

Balasaheb Desai Foundation Sanchit

Smt. Vijayadevi Desai Senior College, Daulatnagar

Tal - Patan Dist-Satara

Teaching Plan 2018-2019

B.Sc-I Semester-I

Prof. Shirke R.M



Subject - Organic Chemistry-II

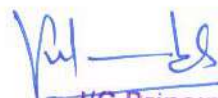
Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Fundamentals Of Organic Chemistry	1.1: Introduction 1.2: Curved arrow notations, Cleavage of Bonds: Homolysis and Heterolysis. Organic molecular species: 1.3: Nucleophiles and electrophiles. 1.4: Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation effect, Reactive Intermediates: Generation, Structure, Stability and Reactions of Carbocations, Carbanions and carbon free radicals.	September	09
2.	Stereochemistry	1.1: Introduction 1.2: Types of Stereoisomerism, Optical Isomerism: Concept of Chirality, Elements of Symmetry, Optical Isomerism in tartaric acid, 2, 3 Dihydroxybutanoic acid, 1.3: Enantiomerism, Diastereomerism and Meso compounds, Geometrical isomerism in C=C, C=N and alicyclic compounds. 1.4: Nomenclature of stereoisomers: D and L, erythro and threo, R and S, E and Z.	October	10
3.	Aromaticity	1.1: Introduction 1.2: Characteristics properties of organic compounds 1.3: Meaning of terms: Aromatic, Non aromatic, Antiaromatic, Pseudoaromatic 1.4: Structure of Benzene: Kekule structure, Resonance structure, M.O. 1.5: picture, Modern theory of Aromaticity, Mechanism of Electrophilic substitution reactions: 1.6: Nitration, Sulphonation, Halogenation and Friedel craft reaction.	November	07

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4.	Cycloalkanes ,Cycloalkenes and alkadienes	1.1: Cycloalkanes: - Introduction. Method of formation - a) By addition of carbene to alkene b) Action of metallic sodium on dihaloalkane c) Diels - Alder reaction d) By reduction of aromatic compounds, Chemical properties- a) Photohalogenation b) Catalytic halogenations c) Catalytic hydrogenation d) Effect of heat e) Reaction with hydrogen halide 5 1.2:Cycloalkenes : Introduction, Method of formation from cyclic compounds, Chemical Properties - a) Hydrogenation b) Addition of Halogens and halogen acids, c) Allylic halogenations 1.3:Alkadienes : Introduction, Classification, Buta-1,3-diene - a) Structure b) Methods of formation - from cyclohexane, From Butane by dehydrogenation, From acetylene, From Butane-1,3 - diol, From ethanol and acetaldehyde (Industrial method), 1.4:Chemical Properties - a) Reaction with hydrogen halide b) Reaction with halogens -With one molar equivalent of halogens (Cl ₂ or Br ₂) c) Diels- Alder reaction d) Reduction – hydrogenation e) Oxidation – Ozonolysis f) Polymerization	December	
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 Smt. Vijayadevi Desai Senior College Daulatnagar
 Tal – Patan Dist – Satara
 Teaching Plan (2018-2019) B.Sc – 1 Sem – 1
Subject – Inorganic Chemistry I

Prof. Jambure J.D

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Atomic Structure and Periodicity Of Elements	1.1 Bohr's theory of hydrogen atom and its limitations 1.2 Wave particle duality 1.3 Heisenberg uncertainty principle 1.4 Quantum numbers and their significance 1.5 Shapes of s, p and d atomic orbitals 1.6 Electrons filling rules in various orbitals: a) Aufbau's principle b) Hund's rule of maximum multiplicity c) Pauli's exclusion principle 1.7 Electronic configuration of elements. Stability of empty, half-filled and completely filled orbitals 1.8 Periodicity of the elements: General discussion of the following properties of the elements with reference to s block elements: a) electronic configuration b) atomic radii c) ionic radii d) ionization energy e) electron affinity f) electronegativity g) metallic characters h) reactivity i) oxidation state j) melting and boiling points k) chemical properties	September	11
2.	Chemical Bonding and Molecular structure A) Ionic Bonding	2:1 Definition and formation of ionic bond. General characteristics of ionic bonding 2:2 Energetic in ionic bond formation 2:3 Born-Haber cycle for NaCl and its applications 2:4 Fajan's Rule, Applications of Fajan's rule for, • Polarizing power and polarizability • Ionic character in covalent compounds • Bond moment, dipole moment and percentage ionic character	September	08



3.	Chemical Bonding and Molecular structure B) Valence bond Theory (VBT)	3.1 Concept of hybridization, different types of hybridization and geometry of following molecules, 3.2 Linear geometry- BeCl_2 (sp hybridization) 3.3 Planer trigonal geometry- BF_3 (sp ² hybridization) 3.4 Tetrahedral geometry- SiCl_4 (sp ³ hybridization) 3.5 Trigonal bipyramidal geometry- PCl_5 (sp ³ d hybridization) 3.6 Octahedral geometry- SF_6 (sp ³ d ² hybridization) 3.7 Pentagonal bipyramidal geometry - IF_7 (sp ³ d ³ hybridization)	October	
4.	Chemical Bonding and Molecular Structure(c)Molecular orbital theory (MOT)	4.1 LCAO method, formation of bonding , anti bonding and nonbonding molecular orbitals. 4.2 Conditions for successful overlap, Types of overlaps - S-S, S-p _x , P _x -P _x , P _y -P _y and P _z -P _z overlaps. 4.3 Bond order and its significance. 4.4 Energy level sequence for molecular orbital when n=1&2. 4.5 MO diagrams for homonuclear diatomic molecule of 1st & 2nd period Elements (He_2 , Li_2 , B_2 , N_2 , O_2). 4.6 Molecular orbital diagrams for heteroatomic diatomic molecules. (CO, NO)	November	09

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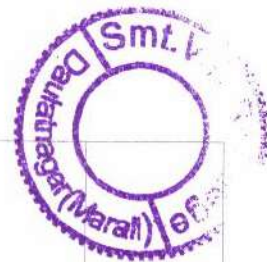
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Tal – Patan Dist – Satara
Teaching Plan (2018-20219) B.Sc – 1 Sem – 2
Subject – Physical Chemistry-III



Prof. Jambure J.D

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Chemical Energetics A) Thermodynamics	1.1A) Thermodynamics Introduction, Basic concepts of thermodynamics, First law of thermodynamics Spontaneous and non-spontaneous process with examples, Statements of second law of thermodynamics, Carnot's cycle and its efficiency.	February	08
2.	B) Thermochemistry	1.2 Entropy, Physical Significance of entropy, Statement of Third Law of thermodynamics and calculation of absolute entropies of substance 1.3 B) Thermochemistry (04) Important principles and definitions of thermochemistry. 1.4 Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. 1.5 Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchoff's equation.		
3.	Chemical Equilibria	1.1 Chemical Equilibrium: Free energy change in a chemical reaction. 1.2 Thermodynamic derivation of the law of chemical equilibrium. 1.3 Distinction between ΔG and ΔG° , Le Chatelier's principle. 1.4 Relationships between K_p , K_c and K_x for reactions involving ideal gases.	March	07
4.	Kinetic Theory of Gases	4.1 Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. 1.2 Ideal and Non ideal gases, Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. 1.3 Van der Waals equation of state for real gases. 4.2 Explanation of real gas behaviour by Van der Waal's equation, Boyle temperature (derivation not required). 4.3 Critical Phenomena: PV-isotherms of	April	09



		real gases (Andrew's isotherms), Continuity of state, Critical constants and their calculation from vander Waals equation. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Numerical Problems.		
5.	Chemical Kinetics	5.1 Introduction, Rate of reaction, Definition and units of rate constant, Factors affecting rate of reaction. (Nature of reactant, Concentration, pressure, temperature and catalyst. 5.2 Order and Molecularity of reaction, Zero order reaction, First order reaction, Characteristics of first order reaction. examples, Pseudo-unimolecular reactions, examples. 5.3 Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants. 5.4 Characteristics of Second order reaction., Determination of order of reaction by i) integration method ii) graphical method iii) Half life method, Effect of temperature on rate of reaction, Arrhenius equation, Concept of energy of activation. 5.5 Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only). Numerical problems.	May	10

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Tal – Patan Dist – Satara
Teaching Plan (2018-2019) B.Sc – 1 Sem – 2
Subject-Analytical Chemistry-IV



Prof. Shejwal.P.K

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Introduction to Analytical Chemistry	1.1 Introduction 1.2 Importance of analysis 1.3 Analytical processes (Qualitative and Quantitative) 1.4 Methods of analysis (Only classification) 1.5 Sampling of solids, liquids and gases 1.6 Errors, types of errors (determinate and indeterminate), methods of expressing accuracy (Absolute and relative error) 1.7 Significant figures, mean, median, standard deviation (Numerical problems expected)	February	06
2.	Chromatography	2.1 Introduction, Basic Principle of Chromatography, Basic terms, Classification of Chromatography 2.2 Paper Chromatography- Principle, Methodology-types of papers and treatment, sample loading, choice of solvent, development-ascending, descending, circular, location of spots, determination of R _f value, Applications, advantages and disadvantages 2.3 Thin layer chromatography; Principle, Solvent system, stationary phases, preparation of TLC plate, Detecting reagents, methodology-sample loading, development, detection of spot, R _f value, Applications, advantages and disadvantages 2.4 Comparison of paper chromatography and TLC	March	06
3.	Theory of titrimetric Analysis	3.1 Introduction 3.2 Acid-base indicators 3.3 Theory of indicators w.r.t. Ostwald's ionization theory and quinoid theory 3.4 Neutralization curves and choice of indicators for a. Strong acid-strong base b. Strong acid-weak base c. Strong base-weak acid 3.5 Complexometric titrations a.	March	08



		Introduction b. Types EDTA titrations c. Metallochromic indicators-Eriochrome black- T d. Indicator Action of Eriochrome black- T 9 TLC, detecting Reagent methodology, sample loading, Application ,Disadvantages,Disadvantages 3.6 Comparison paper chromatography and TLC.		
4	. Water Analysis	4.1 Physical analysis of water – pH, Conductance, Colour, odour, Turbidity and taste 4.2 Chemical Analysis – Total Dissolved solids , Hardness, Salinity, Alkalinity, Acidity, Sulphates, Nitrates, Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand	April	09
5	. Analysis of Fertilizers	5.1 Introduction 5.2 Types of fertilizers 5.3 Necessity and requirements of good fertilizers 5.4 Sampling and sample preparation 5.5 Analysis of Nitrogen by Kjeldahl's method 5.6 Analysis of Phosphorus by phosphomolybdate method 5.7 Analysis of Potassium by sodium tetraphenyl borate method	May	08

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 Teaching Plan 2018-2019
 B.sc-II Sem-III
 Subject- Physical Chemistry-V
 Prof. Jambure J.D




Module number	Topic	Sub Topic	Month	Lecture
1.	Electrolytic Conductivity	1.1 Introduction 1.2 Types of conductors, Conductivity, Equivalent and Molar conductivity and their variation with dilution for weak and strong electrolytes in aqueous solution. 1.3 Equivalent conductivity at infinite dilution, Measurement of conductance by using Wheatstone bridge. 1.3 Kohlrausch law of independent migration of ions and its applications such as ionic mobility, determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of salt. 1.4 Conductometric titrations (only acid base titrations). Advantages of conductometric titrations. 1.5 Transference number, Hittorf's rule, determination of transport number using Moving boundary method, factors affecting transport numbers. 1.6 Numerical problems.	September	16
2.	Physical properties of liquid	2.1 Introduction 2.2 Classification of physical properties, Surface tension and its determination using Stalagmometric and differential capillary rise methods, Viscosity and its determination using Ostwald's viscometer, Refractive index (Snell's law), Specific and Molecular refractivities and its determination using Abbe's refractometer	September	06



3.	Surface Chemistry	3.1 Introduction 3.2 Adsorption as a surface phenomenon, Definition of adsorption, adsorbent, adsorbate, absorbent. 3.3 factors affecting adsorption, Types of adsorption, Distinction between physical and chemical adsorption, Adsorption isotherms: Freundlich adsorption isotherm, Langmuir adsorption isotherm. 3.4 Types of physical adsorption isotherms, applications of adsorption.		
4.	Nuclear chemistry	4.1 Introduction 4.2 Types of Nuclear radiation, properties of α , β and γ radiations, Detection and measurement of nuclear radiations by Scintillation and Geiger muller counter methods, radioactive equilibrium and range of α - particles, Geiger Nuttal relations, determination of radioactive constant (decay constant).	November	05
5.	Chemical Kinetics	5.1 Introduction 5.2 Third order reactions: derivation of rate constant, characteristics and examples of third order reaction. 5.3 Theories of reaction rates as Collision theory and Transition state theory (only quantitative aspect, derivation not expected),	December	04

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Teaching Plan 2018-2019

B.sc-II Sem-III

Subject- Industrial Chemistry –VI

Prof. Shejwal.P.K

Module number	Module name	Subject Topic	Month	Lecture
1	Basic Concept in Industrial chemistry	1.1 1.1 The difference between classical chemistry and industrial chemistry, Raw material for the Chemical Industry, Material Safety data sheets, Units that make up a chemical process-unit operation and unit processes, Flow Diagrams, Block Diagram 1.2 Process flow diagram / flow sheets, Material Balances-The purpose of mass balance calculations, Material Balance Equations 1.3 Mass balance calculation procedure and simple example Definition and Explanation of terms –Normality 1.4 Equivalent weight, Molality, Molecular weight, Molarity, Molarity of mixed solution, Acidity of base 1.5 Basicity of acid, ppt, ppm, ppb solutions, Mole Fraction, Weight fraction, Percentage composition by W/W, W/V, V/V 1.6 Problems based on Normality, Molarity, mole fraction, mixed solution, etc	September	10
2	Unit Operations	2.1 Size reduction- Principle, Jaw crusher, ball mill Size Enlargement – Principle, Pellet mill, tumbling 2.2 agglomerators Separation – Magnetic separation, Froth flotation, Distillation-Distillation of liquid mixtures, Types of distillation 2.3 Types of columns and packings, Condensers, Vacuum distillation, Spinning-band distillation, Steam distillation. U	September	06



3	Corrosion and electroplating	3.1 Introduction of corrosion 3.2 Electrochemical theory of corrosion, Factors affecting on corrosion -i. Position of metals in the electrochemical series on the basis of standard reduction potential ii. Purity of metal iii. Effect of moisture iv. Effect of oxygen (differential aeration principle) v. Hydrogen overvoltage, Methods of protections of metals from corrosion 3.3 Electroplating: Electrolysis, Faraday's laws, Cathode current Efficiency, Basic principles of electroplating, Cleaning of articles, Electroplating of chromium, Anodising	October (Marathi)	
4	Paper Industry	4.1 Manufacturing of Pulp, Types of pulp- Sulphate and soda 4.2 Manufacturing of paper, calendaring, ecological problems of Indian Paper industry, Features of good paper industry	November	06
5	Soap and detergents	5.1 Introduction 5.2 Soaps - Raw materials, Types of soaps, Cleansing action of soap 5.3 Manufacture of soap - Boiled or Hot Process, Detergents - Raw Materials 5.4 Types of Detergents: Anionic, cationic and amphoteric, Preparation of Teepol and Deriphat 5.5 Comparisons between soaps and detergents.	December	07

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Teaching Plan 2018-2019

B.sc-II Sem-IV

Subject- Inorganic Chemistry –VII

Prof. Shirke.R.M

Module number	Module name	Subject Topic	Month	Lecture
1	Co-ordination Chemistry	1.1 Introduction-Definition and formation of co-ordinate covalent bond in $\text{BF}_3 - \text{NH}_3$, $[\text{NH}_4]^+$ and H_2O 1.2 Distinguish between double salt and complex salt 1.3 Werner's theory- 1.3.1. Postulates 1.3.2. The theory as applied to cobalt amines viz. $\text{CoCl}_3.6\text{NH}_3$, $\text{CoCl}_3.5\text{NH}_3$, $\text{CoCl}_3.4\text{NH}_3$, $\text{CoCl}_3.3\text{NH}_3$ 1.4 Description of the terms- ligand, co-ordination number, co-ordination sphere, Effective atomic number 1.5 IUPAC nomenclature of coordination compounds. 1.6 Isomerism in complexes with C.N. 4 and 6 1.7.1 Geometrical Isomerism 2 Optical Isomerism 3 Structural Isomerism-Ionisation 1.8 Isomerism, Hydrate Isomerism, Coordination Isomerism, Linkage Isomerism and Co-ordination position Isomerism 1.9 Valence bond theory of transition metal complex with respect to, C.N. 4, complexes of Cu and Ni C.N. 6 complexes of Fe and Co	February	10
2	Chelation	2.1 A brief introduction with respect to ligands, chelating agent, chelation and metal chelates. 2.2 Structural requirements of chelate formation 2.3 Difference between metal chelate and metal complex 2.4 Classification of chelating agents (with specific illustration of bidentate chelating agents)	March	05

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		2.5 Application of chelation with respect to chelating agents - EDTA and DMG		
3	P-Block element (Group 13,14 and 15)	3.1. Position of elements in periodic table 3.2. Characteristics of p-block elements with special reference to Electronic configuration and Periodic properties 3.3. Compounds of group 13,14 and 15 3.4.1 Boron-Diborane method of preparation and nature of bonding (structure) 3.3.2 Borazine method of preparation and nature of bonding (structure) 3.3.3 Allotropes of carbon and phosphorus 3.3.4 Oxyacids of nitrogen – HNO ₂ , HNO ₃ . 3.3.5 Hydrides of Nitrogen- NH ₃ and N ₂ H ₄	March	09
4	Chemistry of elements of 3d series elements	4.1 Position of elements In periodic table 4.2 Characteristics of d-block element (i) Electronic str (ii) Oxidation states (iii) magnetic character (iv) Colored ions (v) Complex formation	April	08
5	Inorganic semi- micro qualitative analysis	5.1 Theoretical principles involved in qualitative analysis. 5.2 Applications of solubility product and common ion effect in separation of cations into groups. 5.3 Application of complex formation in a) Separation of II group into IIA and IIB sub-groups. b) Separation of Copper from Cadmium. c) Separation of Cobalt from Nickel. d) Separation of Cl ⁻ , Br ⁻ , I ⁻ . e) Detection of NO ₂ ⁻ , NO ₃ ⁻ (Brown ring test). 5.4 Application of oxidation and reduction in a) Separation of Cl ⁻ , Br ⁻ , I ⁻ in mixture b) Separation of NO ₂ ⁻ and NO ₃ ⁻ in mixture. 5.5 Spot test analysis.	May	08

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Teaching Plan 2018-2019

B.Sc-II Semester-IV

Prof. Shirke.R.M

Subject – Organic Chemistry-VIII

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Carboxylic acids and their derivatives	<p>1.1 Monocarboxylic acid: Introduction, Methods of Formation from Alcohols, Aldehydes, Ketones, Nitriles and Alkyl benzenes. Chemical Reaction: Hell-Vohlard-Zelinsky (HVZ) reaction.</p> <p>1.2 Formation of Halo Acids, Mono, Di, Tri- chloro acetic acid. Substitution reaction of Monochloro acetic acid by Nucleophile OH⁻, I⁻, CN⁻ and NH₃</p> <p>1.3 Hydroxy acids: Malic and Citric acid Methods of formation of Malic acid from maleic acid, from Alpha bromo succinic acid and moist Ag₂O. Chemical Reactions: Reactions of Malic acid- Action of heat, oxidation by KMnO₄ and reduction reaction with HI. Uses of Malic acid Method of formation of Citric acid from glycerol. Chemical Reactions: Reaction of citric acid: acetylation by acetic anhydride, reduction by HI, action of heat. Uses of citric acid.</p> <p>1.4 Unsaturated acid: Cinnamic acid: method of formation from benzaldehyde using diethyl malonate and by using acetic anhydride and sodium acetate. Chemical Reactions- Bromination, Oxidation. Uses of cinnamic acid</p>	February	08

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		<p>Acrylic acid: Method of formation from acrolein and by dehydration of beta hydroxy propionic acid. Chemical Reactions: Addition of water, Reduction by Na/ C₂H₅OH. Uses of acrylic acid.</p> <p>1.5 Dicarboxylic acid: Succinic and phthalic acid Method of formation of succinic acid from ethylene dibromide, maleic acid Chemical Reactions: Action of heat, Action of NaHCO₃, C₂H₅OH in presence of acid. Uses of succinic acid. Phthalic acid: Method of formation from o-xylene and Naphthalene Chemical Reactions: Action of heat, reaction with sodalime, ammonia, uses of phthalic acid.</p> <p>1.6 Carboxylic acid derivatives: Introduction Acid halide derivative: Acetyl chloride: formation from acid, by action with PCl₃ and SOCl₂, reaction with water, alcohol (Mechanism of esterification is expected) and ammonia. Uses of acetyl chloride. Acid anhydride derivative: Method of formation of acetic anhydride by dehydration of acetic acid, reactions with water, alcohol and ammonia, uses of acetic anhydride.</p>		
2.	Amines and Diazonium Salts	<p>2.1 Introduction, Classification, Nomenclature, structure.</p> <p>2.2 Methods of preparation: a) From Alkyl halide by Amonolysis, b) By Reduction of Nitriles or Cyanides, c) From Unsubstituted amides (Hoffmann degradation), d) By Gabriel Synthesis (From Phthalamide).</p> <p>2.3 Reactions: Carbylamine reaction, Schotten-Baumann reaction, Electrophilic substitution (Aniline), Nitration, Bromination, Sulphonation.</p> <p>2.4 Diazonium salt: Introduction, Preparation of Benzene diazonium chloride</p> <p>2.5 Reactions: Replacement by Halogen(Sandmeyer), Replacement by Iodine, Replacement by -OH, C</p>	March	08



		and N Coupling reactions: Synthesis of Methyl orange and Congo red. Reduction of BDC.		
3.	Carbohydrates	<p>3.1 Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structure. Epimers, mutarotation and anomers.</p> <p>3.2 Determination of configuration of Glucose (Fischer proof).</p> <p>3.3 Ring structure of glucose Determination of size of the ring of Glucose by methylation method.</p> <p>3.4 Haworth projections. Cyclic structure of fructose. Linkage between monosachharides, structure of disacharrides (sucrose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.</p>	March	
4.	Carbonyl Compounds Aldehydes and Ketones	<p>4.1 Introduction, Nomenclature, structure.</p> <p>4.2 Reactivity of Carbonyl group, mechanism of Nucleophilic addition to Carbonyl group</p> <p>4.3 Reactions: mechanism and application of Aldol condensation, Perkin reaction, Cannizaros reaction, Knoevenagel condensation, Reformatsky reaction.</p>	April	06
5.	Stereochemistry	<p>5.1 Conformational isomerism – Introduction.</p> <p>5.2 Representation of conformations of ethane by using Saw- Horse, Fischer (dotted line wedge) and Newmann's projection formulae.</p> <p>5.3 Conformations and conformational analysis of ethane and n-butane by Newmann's Projection formula with the help of energy profile diagrams.</p> <p>5.4 Cycloalkanes relative stability - Baeyer's strain theory, Theory of strainless rings.</p> <p>5.5 Conformations and stability of cyclohexane and monosubstituted</p>	May	08



		cyclohexanes Cyclohexanol, bromocyclohexane and methyl cyclohexane. 5.6 Locking of conformation in t-butyl	
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Teaching Plan 2018-2019

B.sc-III Sem-V

Physical Chemistry - IX Prof. Prof. Jambure J.D

Module number	Topic	Sub Topic	Month	Lectures
1.	Quantum Theory	1.1 Introduction 1.2 Dual nature of matter and energy:- De Broglie hypothesis. 1.3 The Heisenberg's uncertainty principle. 1.4 Concept of energy operators (Hamiltonian). 1.5 Derivation of Schrodinger wave equation. 1.6 Physical interpretation of the ψ and ψ^2 . 1.7 Particle in a one dimensional box. 1.8 Schrodinger wave equation for hydrogen atom. 1.9 Concept of Quantum	September	08
2.	Spectroscopy	2.1 Introduction 2.2 Electromagnetic radiation. 2.3 Electromagnetic spectrum, Energy level diagram. 2.4 Rotational spectra of diatomic molecules: Rigid rotor model; moment of inertia (derivation expected); energy levels of rigid rotor, selection rules; spectral intensity; distribution using population distribution (Maxwell – Boltzman distribution), determination of bond length; isotope effect(Numerical problems not expected). Interaction of radiation with rotating molecule. 2.5 Vibrational spectra of diatomic molecules : Simple Harmonic oscillator model, Vibrational energies of diatomic molecules, Determination of force constant, overtones. Interaction of radiation with vibrating molecules. 2.6 Raman spectra : Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, selection rules.	September	08

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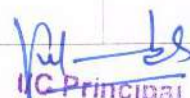


		2.7 Numerical problems..		
3.	Photochemistry	<p>3.1 Introduction Difference between thermal and photochemical processes.</p> <p>3.2 Laws of photochemistry : i) Grotthus - Draper law, ii) Lambert law, iii) Lambert – Beer's law (with derivation), iv) Stark - Einstein law.</p> <p>3.3 Quantum yield, Reasons for high and low quantum yield.</p> <p>3.4 Factors affecting Quantum yield.</p> <p>3.5 Photosensitized reactions – Dissociation of H₂, Photosynthesis.</p> <p>3.6 Photodimerisation of anthracene, decomposition of HI and HBr.</p> <p>3.7 Photophysical and photochemical processes.</p> <p>3.8 Jablonski diagram depicting various processes occurring in the excited state: Qualitative description of fluorescence and phosphorescence.</p> <p>3.9 Chemiluminescence, Electroluminescence.</p> <p>3.10 Numerical problems..</p>	october	07
4.	Soutioins	<p>4.1 Introduction</p> <p>4.2 Ideal solutions, Raoult's law, vapour pressure of ideal and non ideal solutions of miscible liquids.</p> <p>4.3 Composition of liquid and vapour, vapour pressure and boiling point diagrams of miscible liquids. Type I : Systems with intermediate total vapour pressure. (i.e. System in which b.p. increases regularly – Zeotropic) Type II : Systems with a maximum in the total vapour pressure. (i.e. System with a b.p. minimum – Azeotropic) Type III : Systems with a minimum in the total vapour pressure. (i.e. System with a b.p. Maximum – Azeotropic) Distillation of miscible liquid pairs.</p> <p>4.4 Solubility of partially miscible liquids. (i) Maximum solution</p>	November	05



		<p>temperature type : Phenol – water system. (ii) Minimum solution temperature type : Triethyl amine – water system. (iii) Maximum and minimum solution temperature type : Nicotine – water system. Distillation of partially miscible liquid pairs.</p> <p>4.5 Vapour pressure and distillation of immiscible liquids, steam distillation. temperature type : Phenol – water system. (ii) Minimum solution temperature type : Triethyl amine – water system. (iii) Maximum and minimum solution temperature type : Nicotine – water system. Distillation of partially miscible liquid pairs.</p> <p>4.6 Vapour pressure and distillation of immiscible liquids, steam distillation.</p>		
5.	Electromotive force	<p>5.1 Introduction</p> <p>5.2 Thermodynamics of electrode potentials, Nernst equation for electrode and cell potentials in terms of activities.</p> <p>5.3 E.M.F. series.</p> <p>5.4 Types of electrodes : Description in terms of construction, representation, half cell reaction and emf equation for i) Metal – metal ion electrode. ii) Amalgam electrode. iii) Metal – insoluble salt electrode. iv) Gas – electrode. v) Oxidation – Reduction electrode.</p> <p>5.5 Reversible and Irreversible cells. i) Chemical cells without transference. ii) Concentration cells with and without transference. iii) Liquid – Liquid junction potential : Origin, elimination and determination.</p> <p>5.6 Equilibrium constant from cell emf, Determination of the thermodynamic parameters such as ΔG, ΔH and ΔS.</p> <p>5.7 Applications of emf measurements : i) Determination of pH of solution using Hydrogen electrode. ii) Solubility and solubility product of s</p>	December	10

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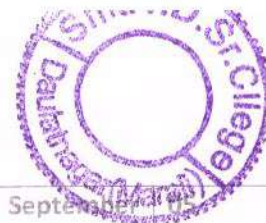
Teaching Plan 2018-2019

B.sc-III Sem-V

Subject- Inorganic Chemistry -X

Name –*prof. Prof. Jambure J.D*

Module number	Module name	Subject Topic	Month	Lecture

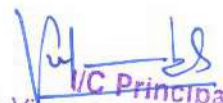


1	Hard and Soft Acids and Bases (HSAB)	1.1 Classification of acids and bases as hard and soft. 1.2 Theoretical bases of hardness and softness 1.3 Pearson's HSAB concept. 1.4 Acid – Base strength and hardness and softness. 1.5 Application and limitations of HSAB principle. Unit 5. Organometallic Chemistry. [07] 5.1 Definition, Nomenclature of organometallic compounds. 5.2 Synthesis and structural study of alkyl and aryl compounds of Li, Be and Al. 5.3 Mononuclear carbonyl and nature of bonding in simple metal carbonyls, sparingly soluble salts (based on concentration cell). 5.8 Numerical problems. cyclohexane. 1.1	September	
2	Metal And Bonding in Transition metal complexes	2.1 Isomerism in complexes with C.N.-4 and 6 2.1.1 Geometrical Isomerism 2.1.2 Optical Isomerism 2.1.3 Structural Isomerism-Ionisation Isomerism, Hydrate Isomerism, Coordination Isomerism, Linkage Isomerism and Co-ordination position Isomerism 2.2 Molecular orbital theory (MOT). 2.2.1 Introduction. 2.2.2 MOT of octahedral complexes with sigma bonding such as $[Ti(H_2O)_6]^{3+}$, $[Ni(NH_3)_6]^{2+}$, $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3+}$. 2.2.3 Merits and demerits of MOT.	September	08
3	Inorganic Polymers	3.1 Introduction. 3.2 Basic concept and definition. 3.3 Classification of polymers - Organic and Inorganic polymers. 3.4 Comparison between organic and inorganic polymers. 3.5 Polymer back bone. 3.6 Homoatomic polymer containing – (i) Phosphorus. (ii) Fluorocarbons. 3.7 Heteroatomic polymers - (i) Silicones (ii) Phosphonitrilic compounds.	October	07
4	Metals, Semiconductors and Superconductors	4.1 Introduction. 4.2 Properties of metallic solids. 4.3 Theories of bonding in metal. i) Free electron theory. ii) Molecular orbital theory (Band theory). 4.4 Classification of solids as conductor, insulators and semiconductors on the basis of band theory.	November	10



		4.5 Semiconductors. Types of semiconductors - intrinsic and extrinsic semiconductors. Applications of semiconductors. 4.6 Superconductors: Ceramic superconductors - Preparation and structures of mixed oxide $YBa_2Cu_3O_{7-x}$ 4.7 Applications of superconductors.		
5	Organometallic Chemistry	5.1 Definition, Nomenclature of organometallic compounds. 5.2 Synthesis and structural study of alkyl and aryl compounds of Li, Be and Al. 5.3 Mononuclear carbonyl and nature of bonding in simple metal carbonyls. sparingly soluble salts (based on concentration cell). 5.4 Numerical problems. cyclohexane.	December	07

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Teaching Plan 2018-2019

B.Sc-III Semester-V

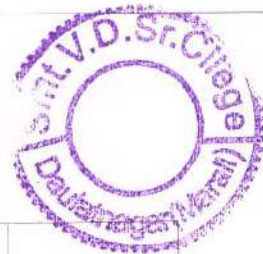
Prof. Shirk.R.M

Subject – Organic Chemistry-XI

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Introduction to Spectroscopy	1.1 Meaning of spectroscopy, Nature of electromagnetic radiation -wave length, frequency, energy, amplitude, wave number, and their relationship, 1.2 different units of measurement of wavelength frequency, different regions of electromagnetic radiations Regions of electromagnetic radiation. 1.3 Interaction of radiation with matter-absorption, emission, fluorescence and scattering, Types of spectroscopy and advantages of spectroscopic methods. 1.4 Energy types and energy levels of atoms and molecules	September	03
2.	Spectroscopy	2.1. Introduction, 2.2. Beer-Lamberts law, absorption of U.V. radiation by organic molecule leading to different excitation. 2. 3. Terms used in U.V. Spectroscopy- Chromophore, Auxochrome, Bathochromic shift, hypsochromic shift, hyperchromic and hypochromic effect. 2. 4. Modes of electromagnetic transitions. 2. 5. Effect of conjugation on position of U.V. band. 2. 6. Calculation of λ -max by Woodward and Fisher rules for	September	05



		<p>dienes and enones systems.</p> <p>2.7. Colour and visible spectrum.</p> <p>2. 8. Applications of U.V. Spectroscopy</p>		
3.	Infrared Spectroscopy	<p>3.1. Introduction,</p> <p>3.2. Principle of I.R. Spectroscopy,</p> <p>3.3. IR Instrumentation, schematic diagram- (Rf No. 6, P. No. 33))</p> <p>3. 4. Fundamental modes of vibrations types and calculation – (3N-6,3N-5; Rf 7, P. No. 19-22)</p> <p>3. 5. Condition for absorption of IR radiations</p> <p>3. 6. Regions of I.R. Spectrum, fundamental group region, finger print region.</p> <p>3. 7. Hooks Law for Calculation of vibrational frequency</p>	October	06
4.	Nuclear Magnetic Resonance (NMR) Spectroscopy	<p>4.1. Introduction,</p> <p>4. 2. Principles of PMR Spectroscopy</p> <p>4.3. NMR- Instrumentation, Schematic diagram.</p> <p>4. 4. Magnetic and nonmagnetic nuclei</p> <p>4.5. Chemical shift- definition, measurement, calculation, Factors affecting Chemical shift.</p> <p>4. 6. Shielding, & deshielding</p> <p>4. 7. Peak Integration</p> <p>4.8. Merits of TMS as PMR reference compounds</p> <p>4. 9. Coupling Constant</p> <p>4.10. Types of Coupling Constant</p> <p>4.11. Spin-spin splitting (n+1 rule</p> <p>4.12. Applications</p>	October	09
5.	Mass Spectroscopy	<p>5.1. Introduction</p> <p>5. 2. Principle of mass spectroscopy</p> <p>5.3. Mass spectrometer - schematic diagram</p> <p>5. 4. Types of ions produced in mass spectrum</p> <p>5.5. Fragmentation patterns of- alkanes, alkenes, aromatic hydrocarbons, alcohols, phenols, amines and carbonyl compounds</p> <p>5.6. McLafferty rearrangement</p> <p>5.7. Applications</p>	November	08
6.	Combined Spectroscopic Problems	<p>6.1. Absorption Spectroscopy of Organic Molecules by V.M.Parikh</p> <p>6 2. Spectroscopy of Organic compounds by P. S. Kalsi.</p>	November	06



		<p>6.3. Elementary Organic Absorption Spectroscopy by Y. R. Sharma.</p> <p>6. 4. Instrumental Methods of Analysis (7th edition) by Willard, Merritt, Dean, Settle.</p> <p>6.5. Spectroscopy by G R Chatwal and S K Anand</p> <p>6.6. Spectroscopy by Pavia, Lampman, Kriz, Vyvyan</p> <p>6.7. Organic Spectroscopy (2nd edition) by Jag Mohan</p> <p>6.8. Organic Spectroscopy (3rd edition) by William Kemp</p> <p>6.9. Instrumental Methods of Chemical Analysis by H Kaur.</p>		
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 Teaching Plan 2018-2019
 B.sc-III Sem-V
Subject- Industrial Chemistry-XII

Prof. Miss.Shejwal .P.K

Module number	Topic	Sub Topic	Month	Lectures
1.	Sugar industry	1.1 Introduction 1.2 Manufacture of Ammonia (NH ₃) i. Physico-chemical principles ii. Manufacture by Haber's process 1.3 Manufacture of Sulphuric acid (H ₂ SO ₄) i. Physico-chemical principles ii. Manufacture by Contact process 1.4 Manufacture of Nitric acid (HNO ₃) i. Physico-chemical principles ii. Manufacture by Ostwald's (Ammonia oxidation process) 1.5 Manufacture of Sodium carbonate (Washing soda) (Na ₂ CO ₃) i. Physico-chemical principles ii. Manufacture by Solvay process 5. Nanomaterials (8) 5.1 Terminology and history 5.2. Optical properties of nanomaterials i. Semiconducting nanoparticle 16 ii. Metallic nanoparticle 5.3 Characterization and fabrication i. Characterization methods a) Scanning electron microscopy b) Transmission electron microscopy ii. Top-down, bottom-up fabrication a) Colloidal route b) Sol-gel method c) Chemical reduction method d) Electrochemical method. 5.4 Applications of Nanomaterials	February	08
2.	Corrosion and Passivity	2.1 Introduction of corrosion 2.2 Electrochemical theory of corrosion 2.3 Factors affecting on corrosion, i. Position of metals in the electrochemical series on the basis of standard reduction potential ii. Purity of metal iii. Effect of moisture iv. Effect of oxygen (differential	March	08



		aeration principle) 15 v. Hydrogen overvoltage 2.4 Methods of protections of metals from corrosion 2.5 Passivity i. Definition ii. Types of passivity iii. Oxide film theory and evidences iv. Applications of passivity		
3.	Sugar Industry	3.1 Introduction 3.2 Manufacture of cane sugar, extraction, decolourisation, crystallization and other details of industrial process 3.3 Refining of raw sugar 3.4 Manufacturing of white sugar in India 3.5 Byproducts of sugar industry	March	07
4.	Soaps and Detergents	4.1 Introduction 4.2 Soaps i. Raw materials, ii. Types of soaps iii. Cleaning action of soap 4.3 Manufacture of soap i. Cold Process ii. Semi-boiled Process iii. Boiled or Hot Process 4.4 Detergents i. Raw Materials ii. Types of Detergents: Anionic, cationic and amphoteric 4.5 Comparisons between soaps and detergents.	April	07
5.	Nanomaterials	5.1 Terminology and history 5.2. Optical properties of nanomaterial: i. Semiconducting nanoparticle 16 ii. Metallic nanoparticle 5.3 Characterization and fabrication i. Characterization methods a) Scanning electron microscopy b) Transmission electron microscopy ii. Top-down, bottom-up fabrication a) Colloidal route b) Sol-gel method c) Chemical reduction method d) Electrochemical method. 5.4 Applications of Nanomaterials	May	08

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Teaching Plan 2018-2019
B.sc-III Sem-VI
Subject- Physical Chemistry -XIII
Prof Prof. Jambure .J.D

Module number	Topic	Sub Topic	Month	Lectures
1.	Phase equilibria	1.1 Introduction 1.2 Gibbs phase rule : Phase rule equation and explanation of terms involved in the equation. 1.3 Phase diagram, true and metastable equilibria. 1.4 One component systems: (i) Water system (ii) Sulphur system with explanation for polymorphism. 1.5 Two component systems: (i) Eutectic system: (Ag – Pb system); Desilverisation of lead, (ii) Freezing mixture; (KI –H ₂ O system), (iii) Formation of compound with congruent melting point (FeCl ₃ – H ₂ O) 1.6 Three component solid-liquid system: Development of triangular phase diagram: (Acetic acid – Chloroform – water system). Unit –6 Surface Chemistry. [07] 6.1 Introduction: Adsorption, Mechanism of adsorption, Factors affecting adsorption. 6.2 Types of adsorption: Physical and chemical 6.3 Types of adsorption isotherms. 6.4 Adsorption isotherm. i) Freundlich adsorption isotherm i) Langmuir adsorption isotherm with derivation. 6.5 BET equation and determination of surface area of adsorbent by BET equation. 6.6 Applications of adsorption.	February	05
2.	Thermodynamics	2.1 Introduction 2.2 Free energy : Gibbs function (G) and Helmholtz function (A), Criteria for thermodynamic equilibrium and spontaneity. 2.3 Relation between ΔG and ΔH : Gibbs Helmholtz equation. 2.4 Phase equilibria : Clapeyron – Clausius equation and its	March	09



		<p>applications.</p> <p>2.5 Thermodynamic derivation of law of mass action, van't – Hoff isotherm and isochore.</p> <p>2.6 Fugacity and activity concepts.</p> <p>2.7 Partial molar quantities, Partial molar volume, Concept of chemical potential, Gibbs-Duhem equation.</p> <p>2.8 Numerical problems. Partial</p>		
3.	The solid state	<p>3.1 Introduction Space lattice, lattice sites, Lattice planes, Unit cell.</p> <p>3.2 Laws of crystallography : (i) Law of constancy of interfacial angles (ii) Law of rational indices (iii) Law of crystal symmetry.</p> <p>3.3 Weiss indices and Miller indices.</p> <p>3.4 Cubic lattice and types of cubic lattice, planes or faces of a simple cubic system, spacing of lattice planes.</p> <p>3.5 Diffraction of X-rays, Derivation of Bragg's equation.</p> <p>3.6 Determination of crystal structure by Bragg's method.</p> <p>3.7 Determination of crystal structure of NaCl and KCl on the basis of Bragg's equation.</p> <p>3.8 Numerical problems.</p>	April	08
4.	Radioactivity	<p>4.1 Introduction.</p> <p>4.2 Detection and measurement of nuclear radiation by Scintillation and Geiger Muller counter methods.</p> <p>4.3 Radioactive equilibrium and range of α - particles.</p> <p>4.4 Geiger – Nuttal relation, Determination of radioactive constant (decay constant).</p>	April	04
5.	Chemical Kinetics	<p>5.1 Introduction</p> <p>5.2 Simultaneous reactions such as i) opposing reaction: (Derivation of rate equation for first order opposed by first order expected, Numerical problems expected), ii) side reaction:, iii) consecutive reactions: (Derivation of rate equation and Numerical problems are not expected).</p>	May	04
6.	Surface Chemistry	<p>6.1 Introduction: Adsorption, Mechanism of adsorption, Factors affecting adsorption.</p> <p>6.2 Types of adsorption: Physical and chemical</p>	May	07



		<p>6.3 Types of adsorption isotherms.</p> <p>6.4 Adsorption isotherm. i) Freundlich adsorption isotherm i) Langmuir adsorption isotherm with derivation.</p> <p>6.5 BET equation and determination of surface area of adsorbent by BET equation.</p> <p>6.6 Applications of adsorption.</p>	
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Teaching Plan 2018-2019

B.sc-III Sem- VI

Subject- Inorganic Chemistry-IVX

Name –prof. Miss.Shirke.R.M.

Module number	Module name	Subject Topic	Month	Lecture
1	1 Inorganic Reaction mechanism	1.1 Introduction 1.2 Classification of Mechanism Association, dissociation, interchange and the rate determining steps 1.3 SN1 and SN2 reaction for inert and labile complexes 1.4 Mechanism of substitution in cobalt (III) octahedral complexes 1.5 Trans effect and its theories 1.6 Applications of trans effect in synthesis of Pt (II) complexes. Unit 4. Iron and Steel. [07] 4.1 Occurrence. 4.2 Extraction of iron by Blast furnace. 4.3 Steel: Definition and types. 4.4 Conversion of cast iron into steel by i) Bessemer process. ii) L.D. process. 4.5 Heat treatment on steel. Unit 5. Bio-inorganic Chemistry. [06] 5.1 Introduction. 5.2 Essential and trace elements in biological process. 5.3 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.4 Biological role of alkali and alkaline earth metal ions with special reference to Na ⁺ , K ⁺ and Ca ²⁺ 1.1	February	6
2	Thermodynamic and Kinetic aspects of metal complexes	2.1 Introduction 2.2 Thermodynamic stability 2.3 Kinetic Stability 2.4. Relation between thermodynamic and kinetic stability 2.5 Step wise stability constant 2.6 Factor affecting the stability of complexes	March	07



3	A. Nuclear Chemistry B. Actinides	3.1 Nuclear reactions and energetic of nuclear reactions. 3.2 Types of nuclear reactions i) Artificial transmutation. ii) Artificial radioactivity. iii) Nuclear fission and its application in Heavy water nuclear reactor. vi) Nuclear fusion. 3.3 Applications of radio-isotopes as tracers. i) Chemical investigation – Esterification. ii) Structural determination – Phosphorus pentachloride. iii) Analytical Chemistry – Isotopic dilution method for determination of volume of blood. iv) Age determination – Dating by C14. 20 B. Actinides 3.4 Position in periodic table. 3.5 Electronic configuration. 3.6 General methods of preparation of Transuranic elements. i) Neutron capture – followed by β decay. ii) Accelerated projectile bombardment. iii) Heavy ion bombardment. 3.7 IUPAC nomenclature of the super heavy elements with atomic number (Z) greater than 100.	April	12
4	Iron and Steel	4.1 Occurrence. 4.2 Extraction of iron by Blast furnace. 4.3 Steel: Definition and types. 4.4 Conversion of cast iron into steel by i) Bessemer process. ii) L.D. process. 4.5 Heat treatment on steel.	May	07
5	Bio-inorganic Chemistry	5.1 Introduction. 5.2 Essential and trace elements in biological process. 5.3 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.4 Biological role of alkali and alkaline earth metal ions with special reference to Na^+ , K^+ and Ca^{2+} elements in biological process. 5.5 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.6 Biological role of alkali and alkaline earth metal ions with special reference to Na^+ , K^+ and Ca^{2+}	May	06

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Teaching Plan 2018-2019

B.Sc-III Semester-VI

Prof. Shirik.R.M

Subject – Organic Chemistry-XV

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Name reactions	<p>1.1. Diels -Alder reaction (Rf.1,P.No.536; Rf.2,P No 248; Rf.3, P No 197, 340, 349 Rf.4, P No No 626-636)</p> <p>1.2. Oppenauer Oxidation (Rf. No.1, P.N.545; Rf.2, P No 391; Rf.3, P No 216; Rf.4, P No. 863,865)</p> <p>1.3. Meerwein –Pondorff-Verley reduction (Rf. No.1, P.N.545)</p> <p>1. 4. Schmidt rearrangement (Rf. No.1, P.N.624; Rf.3, P No 122; Rf.4, P No 783,819)</p> <p>1.5. Hofmann rearrangement (Rf. No.1, P.N.621; Rf.2,P No 732.551; Rf.3, P No 122; Rf.4, P No 783.816).</p> <p>1.6. Wittig reaction (Rf.2,P No 409; Rf.3, P No 233; Rf.4, P No 693,702,709)</p> <p>1.7. Wagner- Meerwein rearrangement (Rf. No.1, P.N. 584; Rf.3, P No 111; Rf.4, P No 794-798).</p> <p>1.8. Favorskii rearrangement (Rf No. 1, P.N.157, 642; Rf.3, P No 294; Rf.4, P No 804- 809).</p> <p>1.9. Michael reaction (Rf No. 1, P.N.392; Rf.3, P No 200; Rf.4, P No 604)</p> <p>1.10. Dieckmann's reaction or condensation (Rf. No. 1, P.N. 334; Rf.2, P No 586; Rf.4, P No 367)</p> <p>1.11. Problem based on above reactions. References: 1. Mechanism and Structure in Organic Chemistry. April,1963 By Edwin S.Gould 2. A text book of Organic Chemistry by Arun Bahl , B.S.Bhal Eighteenth Revised edition 2006 . 3. A guidebook to</p>	February	08



		<p>mechanism in Organic Chemistry sixth Edition by Peter Sykes. 22 4. Advanced Organic Chemistry : Reactions, Mechanisms and structure by Jerry March.</p> <p>Unit V. Pharmaceuticals [06] 1. Introduction, Classification, Qualities of ideal drug. 2. Synthesis and uses: ethambutal, phenobarbitone, isoniazide, benzocaine, Chloramphenicol, paludrine. 3. Drug action of sulpha drugs. (Ref.1: P. No.762-775; Ref.2: P. No.803-804, 818-822; Ref.3: P. No.987-1011)</p>		
2.	Retrosynthesis	<p>2.1. Lithium aluminium hydride LiAlH_4 (Rf No.1 P.No. 350; Rf No.2 P.No. 581-595; Rf No.3 P.No. 877-881)</p> <p>2.2. Osmium tetroxide (Rf No.1 P.No. 616; Rf No.2 P.No. 759-764; Rf No.3 P.No. 894- 895)</p> <p>2.3. Dicyclohexyl Carbodiimide (DCC) (Rf No.2 P.No. 231-236)</p> <p>2.4. Raney Nickel (Rf No.1 P.No. 439, 556; Rf No.2 P.No. 143, 440, 441, 956; Rf No.3 P.No. 870)</p> <p>2. 5. 2,3-Dichloro -5,6-dicyano - 1,4-benzoquinone (DDQ) (Rf No.2 P.No. 215-219)</p> <p>2.6. Polyphosphoric acid (PPA) (Rf No.2 P.No. 894-905).2.7. Diazomethane (Rf No.2 P.No. 191-195; Rf No.3 P.No. 969-972)</p> <p>2.8. Ceric ammonium nitrate (CAN) (Rf No.2 P.No. 120-121)</p> <p>2.9. N-Bromosuccinamide (NBS) (Rf No.2 P.No. 78-80; Rf No.3 P.No. 926-927) 10.Selenium dioxide (SeO_2) (Rf No.2 P.No. 992-1000; Rf No.3 P.No. 200) References : 1. Advanced Organic Chemistry : Reactions, Mechanisms and structure by - Jerry March 2. Reagents for Organic Synthesis by Louis F. Fieser , Mary Fieser - 1967 3. A Text book of Practical Organic Chemistry including Qualitative Organic Analysis by Arthur I Vogel.</p>	March	06
3.	Electrophilic addition to $>\text{C}=\text{C}<$ bond and bond Addition to	<p>A. Addition to Carbon-Carbon double bond ($>\text{C}=\text{C}<$ bond, Hydrohalogenation:-orientation & reactivity, Anti-Markovnikoff's</p>	March	08



	carbon carbon double bond and carbon carbon triple bond	<p>addition (peroxide effect), Rearrangements (support for formation of carbocation), Addition of halogens, Addition of water, Addition of hypohalous acids (HO-X), Hydroxylation (formation of 1,2-diols), 23 Hydroboration-oxidation (formation of alcohol), Hydrogenation (formation of alkane), Ozonolysis (formation of aldehydes & ketones). B. Addition to Carbon-Carbon triple bond () : Introduction, Examples of addition reactions, Mechanism of electrophilic addition to bond. Addition of halogens, Addition of halogen acids, Addition of hydrogen, Addition of water, Formation of metal acetylides. Reference books: 1. Organic Reactions and Their Mechanisms P. S. Kalsi 3rd Revised edition. Sections- 7.6, 11.1, 11.2, 11.3, 11.6, 11.7, 11.8, 11.9, 13.3 to 13.5 . pages – 304 to 310, 421 to 425, 427 to 431. 481 to 486. 2. Advanced organic Chemistry by B.S. Bahl & Arun Bhal (Reprint in 1997) pages – 241 to 258, 3. Organic Chemistry by Morrison and Boyd 6th edition. Sections- 9.1, 9.2, 9.5, 9.14, 9.17, 9.21, 9.25, 9.26 pages -317 to 323, 327 to 343, 346 to 355, 357 to 360, 431 to 433</p>		
4.	Natural Product	<p>A] Terpenoids: 1. Introduction, Occurrence, Isolation, General Characteristic, Classification. (Rf. 1, P No. 368-370; Rf. 2, P No. 312-315) 2. General Methods for structure determinations (Rf. 1, P No. 370-372; Rf. 2, P No. 317-323) 3. Isoprene rule. (Rf. 2, P No. 317) 4. Analytical evidences and synthesis of Citral (Rf. 1 P No. 357-377) and alpha-terpineol. (Rf. 1, P No. 383-385) B] Alkaloid: 1. Introduction, Occurrence, Isolation, Classification, Properties. (Rf. 1, P No. 710-711; Rf. 2, P No. 193-195) 2. General Methods for structure determinations (Rf. 1, P No. 711-715; Rf. 2, P No. 196-203) 3. Analytical evidences and synthesis of Ephedrine (Rf. 2 P No. 204-205) and NicotineU</p>	April	08
5.	Pharmaceuticals	1. Introduction, Classification, Qualities of ideal drug.	May	06



		<p>2. Synthesis and uses: ethambutal, phenobarbitone, isoniazide, benzocaine, Chloramphenicol, paludrine.</p> <p>3. Drug action of sulpha drugs. (Ref.1: P. No.762-775; Ref.2: P. No.803-804, 818-822; Ref.3: P. No.987-1011)</p>	
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V. D. Sr.

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Smt. Vijyadevi Desai Senior College ,Daultanagar
Dist-satara tal- patan
Teaching Plan 2018-2019
B.sc-III Sem-VI
Subject- Analytical Chemistry- XVI

Prof. Miss.Shejwal .P.K

Module number	Topic	Sub Topic	Month	Lectures
1.	Theory of Gravimetric Analysis	1.1 Introduction 1.2 Neutralization Indicators (Acid-Base Indicators) 1.3 Theory of indicators w.r.t. Ostwald's colour change interval and Ostwald's Quinoid theory 1.4 Neutralization curves and choice of indicators for the following titration, i. Strong acid-strong base ii. Strong acid-weak base iii. Strong base - weak acid 1.5 Complexometric titration i. General account ii. Types of EDTA titration iii. Metalochromic indicators w.r.t. Eriochrom Black-T indicator 5. Chromatography (8) 7.1 Introduction 7.2 Developments in chromatography 7.3 Advantages of chromatography 7.4 Types of chromatography on the basis of mechanism of interaction of solute with Stationary phase i) Adsorption ii) Partition iii) Ion Exchange iv) Size exclusion v) Affinity 7.5 Classification of chromatography on the basis of mobile phase and stationary phase i) Gas Chromatography ii) Liquid Chromatography iii) Supercritical-fluid Chromatography 7.5 Paper Chromatography and its applications 7.6 Thin layer chromatography and its applications 7.7 Adsorption column chromatography and its	September	08



2.	Potentiometric Titrations	2.1 Introduction 2.2 Determination of pH 2.3 Study of Quinhydrone and Glass electrodes and their use in determination of pH 2.4 Potentiometric titrations: Classical and analytical methods for locating end points 2.5 Acid base titration 2.6 Redox titration 2.7 Advantages of potentiometric titrations 2.8 Precipitation titration 2.9 Basic circuit of direct reading potentiometer	September	08
3.	Colorimetry and Spectrometry	3.1 Theory of Colorimetry and Spectrophotometry i. Lambert Beer's law ii. Terms used in Colorimetry and Spectrophotometry iii. Deviation from Beer's law. 3.2 Classification of methods of 'colour' measurement or comparison i. Photoelectric Colorimeter method – Single beam photo-electric colorimeter. ii. Spectrophotometer method – Single beam direct reading spectrophotometer 3.3 Determination of unknown concentration by using Concentration-Absorbance plot.	October	06
4.	Flame Photometry	4.1 Introduction 4.2 General principles of flame photometry 4.3 Instrumentation 4.4 Effect of solvent in flame photometry 4.5 Instruments 4.6 Application of flame photometry 4.7 Interference in flame photometry 4.8 Factors that influence the intensity of emitted radiation in a flame photometer 4.9 Limitations of flame photometry 4.10 Conclusions	November	08
5	Chromatography	5.1 Introduction 5.2 Developments in chromatography 5.3 Advantages of chromatography 5.4 Types of chromatography on the basis of mechanism of interaction of solute with Stationary phase i) Adsorption ii) Partition iii) Ion Exchange iv) Size exclusion v) Affinity 5.5 Classification of chromatography on the basis of mobile phase and stationary phase i) Gas Chromatography ii) Liquid	December	8

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Smt.Vijayadevi Desai Senior College, Daulatnagar

Tal – Patan Dist-Satara

Teaching Plan 2019-2020

B.Sc-I Semester-I

Prof.Shirk.R.M



Subject – Organic Chemistry-II

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Fundamentals Of Organic Chemistry	1.1:Introduction 1.2: Curved arrow notations, Cleavage of Bonds: Homolysis and Heterolysis. Organic molecular species: 1.3:Nucleophiles and electrophiles. 1.4:Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation effect, Reactive Intermediates: Generation, Structure, Stability and Reactions of Carbocations, Carbanions and carbon free radicals.	September	09
2.	Stereochemistry	1.1: Introduction 1.2: Types of Stereoisomerism, Optical Isomerism: Concept of Chirality, Elements of Symmetry, Optical Isomerism in tartaric acid, 2, 3 Dihydroxybutanoic acid, 1.3:Enantiomerism, Diastereomerism and Meso compounds, Geometrical isomerism in C=C, C=N and alicyclic compounds. 1.4: Nomenclature of stereoisomers: D and L, erythro and threo, R and S, E and Z.	October	10
3.	Aromaticity	1.1:Introduction 1.2: Characteristics properties of organic compounds 1.3:Meaning of terms: Aromatic, Non aromatic, Antiaromatic, Pseudoaromatic 1.4:Structure of Benzene: Kekule structure, Resonance structure, M.O. 1.5:picture, Modern theory of Aromaticity, Mechanism of Electrophilic substitution reactions: 1.6:Nitration, Sulphonation, Halogenation and Friedel craft reaction.	November	07

Rshirke



4.	Cycloalkanes ,Cycloalkenes and alkadienes	1.1: Cycloalkanes: - Introduction. Method of formation - a) By addition of carbene to alkene b) Action of metallic sodium on dihaloalkane c) Diels - Alder reaction d) By reduction of aromatic compounds, Chemical properties- a) Photohalogenation b) Catalytic halogenations c) Catalytic hydrogenation d) Effect of heat e) Reaction with hydrogen halide 5 1.2:Cycloalkenes : Introduction, Method of formation from cyclic compounds, Chemical Properties - a) Hydrogenation b) Addition of Halogens and halogen acids, c) Allylic halogenations 1.3:Alkadienes : Introduction, Classification, Buta-1,3-diene - a) Structure b) Methods of formation - from cyclohexane, From Butane by dehydrogenation, From acetylene, From Butane-1,3 - diol, From ethanol and acetaldehyde (Industrial method), 1.4:Chemical Properties - a) Reaction with hydrogen halide b) Reaction with halogens -With one molar equivalent of halogens (Cl ₂ or Br ₂) c) Diels- Alder reaction d) Reduction - hydrogenation e) Oxidation - Ozonolysis f) Polymerization	December	
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Tal – Patan Dist – Satara
Teaching Plan (2019-2020)
B.Sc – 1 Sem – 1

Subject – Inorganic Chemistry I

Prof. Thorat J.P

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Atomic Structure and Periodicity Of Elements	1.1 Bohr's theory of hydrogen atom and its limitations 1.2 Wave particle duality 1.3 Heisenberg uncertainty principle 1.4 Quantum numbers and their significance 1.5 Shapes of s, p and d atomic orbitals 1.6 Electrons filling rules in various orbitals: a) Aufbau's principle b) Hund's rule of maximum multiplicity c) Pauli's exclusion principle 1.7 Electronic configuration of elements. Stability of empty, half-filled and completely filled orbitals 1.8 Periodicity of the elements: General discussion of the following properties of the elements with reference to s block elements: a) electronic configuration b) atomic radii c) ionic radii d) ionization energy e) electron affinity f) electronegativity g) metallic characters h) reactivity i) oxidation state j) melting and boiling points k) chemical properties	September	11
2.	Chemical Bonding and Molecular structure A) Ionic Bonding	2:1 Definition and formation of ionic bond. General characteristics of ionic bonding 2:2 Energetic in Ionic bond formation 2:3 Born-Haber cycle for NaCl and its applications 2:4 Fajan's Rule, Applications of Fajan's rule for, • Polarizing power and polarizability • Ionic character in covalent compounds • Bond moment, dipole moment and percentage ionic character	September	08



3.	Chemical Bonding and Molecular structure B) Valence bond Theory (VBT)	3.1 Concept of hybridization, different types of hybridization and geometry of following molecules, 3.2 Linear geometry- BeCl_2 (sp hybridization) 3.3 Planer trigonal geometry- BF_3 (sp ² hybridization) 3.4 Tetrahedral geometry- SiCl_4 (sp ³ hybridization) 3.5 Trigonal bipyramidal geometry- PCl_5 (sp ³ d hybridization) 3.6 Octahedral geometry- SF_6 (sp ³ d ² hybridization) 3.7 Pentagonal bipyramidal geometry - IF_7 (sp ³ d ³ hybridization)	October	
4.	Chemical Bonding and Molecular Structure(c)Molecular orbital theory (MOT)	4.1 LCAO method, formation of bonding , anti bonding and nonbonding molecular orbitals. 4.2 Conditions for successful overlap, Types of overlaps - S-S ,S-px, Px-Px, Py-Py and Pz-Pz overlaps. 4.3 Bond order and its significance. 4.4 Energy level sequence for molecular orbital when n=1&2. 4.5 MO diagrams for homonuclear diatomic molecule of 1st & 2nd period Elements (He_2 , Li_2 , B_2 , N_2 , O_2). 4.6 Molecular orbital diagrams for heteroatomic diatomic molecules. (CO, NO)	November	09

Shorut J.P.

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Tal – Patan Dist – Satara
Teaching Plan (2019-2020)
B.Sc – 1 Sem – 2

Subject – Physical Chemistry-III

Prof.Thorat .J.P

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Chemical Energetics A) Thermodynamics	1.1A)Thermodynamics Introduction, Basic concepts of thermodynamics, First law of thermodynamics Spontaneous and non-spontaneous process with examples, Statements of second law of thermodynamics, Carnot's cycle and its efficiency.	February	08
2.	B) Thermochemistry	1.2 Entropy, Physical Significance of entropy, Statement of Third Law of thermodynamics and calculation of absolute entropies of substance 1.3 B) Thermochemistry (04) Important principles and definitions of thermochemistry. 1.4Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. 1.5Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchoff's equation.		
3.	Chemical Equilibria	1.1 Chemical Equilibrium: Free energy change in a chemical reaction. 1.2 Thermodynamic derivation of the law of chemical equilibrium. 1.3 Distinction between ΔG and ΔG_0 , Le Chatelier's principle. 1.4 Relationships between K_p , K_c and K_x for reactions involving ideal gases.	March	07
4.	Kinetic Theory of Gases	4.1Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. 1.2 Ideal and Non ideal gases, Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation. 1.3 Van der Waals equation of state for real gases. 4.2 Explanation of real gas behaviour by Van der Waal's equation, Boyle	April	09



		temperature (derivation not required). 4.3 Critical Phenomena: PV-isotherms of real gases (Andrew's isotherms), Continuity of state, Critical constants and their calculation from vander Waals equation. Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions. Most probable, average and root mean square velocities (no derivation). Numerical Problems.		
5.	Chemical Kinetics	5.1 Introduction, Rate of reaction, Definition and units of rate constant, Factors affecting rate of reaction. (Nature of reactant, Concentration, pressure, temperature and catalyst. 5.2 Order and Molecularity of reaction, Zero order reaction, First order reaction, Characteristics of first order reaction. examples, Pseudo-unimolecular reactions, examples. 5.3 Second order reaction: Derivation of rate constant for equal and unequal concentration of the reactants. 5.4 Characteristics of Second order reaction, Determination of order of reaction by i) integration method ii) graphical method iii) Half life method, Effect of temperature on rate of reaction, Arrhenius equation, Concept of energy of activation. 5.5 Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only). Numerical problems.	May	10

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		indicators for a. Strong acid-strong base b. Strong acid-weak base c. Strong base-weak acid 3.5 Complexometric titrations a. Introduction b. Types EDTA titrations c. Metallochromic indicators-Eriochrome black- T d. Indicator Action of Eriochrome black- T 9 TLC, detecting Reagent methodology, sample loading, Application ,Disadvantages,Disadvantages 3.6 Comparison paper chromatography and TLC.		
4	. Water Analysis	4.1 Physical analysis of water – pH, Conductance, Colour, odour, Turbidity and taste 4.2 Chemical Analysis – Total Dissolved solids , Hardness, Salinity, Alkalinity, Acidity, Sulphates, Nitrates, Dissolved Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand	April	09
5	. Analysis of Fertilizers	5.1 Introduction 5.2 Types of fertilizers 5.3 Necessity and requirements of good fertilizers 5.4 Sampling and sample preparation 5.5 Analysis of Nitrogen by Kjeldahl's method 5.6 Analysis of Phosphorus by phosphomolybdate method 5.7 Analysis of Potassium by sodium tetraphenyl borate method	May	08

Arjunal.PK

V.D. Desai

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BALASHEB DESAI FOUNDATION
Smt. Vijyadevi Desai Senior College, Daulatnagar
 Dist-satara tal-patan
 Teaching Plan 2019-2020
 B.sc-II Sem-III
Subject- Physical Chemistry-V
Prof.Thorat .J.P

Module number	Topic	Sub Topic	Month	Lectures
1.	Electrolytic Conductivity	1.1 Introduction 1.2 Types of conductors, Conductivity, Equivalent and Molar conductivity and their variation with dilution for weak and strong electrolytes in aqueous solution. 1.3 Equivalent conductivity at infinite dilution, Measurement of conductance by using Wheatstone bridge. 1.3 Kohlrausch law of independent migration of ions and its applications such as ionic mobility, determination of degree of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of salt. 1.4 Conductometric titrations (only acid base titrations). Advantages of conductometric titrations. 1.5 Transference number, Hittorf's rule, determination of transport number using Moving boundary method, factors affecting transport numbers. 1.6 Numerical problems.	September	16
2.	Physical properties of liquid	2.1 Introduction 2.2 Classification of physical properties, Surface tension and its determination using Stalagmometric and differential capillary rise methods, Viscosity and its determination using Ostwald's viscometer, Refractive index (Snell's law), Specific and Molecular refractivities and its determination using Abbe's refractometer	September	06

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Dist-satara tal- patan

Teaching 2019-2020



B.sc-II Sem-III

Subject- Industrial Chemistry –VI

Prof. Shejwal. P.K

Module number	Module name	Subject Topic	Month	Lecture
1	Basic Concept in Industrial chemistry	1.1 1.1 The difference between classical chemistry and industrial chemistry, Raw material for the Chemical Industry, Material Safety data sheets, Units that make up a chemical process-unit operation and unit processes, Flow Diagrams, Block Diagram 1.2 Process flow diagram / flow sheets, Material Balances-The purpose of mass balance calculations, Material Balance Equations 1.3 Mass balance calculation procedure and simple example Definition and Explanation of terms –Normality 1.4 Equivalent weight, Molality, Molecular weight, Molarity, Molarity of mixed solution, Acidity of base 1.5 Basicity of acid, ppt, ppm, ppb solutions, Mole Fraction, Weight fraction, Percentage composition by W/W, W/V, V/V 1.6 Problems based on Normality, Molarity, mole fraction, mixed solution, etc	September	10
2	Unit Operations	2.1 Size reduction- Principle, Jaw crusher, ball mill Size Enlargement – Principle, Pellet mill, tumbling 2.2 agglomerators Separation – Magnetic separation, Froth flotation, Distillation-Distillation of liquid mixtures, Types of distillation 2.3 Types of columns and packings, Condensers, Vacuum distillation, Spinning-band distillation, Steam distillation. U	September	06



3	Corrosion and electroplating	3.1 Introduction of corrosion 3.2 Electrochemical theory of corrosion, Factors affecting on corrosion -i. Position of metals in the electrochemical series on the basis of standard reduction potential ii. Purity of metal iii. Effect of moisture iv. Effect of oxygen (differential aeration principle) v. Hydrogen overvoltage, Methods of protections of metals from corrosion 3.3 Electroplating: Electrolysis, Faraday's laws, Cathode current Efficiency, Basic principles of electroplating, Cleaning of articles, Electroplating of chromium, Anodising	September	89
4	Paper Industry	4.1 Manufacturing of Pulp, Types of pulp- Sulphate and soda 4.2 Manufacturing of paper, calendaring, ecological problems of Indian Paper industry, Features of good paper industry	November	06
5	Soap and detergents	5.1 Introduction 5.2 Soaps - Raw materials, Types of soaps, Cleansing action of soap 5.3 Manufacture of soap - Boiled or Hot Process, Detergents - Raw Materials 5.4 Types of Detergents: Anionic, cationic and amphoteric, Preparation of Teepol and Deriphath 5.5 Comparisons between soaps and detergents.	December	07

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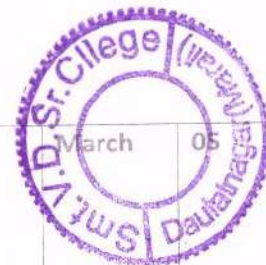
Teaching Plan 2019-2020

B.sc-II Sem-IV

Subject- Inorganic Chemistry –VII

Prof. Shirke.R.M

Module number	Module name	Subject Topic	Month	Lecture
1	Co-ordination Chemistry	<p>1.1 Introduction-Definition and formation of co-ordinate covalent bond in $\text{BF}_3 - \text{NH}_3$, $[\text{NH}_4]^+$ and H_2O</p> <p>1.2 Distinguish between double salt and complex salt</p> <p>1.3 Werner's theory-</p> <p>1.3.1. Postulates 1.3.2. The theory as applied to cobalt amines viz. $\text{CoCl}_3.6\text{NH}_3$, $\text{CoCl}_3.5\text{NH}_3$, $\text{CoCl}_3.4\text{NH}_3$, $\text{CoCl}_3.3\text{NH}_3$</p> <p>1.4 Description of the terms- ligand, co-ordination number, co-ordination sphere, Effective atomic number</p> <p>1.5 IUPAC nomenclature of coordination compounds.</p> <p>1.6 Isomerism in complexes with C.N. 4 and 6</p> <p>1.7.1 Geometrical Isomerism</p> <p>2 Optical Isomerism</p> <p>3 Structural Isomerism-Ionisation</p> <p>1.8 Isomerism, Hydrate Isomerism, Coordination Isomerism, Linkage Isomerism and Co-ordination position Isomerism</p> <p>1.9 Valance bond theory of transition metal complex with respect to, C.N. 4, complexes of Cu and Ni C.N. 6 complexes of Fe and Co</p>	February	10



2	Chelation	<p>2.1 A brief introduction with respect to ligands, chelating agent, chelation and metal chelates.</p> <p>2.2 Structural requirements of chelate formation</p> <p>2.3 Difference between metal chelate and metal complex</p> <p>2.4 Classification of chelating agents (with specific illustration of bidentate chelating agents)</p> <p>2.5 Application of chelation with respect to chelating agents - EDTA and DMG</p>	March	05
3	P-Block element (Group 13,14 and 15)	<p>3.1. Position of elements in periodic table</p> <p>3.2. Characteristics of p-block elements with special reference to Electronic configuration and Periodic properties</p> <p>3.3. Compounds of group 13,14 and 15</p> <p>3.4.1 Boron-Diborane method of preparation and nature of bonding (structure)</p> <p>3.3.2 Borazine method of preparation and nature of bonding (structure)</p> <p>3.3.3 Allotropes of carbon and phosphorus</p> <p>3.3.4 Oxyacids of nitrogen – HNO₂, HNO₃.</p> <p>3.3.5 Hydrides of Nitrogen- NH₃ and N₂H₄</p>	March	09
4	Chemistry of elements of 3d series elements	<p>4.1 Position of elements in periodic table</p> <p>4.2 Characteristics of d-block element</p> <p>(i) Electronic str (ii) Oxidation states</p> <p>(iii) magnetic character (iv) Colored ions</p> <p>(v) Complex formation</p>	April	08
5	Inorganic semi- micro qualitative analysis	<p>5.1 Theoretical principles involved in qualitative analysis.</p> <p>5.2 Applications of solubility product and common ion effect in separation of cations into groups.</p> <p>5.3 Application of complex formation in</p> <p>a) Separation of II group into IIA and IIB sub-groups. b) Separation of Copper from Cadmium. c) Separation of Cobalt from Nickel. d) Separation of Cl⁻, Br⁻, I⁻. e) Detection of NO₂⁻, NO₃⁻ (Brown ring test).</p> <p>5.4 Application of oxidation and reduction in a) Separation of Cl⁻, Br⁻, I⁻ in mixture b) Separation of NO₂⁻ and NO₃⁻ in mixture.</p> <p>5.5 Spot test analysis.</p>	May	08

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Tal – Patan Dist-Satara

Teaching Plan 2019-2020

B.Sc-II Semester-IV

Prof. Shirke. R.M

Subject – Organic Chemistry-VIII

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Carboxylic acids and their derivatives	<p>1.1 Monocarboxylic acid: Introduction, Methods of Formation from Alcohols, Aldehydes, Ketones, Nitriles and Alkyl benzenes. Chemical Reaction: Hell-Vohlard-Zelinsky (HVZ) reaction.</p> <p>1.2 Formation of Halo Acids, Mono, Di, Tri- chloro acetic acid. Substitution reaction of Monochloro acetic acid by Nucleophile OH⁻, I⁻, CN⁻ and NH₃</p> <p>1.3 Hydroxy acids: Malic and Citric acid Methods of formation of Malic acid from maleic acid, from Alpha bromo succinic acid and moist Ag₂O. Chemical Reactions: Reactions of Malic acid- Action of heat, oxidation by KMnO₄ and reduction reaction with HI. Uses of Malic acid Method of formation of Citric acid from glycerol. Chemical Reactions: Reaction of citric acid: acetylation by acetic anhydride, reduction by HI, action of heat. Uses of citric acid.</p> <p>1.4 Unsaturated acid: Cinnamic acid: method of formation from benzaldehyde using diethyl</p>	February	08



		<p>malonate and by using acetic anhydride and sodium acetate.</p> <p>Chemical Reactions- Bromination, Oxidation. Uses of cinnamic acid</p> <p>Acrylic acid: Method of formation from acrolein and by dehydration of beta hydroxy propionic acid.</p> <p>Chemical Reactions: Addition of water, Reduction by Na/ C₂H₅OH. Uses of acrylic acid.</p> <p>1.5 Dicarboxylic acid: Succinic and phthalic acid Method of formation of succinic acid from ethylene dibromide, maleic acid Chemical Reactions: Action of heat, Action of NaHCO₃, C₂H₅OH in presence of acid. Uses of succinic acid. Phthalic acid: Method of formation from o-xylene and Naphthalene Chemical Reactions: Action of heat, reaction with sodalime, ammonia, uses of phthalic acid.</p> <p>1.6 Carboxylic acid derivatives: Introduction Acid halide derivative: Acetyl chloride: formation from acid, by action with PCl₃ and SOCl₂, reaction with water, alcohol (Mechanism of esterification is expected) and ammonia. Uses of acetyl choride. Acid anhydride derivative: Method of formation of acetic anhydride by dehydration of acetic acid, reactions with water, alcohol and ammonia, uses of acetic anhydride.</p>		
2.	Amines and Diazonium Salts	<p>2.1 Introduction, Classification, Nomenclature, structure.</p> <p>2.2 Methods of preparation: a) From Alkyl halide by Amonolysis, b) By Reduction of Nitriles or Cyanides, c) From Unsubstituted amides (Hoffmann degradation), d) By Gabriel Synthesis (From Phthalamide).</p> <p>2.3 Reactions: Carbylamine reaction, Schotten-Baumann reaction, Electrophilic substitution (Aniline), Nitration, Bromination, Sulphonation.</p> <p>2.4 Diazonium salt: Introduction, Preparation of Benzene diazonium</p>	March	08



		chloride 2.5 Reactions: Replacement by Halogen(Sandmeyer), Replacement by Iodine, Replacement by -OH, C and N Coupling reactions: Synthesis of Methyl orange and Congo red.Reduction of BDC.		
3.	Carbohydrates	3.1 Classification of carbohydrates, reducing and non-reducing sugars, General properties of glucose and fructose, their open chain structure. Epimers, mutarotation and anomers. 3.2 Determination of configuration of Glucose (Fischer proof). 3.3 Ring structure of glucose Determination of size of the ring of Glucose by methylation method. 3.4Haworth projections.Cyclic structure of fructose.Linkage between monosachharides, structure of disacharrides (sucrose, maltose, lactose) andpolysacharrides (starch and cellulose) excluding their structure elucidation.	March	08
4.	Carbonyl Compounds Aldehydes and Ketones	4.1 Introduction, Nomenclature, structure. 4.2 Reactivity of Carbonyl group, mechanism of Nucleophilic addition to Carbonyl group 4.3 Reactions: mechanism and application of Aldol condensation, Perkin reaction, Cannizaros reaction, Knoevenagel condensation, Reformatsky reaction.	April	06
5.	Stereochemistry	5.1 Conformational isomerism – Introduction. 5.2 Representation of conformations of ethane by using Saw- Horse, Fischer (dotted line wedge) and Newmann's projection formulae. 5.3 Conformations and conformational analysis of ethane and n-butane by Newmann's Projection formula with the help of energy profile diagrams. 5.4 Cycloalkanes relative stability -	May	08



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B.sc-III Sem-V
Physical Chemistry - IX Prof.Thorat .J.P

Module number	Topic	Sub Topic	Month	Lectures
1.	Quantum Theory	1.1 Introduction 1.2 Dual nature of matter and energy:- De Broglie hypothesis. 1.3 The Heisenberg's uncertainty principle. 1.4 Concept of energy operators (Hamiltonian). 1.5 Derivation of Schrodinger wave equation. 1.6 Physical interpretation of the ψ and ψ^2 . 1.7 Particle in a one dimensional box. 1.8 Schrodinger wave equation for hydrogen atom. 1.9 Concept of Quantum	September	08
2.	Spectroscopy	2.1 Introduction 2.2 Electromagnetic radiation. 2.3 Electromagnetic spectrum, Energy level diagram. 2.4 Rotational spectra of diatomic molecules: Rigid rotor model; moment of inertia (derivation expected); energy levels of rigid rotor, selection rules; spectral intensity; distribution using population distribution (Maxwell – Boltzman distribution), determination of bond length; isotope effect(Numerical problems not expected). Interaction of radiation with rotating molecule. 2.5 Vibrational spectra of diatomic molecules : Simple Harmonic oscillator model, Vibrational energies of diatomic molecules, Determination of force constant,	spetember	08

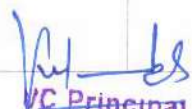


		<p>overtones. Interaction of radiation with vibrating molecules.</p> <p>2.6 Raman spectra : Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules, selection rules.</p> <p>2.7 Numerical problems..</p>		
3.	Photochemistry	<p>3.1 Introduction Difference between thermal and photochemical processes.</p> <p>3.2 Laws of photochemistry : i) Grotthus - Draper law, ii) Lambert law, iii) Lambert -- Beer's law (with derivation), iv) Stark - Einstein law.</p> <p>3.3 Quantum yield, Reasons for high and low quantum yield.</p> <p>3.4 Factors affecting Quantum yield.</p> <p>3.5 Photosensitized reactions – Dissociation of H₂, Photosynthesis.</p> <p>3.6 Photodimerisation of anthracene, decomposition of HI and HBr.</p> <p>3.7 Photophysical and photochemical processes.</p> <p>3.8 Jablonski diagram depicting various processes occurring in the excited state: Qualitative description of fluorescence and phosphorescence.</p> <p>3.9 Chemiluminescence, Electroluminescence.</p> <p>3.10 Numerical problems..</p>	october	07
4.	Soutioins	<p>4.1 Introduction</p> <p>4.2 Ideal solutions, Raoult's law, vapour pressure of ideal and non ideal solutions of miscible liquids.</p> <p>4.3 Composition of liquid and vapour, vapour pressure and boiling point diagrams of miscible liquids.</p> <p>Type I : Systems with intermediate total vapour pressure. (i.e. System in which b.p. increases regularly – Zeotropic) Type II : Systems with a maximum in the total vapour pressure. (i.e. System with a b.p. minimum – Azeotropic) Type III : Systems with a minimum in the total vapour pressure. (i.e. System with a b.p. Maximum – Azeotropic)</p>	November	05



		<p>Distillation of miscible liquid pairs.</p> <p>4.4 Solubility of partially miscible liquids. (i) Maximum solution temperature type : Phenol – water system. (ii) Minimum solution temperature type : Triethyl amine – water system. (iii) Maximum and minimum solution temperature type : Nicotine – water system.</p> <p>Distillation of partially miscible liquid pairs.</p> <p>4.5 Vapour pressure and distillation of immiscible liquids; steam distillation. temperature type : Phenol – water system. (ii) Minimum solution temperature type : Triethyl amine – water system. (iii) Maximum and minimum solution temperature type : Nicotine – water system. Distillation of partially miscible liquid pairs.</p> <p>4.6 Vapour pressure and distillation of immiscible liquids, steam distillation.</p>		
5.	Electromotive force	<p>5.1 Introduction</p> <p>5.2 Thermodynamics of electrode potentials, Nernst equation for electrode and cell potentials in terms of activities.</p> <p>5.3 E.M.F. series.</p> <p>5.4 Types of electrodes : Description in terms of construction, representation, half cell reaction and emf equation for i) Metal – metal ion electrode. ii) Amalgam electrode. iii) Metal – insoluble salt electrode. iv) Gas – electrode. v) Oxidation – Reduction electrode.</p> <p>5.5 Reversible and Irreversible cells. i) Chemical cells without transference. ii) Concentration cells with and without transference. iii) Liquid – Liquid junction potential : Origin, elimination and determination.</p> <p>5.6 Equilibrium constant from cell emf, Determination of the thermodynamic parameters such as ΔG, ΔH and ΔS.</p> <p>5.7 Applications of emf measurements : i) Determination of pH of solution using Hydrogen electrode. ii) Solubility and solubility product of s</p>	December	10

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BALASAHEB DESAI FOUNDATION

Smt. Vijyadevi Desai Senior College, Daulatnagar

Dist-satara tal-patan

Teaching 2019-2020

B.sc-III Sem-V

Subject- Inorganic Chemistry -X

Name – Prof.Thorat .J.P

Module number	Module name	Subject Topic	Month	Lecture
1	Hard and Soft Acids and Bases (HSAB)	1.1 Classification of acids and bases as hard and soft. 1.2 Theoretical bases of hardness and softness 1.3 Pearson's HSAB concept. 1.4 Acid – Base strength and hardness and softness. 1.5 Application and limitations of HSAB principle. Unit 5. Organometallic Chemistry. [07] 5.1 Definition, Nomenclature of organometallic compounds. 5.2 Synthesis and structural study of alkyl and aryl compounds of Li, Be and Al. 5.3 Mononuclear carbonyl and nature of bonding in simple metal carbonyls, sparingly soluble salts (based on concentration cell). 5.8 Numerical problems. cyclohexane. 1.1	September	05
2	Metal And Bonding in Transition metal complexes	2.1 Isomerism in complexes with C.N.-4 and 6 2.1.1 Geometrical Isomerism 2.1.2 Optical Isomerism 2.1.3 Structural Isomerism-Ionisation Isomerism, Hydrate Isomerism, Coordination Isomerism, Linkage Isomerism and Coordination position Isomerism 2.2 Molecular orbital theory (MOT). 2.2.1 Introduction. 2.2.2 MOT of octahedral complexes with sigma bonding such as $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$, $[\text{Ni}(\text{NH}_3)_6]^{2+}$, $[\text{CoF}_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$. 2.2.3 Merits and demerits of MOT.	September	08



3	Inorganic Polymers	3.1 Introduction. 3.2 Basic concept and definition. 3.3 Classification of polymers - Organic and Inorganic polymers. 3.4 Comparison between organic and inorganic polymers. 3.5 Polymer back bone. 3.6 Homoatomic polymer containing - (i) Phosphorus. (ii) Fluorocarbons. 3.7 Heteroatomic polymers - (i) Silicones (ii) Phosphonitrilic compounds.	October	07
4	Metals, Semiconductors and Superconductors	4.1 Introduction. 4.2 Properties of metallic solids. 4.3 Theories of bonding in metal. i) Free electron theory. ii) Molecular orbital theory (Band theory). 4.4 Classification of solids as conductor, insulators and semiconductors on the basis of band theory. 4.5 Semiconductors. Types of semiconductors - intrinsic and extrinsic semiconductors. Applications of semiconductors. 4.6 Superconductors: Ceramic superconductors - Preparation and structures of mixed oxide $YBa_2Cu_3O_{7-x}$ 4.7 Applications of superconductors.	November	10
5	Organometallic Chemistry	5.1 Definition, Nomenclature of organometallic compounds. 5.2 Synthesis and structural study of alkyl and aryl compounds of Li, Be and Al. 5.3 Mononuclear carbonyl and nature of bonding in simple metal carbonyls. sparingly soluble salts (based on concentration cell). 5.4 Numerical problems. cyclohexane.	December	07

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Tal – Patan Dist-Satara

Teaching Plan 2019-2020

B.Sc-III Semester-V

Prof.Shirk.R.M

Subject – Organic Chemistry-XI

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Introduction to Spectroscopy	1.1 Meaning of spectroscopy, Nature of electromagnetic radiation -wave length, frequency, energy, amplitude, wave number, and their relationship, 1.2 different units of measurement of wavelength frequency, different regions of electromagnetic radiations Regions of electromagnetic radiation. 1.3 Interaction of radiation with matter-absorption, emission, florescence and scattering, Types of spectroscopy and advantages	September	03



		of spectroscopic methods. 1.4 Energy types and energy levels of atoms and molecules		
2.	Spectroscopy	2.1. Introduction, 2.2. Beer-Lamberts law, absorption of U.V. radiation by organic molecule leading to different excitation. 2. 3. Terms used in U.V. Spectroscopy- Chromophore, Auxochrome, Bathochromic shift, hypsochromic shift, hyperchromic and hypochromic effect. 2. 4. Modes of electromagnetic transitions. 2. 5. Effect of conjugation on position of U.V. band. 2. 6. Calculation of λ -max by Woodward and Fisher rules for dienes and enones systems. 2.7. Colour and visible spectrum. 2. 8. Applications of U.V. Spectroscopy	September	
3.	Infrared Spectroscopy	3.1. Introduction, 3.2. Principle of I.R. Spectroscopy, 3.3. IR Instrumentation, schematic diagram- (Rf No. 6, P. No. 33) 3. 4. Fundamental modes of vibrations types and calculation – (3N-6,3N-5; Rf 7, P. No. 19-22) 3. 5. Condition for absorption of IR radiations 3. 6. Regions of I.R. Spectrum, fundamental group region, finger print region. 3. 7. Hooks Law for Calculation of vibrational frequency	October	06
4.	Nuclear Magnetic Resonance (NMR) Spectroscopy	4.1. Introduction, 4. 2. Principles of PMR Spectroscopy 4.3. NMR- Instrumentation, Schematic diagram. 4. 4. Magnetic and nonmagnetic nuclei 4.5. Chemical shift- definition, measurement, calculation, Factors affecting Chemical shift. 4. 6. Shielding, & deshielding 4. 7. Peak Integration 4.8. Merits of TMS as PMR reference compounds 4. 9. Coupling Constant 4.10. Types of Coupling Constant	October	09



		4.11. Spin-spin splitting (n+1 rule) 4.12. Applications		
5.	Mass Spectroscopy	5.1. Introduction 5.2. Principle of mass spectroscopy 5.3. Mass spectrometer - schematic diagram 5.4. Types of ions produced in mass spectrum 5.5. Fragmentation patterns of- alkanes, alkenes, aromatic hydrocarbons, alcohols, phenols, amines and carbonyl compounds 5.6. McLafferty rearrangement 5.7. Applications	November	08
6.	Combined Spectroscopic Problems	6.1. Absorption Spectroscopy of Organic Molecules by V.M.Parikh 6.2. Spectroscopy of Organic compounds by P. S. Kalsi. 6.3. Elementary Organic Absorption Spectroscopy by Y. R. Sharma. 6.4. Instrumental Methods of Analysis (7th edition) by Willard, Merritt, Dean, Settle. 6.5. Spectroscopy by G R Chatwal and S K Anand 6.6. Spectroscopy by Pavia, Lampman, Kriz, Vyvyan 6.7. Organic Spectroscopy (2nd edition) by Jag Mohan 6.8. Organic Spectroscopy (3rd edition) by William Kemp 6.9. Instrumental Methods of Chemical Analysis by H Kaur.	November	06

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Dist-satara tal- patan
Teaching Plan 2019-2020

B.sc-III Sem-V
Subject- Industrial Chemistry-*XII*

Prof. Miss.Shejwal .P.K

Module number	Topic	Sub Topic	Month	Lectures
1.	Sugar industry	1.1 Introduction 1.2 Manufacture of Ammonia (NH ₃) i. Physico-chemical principles ii. Manufacture by Haber's process 1.3 Manufacture of Sulphuric acid (H ₂ SO ₄) i. Physico-chemical principles ii. Manufacture by Contact process 1.4 Manufacture of Nitric acid (HNO ₃) i. Physico-chemical principles ii. Manufacture by Ostwald's (Ammonia oxidation process) 1.5 Manufacture of Sodium carbonate (Washing soda) (Na ₂ CO ₃) i. Physico-chemical principles ii. Manufacture by Solvay process 5. Nanomaterials (8) 5.1 Terminology and history 5.2. Optical properties of nanomaterials i.	February	08



		Semiconducting nanoparticle 16 ii. Metallic nanoparticle 5.3 Characterization and fabrication i. Characterization methods a) Scanning electron microscopy b) Transmission electron microscopy ii. Top-down, bottom-up fabrication a) Colloidal route b) Sol-gel method c) Chemical reduction method d) Electrochemical method. 5.4 Applications of Nanomaterials		
2.	Corrosion and Passivity	2.1 Introduction of corrosion 2.2 Electrochemical theory of corrosion 2.3 Factors affecting on corrosion, i. Position of metals in the electrochemical series on the basis of standard reduction potential ii. Purity of metal iii. Effect of moisture iv. Effect of oxygen (differential aeration principle) 15 v. Hydrogen overvoltage 2.4 Methods of protections of metals from corrosion 2.5 Passivity i. Definition ii. Types of passivity iii. Oxide film theory and evidences iv. Applications of passivity	March	08
3.	Sugar Industry	3.1 Introduction 3.2 Manufacture of cane sugar, extraction, decolourisation, crystallization and other details of industrial process 3.3 Refining of raw sugar 3.4 Manufacturing of white sugar in India 3.5 Byproducts of sugar industry	March	07
4.	Soaps and Detergents	4.1 Introduction 4.2 Soaps i. Raw materials, ii. Types of soaps iii. Cleaning action of soap 4.3 Manufacture of soap i. Cold Process ii. Semi-boiled Process iii. Boiled or Hot Process 4.4 Detergents i. Raw Materials ii. Types of Detergents: Anionic, cationic and amphoteric 4.5 Comparisons between soaps and detergents.	April	07
5.	Nanomaterials	5.1 Terminology and history 5.2. Optical properties of nanomaterials i. Semiconducting nanoparticle 16 ii. Metallic nanoparticle 5.3 Characterization and fabrication i. Characterization methods a) Scanning	May	08



		electron microscopy b) Transmission electron microscopy ii. Top-down, bottom-up fabrication a) Colloidal route b) Sol-gel method c) Chemical reduction method d) Electrochemical method. 5.4 Applications of Nanomaterials	
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B.sc-III Sem-VI
Subject- Physical Chemistry -XIII
Prof.Thorat .J.P

Module number	Topic	Sub Topic	Month	Lectures
1.	Phase equilibria	1.1 Introduction 1.2 Gibbs phase rule : Phase rule equation and explanation of terms involved in the equation. 1.3 Phase diagram, true and metastable equilibria. 1.4 One component systems: (i) Water system (ii) Sulphur system with explanation for polymorphism. 1.5 Two component systems: (i) Eutectic system: (Ag – Pb system); Desilverisation of lead, (ii) Freezing mixture: (KI –H ₂ O system), (iii) Formation of compound with congruent melting point (FeCl ₃ – H ₂ O) 1.6 Three component solid-liquid system: Development of triangular phase diagram: (Acetic acid – Chloroform – water system). Unit –6 Surface Chemistry. [07] 6.1 Introduction: Adsorption, Mechanism of adsorption, Factors affecting adsorption. 6.2 Types of adsorption: Physical and chemical 6.3 Types of adsorption isotherms. 6.4 Adsorption isotherm. i) Freundlich adsorption isotherm i) Langmuir adsorption isotherm with derivation. 6.5 BET equation and determination of surface area of adsorbent by BET equation. 6.6 Applications of adsorption.	February	05
2.	Thermodynamics	2.1 Introduction 2.2 Free energy : Gibbs function (G) and Helmholtz function (A), Criteria for thermodynamic equilibrium and spontaneity. 2.3 Relation between ΔG and ΔH : Gibbs Helmholtz equation. 2.4 Phase equilibria : Clapeyron –	March	09



		<p>Clausius equation and its applications.</p> <p>2.5 Thermodynamic derivation of law of mass action, van't – Hoff isotherm and isochore.</p> <p>2.6 Fugacity and activity concepts.</p> <p>2.7 Partial molar quantities, Partial molar volume, Concept of chemical potential, Gibbs-Duhem equation.</p> <p>2.8 Numerical problems. Partial</p>		
3.	The solid state	<p>3.1 Introduction Space lattice, lattice sites, Lattice planes, Unit cell.</p> <p>3.2 Laws of crystallography : (i) Law of constancy of interfacial angles (ii) Law of rational indices (iii) Law of crystal symmetry.</p> <p>3.3 Weiss indices and Miller indices.</p> <p>3.4 Cubic lattice and types of cubic lattice, planes or faces of a simple cubic system, spacing of lattice planes.</p> <p>3.5 Diffraction of X-rays, Derivation of Bragg's equation.</p> <p>3.6 Determination of crystal structure by Bragg's method.</p> <p>3.7 Determination of crystal structure of NaCl and KCl on the basis of Bragg's equation.</p> <p>3.8 Numerical problems.</p>	April	08
4.	Radioactivity	<p>4.1 Introduction.</p> <p>4.2 Detection and measurement of nuclear radiation by Scintillation and Geiger Muller counter methods.</p> <p>4.3 Radioactive equilibrium and range of α - particles.</p> <p>4.4 Geiger – Nuttal relation, Determination of radioactive constant (decay constant).</p>	April	04
5.	Chemical Kinetics	<p>5.1 Introduction</p> <p>5.2 Simultaneous reactions such as i) opposing reaction: (Derivation of rate equation for first order opposed by first order expected, Numerical problems expected), ii) side reaction:, iii) consecutive reactions: (Derivation of rate equation and Numerical problems are not expected).</p>	May	04
6.	Surface Chemistry	<p>6.1 Introduction: Adsorption, Mechanism of adsorption, Factors affecting adsorption.</p> <p>6.2 Types of adsorption: Physical and</p>	May	07



		<p>chemical</p> <p>6.3 Types of adsorption isotherms.</p> <p>6.4 Adsorption isotherm. i) Freundlich adsorption isotherm i) Langmuir adsorption isotherm with derivation.</p> <p>6.5 BET equation and determination of surface area of adsorbent by BET equation.</p> <p>6.6 Applications of adsorption.</p>	
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Teaching Plan 2019-2020

B.sc-III Sem- VI

Subject- Inorganic Chemistry-IVX

Name –prof. Miss.Shirke.R.M.

Module number	Module name	Subject Topic	Month	Lecture
1	1 Inorganic Reaction mechanism	1.1 Introduction 1.2 Classification of Mechanism Association, dissociation, interchange and the rate determining steps 1.3 SN1 and SN2 reaction for inert and labile complexes 1.4 Mechanism of substitution in cobalt (III) octahedral complexes 1.5 Trans effect and its theories 1.6 Applications of trans effect in synthesis of Pt (II) complexes. Unit 4. Iron and Steel. [07] 4.1 Occurrence. 4.2 Extraction of iron by Blast furnace. 4.3 Steel: Definition and types. 4.4 Conversion of cast iron into steel by i) Bessemer process. ii) L.D. process. 4.5 Heat treatment on steel. Unit 5. Bio-inorganic Chemistry. [06] 5.1 Introduction. 5.2 Essential and trace elements in biological process. 5.3 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.4 Biological role of alkali and alkaline earth metal ions with special reference to Na ⁺ , K ⁺ and Ca ²⁺ 1.1	February	6
2	Thermodynamic and Kinetic aspects of metal complexes	2.1 Introduction 2.2 Thermodynamic stability 2.3 Kinetic Stability 2.4. Relation between thermodynamic and kinetic stability 2.5 Step wise stability constant 2.6 Factor affecting the stability of complexes	March	07



3	A. Nuclear Chemistry B. Actinides	3.1 Nuclear reactions and energetic of nuclear reactions. 3.2 Types of nuclear reactions i) Artificial transmutation. ii) Artificial radioactivity. iii) Nuclear fission and its application in Heavy water nuclear reactor. vi) Nuclear fusion. 3.3 Applications of radio-isotopes as tracers. i) Chemical investigation – Esterification. ii) Structural determination – Phosphorus pentachloride. iii) Analytical Chemistry – Isotopic dilution method for determination of volume of blood. iv) Age determination – Dating by C14. 20 B. Actinides 3.4 Position in periodic table. 3.5 Electronic configuration. 3.6 General methods of preparation of Transuranic elements. i) Neutron capture – followed by β decay. ii) Accelerated projectile bombardment. iii) Heavy ion bombardment. 3.7 IUPAC nomenclature of the super heavy elements with atomic number (Z) greater than 100.		
4	Iron and Steel	4.1 Occurrence. 4.2 Extraction of iron by Blast furnace. 4.3 Steel: Definition and types. 4.4 Conversion of cast iron into steel by i) Bessemer process. ii) L.D. process. 4.5 Heat treatment on steel.	May	07
5	Bio-inorganic Chemistry	5.1 Introduction. 5.2 Essential and trace elements in biological process. 5.3 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.4 Biological role of alkali and alkaline earth metal ions with special reference to Na^+ , K^+ and Ca^{2+} elements in biological process. 5.5 Metalloporphyrins with special reference to hemoglobin and myoglobin. 5.6 Biological role of alkali and alkaline earth metal ions with special reference to Na^+ , K^+ and Ca^{2+}	May	06

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Teaching Plan 2019-2020

B.Sc-III Semester-VI
Prof.Shirk.R.M

Subject – Organic Chemistry-XV

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Name reactions	<p>1.1. Diels -Alder reaction (Rf.1,P.No.536; Rf.2,P No 248; Rf.3, P No 197, 340, 349 Rf.4, P No No 626-636)</p> <p>1.2. Oppenauer Oxidation (Rf. No.1, P.N.545; Rf.2, P No 391; Rf.3, P No 216; Rf.4, P No. 863,865)</p> <p>1.3. Meerwein –Pondorff-Verley reduction (Rf. No.1, P.N.545)</p> <p>1. 4. Schmidt rearrangement (Rf. No.1, P.N.624; Rf.3, P No 122; Rf.4, P No 783,819)</p> <p>1.5. Hofmann rearrangement (Rf. No.1, P.N.621; Rf.2,P No 732.551; Rf.3, P No 122; Rf.4, P No 783.816).</p> <p>1.6. Wittig reaction (Rf.2,P No 409; Rf.3, P No 233; Rf.4, P No 693,702,709)</p> <p>1.7. Wagner- Meerwein rearrangement (Rf. No.1, P.N. 584; Rf.3, P No 111; Rf.4, P No 794-798).</p> <p>1.8. Favorskii rearrangement (Rf No. 1, P.N.157, 642; Rf.3, P No 294; Rf.4, P No 804- 809).</p> <p>1.9. Michael reaction (Rf No. 1, P.N.392; Rf.3, P No 200; Rf.4, P No 604)</p> <p>1.10. Dieckmann's reaction or condensation (Rf. No. 1, P.N. 334; Rf.2, P No 586; Rf.4, P No 367)</p> <p>1.11. Problem based on above reactions. References: 1. Mechanism and Structure in Organic Chemistry. April,1963 By Edwin S.Gould 2. A text book of Organic Chemistry by Arun Bahl , B.S.Bhal Eighteenth Revised</p>	February	08



		<p>edition 2006 . 3. A guidebook to mechanism in Organic Chemistry sixth Edition by Peter Sykes. 22 4. Advanced Organic Chemistry : Reactions, Mechanisms and structure by Jerry March.</p> <p>Unit V. Pharmaceuticals [06] 1. Introduction, Classification, Qualities of ideal drug. 2. Synthesis and uses: ethambutal, phenobarbitone, isoniazide, benzocaine, Chloramphenicol, paludrine. 3. Drug action of sulpha drugs. (Ref.1: P. No.762-775; Ref.2: P. No.803-804, 818-822; Ref.3: P. No.987-1011)</p>		
2.	Retrosynthesis	<p>2.1. Lithium aluminium hydride LiAlH_4 (Rf No.1 P.No. 350; Rf No.2 P.No. 581-595; Rf No.3 P.No. 877-881)</p> <p>2.2. Osmium tetroxide (Rf No.1 P.No. 616; Rf No.2 P.No. 759-764; Rf No.3 P.No. 894- 895)</p> <p>2.3. Dicyclohexyl Carbodiimide (DCC) (Rf No.2 P.No. 231-236)</p> <p>2.4. Raney Nickel (Rf No.1 P.No. 439, 556; Rf No.2 P.No. 143, 440, 441, 956; Rf No.3 P.No. 870)</p> <p>2. 5. 2,3-Dichloro -5,6-dicyano - 1,4-benzoquinone (DDQ) (Rf No.2 P.No. 215-219)</p> <p>2.6. Polyphosphoric acid (PPA) (Rf No.2 P.No. 894-905).2.7. Diazomethane (Rf No.2 P.No. 191-195; Rf No.3 P.No. 969-972)</p> <p>2.8. Ceric ammonium nitrate (CAN) (Rf No.2 P.No. 120-121)</p> <p>2.9. N-Bromosuccinamide (NBS) (Rf No.2 P.No. 78-80; Rf No.3 P.No. 926-927) 10.Selenium dioxide (SeO_2) (Rf No.2 P.No. 992-1000; Rf No.3 P.No. 200) References : 1. Advanced Organic Chemistry : Reactions, Mechanisms and structure by – Jerry March 2. Reagents for Organic Synthesis by Louis F. Fieser , Mary Fieser - 1967 3. A Text book of Practical Organic Chemistry including Qualitative Organic Analysis by Arthur I Vogel.</p>	March	06
3.	Electrophilic addition to $>\text{C}=\text{C}<$ bond and bond	<p>A. Addition to Carbon-Carbon double bond ($>\text{C}=\text{C}<$ bond, Hydrohalogenation:-orientation &</p>	March	08



	Addition to carbon carbon double bond and carbon carbon triple bond	<p>reactivity, Anti-Markovnikoff's addition (peroxide effect), Rearrangements (support for formation of carbocation), Addition of halogens, Addition of water, Addition of hypohalous acids (HO-X), Hydroxylation (formation of 1,2-diols), 23 Hydroboration-oxidation (formation of alcohol), Hydrogenation (formation of alkane), Ozonolysis (formation of aldehydes & ketones). B. Addition to Carbon-Carbon triple bond () : Introduction, Examples of addition reactions, Mechanism of electrophilic addition to bond. Addition of halogens, Addition of halogen acids, Addition of hydrogen, Addition of water, Formation of metal acetylides. Reference books: 1. Organic Reactions and Their Mechanisms P. S. Kalsi 3rd Revised edition. Sections- 7.6, 11.1, 11.2, 11.3.11.6.11.7, 11.8, 11.9, 13.3 to 13.5 . pages – 304 to 310, 421 to 425, 427 to 431. 481 to 486. 2. Advanced organic Chemistry by B.S. Bahl & Arun Bhal (Reprint in 1997) pages – 241 to 258, 3. Organic Chemistry by Morrison and Boyd 6th edition. Sections- 9.1,9.2,9.5,9.14,9.17,9.21,9.25,9.26 pages -317 to 323,327 to 343,346 to 355,357 to 360,431 to 433</p>		
4.	Natural Product	<p>A] Terpenoids: 1. Introduction, Occurrence, Isolation, General Characteristic, Classification. (Rf. 1, P No. 368-370; Rf. 2, P No. 312-315) 2. General Methods for structure determinations (Rf. 1, P No. 370-372; Rf. 2, P No. 317-323) 3. Isoprene rule. (Rf. 2, P No. 317) 4. Analytical evidences and synthesis of Citral (Rf. 1 P No. 357-377) and alpha-terpineol.(Rf. 1, P No. 383-385) B] Alkaloid: 1. Introduction, Occurrence, Isolation, Classification, Properties. (Rf. 1, P No. 710-711; Rf. 2, P No. 193-195) 2. General Methods for structure determinations (Rf. 1, P No. 711-715; Rf. 2, P No. 196-203) 3. Analytical evidences and synthesis of Ephedrine (Rf. 2 P No. 204-205) and NicotineU</p>	April	08
5.	Pharmaceuticals	1. Introduction, Classification, Qualities	May	06



		<p>of ideal drug.</p> <p>2. Synthesis and uses: ethambutal, phenobarbitone, isoniazide, benzocaine, Chloramphenicol, paludrine.</p> <p>3. Drug action of sulpha drugs. (Ref.1: P. No.762-775; Ref.2: P. No.803-804, 818-822; Ref.3: P. No.987-1011)</p>	
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Teaching Plan 2019-2020

B.sc-III Sem-VI
Subject- Analytical Chemistry- XVI

Prof. Miss.Shejwal .P.K

Module number	Topic	Sub Topic	Month	Lectures
1.	Theory of Gravimetric Analysis	1.1 Introduction 1.2 Neutralization Indicators (Acid-Base Indicators) 1.3 Theory of indicators w.r.t. Ostwald's colour change interval and Ostwald's Quinoid theory 1.4 Neutralization curves and choice of indicators for the following titration, i. Strong acid-strong base ii. Strong acid-weak base iii. Strong base - weak acid 1.5 Complexometric titration i. General account ii.Types of EDTA titration iii. Metallochromic indicators w.r.t. Eriochrom Black-T indicator 5. Chromatography (8) 7.1 Introduction 7.2 Developments in chromatography 7.3 Advantages of chromatography 7.4 Types of chromatography on the basis of mechanism of interaction of solute with Stationary phase i) Adsorption ii) Partition iii) Ion Exchange iv) Size exclusion v) Affinity 7.5 Classification of chromatography on the basis of mobile phase and stationary phase i) Gas Chromatography ii) Liquid Chromatography iii) Supercritical-fluid Chromatography 7.5 Paper Chromatography and its applications 7.6 Thin layer chromatography and its applications 7.7 Adsorption column chromatography and its	September	08



2.	Potentiometric Titrations	2.1 Introduction 2.2 Determination of pH 2.3 Study of Quinhydrone and Glass electrodes and their use in determination of pH 2.4 Potentiometric titrations: Classical and analytical methods for locating end points 2.5 Acid base titration 2.6 Redox titration 2.7 Advantages of potentiometric titrations 2.8 Precipitation titration 2.9 Basic circuit of direct reading potentiometer	September	08
3.	Colorimetry and Spectrometry	3.1 Theory of Colorimetry and Spectrophotometry i. Lambert Beer's law ii. Terms used in Colorimetry and Spectrophotometry iii. Deviation from Beer's law. 3.2 Classification of methods of 'colour' measurement or comparison i. Photoelectric Colorimeter method – Single beam photo-electric colorimeter. ii. Spectrophotometer method – Single beam direct reading spectrophotometer 3.3 Determination of unknown concentration by using Concentration-Absorbance plot.	October	06
4.	Flame Photometry	4.1 Introduction 4.2 General principles of flame photometry 4.3 Instrumentation 4.4 Effect of solvent in flame photometry 4.5 Instruments 4.6 Application of flame photometry 4.7 Interference in flame photometry 4.8 Factors that influence the intensity of emitted radiation in a flame photometer 4.9 Limitations of flame photometry 4.10 Conclusions	November	08
5	Chromatography	5.1 Introduction 5.2 Developments in chromatography 5.3 Advantages of chromatography 5.4 Types of chromatography on the basis of mechanism of interaction of solute with Stationary phase i) Adsorption ii) Partition iii) Ion Exchange iv) Size exclusion v) Affinity 5.5 Classification of chromatography on the basis of mobile phase and stationary phase i) Gas Chromatography ii) Liquid	December	8



		Chromatography iii) Supercritical-fluid Chromatography 5.6 Paper Chromatography and its applications 5.7 Thin layer chromatography and its applications 5.8 Adsorption column chromatography and its	
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 Teaching Plan (2020-2021) B.Sc – 1 Sem – 1
Subject – Inorganic Chemistry I

Prof. Miss. Dige. J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Atomic Structure and Periodicity Of Elements	1.1 Bohr's theory of hydrogen atom and its limitations. 1.2 Wave Particle duality. 1.3 Heisenberg uncertainty principle. 1.4 Quantum numbers and their significance. 1.5 Shapes of s, p and d atomic orbitals. 1.6 Electrons filling rules in various orbitals. 1.7 Electronic configuration of elements. 1.8 Periodicity of elements.	September	10
2.	Chemical Bonding and Molecular structure A) Ionic Bonding	2.1 Definition and formation of ionic bond. Characteristics of ionic bonding. 2.2 Energetic in ionic bond formation 2.3 Born- Haber cycle for NaCl and its applications 2.4 Fajan's Rule, Application of Fajan, s rule	September	09
3.	Chemical Bonding and Molecular structure B) Valence bond Theory (VBT)	3.1 Concept of hybridization, different types of hybridization and geometry of following molecules, Linear geometry- BeCl_2 (sp hybridization) Planer trigonal geometry- BF_3 (sp^2 hybridization) Tetrahedral geometry - SiCl_4 (sp^3 hybridization) Trigonal bipyramidal geometry - PCl_5 ($sp^3 d$ hybridization) Octahedral geometry - SF_6 ($sp^3 d^2$ hybridization) Pentagonal bipyramidal geometry - IF_7 ($sp^3 d^3$ hybridization)	October	07
4.	Acid And Bases	4.1 Theories of Acid And Bases- Arrhenius concept, Bronsted, Lowery concept, lewis concept. 4.2 Classification of Acid and bases 4.3 Pearsons HSAB Concept. 4.4 Acid Bases strength and hardness softness 4.5 Application and Limitation.	November	06
5	P-block Elements	5.1 Position of elements in periodic table . 5.2 Characteristics of group 13,14,15 elements. 5.3 comounds of group 13,14,15 elements.	December	07


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Teaching Plan 2020-2021

B.Sc-I Semester-I

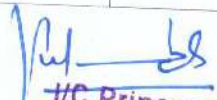
Prof.Shirk.R.M



Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Fundamentals Of Organic Chemistry	1.1 : Curved Arrow Nations 1.2 : Cleavage of Bonds 1.3 : Organic Molecular Species 1.4 : Electronic Displacement 1.5 : Reactive Intermediates	September	10
2.	Stereochemistry	2.1: Important terms in spectroscopy 2.2 :Representation of organic molecule 2.3 :Concept of Chirality 2.4 :Elements of Symmetry 2.5 :Optical isomers in tartaric acid 2,3-Dihydroxy Butanoic acid 2.6 :Enantiomerism ,Distereomerism and Meso compound 2.7 :Geometric and Cis-trans isomerism,nomenclature of stereoisomer and E and Z configuration.	October	11
3.	Aromaticity	3.1: Introduction 3.2:Structure of Benzene 3.3: Meaning of terms in aromatic chemistry Classification of aromatic compounds.	November	07
4.	Heterocyclic Compounds	4.1: Introduction 4.2: Classification and Nomenclature of heterocyclic compounds 4.3: Pyrrole 4.4: Pyridine	December	08

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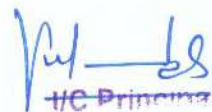

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Teaching Plan (2020-2021) B.Sc – 1 Sem – 2
Subject – Physical Chemistry-III

Prof. Miss. Dige. J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Chemical Energetics A) Thermodynamics	Basic concepts of thermodynamics, first law of thermodynamics spontaneous and non spontaneous process with ex. Statements of second law of thermodynamics, Carnot, s cycle. Third law of thermodynamics.	February	10
2.	B) Thermochemistry	Concept of standard state and standard enthalpies of formations. Variation of enthalpy of a reaction with temperature- Kirchoff's equation.		
3.	Chemical Kinetics	Rate of reaction. Order and Molecularity of reaction, Zero order reaction, first order reaction, characteristics of first order reaction. Second order reaction Characteristics of second order reactions, determination of order of reaction by i) integration method ii) graphical method Half life method. Arrhenius equation. Concept of energy of activation Theories of reactions rates. Collision of the two theories.	March	09
4.	Physical Properties of liquids	Introduction structure of liquid, Surface tension and its determination. Viscosity, Refractive index Specific and molecular refractivities and Its determination.	April	08
5.	Electrochemistry	Introduction, Types of Conductors, Variation of Specific Conductance Dipping type of conductivity cell Measurement of conductance by Whistone bridge.	May	10


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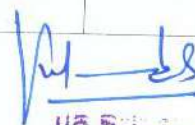
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Teaching Plan (2020-2021) B.Sc – 1 Sem – 2
Subject-Analytical Chemistry-IV

Prof.Miss.Panaskar.S.A.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Introduction to Analytical Chemistry	1.1 Introduction, importance of analytical Process, Methods of analysis, Sampling of Solids . 1.2 Types of errors. 1.3 Significant Figures, Mean Median, Standard Deviation.	February	08
2.	Fundamental of Industrial Chemistry And IPR	2.1 Difference between Classical and industrial chemistry, raw material of chemical industry. 2.2 Definition and explanation of Terms- 2.3 IPR , Introduction to IPR and Significance.	March	07
3.	Chromatography	3.1 Introduction, Basic Principle, basic terms, classification. 3.2 Paper Chromatography- Principle, types, Methodology, types, sample loading choice of solvent, develop ascending Descending, Determination of Rf Value, Application , Advantages , disadvantages. 3.3 Thin Layer Chromatography – Principle , solvent system, stationary phase, preparation of TLC, detecting Reagent methodology, sample loading, Application , Disadvantages, Disadvantages 3.4 Comparison paper chromatography and TLC.	March	07
4	Theory of Titrimetric Analysis	4.1 Introduction, Acid base indicators, Theory of Indicators. 4.2 Neutrilisation curves and choice of Indicators 4.3 Compleximetric Titration.	April	08
5	Soaps and Detergents	5.1 Introduction 5.2 Soaps-Raw material , Types of soap, cleansing action soap, Manufacture of soap, 5.3 Detergents- Types , Anionic cationic, amphoteric , Preparation 5.4 Preparation of Shampoos 5.5 comparison between soap detergents.	May	09



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 Teaching Plan 2020-2021
 B.sc-II Sem-III
Subject-Physical Chemistry-V

Prof. miss. Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Electrolytic Conductivity	Introduction Conductivity Equivalent and molar conductivity And their variation with dilution for Weak and strong electrolysis in Aqueous solution,Equivalent Conductivity at infinite dilution,Measurement of conductance by Determination of degree of ionization of weak electrolyte ,solubility and products sparingly soluble salt ,ionic product Of water,ionic product of water,hydrolysis constant of salt,conductometric titration ,Advantage of conductometric titrations. Transference number , Hittorff Rule,determination of transport number using moving boundary method, factors affecting transport number.	September	07
2.	Physical properties of liquid	2.1 Introduction 2.2 Classification of physical properties 2.3 Surface tension and its determination using 2.4 Viscosity 2.5 Refractive index 2.6 Abbe's refractometre	September	08
3.	Surface tension	3.1 Introduction 3.2 Adsorption as a surface phenomenon 3.3 Definition of adsorption 3.4 Adsorbent 3.5 Adsorbate,Adsorbent factors affecting Adsorbent,types ,distinction between physical and chemical adsorption, 3.6 Adsorption isotherm	October	07
4.	Nuclear chemistry	4.1 Introduction, 4.2 types of nuclear radiation , 4.3 properties of Radioactive, 4.3 Direction and measurement of radiation by, 4.4 Scintillation method., Radioactive equilibrium and range of particles Giger nuttal radiation Determination of radioactive constant.	November	07
5.	Nanotechnology	5.1 Introduction 5.2 Third order reaction ,deviation of rate constant , 5.3 characteristics of third order reaction 5.4 theories of reaction rate as collision theory Transition state theory .	December	09

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Teaching Plan 2020-2021

B.sc-II Sem-III

Subject- Industrial Chemistry –VI

Prof. Miss.Panaskar. S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Basic Concept in Industrial chemistry	1.1 The difference between classical chemistry and industrial chemistry 1.2 Raw material for the chemical industry 1.3 Material safety data sheet 1.4 unit that makes up chemical process unit operation and unit process 1.5 Flow Diagram, Block Diagram, process flow diagram. 1.6 Material balances 1.7 Definition and explanation of terms – Equivalent weight, molality, molecular weight, molarity, molarity of mixed solution, Acidity of base	September	10
2	Unit Operations	2.1 Size Reduction- Principle, Jaw crusher, ball Mill 2.2 Size Enlargement –Principle pellet, Tumbling, agglomerators 2.3 Separation-Magnetic separation, Froth Flotation 2.4 Distillation – Distillation of liquid mixture, Types of Distillation, Type of column packings, Condensers Vacuum Distillation spinning band distillation, Steam distillation.	September	07
3	Corrosion and electroplating	3.1 Introduction of corrosion 3.2 Electrochemical theory of corrosion 3.3 Factors affecting, on corrosion- 3.4 Electroplating	October	08
4	Paper Industry	4.1 Manufacturing of pulp 4.2 Type of pulp –sulphat and soda 4.3 Manufacturing of paper 4.4 Calendering 4.5 ecological problems of Indian paper Industry 4.6 Features of good paper industry	November	06
5	Soap and detergents	5.1 Introduction of soap –raw material, type Soaps, cleansing action of soap, Manufacturing of soap –Boiled –Hot process 5.2 Detergents –raw material, types of	December	06

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Teaching Plan 2020-2021

B.sc-II Sem-IV

Subject- Inorganic Chemistry –VII

Prof. Miss.Panaskar. S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Co-ordination Chemistry	1.1 Introduction 1.2 Distinguish between double salt and complex salt 1.3 Werner's Theory 1.4 Description of Terms- 1.5 IUPAC nomenclature of coordination compounds. 1.6 Isomerism in complexes with C 1.7 Valence bond theory of transition metal complexes	February	9
2	Chelation	2.1 Introduction with respect to ligand, chelating agent, chelation, and metal complexes. 2.2 Structural requirement of chelate formation. 2.3 Difference between metal chelate and metal complexes 2.4 Classification of chelating agent. 2.5 Application of chelation with respect to Chelating agents –EDTA and DMG .	March	06
3	P-Block element (Group 13,14 and 15)	3.1 Position of elements in periodic table. 3.2 Characteristics of p-block elements with Reference to electronic configuration And periodic properties 3.3 compounds of group 13,14,15	March	08
4	Chemistry of elements of 3d series elements	4.1 Position of elements in periodic table 4.2 Characteristics of d-block element (i) Electronic str (ii) Oxidation states (iii) magnetic character (iv) Colored ions (v) Complex formation	April	08
5	Inorganic semi- micro qualitative analysis	5.1 Theroretical principle involved in qualitative analysis. 5.2 Application of solubility product and common ion effect separation of cations into groups 5.3 Application of complex formatin in 5.4 Application of oxidisation and reduction 5.5 Spot test analysis.	May	08

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Teaching Plan 2020-2021

B.Sc-II Semester-IV


Prof. Shirke.R.M

Subject - Organic Chemistry



Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Carboxylic acids and their derivatives	1.1: Monocarboxylic acids 1.2: Formation of Halo Acids, Mono, Di, Tri-chloro acetic 1.3: Substitution reactions of Monochloroacetic acid 1.4: Hydroxy Acids 1.5: Unsaturated Acids 1.6: Dicarboxylic Acids 1.7: Carboxylic Acid Derivatives	February	07
2.	Amines and Diazonium Salts	2.1: Introduction 2.2: Methods of preparation 2.3: Reactions 2.4: Diazonium Salts 2.5: Chemical Reactions	March	05
3.	Carbohydrates	3.1: Introduction 3.2: Classification of Carbohydrates 3.3: General properties of Glucose and Fructose their open chain structure 3.4: Ring structure of D (+) Glucose 3.5: Determination of size of the Ring of Glucose by Methylation method 3.6: Cyclic structure of Fructose 3.7: Epimers, Mutarotation and Anomers 3.8: Haworth Projection 3.9: Linkage between the monosaccharides 3.10: Structure of disaccharides 3.11: Polysaccharides	March	09
4.	Carbonyl Compounds Aldehydes and Ketones	4.1: Introduction 4.2: Reactivity of carbonyl group 4.3: Reactions	April	07
5.	Stereochemistry	5.1: Conformational Isomerism 5.2: Representation of Conformers of Ethane 5.3: Conformational analysis 5.4: Cycloalkenes relative stability	May	09

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Teaching Plan 2020-2021

B.sc-III Sem-V

Subject- Inorganic Chemistry -IX



Name –prof. Miss.Panaskar.S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Acid bases and Non Aqueous Solvents .	1.1 Introduction 1.2 Hard and soft Acids and bases (HSAB Concept) 1.3 Chemistry of non Aqueous solvents	September	08
2	Metal And Bonding in Transition metal complexes	2.1 Crystal field theory (CFT). 2.2 Molecular orbital theory (MOT).	September	09
3	Metal ,Semiconductors and superconductors	3.1 Introduction 3.2 properties of Metallic solids. 3.3 Theories of bonding in metals. 3.4 Classification of solids as conductors, Insulators and semiconductors on the Basis bond theory. 3.5 semiconductors 3.6 Superconductors 3.7 Application of Superconductors	october	10
4	Organometallic Chemistry	4.1 Introduction 4.2 Defination and Nomenclature 4.3 Synthesis and structural study of Alkyl And Aryl compounds of (a) Be (b) Al 4.4 Mononuclear carbonyl and nature of Bonding in simple mononuclear metal Carbonyls.	November	07
5	Catalysis	5.1 Introduction 5.2 classification of Catalytic Reaction. 5.3 Mechanism of catalysis 5.4 Industrial application of catalysis. 5.2 Detergents –raw material,types of Detergents anionic-cationic amphoteric	December	05

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Teaching Plan 2020-2021

B.Sc-III Semester-V

Prof. Shirk.R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Introduction to Spectroscopy	1.1: Meaning of Spectroscopy 1.2: Nature of Electromagnetic Radiation 1.3: Different Regions of Electromagnetic Radiations 1.4: Interaction of Radiation With Matter 1.5: Types of Spectroscopy and Advantages of Spectroscopic Methods 1.6: Energy Levels and Energy Levels of Atoms and Molecules	September	05
2.	Ultraviolet and Visible Spectroscopy	2.1: Introduction 2.2: Beer Lambert's Law 2.3: Terms used in Ultraviolet Spectroscopy 2.4: Modes of Electronic Transitions 2.5: Effect of conjugation on the position of uv and visible band 2.6: Calculation of Lambda max by Woodward-Fieser Rule 2.7: Colour and Visible Spectrum 2.8: Applications of ultraviolet spectroscopy	September	04
3.	Infrared Spectroscopy	3.1: Introduction 3.2: Principle of I.R. Spectroscopy 3.3: Instrumentation 3.4: Fundamental modes of vibrations	October	06



		3.5: Condition for the absorption of IR-radiation 3.6: Regions of IR Spectrum 3.7: Hook's Law 3.8: Factors affecting IR absorption frequency 3.9: Characteristics of I.R. absorption of functional groups		
4.	Nuclear Magnetic Resonance (NMR) Spectroscopy	4.1: Introduction 4.2: Principles of PMR-spectroscopy 4.3: NMR-Instrumentation 4.4: Magnetic and Non-magnetic nuclei 4.5: Chemical Shift 4.6: Sheilding and De-Sheilding 4.7: Peak-area 4.8: Merits of TMS as per Reference Compound 4.9: Coupling Constant 4.10: Types of Coupling Constants 4.11: Spin-spin Splitting 4.12: Applications 4.13; Solved Problems	October	09
5.	Mass Spectroscopy	5.1: Introduction 5.2: Principle of Mass Spectroscopy 5.3: Mass Spectroscopy 5.4: Types of Ions Produced during Fragmentation 5.5: Nitrogen Rule 5.6: Fragmentation Patterns of Selected Classes of Organnic Compounds 5.7: Carbonyl Compounds 5.8: McLafferty Rearrangement 5.9: Solved Problems	November	09
6.	Combined Spectroscopic Problems	6.1: Introduction 6.2: Combined Spectroscopic Solved Problems	November	06

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 B.sc-III Sem-V



Physical Chemistry XI Prof. Miss.Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Elementary quantum mechanics	1.5 Introduction 1.6 Drawbacks of classical mechanics, Black body radiation. 1.7 The Heisenberg's uncertainty principle. 1.8 Concept of energy operators. 1.9 Derivation of Schrodinger wave equation. 1.10 Physical interpretation. 1.11 Particle in a one dimensional box.	September	10
2.	Spectroscopy	1.7 Introduction 1.8 Electromagnetic radiation. 1.9 Rotational spectra of diatomic molecules. 1.10 Vibrational spectra of diatomic molecules. 1.11 Raman spectra 2 Comparative study of IR and Raman spectra.	spetember	08
3.	Photochemistry	1.1 laws of Photochemistry 1.2 Quantum yield 1.3 Photosensitized reactions 1.4 Jablonski diagram 1.5 Chemiluminescence, Electroluminescence and Bioluminescence.	october	05
4.	Soutioins	1.3 ideal solutions 1.4 Composition of liquid and vapour, vapour pressure and boiling point 1.5 Solubility of partially miscible liquids. 1.6 Vapour pressure and distillation of immiscible liquids, steam distillation.	November	06
5.	Electromotive force	5.1 Thermodynamics of electrode potentials,Nernst equation for electrode and cell 5.2 E.M.F. Series 5.3 types of electrodes 5.4 Reversible and irreversible cells 5.5 applications of emf measurements.	December	07

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 Teaching Plan 2020-2021
 B.sc-III Sem-v



Subject- Analytical Chemistry- XII

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Theory of Gravimetric Analysis	1.1 Introduction 1.2 Gravimetric analysis by precipitation Nucleation,crystal growth,digestion/ageing,filteration,drying Ignition,weighing. 1.3 optimum condition for good precipitation 1.4 Physical nature of precipitate 1.5 Purity precipitate: 1.6 Organic precipitants and their application	September	08
2.	Flame photometry	2.1 Introduction 2.2 Gernal principal of flame photometry 2.3 Instumentation:Block digram,Burners(premix and Lundergraph burners),mirrors,shits,Filters,detector(photom ultipier tube) 2.4 Effect of solvent in flame photometry. 2.5 Experimental procedure of analysis 2.6 Interference and factors that influence the intensity of emitted radiation in flame photometry. 2.7 Application of flame photometry in real simple analysis. 2.8 Limitation of flame photometry.	spetember	07
3.	Colrimetry and Spectrometry	3.1 Thery of colorimetry and Spectrometry. 3.2 Lambert Beer's law,deviation from beer's law . 3.3 Terms used colorimetry and spectrometry. 3.4 Classification methods of colour measurement 3.5 Phthoelectric colorimetry method-single beam Photoelectric colorimeter 3.6 Spertrophotometre method – single beam Direct reading spectrophotometer 3.7 Determination of unknown concentration by Using concentration absorbance plot. 3.8 Application of colorimetry and Spectrophotometry.	octomber	06
4.	Colorimetry and spectrophotometry	4.1 Introduction 4.2determination of Ph. 4.3 study of quinhydrone and glass Electrodeand their use in determination of Ph. 4.4 Potentiometric titration :classical and Analytical method. 4.5 Acid –Base titration with suitable Example. 4.6 Redox titration with suitable Example. 4.7 Precipitation Titration 4.8 Basic circuit of direct reading 4.9 Advantage of potentiometric titration .	November	07
5	Chromatographic techniques and quality control	5.1 Introduction,classification 5.2 Coloumn chromatography 5.3 Ion exchange chromatography . 5.4 concept in quality control.	Dcember	11

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Teaching Plan 2020-2021

B.sc-III Sem- VI

Subject- Inorganic Chemistry-XIII

Name –prof. Miss.Shirke.R.M.



Module number	Module name	Subject Topic	Month	Lecture
1	Coordination Chemistry	A. Inorganic Reaction Mechanism 1.1 Introduction 1.2 Classification of Mechanism 1.3 SN1 and SN2 Reaction for inert and labile complexes. 1.4 Mechanism of substitution in cobalt (III) Octahedral complexes. 1.5 Trans effect and theories. 1.6 Application of trans effect in synthesis of Pt (II) complexes. B. Thermodynamic and kinetic aspects of Metal complexes. 1.7 Introduction 1.8 Thermodynamic stability. 1.9 Kinetic stability. relation Thermodynamic. Stepwise stability factor affecting stability. Determination stability.	February	12
2	Nuclear Chemistry	2.1 Nuclear reaction 2.2 types Nuclear reaction 2.3 Use of Thorium, uranium, and Plutonium 2.4 Application of radioisotopes	March	08
3	Chemistry of F-block Elements.	3.1 Introduction 3.2 Electronic configuration. 3.3 oxidation state. Lanthanide contraction 3.4 separation of Lanthanides. B) Actinides 3.4 position in periodic table. Electronic Configuration. General methods of Preparation of transuranic elements. 3.5 IUPAC Nomenclature of the super heavy Elements	April	09
4	Iron and Steel	4.1 Occurrence ore of iron 4.2 Definition Of Terms extraction of iron By blast furnace ,steel, conversion cast Iron into steel by 4.3 Heat Treatment on steel.	May	08

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Teaching Plan 2020-2021

B.Sc-III Semester-VI

Prof. Shirke, R.M

Subject - Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Reagents and Reactions in Organic Synthesis	1.1: Introduction 1.2: Reagents in Organic Synthesis- Lithium Aluminium Hydride 1.3: Raney Nickel-Osium Tetraoxide 1.4: Selenium Dioxide-Dicyclohexyl-Diazomethane-Named Reactions- Reaction Mechanism 1.5: Synthetic Application	February	10
2.	Retrosynthesis	2.1: Introduction 2.2: Recapitulation of Basis of Reaction Mechanism and Reagent -Terms used 2.3: Reterosynthesis Analysis and synthesis of Target Molecules	March	08
3.	Electrophilic Addition to carbon carbon double bond and carbon carbon triple bond	3.1: Introduction 3.2: Mechanism of Electrophilic Addition To Carbon carbon double bond and Carbon carbon triple bond	March	08
4.	Natural Product	4.1: Introduction 4.2: Terpenoids 4.3: General Methods of Terpenoids structure Determination 4.4: Isuprene Rule 4.5: Constitution of Citral-Alkaloida 4.6: General Methods of Structure Determination of Nicotine	April	07

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5.	Pharmaceuticals	5.1: Introduction 5.2: Classification 5.3: Qualities of Ideal Drugs- Functional Drugs-Chemotherapeutic Agents 5.4: Synthesis and uses of Some Selected Classes of Drugs 5.5: Drugs action of Sulpha Drugs	May	05
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Teaching Plan 2020-2021
B.sc-III Sem-VI

Subject- Physical Chemistry XV

Prof. Miss.Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Phase equilibria	1.1 Indroduction 1.2 Gibbs phase rule 1.3phase diagram 1.4one component system(i) water system (ii)sulphur system 1.5 two component system 1.6 three component solid-liquid system	February	07
2.	Thermodynamics	2.1 Indrotuction 2.2 Free energy 2.2 Relation between G and H: Gibbs helmntoz equation 2.3 Phase equilibria 2.4 Thermodynamic derivation of law of mass action ,vant –Hoff isotherm and isochore 2.5 Fugacity and activity concepts 2.6 Partial	March	08
3.	The solid state	3.1 laws of crystallography 3.2 Weiss indices and Miller indices 3.3cubic lattice and type 3.5 diffraction of x-ray 3.6 determination of crystal structure by braggs process 3.7 determination of crystal structure by nacl and kcl	April	09
4.	Chemical kinetics	4.1 simultaneous reactions i) opposing reaction ii) side reation iii)consecutive reactions iv)chain reaction v) explosive reaction	April	07
5.	Distribution law	5.1 Nernst distribution law and its limitations 5.2 modification of distributation law with respect to change in molecule state. 5.3 applications of the distribution law 5.4 distribution indicators	May	06

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Dist-satara tal- patan
Teaching Plan 2020-2021
B.sc-III Sem-VI

Subject- Industrial Chemistry-XVI

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Sugar industry	1.1 Introduction 1.2 Manufacture of cane sugar in india 1.3 By products of sugar industry . 1.4 Manufacture of Ethyl alcohol from Molasses:By fementation.	February	07
2.	Manufacture of Industrial Heavy Chemicals	1.1 Introduction 1.2 Manufacture of Ammonia (NH ₃) 1.3 Manufacture of Sulphuric acid (H ₂ so ₄) 1.4 Manufacture of Nitric acid (HNO ₃) 1.5 Manufacture of Sodium Carbonate	March	07
3.	Synthetic Polymer	1.1 Introduction 1.2 Classification 1.3 Addition Polymerisation 1.4 Zigler Nata Polymerisation 1.5 Methods of preparation and Application of some organic Polymers. 1.5 Conducting organic polymers 1.6 Application of conducting organic Polymers.	March	09
4.	Petroleum Industry and Eco-friendly fuels	1.1 Petroleum Industry- 1.2 Fuels	April	-07
5.	Nanotecnology	5.1 Introduction 5.2 Opetical properties of nanomaterials' 5.3 Synthetic Routes of nanomaterials 5.4 Synthesis methods 5.5 Characterization of nanomaterials 5.4 Application of nanotechnology	May	08

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Tal – Patan Dist – Satara
Teaching Plan (2021-2022) B.Sc – 1 Sem – 1
Subject – Inorganic Chemistry I



Prof. Miss. Dige. J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Atomic Structure and Periodicity Of Elements	1.1 Bohr's theory of hydrogen atom and its limitations. 1.2 Wave Particle duality. 1.3 Heisenberg uncertainty principle. 1.4 Quantum numbers and their significance. 1.5 Shapes of s,p and d atomic orbitals. 1.6 Electrons filling rules in various orbitals. 1.7 Electronic configuration of elements. 1.8 Periodicity of elements.	September	09
2.	Chemical Bonding and Molecular structure A) Ionic Bonding	2.1 Definition and formation of ionic bond. Characteristics of ionic bonding. 2.2 Energetic in ionic bond formation 2.3 Born- Haber cycle for NaCl and its applications 2.4 Fajan's Rule, Application of Fajan,s rule	September	08
3.	Chemical Bonding and Molecular structure B) Valence bond Theory (VBT)	3.1 Concept of hybridization, different types of hybridization and geometry of following molecules, Linear geometry- BeCl_2 (sp hybridization) Planer trigonal geometry- BF_3 (sp^2 hybridization) Tetrahedral geometry – SiCl_4 (sp^3 hybridization) Trigonal bipyramidal geometry – PCl_5 ($sp^3 d$ hybridization) Octahedral geometry – SF_6 ($sp^3 d^2$ hybridization) Pentagonal bipyramidal geometry – IF_7 ($sp^3 d^3$ hybridization)	October	07
4.	Acid And Bases	4.1 Theories of Acid And Bases- Arrhenius concept, Bronsted, Lowry concept, Lewis concept. 4.2 Classification of Acid and bases 4.3 Pearsons HSAB Concept. 4.4 Acid Bases strength and hardness softness 4.5 Application and Limitation.	November	06
5	P-block Elements	5.1 Position of elements in periodic table . 5.2 Characteristics of group 13,14,15 elements. 5.3 compounds of group 13,14,15 elements.	December	07

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Teaching Plan 2021-2022

B.Sc-I Semester-I

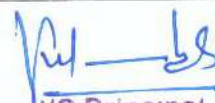
Prof.Shirk.R.M



Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Fundamentals Of Organic Chemistry	1.1 : Curved Arrow Nations 1.2 : Cleavage of Bonds 1.3 : Organic Molecular Species 1.4 : Electronic Displacement 1.5 : Reactive Intermediates	September	11
2.	Stereochemistry	2.1: Important terms in spectroscopy 2.2 :Representation of organic molecule 2.3 :Concept of Chirality 2.4 :Elements of Symmetry 2.5 :Optical isomers in tartaric acid 2,3-Dihydroxy Butanoic acid 2.6 :Enantiomerism ,Distereomerism and Meso compound 2.7 :Geometric and Cis-trans isomerism,nomenclature of stereoisomer and E and Z configuration.	October	10
3.	Aromaticity	3.1: Introduction 3.2:Structure of Benzene 3.3: Meaning of terms in aromatic chemistry Classification of aromatic compounds.	November	08
4.	Heterocyclic Compounds	4.1: Introduction 4.2: Classification and Nomenclature of heterocyclic compounds 4.3: Pyrrole 4.4: Pyridine	December	08

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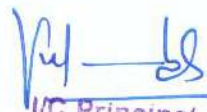


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Teaching Plan (2021-2022) B.Sc – 1 Sem – 2
Subject – Physical Chemistry-III

Prof. Miss. Dige. J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Chemical Energetics A) Thermodynamics	Basic concepts of thermodynamics, first law of thermodynamics spontaneous and non spontaneous process with ex. Statements of second law of thermodynamics, Carnot, s cycle. Third law of thermodynamics.	February	10
2.	B) Thermochemistry	Concept of standard state and standard enthalpies of formations. Variation of enthalpy of a reaction with temperature- Kirchhoff's equation.		
3.	Chemical Kinetics	Rate of reaction. Order and Molecularity of reaction, Zero order reaction, first order reaction, characteristics of first order reaction. Second order reaction Characteristics of second order reactions, determination of order of reaction by i) integration method ii) graphical method Half life method. Arrhenius equation. Concept of energy of activation Theories of reactions rates. Collision of the two theories.	March	09
4.	Physical Properties of liquids	Introduction structure of liquid, Surface tension and its determination. Viscosity, Refractive index Specific and molecular refractivities and Its determination.	April	08
5.	Electrochemistry	Introduction, Types of Conductors, Variation of Specific Conductance Dipping type of conductivity cell Measurement of conductance by Whistone bridge.	May	10

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Tal – Patan Dist – Satara
Teaching Plan (2021-2022) B.Sc – 1 Sem – 2
Subject-Analytical Chemistry-IV



Prof. Miss. Panaskar. S.A.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Introduction to Analytical Chemistry	1.1 Introduction, importance of analytical Process, Methods of analysis, Sampling of Solids . 1.2 Types of errors. 1.3 Significant Figures, Mean Median, Standard Deviation.	February	08
2.	Fundamental of Industrial Chemistry And IPR	2.1 Difference between Classical and industrial chemistry, raw material of chemical industry. 2.2 Definition and explanation of Terms- 2.3 IPR ,Introduction to IPR and Significance.	March	07
3.	Chromatography	3.1 Introduction, Basic Principle, basic terms, classification. 3.2 Paper Chromatography- Principle, types, Methodology, types, sample loading choice of solvent, develop ascending Descending, Determination of Rf Value, Application , Advantages , disadvantages. 3.3 Thin Layer Chromatography – Principle , solvent system, stationary phase, preparation of TLC, detecting Reagent methodology, sample loading, Application ,Disadvantages, Disadvantages 3.4 Comparison paper chromatography and TLC.	March	07
4	Theory of Titrimetric Analysis	4.1 Introduction, Acid base indicators, Theory of Indicators. 4.2 Neutrilisation curves and choice of Indicators 4.3 Complexiometric Titration.	April	07
5	Soaps and Detergents	5.1 Introduction 5.2 Soaps-Raw material , Types of soap, cleansing action soap, Manufacture of soap, 5.3 Detergents- Types ,Anioic cationic, amphoteric ,Preparation 5.4 Preparation of Shampoos 5.5 comparison between soap detergents.	May	08

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 B.sc-II Sem-III
Subject- Physical Chemistry-V



Prof. miss. Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Electrolytic Conductivity	Introduction Conductivity Equivalent and molar conductivity And their variation with dilution for Weak and strong electrolysis in Aqueous solution,Equivalent Conductivity at infinite dilution,Measurement of conductance by Determination of degree of ionization of weak electrolyte ,solubility and products sparingly soluble salt ,ionic product Of water,ionic product of water,hydrolysis constant of salt,conductometric titration ,Advantage of conductometric titrations. Transference number , Hittorff Rule,determination of transport number using moving boundary method, factors affecting transport number.	September	07
2.	Physical properties of liquid	2.1 Introduction 2.2 Classification of physical properties 2.3 Surface tension and its determination using 2.4 Viscosity 2.5 Refractive index 2.6 Abbe's refractometre	September	08
3.	Surface tension	3.1 Introduction 3.2 Adsorption as a surface phenomenon 3.3 Definition of adsorption 3.4 Adsorbent 3.5 Adsorbate,Adsorbent factors affecting Adsorbent,types ,distinction between physical and chemical adsorption, 3.6 Adsorption isotherm	October	08
4.	Nuclear chemistry	4.1 Introduction, 4.2 types of nuclear radiation , 4.3 properties of Radioactive, 4.3 Direction and measurement of radiation by, 4.4 Scintillation method., Radioactive equilibrium and range of particles Geiger nuttal radiation Determination of radioactive constant.	November	07
5.	Nanotechnology	5.1 Introduction 5.2 Third order reaction ,deviation of rate constant , 5.3 characteristics of third order reaction 5.4 theories of reaction rate as collision theory Transition state theory .	December	08

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Teaching Plan 2021-2022

B.sc-II Sem-III

Subject- Industrial Chemistry –VI

Prof. Miss.Panaskar. S.A.



Module number	Module name	Subject Topic	Month	Lecture
1	Basic Concept in Industrial chemistry	1.1 The difference between classical chemistry and industrial chemistry 1.2 Raw material for the chemical industry 1.3 Material safety data sheet 1.4 unit that makes up chemical process unit operation and unit process 1.5 Flow Diagram ,Block Diagram ,process flow diagram. 1.6 Material balances 1.7 Definition and explanation of terms – Equivalent weight ,molality ,molecular weight,molarity ,molarity of mixed solution ,Acidity of base	September	10
2	Unit Operations	2.1 Size Reduction- Principle,Jaw crusher,ball Mill 2.2 Size Enlargement –Principle pellet, Tumbling,agglomerators 2.3 Separation-Magnetic separation, Froth Flotation 2.4 Distillation – Distillation of liquid mixture , Types of Distillation, Type of column packings,Condensers Vacuum Distillation spinning band distillation, Steam distillation.	September	06
3	Corrosion and electroplating	3.1 Introduction of corrosion 3.2 Electrochemical theory of corrosion 3.3 Factors affecting ,on corrosion- 3.4 Electroplating	October	08
4	Paper Industry	4.1 Manufacturing of pulp 4.2 Type of pulp –sulphate and soda 4.3 Manufacturing of paper 4.4 Calendering 4.5 ecological problems of Indian paper Industry 4.6 Features of good paper industry	November	06
5	Soap and detergents	5.1 Introduction of soap –raw material,type Soaps,cleansing action of soap, Manufacturing of soap –Boiled –Hot process 5.2 Detergents –raw material,types of	December	07

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Teaching Plan 2021-2022

B.sc-II Sem-IV

Subject- Inorganic Chemistry –VII

Prof. Miss.Panaskar. S.A.



Module number	Module name	Subject Topic	Month	Lecture
1	Co-ordination Chemistry	1.1 Introduction 1.2 Distinguish between double salt and complex salt 1.3 Werner's Theory 1.4 Description of Terms- 1.5 IUPAC nomenclature of coordination compounds. 1.6 Isomerism in complexes with C 1.7 Valence bond theory of transition metal complexes	February	10
2	Chelation	2.1 Introduction with respect to ligand, chelating agent, chelation, and metal complexes. 2.2 Structural requirement of chelate Formation. 2.3 Difference between metal chelate and metal complexes 2.4 Classification of chelating agent. 2.5 Application of chelation with respect to Chelating agents –EDTA and DMG .	March	05
3	P-Block element (Group 13,14 and 15)	3.1 Position of elements in periodic table. 3.2 Characteristics of p-block elements with Reference to electronic configuration And periodic properties 3.3 compounds of group 13,14,15	March	09
4	Chemistry of elements of 3d series elements	4.1 Position of elements in periodic table 4.2 Characteristics of d-block element (i) Electronic str (ii) Oxidation states (iii) magnetic character (iv) Colored ions (v) Complex formation	April	06
5	Inorganic semi- micro qualitative analysis	5.1 Theoretical principle involved in qualitative analysis. 5.2 Application of solubility product and common ion effect separation of cations into groups 5.3 Application of complex formation in 5.4 Application of oxidation and reduction 5.5 Spot test analysis.	May	08

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Tal – Patan Dist-Satara

Teaching Plan 2021-2022

B.Sc-II Semester-IV

Prof. Shirke.R.M

Subject – Organic Chemistry



Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Carboxylic acids and their derivatives	1.1: Monocarboxylic acids 1.2: Formation of Halo Acids, Mono, Di, Tri-chloro acetic 1.3: Substitution reactions of Monochloroacetic acid 1.4: Hydroxy Acids 1.5: Unsaturated Acids 1.6: Dicarboxylic Acids 1.7: Carboxylic Acid Derivatives	February	06
2.	Amines and Diazonium Salts	2.1: Introduction 2.2: Methods of preparation 2.3: Reactions 2.4: Diazonium Salts 2.5: Chemical Reactions	March	05
3.	Carbohydrates	3.1: Introduction 3.2: Classification of Carbohydrates 3.3: General properties of Glucose and Fructose their open chain structure 3.4: Ring structure of D (+) Glucose 3.5: Determination of size of the Ring of Glucose by Methylation method 3.6: Cyclic structure of Fructose 3.7: Epimers, Mutarotation and Anomers 3.8: Haworth Projection 3.9: Linkage between the monosaccharides 3.10: Structure of disaccharides 3.11: Polysaccharides	March	08
4.	Carbonyl Compounds Aldehydes and Ketones	4.1: Introduction 4.2: Reactivity of carbonyl group 4.3: Reactions	April	08
5.	Stereochemistry	5.1: Conformational Isomerism 5.2: Representation of Conformers of Ethane 5.3: Conformational analysis 5.4: Cycloalkenes relative stability	May	09

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H.O. Principal

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		Baeyer's strain theory 5.5: Conformation and stability of Cyclohexane and Monosubstituted derivatives 5.6: Locking of Conformation in t- butyl Cyclohexane	
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Teaching Plan 2021-2022

B.sc-III Sem-V

Subject- Inorganic Chemistry -IX



Name - prof. Miss. Panaskar. S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Acid bases and Non Aqueous Solvents .	1.1 Introduction 1.2 Hard and soft Acids and bases (HSAB Concept) 1.3 Chemistry of non Aqueous solvents	September	08
2	Metal And Bonding in Transition metal complexes	2.1 Crystal field theory (CFT). 2.2 Molecular orbital theory (MOT).	September	10
3	Metal ,Semiconductors and superconductors	3.1 Introduction 3.2 properties of Metallic solids. 3.3 Theories of bonding in metals. 3.4 Classification of solids as conductors, Insulators and semiconductors on the Basis bond theory. 3.5 semiconductors 3.6 Superconductors 3.7 Application of Superconductors	octomber	10
4	Organometallic Chemistry	4.1 Introduction 4.2 Defination and Nomenclature 4.3 Synthesis and structural study of Alkyl And Aryl compounds of (a) Be (b) Al 4.4 Mononuclear carbonyl and nature of Bonding in simple mononuclear metal Carbonyls.	November	05
5	Catalysis	5.1 Introduction 5.2 classification of Catalytic Reaction. 5.3 Mechanism of catalysis 5.4 Industrial application of catalysis. 5.2 Detergents -raw material, types of Detergents anionic cationic amphoteric	December	05

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Tal – Patan Dist-Satara

Teaching Plan 2021-2022

B.Sc-III Semester-V

Prof. Shirke.R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Introduction to Spectroscopy	1.1: Meaning of Spectroscopy 1.2: Nature of Electromagnetic Radiation 1.3: Different Regions of Electromagnetic Radiations 1.4: Interaction of Radiation With Matter 1.5: Types of Spectroscopy and Advantages of Spectroscopic Methods 1.6: Energy Types and Energy Levels of Atoms and Molecules	September	03
2.	Ultraviolet and Visible Spectroscopy	2.1: Introduction 2.2: Beer Lambert's Law 2.3: Terms used in Ultraviolet Spectroscopy 2.4: Modes of Electronic Transitions 2.5: Effect of conjugation on the position of uv and visible band 2.6: Calculation of Lambda max by Woodward-Fieser Rule 2.7: Colour and Visible Spectrum 2.8: Applications of ultraviolet spectroscopy	September	05
3.	Infrared Spectroscopy	3.1: Introduction 3.2: Principle of I.R. Spectroscopy 3.3: Instrumentation 3.4: Fundamental modes of vibrations	October	06

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		3.5: Condition for the absorption of IR-radiation 3.6: Regions of IR Spectrum 3.7: Hook's Law 3.8: Factors affecting IR absorption frequency 3.9: Characteristics of I.R. absorption of functional groups		
4.	Nuclear Magnetic Resonance (NMR) Spectroscopy	4.1: Introduction 4.2: Principles of PMR-spectroscopy 4.3: NMR-Instrumentation 4.4: Magnetic and Non-magnetic nuclei 4.5: Chemical Shift 4.6: Sheilding and De-Sheilding 4.7: Peak-area 4.8: Merits of TMS as per Reference Compound 4.9: Coupling Constant 4.10: Types of Coupling Constants 4.11: Spin-spin Splitting 4.12: Applications 4.13; Solved Problems	October	09
5.	Mass Spectroscopy	5.1: Introduction 5.2: Principle of Mass Spectroscopy 5.3: Mass Spectroscopy 5.4: Types of Ions Produced during Fragmentation 5.5: Nitrogen Rule 5.6: Fragmentation Patterns of Selected Classes of Organnic Compounds 5.7: Carbonyl Compounds 5.8: McLafferty Rearrangement 5.9: Solved Problems	November	08
6.	Combined Spectroscopic Problems	6.1: Introductionin 6.2: Combined Spectroscopic Solved Problems	November	07

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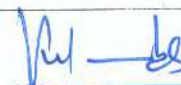
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 Teaching Plan 2021-2022
 B.sc-III Sem-V



Physical Chemistry XI **Prof. Miss.Dige.J.S.**

Module number	Topic	Sub Topic	Month	Lectures
1.	Elementary quantum mechanics	1.5 Introduction 1.6 Drawbacks of classical mechanics, Black body radiation. 1.7 The Heisenberg's uncertainty principle. 1.8 Concept of energy operators. 1.9 Derivation of Schrodinger wave equation. 1.10 Physical interpretation. 1.11 Particle in a one dimensional box.	September	08
2.	Spectroscopy	1.7 Introduction 1.8 Electromagnetic radiation. 1.9 Rotational spectra of diatomic molecules. 1.10 Vibrational spectra of diatomic molecules. 1.11 Raman spectra 2 Comparative study of IR and Raman spectra.	September	08
3.	Photochemistry	1.1 laws of Photochemistry 1.2 Quantum yield 1.3 Photosensitized reactions 1.4 Jablonski diagram 1.5 Chemiluminescence, Electroluminescence and Bioluminescence.	October	06
4.	Solutions	1.3 ideal solutions 1.4 Composition of liquid and vapour, vapour pressure and boiling point 1.5 Solubility of partially miscible liquids. 1.6 Vapour pressure and distillation of immiscible liquids, steam distillation.	November	06
5.	Electromotive force	5.1 Thermodynamics of electrode potentials, Nernst equation for electrode and cell 5.2 E.M.F. Series 5.3 types of electrodes 5.4 Reversible and irreversible cells 5.5 applications of emf measurements.	December	08


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 Teaching Plan 2021-2022
 B.sc-III Sem-v



Subject- Analytical Chemistry- XII

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Theory of Gravimetric Analysis	1.1 Introduction 1.2 Gravimetric analysis by precipitation Nucleation,crystal growth,digestion/ageing,filtration,drying Ignition,weighing. 1.3 optimum condition for good precipitation 1.4 Physical nature of precipitate 1.5 Purity precipitate: 1.6 Organic precipitants and their application	September	08
2.	Flame photometry	2.1 Introduction 2.2 Gernal principal of flame photometry 2.3 Instrumentation:Block digram,Burners(premix and Lundergraph burners),mirrors,shits,Filters,detector(photom ultipier tube) 2.4 Effect of solvent in flame photometry. 2.5 Experimental procedure of analysis 2.6 Interference and factors that influence the intensity of emitted radiation in flame photometry. 2.7 Application of flame photometry in real simple analysis. 2.8 Limitation of flame photometry.	spetember	07
3.	Colrimetry and Spectrometry	3.1 Theory of colorimetry and Spectrometry. 3.2 Lambert Beer's law,deviation from beer's law . 3.3 Terms used colorimetry and spectrometry. 3.4 Classification methods of colour measurement 3.5 Phthoelectric colorimetry method-single beam Photoelectric colorimeter 3.6 Spertrophotometre method – single beam Direct reading spectrophotometer 3.7 Determination of unknown concentration by Using concentration absorbance plot. 3.8 Application of colorimetry and Spectrophotometry.	october	07
4.	Colorimetry and spectrophotometry	4.1 Introduction 4.2determination of Ph. 4.3 study of quinhdyrone and glass Electrodeand their use in determination of Ph. 4.4 Potentiometric titration :classical and Analytical method. 4.5 Acid –Base titration with suitable Example. 4.6 Redox titration with suitable Example. 4.7 Precipitation Titration 4.8 Basic circuit of direct reading 4.9 Advantage of potentiometric titration .	November	06
5	Chromatographic techniques and quality control	5.1 Introduction,classification 5.2 Coloumn chromatography 5.3 Ion exchange chromatography , 5.4 concept in quality control.	Dcember	10

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Teaching Plan 2021-2022

B.sc-III Sem- VI

Subject- Inorganic Chemistry-XIII

Name –prof. Miss.Shirke.R.M.

Module number	Module name	Subject Topic	Month	Lecture
1	Coordination Chemistry	A. Inorganic Reaction Mechanism 1.1 Introduction 1.2 Classification of Mechanism 1.3 SN1 and SN2 Reaction for inert and labile complexes. 1.4 Mechanism of substitution in cobalt (III) Octahedral complexes. 1.5 Trans effect and theories. 1.6 Application of trans effect in synthesis Of Pt (II) complexes. B. Thermodynamic and kinetic aspects of Metal complexes. 1.7 Introduction 1.8 Thermodynamic stability. 1.9 Kinetic stability. relation Thermodynamic. Stepwise stability factor affecting stability.Determination stability.	February	12
2	Nuclear Chemistry	2.1 Nuclear reaction 2.2 types Nuclear reaction 2.3 Use of Thorium,uranium, and Plutonium 2.4 Application of radioisotopes	March	08
3	Chemistry of F-block Elements.	3.1 Introduction 3.2 Electronic configuration. 3.3 oxidation state. Lanthanide contraction 3.4 separation of Lanthanides. B) Actinides 3.4 position in periodic table. Electronic Configuration. General methods of Preparation of transuranic elements. 3.5 IUPAC Nomenclature of the super heavy Elements	April	09
4	Iron and Steel	4.1 Occurrence ore of iron 4.2 Definition Of Terms extraction of iron By blast furnace ,steel,conversion cast iron into steel by 4.3 Heat Treatment on steel.	May	08

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Tal – Patan Dist-Satara

Teaching Plan 2021-2022

B.Sc-III Semester-VI

Prof. Shirk. R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Reagents and Reactions in Organic Synthesis	1.1: Introduction 1.2: Reagents in Organic Synthesis- Lithium Aluminium Hydride 1.3: Raney Nickel-Osium Tetraoxide 1.4: Selenium Dioxide-Dicyclohexyl-Diazomethane-Named Reactions- Reaction Mechanism 1.5: Synthetic Application	February	10
2.	Retrosynthesis	2.1: Introduction 2.2: Recapitulation of Basis of Reaction Mechanism and Reagent –Terms used 2.3: Reterosynthesis Analysis and synthesis of Target Molecules	March	06
3.	Electrophilic Addition to carbon carbon double bond and carbon carbon triple bond	3.1: Introduction 3.2: Mechanism of Electrophilic Addition To Carbon carbon double bond and Carbon carbon triple bond	March	08
4.	Natural Product	4.1: Introduction 4.2: Terpenoids 4.3: General Methods of Terpenoids structure Determination 4.4: Isuprene Rule 4.5: Constitution of Citral-Alkaloida 4.6: General Methods of Structure Determination of Nicotine	April	08

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5.	Pharmaceuticals	5.1: Introduction 5.2: Classification 5.3: Qualities of Ideal Drugs- Functional Drugs-Chemotherapeutic Agents 5.4: Synthesis and uses of Some Selected Classes of Drugs 5.5: Drugs action of Sulpha Drugs	May	06
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 Dist-satara tal- patan
 Teaching Plan 2021-2022
 B.sc-III Sem-VI



Subject- Physical Chemistry XV

Prof. Miss.Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Phase equilibria	1.1 Indroduction 1.2 Gibbs phase rule 1.3phase diagram 1.4one component system(i) water system (ii)sulphur system 1.5 two component system 1.6 three component solid-liquid system	February	07
2.	Thermodynamics	2.1 Indrotuction 2.2 Free energy 2.2 Relation between G and H: Gibbs helmntoz equation 2.3 Phase equilibria 2.4 Thermodynamic derivation of law of mass action ,vant –Hoff isotherm and isochore 2.5 Fugacity and activity concepts 2.6 Partial	March	09
3.	The solid state	3.1 laws of crystallography 3.2 Weiss indices and Miller indices 3.3cubic lattice and type 3.5 diffraction of x-ray 3.6 determination of crystal structure by braggs process 3.7 determination of crystal structure by nacl and kcl	April	09
4.	Chemical kinetics	4.1 simultaneous reactions i) opposing reaction ii) side reation iii)consecutive reactions iv)chain reaction v) explosive reaction	April	06
5.	Distribution law	5.1 Nernst distribution law and its limitations 5.2 modification of distributation law with respect to change in molecule state. 5.3 applications of the distribution law 5.4 distribution indicators	May	06

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Dist-satara tal- patan
Teaching Plan 2021-2022
B.sc-III Sem-VI
Subject- Industrial Chemistry-XVI

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Sugar industry	1.1 Introduction 1.2 Manufacture of cane sugar in india 1.3 By products of sugar industry . 1.4 Manufacture of Ethyl alcohol from Molasses:By fementation.	February	07
2.	Manufacture of Industrial Heavy Chemicals	1.1 Introduction 1.2 Manufacture of Ammonia (NH ₃) 1.3 Manufacture of Sulphuric acid (H ₂ so ₄) 1.4 Manufacture of Nitric acid (HNO ₃) 1.5 Manufacture of Sodium Carbonate	March	08
3.	Synthetic Polymer	1.1 Introduction 1.2 Classification 1.3 Addition Polymerisation 1.4 Zigler Nata Polymerisation 1.5 Methods of preparation and Application of some organic Polymers. 1.5 Conducting organic polymers 1.6 Application of conducting organic Polymers.	March	08
4.	Petroleum Industry and Eco-friendly fuels	1.1 Petroleum Industry- 1.2 Fuels	April	07
5.	Nanotecnology	5.1 Introduction 5.2 Opetical properties of nanomaterials' 5.3 Synthetic Routes of nanomaterials 5.4 Synthesis methods 5.5 Characterization of nanomaterials 5.4 Application of nanotechnology	May	08

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Tal – Patan Dist – Satara
Teaching Plan 2022-2023 **B.Sc – 1 Sem – 1**
Subject – Inorganic Chemistry I



Prof. Miss. Dige J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Atomic Structure and Periodicity Of Elements	1.1 Bohr's theory of hydrogen atom and its limitations. 1.2 Wave Particle duality. 1.3 Heisenberg uncertainty principle. 1.4 Quantum numbers and their significance. 1.5 Shapes of s, p and d atomic orbitals. 1.6 Electrons filling rules in various orbitals. 1.7 Electronic configuration of elements. 1.8 Periodicity of elements.	September	09
2.	Chemical Bonding and Molecular structure A) Ionic Bonding	2.1 Definition and formation of ionic bond. Characteristics of ionic bonding. 2.2 Energetic in ionic bond formation 2.3 Born- Haber cycle for NaCl and its applications 2.4 Fajan's Rule, Application of Fajan,s rule	September	08
3.	Chemical Bonding and Molecular structure B) Valence bond Theory (VBT)	3.1 Concept of hybridization, different types of hybridization and geometry of following molecules, Linear geometry- BeCl_2 (sp hybridization) Planer trigonal geometry- BF_3 (sp^2 hybridization) Tetrahedral geometry – SiCl_4 (sp^3 hybridization) Trigonal bipyramidal geometry – PCl_5 ($\text{sp}^3 \text{d}$ hybridization) Octahedral geometry – SF_6 ($\text{sp}^3 \text{d}^2$ hybridization) Pentagonal bipyramidal geometry – IF_7 ($\text{sp}^3 \text{d}^3$ hybridization)	October	07
4.	Acid And Bases	4.1 Theories of Acid And Bases- Arrhenius concept, Bronsted, Lowery concept, lewis concept. 4.2 Classification of Acid and bases 4.3 Pearsons HSAB Concept. 4.4 Acid Bases strength and hardness softness 4.5 Application and Limitation.	November	06
5	P-block Elements	5.1 Position of elements in periodic table . 5.2 Characteristics of group 13,14,15 elements. 5.3 comounds of group 13,14,15 elements.	December	07

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Teaching Plan 2022-2023 B.Sc – 1 Sem – 2
Subject – Physical Chemistry-III



Prof. Miss. Dige. J.S.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Chemical Energetics A) Thermodynamics	Basic concepts of thermodynamics, first law of thermodynamics spontaneous and non spontaneous process with ex. Statements of second law of thermodynamics, Carnot, s cycle. Third law of thermodynamics.	February	10
2.	B) Thermochemistry	Concept of standard state and standard enthalpies of formations. Variation of enthalpy of a reaction with temperature- Kirchoff's equation.		
3.	Chemical Kinetics	Rate of reaction. Order and Molecularity of reaction, Zero order reaction, first order reaction, characteristics of first order reaction. Second order reaction Characteristics of second order reactions, determination of order of reaction by i) integration method ii) graphical method Half life method. Arrhenius equation. Concept of energy of activation Theories of reactions rates. Collision of the two theories.	March	09
4.	Physical Properties of liquids	Introduction structure of liquid, Surface tension and its determination. Viscosity, Refractive index Specific and molecular refractivities and its determination.	April	08
5.	Electrochemistry	Introduction, Types of Conductors, Variation of Specific Conductance Dipping type of conductivity cell Measurement of conductance by Whistone bridge.	May	10

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Tal – Patan Dist – Satara
Teaching Plan 2022-2023 B.Sc – 1 Sem – 2
Subject-Analytical Chemistry-IV



Prof. Miss. Panaskar. S.A.

Topic No.	Topic	Sub Topic	Month	Lectures
1.	Introduction to Analytical Chemistry	1.1 Introduction, importance of analytical Process, Methods of analysis, Sampling of Solids . 1.2 Types of errors. 1.3 Significant Figures, Mean Median, Standard Deviation.	February	08
2.	Fundamental of Industrial Chemistry And IPR	2.1 Difference between Classical and industrial chemistry, raw material of chemical industry. 2.2 Definition and explanation of Terms- 2.3 IPR , Introduction to IPR and Significance.	March	07
3.	Chromatography	3.1 Introduction, Basic Principle, basic terms, classification. 3.2 Paper Chromatography- Principle, types, Methodology, types, sample loading choice of solvent, develop ascending Descending, Determination of R _f Value, Application , Advantages , disadvantages. 3.3 Thin Layer Chromatography – Principle , solvent system, stationary phase, preparation of TLC, detecting Reagent methodology, sample loading, Application , Disadvantages, Disadvantages 3.4 Comparison paper chromatography and TLC.	March	07
4	Theory of Titrimetric Analysis	4.1 Introduction, Acid base indicators, Theory of Indicators. 4.2 Neutrillisation curves and choice of Indicators 4.3 Complexiometric Titration.	April	07
5	Soaps and Detergents	5.1 Introduction 5.2 Soaps-Raw material , Types of soap, cleansing action soap, Manufacture of soap, 5.3 Detergents- Types , Anionic cationic, amphoteric , Preparation 5.4 Preparation of Shampoos 5.5 comparison between soap detergents.	May	08

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 Teaching Plan 2022-2023
 B.sc-II Sem-III
Subject- Physical Chemistry-V



Prof. miss. Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Electrolytic Conductivity	Introduction Conductivity Equivalent and molar conductivity And their variation with dilution for Weak and strong electrolysis in Aqueous solution,Equivalent Conductivity at infinite dilution,Measurement of conductance by Determination of degree of ionization of weak electrolyte ,solubility and products sparingly soluble salt ,ionic product Of water,ionic product of water,hydrolysis constant of salt,conductometric titration ,Advantage of conductometric titrations. Transference number , Hittorff Rule,determination of transport number using moving boundary method, factors affecting transport number.	September	07
2.	Physical properties of liquid	2.1 Introduction 2.2 Classification of physical properties 2.3 Surface tension and its determination using 2.4 Viscosity 2.5 Refractive index 2.6 Abbe's refractometre	September	08
3.	Surface tension	3.1 Introduction 3.2 Adsorption as a surface phenomenon 3.3 Definition of adsorption 3.4 Adsorbent 3.5 Adsorbate,Adsorbent factors affecting Adsorbent,types ,distinction between physical and chemical adsorption, 3.6 Adsorption isotherm	October	08
4.	Nuclear chemistry	4.1 Introduction, 4.2 types of nuclear radiation , 4.3 properties of Radioactive, 4.3 Direction and measurement of radiation by, 4.4 Scintillation method., Radioactive equilibrium and range of particles Giger nuttal radiation Determination of radioactive constant.	November	07
5.	Nanotechnology	5.1 Introduction 5.2 Third order reaction ,deviation of rate constant , 5.3 characteristics of third order reaction 5.4 theories of reaction rate as collision theory Transition state theory .	December	08

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Teaching Plan 2022-2023

B.sc-II Sem-III

Subject- Industrial Chemistry –VI

Prof. Miss.Panaskar. S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Basic Concept in Industrial chemistry	1.1 The difference between classical chemistry and industrial chemistry 1.2 Raw material for the chemical industry 1.3 Material safety data sheet 1.4 unit that makes up chemical process unit operation and unit process 1.5 Flow Diagram, Block Diagram, process flow diagram. 1.6 Material balances 1.7 Definition and explanation of terms – Equivalent weight, molality, molecular weight, molarity, molarity of mixed solution, Acidity of base	September	10
2	Unit Operations	2.1 Size Reduction- Principle, Jaw crusher, ball Mill 2.2 Size Enlargement –Principle pellet, Tumbling, agglomerators 2.3 Separation-Magnetic separation, Froth Flotation 2.4 Distillation – Distillation of liquid mixture, Types of Distillation, Type of column packings, Condensers Vacuum Distillation spinning band distillation, Steam distillation.	September	06
3	Corrosion and electroplating	3.1 Introduction of corrosion 3.2 Electrochemical theory of corrosion 3.3 Factors affecting, on corrosion- 3.4 Electroplating	October	08
4	Paper Industry	4.1 Manufacturing of pulp 4.2 Type of pulp –sulphate and soda 4.3 Manufacturing of paper 4.4 Calendering 4.5 ecological problems of Indian paper Industry 4.6 Features of good paper industry	November	06
5	Soap and detergents	5.1 Introduction of soap –raw material, type Soaps, cleansing action of soap, Manufacturing of soap –Boiled –Hot process 5.2 Detergents –raw material, types of	December	07

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Dist-satara tal- patan

Teaching Plan 2022-2023

B.sc-II Sem-IV

Subject- Inorganic Chemistry –VII

Prof. Miss.Panaskar. S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Co-ordination Chemistry	1.1 Introduction 1.2 Distinguish between double salt and complex salt 1.3 Werner's Theory 1.4 Description of Terms- 1.5 IUPAC nomenclature of coordination compounds. 1.6 Isomerism in complexes with C 1.7 Valence bond theory of transition metal complexes	February	10
2	Chelation	2.1 Introduction with respect to ligand, chelating agent, chelation, and metal complexes. 2.2 Structural requirement of chelate Formation. 2.3 Difference between metal chelate and metal complexes 2.4 Classification of chelating agent. 2.5 Application of chelation with respect to Chelating agents –EDTA and DMG .	March	05
3	P-Block element (Group 13,14 and 15)	3.1 Position of elements in periodic table. 3.2 Characteristics of p-block elements with Reference to electronic configuration And periodic properties 3.3 compounds of group 13,14,15	March	09
4	Chemistry of elements of 3d series elements	4.1 Position of elements in periodic table 4.2 Characteristics of d-block element (i) Electronic str (ii) Oxidation states (iii) magnetic character (iv) Colored ions (v) Complex formation	April	06
5	Inorganic semi- micro qualitative analysis	5.1 Therotical principle involved in qualitative analysis. 5.2 Application of solubility product and common ion effect separation of cations into groups 5.3 Application of complex formatin in 5.4 Application of oxidisation and reduction 5.5 Spot test analysis.	May	08

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Tal – Patan Dist-Satara

Teaching Plan 2022-2023

B.Sc-II Semester-IV

Prof. Shirke. R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Carboxylic acids and their derivatives	1.1: Monocarboxylic acids 1.2: Formation of Halo Acids, Mono, Di, Tri-chloro acetic 1.3: Substitution reactions of Monochloroacetic acid 1.4: Hydroxy Acids 1.5: Unsaturated Acids 1.6: Dicarboxylic Acids 1.7: Carboxylic Acid Derivatives	February	06
2.	Amines and Diazonium Salts	2.1: Introduction 2.2: Methods of preparation 2.3: Reactions 2.4: Diazonium Salts 2.5: Chemical Reactions	March	05
3.	Carbohydrates	3.1: Introduction 3.2: Classification of Carbohydrates 3.3: General properties of Glucose and Fructose their open chain structure 3.4: Ring structure of D (+) Glucose 3.5: Determination of size of the Ring of Glucose by Methylation method 3.6: Cyclic structure of Fructose 3.7: Epimers, Mutarotation and Anomers 3.8: Haworth Projection 3.9: Linkage between the monosaccharides 3.10: Structure of disaccharides 3.11: Polysaccharides	March	08
4.	Carbonyl Compounds Aldehydes and Ketones	4.1: Introduction 4.2: Reactivity of carbonyl group 4.3: Reactions	April	08
5.	Stereochemistry	5.1: Conformational Isomerism 5.2: Representation of Conformers of Ethane 5.3: Conformational analysis 5.4: Cycloalkenes relative stability	May	09

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		Baeyer's strain theory 5.5: Conformation and stability of Cyclohexane and Monosubstituted derivatives 5.6: Locking of Conformation in t- butyl Cyclohexane	
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Teaching Plan 2022-2023

B.sc-III Sem-V

Subject- Inorganic Chemistry -IX



Name –prof. Miss.Panaskar.S.A.

Module number	Module name	Subject Topic	Month	Lecture
1	Acid bases and Non Aqueous Solvents .	1.1 Introduction 1.2 Hard and soft Acids and bases (HSAB Concept) 1.3 Chemistry of non Aqueous solvents	September	08
2	Metal And Bonding in Transition metal complexes	2.1 Crystal field theory (CFT). 2.2 Molecular orbital theory (MOT).	September	10
3	Metal ,Semiconductors and superconductors	3.1 Introduction 3.2 properties of Metallic solids. 3.3 Theories of bonding in metals. 3.4 Classification of solids as conductors, Insulators and semiconductors on the Basis bond theory. 3.5 semiconductors 3.6 Superconductors 3.7 Application of Superconductors	october	10
4	Organometallic Chemistry	4.1 Introduction 4.2 Defination and Nomenclature 4.3 Synthesis and structural study of Alkyl And Aryl compounds of (a) Be (b) Al 4.4 Mononuclear carbonyl and nature of Bonding in simple mononuclear metal Carbonyls.	November	06
5	Catalysis	5.1 Introduction 5.2 classification of Catalytic Reaction. 5.3 Mechanism of catalysis 5.4 Industrial application of catalysis. 5.2 Detergents –raw material,types of Detergents anionic cationic amphoteric	December	05

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Tal – Patan Dist-Satara
Teaching Plan 2022-2023
B.Sc-III Semester-V
Prof. Shirke.R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Introduction to Spectroscopy	1.1: Meaning of Spectroscopy 1.2: Nature of Electromagnetic Radiation 1.3: Different Regions of Electromagnetic Radiations 1.4: Intraction of Radiation With Matter 1.5: Types of Spectroscopy and Advantages of Spectroscopic Methods 1.6: Energy Tyoes and Energy Levels of Atoms and Molecules	September	03
2.	Ultravoilet and Visible Spectroscopy	2.1: Introduction 2.2: Beer Lambert's Law 2.3: Terms used in Ultravoilet Spectroscopy 2.4: Modes of Electronic Transitions 2.5: Effect of conjugation on the position of uv and visible band 2.6: Calculation of Lambda max by Woodward-Fieser Rule 2.7: Colour and Visible Spectrum 2.8: Applications of ultravoilet spectroscopy	September	05
3.	Infrared Spectroscopy	3.1: Introduction 3.2: Principle of I.R. Spectroscopy 3.3: Instrumentation 3.4: Fundamental modes of vibrations	Octomber	06

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		3.5: Condition for the absorption of IR-radiation 3.6: Regions of IR Spectrum 3.7: Hook's Law 3.8: Factors affecting IR absorption frequency 3.9: Characteristics of I.R. absorption of functional groups		
4.	Nuclear Magnetic Resonance (NMR) Spectroscopy	4.1: Introduction 4.2: Principles of PMR-spectroscopy 4.3: NMR-Instrumentation 4.4: Magnetic and Non-magnetic nuclei 4.5: Chemical Shift 4.6: Sheilding and De-Sheilding 4.7: Peak-area 4.8: Merits of TMS as per Reference Compound 4.9: Coupling Constant 4.10: Types of Coupling Constants 4.11: Spin-spin Splitting 4.12: Applications 4.13; Solved Problems	October	09
5.	Mass Spectroscopy	5.1: Introduction 5.2: Principle of Mass Spectroscopy 5.3: Mass Spectroscopy 5.4: Types of Ions Produced during Fragmentation 5.5: Nitrogen Rule 5.6: Fragmentation Patterns of Selected Classes of Organic Compounds 5.7: Carbonyl Compounds 5.8: McLafferty Rearrangement 5.9: Solved Problems	November	08
6.	Combined Spectroscopic Problems	6.1: Introductioin 6.2: Combined Spectroscopic Solved Problems	November	07

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 Teaching Plan 2022-2023
 B.sc-III Sem-v



Subject- Analytical Chemistry- XII

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Theory of Gravimetric Analysis	1.1 Introduction 1.2 Gravimetric analysis by precipitation Nucleation,crystal growth,digestion/ageing,filtration,drying ignition,weighing. 1.3 optimum condition for good precipitation 1.4 Physical nature of precipitate 1.5 Purity precipitate: 1.6 Organic precipitants and their application	September	08
2.	Flame photometry	2.1 Introduction 2.2 Gernal principal of flame photometry 2.3 Instumentation:Block digram,Burners(premix and Lundergraph burners),mirrors,shits,Filters,detector(photom ultiplier tube) 2.4 Effect of solvent in flame photometry. 2.5 Experimental procedure of analysis 2.6 Interference and factors that influence the intensity of emitted radiation in flame photometry. 2.7 Application of flame photometry in real simple analysis. 2.8 Limitation of flame photometry.	spetember	07
3.	Colrimetry and Spectrometry	3.1 Therory of colorimetry and Spectrometry. 3.2 Lambert Beer's law,deviation from beer's law . 3.3 Terms used colorimetry and spectrometry. 3.4 Classification methods of colour measurement 3.5 Phtoelectric colorimetry method-single beam Photoelectric colorimeter 3.6 Spertrophotometre method – single beam Direct reading spectrophotometer 3.7 Determination of unknown concentration by Using concentration absorbance plot. 3.8 Application of colorimetry and Spectrophotometry.	october	07
4.	Colorimetry and spectrophotometry	4.1 Introduction 4.2determination of Ph. 4.3 study of quinhdrone and glass Electrodeand their use in determination of Ph. 4.4 Potentiometric titration :classical and Analytical method. 4.5 Acid –Base titration with suitable Example. 4.6 Redox titration with suitable Example. 4.7 Precipitation Titration 4.8 Basic circuit of direct reading 4.9 Advantage of potentiometric titration .	November	06
5	Chromatrographic techniques and quality control	5.1 Introduction,classification 5.2 Coloumn chromatography 5.3 Ion exchange chromatography , 5.4 concept in quality control.	Dcember	10

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 Teaching Plan 2022-2023
 B.sc-III Sem-V



Physical Chemistry XI Prof. Miss.Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Elementary quantum mechanics	1.5 Introduction 1.6 Drawbacks of classical mechanics, Black body radiation. 1.7 The Heisenberg's uncertainty principle. 1.8 Concept of energy operators. 1.9 Derivation of Schrodinger wave equation. 1.10 Physical interpretation. 1.11 Particle in a one dimensional box.	September	08
2.	Spectroscopy	1.7 Introduction 1.8 Electromagnetic radiation. 1.9 Rotational spectra of diatomic molecules. 1.10 Vibrational spectra of diatomic molecules. 1.11 Raman spectra 2 Comparative study of IR and Raman spectra.	September	08
3.	Photochemistry	1.1 laws of Photochemistry 1.2 Quantum yield 1.3 Photosensitized reactions 1.4 Jablonski diagram 1.5 Chemiluminescence, Electroluminescence and Bioluminescence.	October	06
4.	Solutions	1.3 ideal solutions 1.4 Composition of liquid and vapour, vapour pressure and boiling point 1.5 Solubility of partially miscible liquids. 1.6 Vapour pressure and distillation of immiscible liquids, steam distillation.	November	06
5.	Electromotive force	5.1 Thermodynamics of electrode potentials, Nernst equation for electrode and cell 5.2 E.M.F. Series 5.3 types of electrodes 5.4 Reversible and irreversible cells 5.5 applications of emf measurements.	December	08

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J.S.
 T/C Principal

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Dist-satara tal-patan

Teaching Plan 2022-2023

B.sc-III Sem-VI

Subject- Inorganic Chemistry-XIII

Name—prof. Miss.Shirke.R.M.

Module number	Module name	Subject Topic	Month	Lecture
1	Coordination Chemistry	A. Inorganic Reaction Mechanism 1.1 Introduction 1.2 Classification of Mechanism 1.3 SN1 and SN2 Reaction for inert and labile complexes. 1.4 Mechanism of substitution in cobalt (III) Octahedral complexes. 1.5 Trans effect and theories. 1.6 Application of trans effect in synthesis Of Pt (II) complexes. B. Thermodynamic and kinetic aspects of Metal complexes. 1.7 Introduction 1.8 Thermodynamic stability. 1.9 Kinetic stability. relation Thermodynamic. Stepwise stability factor affecting stability.Determination stability.	February	12
2	Nuclear Chemistry	2.1 Nuclear reaction 2.2 types Nuclear reaction 2.3 Use of Thorium, uranium, and Plutonium 2.4 Application of radioisotopes	March	08
3	Chemistry of F-block Elements.	3.1 Introduction 3.2 Electronic configuration. 3.3 oxidation state. Lanthanide contraction 3.4 separation of Lanthanides. B) Actinides 3.4 position in periodic table. Electronic Configuration. General methods of Preparation of transuranic elements. 3.5 IUPAC Nomenclature of the super heavy Elements	April	09
4	Iron and Steel	4.1 Occurrence ore of iron 4.2 Definition Of Terms extraction of iron By blast furnace ,steel,conversion cast Iron into steel by 4.3 Heat Treatment on steel.	May	08

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Tal – Patan Dist-Satara

Teaching Plan 2022-2023

B.Sc-III Semester-VI

Prof. Shirke R.M

Subject – Organic Chemistry

Topic No	Topic Name	Subject Topic	Month	Lecture
1.	Reagents and Reactions in Organic Synthesis	1.1: Introduction 1.2: Reagents in Organic Synthesis- Lithium Aluminium Hydride 1.3: Raney Nickel-Osium Tetraoxide 1.4: Selenium Dioxide-Dicyclohexyl-Diazomethane-Named Reactions- Reaction Mechanism 1.5: Synthetic Application	February	10
2.	Retrosynthesis	2.1: Introduction 2.2: Recapitulation of Basis of Reaction Mechanism and Reagent –Terms used 2.3: Reterosynthesis Analysis and synthesis of Target Molecules	March	06
3.	Electrophilic Addition to carbon carbon double bond and carbon carbon triple bond	3.1: Introduction 3.2: Mechanism of Electrophilic Addition To Carbon carbon double bond and Carbon carbon triple bond	March	08
4.	Natural Product	4.1: Introduction 4.2: Terpenoids 4.3: General Methods of Terpenoids structure Determination 4.4: Isuprene Rule 4.5: Constitution of Citral-Alkaloida 4.6: General Methods of Structure Determination of Nicotine	April	08

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5.	Pharmaceuticals	5.1: Introduction 5.2: Classification 5.3: Qualities of Ideal Drugs- Functional Drugs-Chemotherapeutic Agents 5.4: Synthesis and uses of Some Selected Classes of Drugs 5.5: Drugs action of Sulpha Drugs	May	06
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 Teaching Plan 2022-2023
 B.sc-III Sem-VI
Subject- Physical Chemistry XV



Prof. Miss.Dige.J.S.

Module number	Topic	Sub Topic	Month	Lectures
1.	Phase equilibria	1.1 Introduction 1.2 Gibbs phase rule 1.3 phase diagram 1.4 one component system (i) water system (ii) sulphur system 1.5 two component system 1.6 three component solid-liquid system	February	07
2.	Thermodynamics	2.1 Introduction 2.2 Free energy 2.2 Relation between G and H: Gibbs helmntoz equation 2.3 Phase equilibria 2.4 Thermodynamic derivation of law of mass action, vant-Hoff isotherm and isochore 2.5 Fugacity and activity concepts 2.6 Partial	March	09
3.	The solid state	3.1 laws of crystallography 3.2 Weiss indices and Miller indices 3.3 cubic lattice and type 3.5 diffraction of x-ray 3.6 determination of crystal structure by braggs process 3.7 determination of crystal structure by nacl and kcl	April	09
4.	Chemical kinetics	4.1 simultaneous reactions i) opposing reaction ii) side reation iii) consecutive reactions iv) chain reaction v) explosive reaction	April	06
5.	Distribution law	5.1 Nernst distribution law and its limitations 5.2 modification of distributation law with respect to change in molecule state. 5.3 applications of the distribution law 5.4 distribution indicators	May	06

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BALASHEB DESAI FOUNDATION
Smt. Vijayadevi Desai Senior College, Daulatnagar
Dist-satara tal- patan
Teaching Plan 2022-2023
B.sc-III Sem-VI
Subject- Industrial Chemistry-XVI

Prof. Miss.Panaskar. S.A.

Module number	Topic	Sub Topic	Month	Lectures
1.	Sugar industry	1.1 Introduction 1.2 Manufacture of cane sugar in india 1.3 By products of sugar industry . 1.4 Manufacture of Ethyl alcohol from Molasses:By fermentation.	February	07
2.	Manufacture of Industrial Heavy Chemicals	1.1 Introduction 1.2 Manufacture of Ammonia (NH ₃) 1.3 Manufacture of Sulphuric acid (H ₂ so ₄) 1.4 Manufacture of Nitric acid (HNO ₃) 1.5 Manufacture of Sodium Carbonate	March	08
3.	Synthetic Polymer	1.1 Introduction 1.2 Classification 1.3 Addition Polymerisation 1.4 Zigler Nata Polymerisation 1.5 Methods of preparation and Application of some organic Polymers. 1.5 Conducting organic polymers 1.6 Application of conducting organic Polymers.	March	08
4.	Petroleum Industry and Eco-friendly fuels	1.1 Petroleum Industry- 1.2 Fuels	April	07
5.	Nanotecnology	5.1 Introduction 5.2 Opetical properties of nanomaterials' 5.3 Synthetic Routes of nanomaterials 5.4 Synthesis methods 5.5 Characterization of nanomaterials 5.4 Application of nanotechnology	May	08

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