thermodynamics-111 Third law of thermodynamics, Nernst heat theorem, statement and concept of residual entropy, evaluation of absolute entropy from heat capacity data, Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities. A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of G and A with P, V and T.
Week11	I. Chemical Equilibrium Equilibrium constant and free energy, Thermodynamic derivation of law of mass action. Le Chatelier's principle
Week12	Reaction isotherm and reaction isochore-Clapeyron equation and Clausius-Clapeyron equation
Week13	Revision

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Name Of Department: Chemistry

Class: B.Sc-2nd Yr (Sem 4)

Paper: C (Inorganic Chemistry)

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

TIME PERIOD	TOPICS TO BE COVERED
Week1	Coordination Compounds Werner's coordination theory and its experimental verification, effective atomic number concept,
Week2	chelates, nomenclature of coordination compounds
Week3	, isomerism in coordination compounds
Week4	valence bond theory of transition metal complexes
Week5	Oxidation and Reduction Use of redox potential data-analysis of redox cycle, redox stability of water-Frost, Latimer diagram Pourbaix diagrams.
Week6	Principles involved in the extraction of the elements
Week7	Acids and Bases Arrhenius, Bronsted-Lowry, the Lux-Flood solvent system
Week8	Lewis concepts of acids and bases
Week9	Non-aqueous Solvents Physical properties of a solvent, types of solvents and their general characteristics
Week10	reaction in non-aqueous solvents with reference to liquid NH_3 , reaction in non-aqueous solvents with reference to liquid SO_2
Week11	Revision test


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Distribution Of Syllabus & Lesson Plan/Teaching Plan (2020-21)Name Of Department: ChemistryClass: B.Sc-2nd Yr (Sem-4)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	I. Carboxylic Acids :-Nomenclature, structure and bonding. physical properties, acidity of carboxylic acids, effects of substituents on acid strength
Week2	Preparation of carboxylic acids, Reactions of amides, Reactions of carboxylic acids, Mechanism of decarboxylation
Week3	Methods of formation and chemical reactions of Halo acids and Hydroxyacids. Maleic acid, tartaric acid and citric acid. (Structural Formula only).
Week4	Methods of formation and chemical reaction of unsaturated monocarboxylic acids. Dicarboxylic acids, methods of formation and effect of heat and dehydrating agents.
Week5	II. Carboxylic Acid Derivatives :-Structure and nomenclature of acid chlorides, esters. amides and acid anhydrides. Relative stability and reactivity of acyl derivatives.
Week6	Physical properties, interconversion of acid derivatives by nucleophilic acyl substitution. Preparation of carboxylic derivatives, chemical reactions, Mechanism of esterification and hydrolysis (acidic and Basic).
Week7	III. Ethers and Epoxides :-Nomenclature of ethers and methods of their formation, physical properties, Chemical reactions-cleavage and autooxidation, Ziesel' s Method. Synthesis of epoxides, acid and base catalysed ring opening of epoxide, orientation of ring opening reactions of Grignard and organolithium reagents with epoxide.
Week8	IV. Fats, Oils and Detergents :-Natural fats, edible and industrial oils of vegetable origin, common fatty acids, glycerides, hydrogenation of unsaturated oils. Saponification value, iodine value, acid value. Soaps, synthetic detergents, alkyl and aryl sulphonates.
Week9	V. Organic Compounds of Nitrogen a) Nitro Compounds :- Preparation of nitroalkanes and nitroarenes. Chemical reactions of nitroalkanes, Mechanism of nucleophilic substitution in nitroarenes and their reactions in acidic, neutral and alkaline media, Picric acid
Week10	b) Amines Reactivity, structure and nomenclature of amines, physical properties. Stereochemistry of amines. Separation of mixture of primary, secondary and tertiary amines. Structural features affecting the basicity of amines
Week11	Amine salts as phase-transfer catalyst and preparation of alkyl and aryl amines (reduction of nitro compounds and nitriles), reductive amination of aldehydic and ketonic compounds Gabriel-phthalimide reaction, Hoffmann bromamide reaction.
Week12	Revision

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Name Of Department: Chemistry

Class: B.Sc-2nd Yr(Sem-4)

Paper: A (Physical Chemistry)

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

TIME PERIOD	TOPICS TO BE COVERED
Week1	Electrochemistry-I (a) :-Electrical transport-conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance with dilution. Migration of ions and Kohlrausch law. Arrhenius theory of electrolyte dissociation and its limitations
Week2	weak and strong electrolytes, Ostwald's dilution law, its uses and limitations. Debye-Huckel-Onsagar's equation for strong electrolytes (elemental treatment only).
Week3	Electrochemistry-I (b) :-Transport number, definition and determination by Hittorf method and moving boundary method.
Week4	Applications of conductance measurements: determination of degree of dissociation, determination of K_a of acids, Determination of solubility product of a sparingly soluble salts, conductometric titrations
Week5	Electrochemistry-II :-Types of reversible electrodes--gas-metal ion, metal-metal ion, metal-insoluble salt-anion and redox electrodes. Electrode reactions, Nernst equation, derivation of cell E.M.F. and single electrode potential, standard hydrogen electrode-reference electrodes-standard electrode. potential,
Week6	sign conventions, electrochemical series and its significance. Electrolyte and Galvanic cells-reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurements, Computation of cell EMF. Calculation of thermodynamic quantities of cell reaction (G , H and K), polarization, over potential and hydrogen over voltage.
Week7	Concentration cell with and without transport, liquid junction potential, application of concentration cells, valency of ions, solubility product and activity coefficient potentiometric titrations
Week8	Definition of pH and pK., determination of pH using hydrogen, quinhydrone and glass electrodes, by potentiometric methods. Buffers--mechanism of buffer action, Henderson-Hassel equation, Hydrolysis of salts, Corrosion-types, theories and methods of combating it.
Week9	Phase Equilibrium :-Statement and meaning of the terms-phase, component and degree of freedom, derivation of Gibbs phase rule; phase equilibria of one component system-water and S systems.
Week10	Phase equilibria of two component systems-solid-liquid equilibria, simple eutectic Pb-Ag systems, desilverisation of lead. Solid Solutions-compound formation with congruent melting point (Mg-Zn) and incongruent melting point, (NaCl-H ₂ O), (FeCl ₃ -H ₂ O) systems.
Week11	Freezing mixtures, acetone-dry ice. Partially miscible liquids: Lower and upper consolute temperature, Effect of impurity on consolute temperature. Immiscible liquids, steam distillation. Nernst distribution law, thermodynamic derivation & applications

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