Subject: Chemistry **Code: 34** **Class: Second PU**

Sl No	Term	Prescribed Chapters	Prescribed Practical classes	Period
1	**First Term: 15-07-2021 to 15-09-2021**	**Unit I: Solid State (8 Hours)** Classification of solids based on different binding forces :molecular, ionic covalent and metallic solids, amorphous and crystalline solids(elementary idea),unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids ,number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties, Band theory of metals ,conductors, Semiconductors and insulators and n and p type semiconductors. **Unit II : Solutions (9 Hours)** Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties – relative lowering of vapour pressure, Raoult's law , elevation of B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor. **Unit VIII: d and f Block Elements (9 Hours)** General introduction ,electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation. Preparation and properties of $K_2Cr_2O_7$ and $KMnO_4$.	**A. Surface Chemistry (2 lab class)** (a) Preparation of one lyophilic and one lyophobic sol. Lyophilic sol: starch, egg albumin and gum. Lyophobic sol: aluminium hydroxide, ferric hydroxide, arsenious sulphide. (b) Dialysis of sol prepared in (a) above. (c) Study of the role of emulsifying agent in stabilizing the emulsions of different oils. **B. Chemical Kinetics (2 lab class)** (a) Effect of concentration and temperature on the rate of reaction between sodium thiosulphateand hydrochloric acid. (b) Study of reaction rates of any one of the following: (i) Reaction of iodide ion with hydrogen peroxide at room temperatureusing different concentrations of iodide ions. (ii) Reaction between potassium iodate (KIO_3) and sodium sulphite (Na_2SO_3) using starch Solution as indicator (clock reaction). **C. Thermochemistry (2 lab class)** Any one of the following experiments : (a) Enthalpy of dissolution of copper sulphate or potassium nitrate. (b) Enthalpy of neutralization of strong acid (HCl) and strong base (NaOH) (c) Determination of enthalpy change during	

		Lanthanoids – electronic configuration, oxidation states,	interaction (Hydrogen bond formation)	

		chemical reactivity and lanthanoid contraction and its consequences. Actinoids – Electronic configuration, oxidation states and comparison with lanthenoids. **Unit X: Haloalkanes and Haloarenes (7 Hours)** Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions. Optical rotation. Haloarenes: Nature of C-X bond, substitution reactions (directive influence of halogen for monosubstituted compounds only). Uses and environmental effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.	between acetone and chloroform. **D. Electrochemistry (1 lab class)** Variation of cell potential in $Zn/Zn^{2+}//Cu^{2+/}Cu$ with change in concentration of electrolytes ($CuSO_4$ or $ZnSO_4$) at room temperature.	

2	**First Term test: 13-09-2021 to 15-09-2021**	Chapters taught in first term Same question paper pattern as in annual exam paper.		
3	**Assaignment -1**			

4	**Second Term: 16-09-2021 to 30-11-2021**	**Unit III: Electrochemistry (9 Hours)** Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells; corrosion. **Unit IX Coordination Compounds (7 Hours)** Coordination compounds : Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding, Werner's theory VBT, CFT; isomerism (structural and stereo) importance of coordination compounds (in qualitative analysis, extraction of metals and biological systems).	**E. Chromatography (1 lab class)** (a) Separation of pigments from extracts of leaves and flowers by paper chromatography anddetermination of Rf values. (b) Separation of constituents present in an inorganic mixture containing two cations only (constituentshaving wide difference in Rf values to be provided). **F. Preparation of Inorganic Compounds (1 lab class)** (a) Preparation of double salt of ferrous ammonium sulphate or potash alum. (b) Preparation of potassium ferric oxalate. **G. Preparation of Organic Compounds (1 lab class)** Preparation of any one of the following compounds: (a) Acetanilide	

		Unit XI: Alcohols, Phenols and Ethers (8 Hours) Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only); identification of primary, secondary and tertiary alcohols; mechanism of dehydration, uses, with special reference to methanol and ethanol. Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophillic substitution reactions, uses of phenols. Ethers: Nomenclature, methods of preparation, physical and chemical properties, uses. **Unit XIII: Organic Compounds Containing Nitrogen (6 Hours)**	(b) Di-benzal acetone (c) p-Nitroacetanilide (d) Aniline yellow or 2 - Napththol aniline dye	
		Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines. Cyanides and Isocyanides – will be mentioned at relevant places in context. Diazonium salts: Preparation, chemical reactions and importance in synthetic organic chemistry.		
5	**Assaignment -2**			
6.	**Mid-term examinations 20-11-2021 to 30-11-2021**	Chapters taught in first and second term		
7	**Third Term:**	**Unit IV: Chemical Kinetics (9Hours)** Rate of a reaction (average and instantaneous), factors	**H. Test for the Functional Groups Present in Organic Compounds (2 Lab**	

	01-12-2021 to 30-01-2021	affecting rates of reaction: concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment).Activation energy, Arrhenious equation. **Unit VII: p-Block Elements (11 Hours)** Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous-allotropic forms; compounds of phosphorous: preparation and properties of phosphine, halides (PCl_3, PCl_5) and oxoacids (elementary idea only). Group 16 elements : General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; dioxygen: preparation, properties and uses; classification of oxides; ozone. Sulphur – allotropic forms; compounds of sulphur: preparation, properties and uses of sulphur dioxide; sulphuric acid: industrial process of manufacture, properties and uses, oxoacids of sulphur (structures only). Group 17 elements : General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens: preparation, properties and uses of chlorine and hydrochloric acid, interhalogen compounds, oxoacids of halogens (structures only). Group 18 elements: General introduction, electronic	**class)**Unsaturation, alcoholic, phenolic, aldehydic, ketonic, carboxylic and amino (primary) groups. **I. Characteristic Tests of Carbohydrates, Fats and Proteins in Pure Samples and TheirDetection in Given Food Stuffs. (1 Lab class)** **J. Determination of Concentration/Molarity of KMnO4 Solution by Titrating it against a Standard Solution of – (2 Lab class)** (i) Oxalic acid (ii) Ferrous ammonium sulphate (Students will be required to prepare standard solutions by weighing themselves). **K. Qualitative Analysis (6 Lab class)** **• Determination of one cation and one anion in a given salt.** Cations - Pb^{2+} Cu^{2+}, As^{3+}, Al^{3+}, Fe^{3+}, Mn^{2+}, Ni^{2+}, Zn^{2+}, ,Co^{2+}, Ca^{2+},Sr^{2+}, Ba^{2+}, Mg^{2+}, NH_4^+ CO_3^{2-}, S^{2-}, SO_3^{2-}, SO_4^{2-}, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, PO_4^{3-}, $C_2O_4^{2-}$, CH_3C0O^-, (Note : Insoluble salts excluded)	

		configuration, occurrence, trends in physical and chemical properties, uses. **Unit XII: Aldehydes, Ketones and Carboxylic Acids (9 Hours)** Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes; uses. Carboxylic Acids: Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.		
8	**Second term test 28-01-2022 to 31-01-2022**	Chapters taught in third term		

9	**Fourth Term:** **01-02-2022 to 31-03-2022**	**Unit V: Surface Chemistry (6 Hours)** Adsorption – physisorption and chemisorption; factors affecting adsorption of gases on solids; catalysis:homogenous and heterogeneous, activity and selectivity: enzyme catalysis; colloidal state: distinction between true solutions, colloids and suspensions; lyophillic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation; emulsions – types of emulsions. **Unit VI: General Principles and Processes of Isolation of Elements (5 Hours)** Principles and methods of extraction – concentration, oxidation, reduction electrolytic method and refining; occurrence and principles of extraction of aluminium, copper, zinc and iron.		

		Unit XIV: Biomolecules (7 Hours) Carbohydrates – Classification (aldoses and ketoses), monosaccharide (glucose and fructose), D-L configuration, oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen): importance. Proteins - Elementary idea of a - amino acids, peptide bond, polypeptides, proteins, primary structure, secondary structure, tertiary structure and quaternary structure (qualitative idea only), denaturation of proteins; enzymes. Hormones –Elementary idea (excluding structure). Vitamins – Classification and functions. Nucleic Acids: DNA and RNA **Unit XV: Polymers (5 Hours)**		
		Classification – Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters, bakelite, rubber. Biodegradable and non-biodegradable polymers. **Unit XVI: Chemistry in Everyday Life (5 Hours)** 1. Chemicals in medicines – analgesics, tranquilizers, antiseptics, disinfectants, antimicrobials, antifertility drugs, antibiotics, antacids, antihistamines. 2. Chemicals in food – preservatives, artificial sweetening agents, elementary idea of antioxidants. 3. Cleansing agents – soaps and detergents, cleansing action.		
10	**Preparatory Exam**	Full syllabus		

	24-03-2022 to 30-03-2022			
11	**Annual Examinations First week of April**	Full syllabus		

NOTE: 1. Strictly all the topics of NCERT text book should be taught.

2. Laboratory experiments should be conducted only during offline class for the students. Till that time students are asked to write the physical chemistry experiments in record book.