

**K.T.S.P. Mandal's**  
**Sahebraoji ButtePatil Mahavidyalaya, Rajgurunagar.**  
**Department of Chemistry**  
**Teaching Plan 2020-21**

Sr. No.	Class	Subject Name
1	F.Y.B.Sc	1. Physical Chemistry 2. Organic Chemistry 3. Inorganic Chemistry 4. Analytical Chemistry 5. Practical Paper
2	S.Y.B.Sc.	1. Physical & Analytical Chemistry 2. Organic & Inorganic Chemistry 3. Practical Paper
3	T.Y.B.Sc.	1. Physical Chemistry 2. Inorganic Chemistry 3. Organic Chemistry 4. Analytical Chemistry 5. Industrial Chemistry 6. Agricultural & Dairy Chemistry 7. Physical Practical 8. Inorganic Practical 9. Organic Practical

**K.T.S.P. MANDAL'S**  
**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA ,RAJGURUNAGAR**  
**F.Y.B.Sc. Physical chemistry (Paper I)**  
**Teaching plan 2020 -2021(SEM-I)**  
**No. Of Lectures per week-03**  
**Name of Teacher: Prof. Kolhe M.P.**

Month	Chapter	Topic Name	No.of lectures
Sep-Oct-2020	Chemical Energetic	Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances, problems. <b>Assignment No-1</b>	11 L
Nov-Dec 2020	Chemical Equilibrium	Introduction: Free Energy and equilibrium - Concept, Definition and significance The reaction Gibbs Energy, Exergonic and endergonic reaction. The perfect gas equilibrium, the general case of equilibrium, the relation between equilibrium constants, Molecular interpretation of equilibrium constant. The response of equilibria to conditions- response to pressure, response to temperature, Van't Haff equation, Value of K at different temperature, Problems <b>Assignment No-2</b> <b>Internal Exam</b>	11 L
Jan-Feb 2021	Ionic Equilibria	Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts– applications of solubility product principle. Learning Outcome 1. Chemical Energetics 1. Students will be able to apply thermodynamic principles to physical and chemical process. <b>Assignment No-3</b> <b>Question Bank</b> <b>Question Paper solving</b>	14 L

**K.T.S.P. MANDAL'S**  
**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA ,RAJGURUNAGAR**  
**F.Y.B.Sc. Organic chemistry (Paper II)**

**Teaching plan 2020 -2021(SEM-I)**  
**No. of Lectures allotted per week: 03**  
**Name of Teacher: Prof. M. P. Kolhe**

Month	Name of Chapter	Topic Covered	Lectures
Sep-2020	Fundamentals of Organic Chemistry	Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule. <b>Assignment No-1</b>	<b>09L</b>
Oct-Nov-2020	Stereochemistry	Introduction, classification, Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Conformations with respect to ethane, butane and cyclohexane. Configuration: Geometrical - cis – trans, and E / Z Nomenclature (for upto two C=C systems). Optical isomerism Enantiomerism, Diastereomerism and Meso compounds). Concept of chirality (upto two carbon atoms). Threo and erythro; D and L; nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) <b>Assignment No-2</b>	<b>14 L</b>
Dec-2020	Aliphatic Hydrocarbons	Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. Alkanes: (Up to 5 Carbons) Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation. <b>Assignment No-3</b> <b>Internal Exam</b> Alkenes:(Up to 5 Carbons)Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis-addition (alk. KMnO <sub>4</sub> ) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration,	<b>(13 L)</b>
Jan-2021			

<b>Feb-2021</b>		<p>Ozonolysis, oxymercuration-demercuration, Hydroboration-oxidation. Alkynes: (Upto 5 Carbons) Preparation: Acetylene from <math>\text{CaC}_2</math> and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal dihalide Reactions: formation of metal acetylides, addition of bromine and alkaline <math>\text{KMnO}_4</math>, ozonolysis and oxidation Learning Outcome 1. The students are expected to understand the fundamentals, principles, and recent development <b>Assignment No-4</b> <b>Online Internal Exam</b></p>	
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**K.T.S.P. MANDAL'S**  
**HUTATMA RAJGURU MAHAVIDYALAYA, RAJGURUNAGAR**  
**F.Y.B.SC.: Inorganic Chemistry (Paper I)**  
**Teaching plan 2020-2021 (Sem-II) NO. Of Lectures per week-03**  
**Name of Lecturer – Prof. Kolhe M.P.**

Month	Chapter	Topic Name	No. of lecture
May -2021	Atomic Structure	Origin of Quantum Mechanics: Why study quantum mechanics ?, Quantum mechanics arose out of interplay of experiments and Theory Energy quantization- i) Black body radiation ii) The photoelectric effect iii) Wave particle duality-a) The particle character of electromagnetic radiation b) the wave character of particle, iv) diffraction by double slit v) atomic spectra, Review of-Bohr's theory and its limitations, Heisenberg Uncertainty principle. Quantum mechanics: Time independent Schrodinger equation and meaning of various terms in it, Significance of $\psi$ and $\psi^2$ , Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers $m_l$ and $m_s$ . Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum Number (s) and magnetic spin quantum number ( $m_s$ ). <b>Assignment No-1</b>	12 L
May-2021	Periodicity of Elements	Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations Long form of periodic table-s, p, d, and f block elements Detailed discussion of following properties of elements with reference to s and p block a) Effective nuclear charge, shielding or screening effect b) Atomic and ionic radii c) Crystal radii d) Covalent radii e) Ionization energies f) Electronegativity, Pauling's electronegativity scale. <b>Assignment No-2</b>	09L
June -2021	Chemical Bonding	Attainment of stable electronic configurations, Types of Chemical bonds: Ionic, covalent, coordinate and metallic bonds Ionic Bond: General characteristics of ionic bonding, Types of ions, Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment,	09 L

		<p>dipole moment and percentage ionic character. Covalent bond: Valence Bond Approach, Hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. VSEPR theory, Assumptions, need of theory, application of theory to explain geometries of molecules such as i) <math>\text{ClF}_3</math> ii) <math>\text{Cl}_2\text{O}</math> iii) <math>\text{BrF}_5</math> iv) <math>\text{XeO}_3</math> v) <math>\text{XeOF}_4</math></p> <p><b>Assignment No-3</b></p>	
<b>June -2021</b>	Calculation used in Analytical Chemistry	<p>Some important units of measurements-SI units, distinction between mass and weight, mole, mill mole and Calculations Solution and their concentrations- Molar concentrations, Molar analytical Concentrations, Molar equilibrium concentration, percent Concentration, part per million , part per billion , part per thousand, Solution –dilutant volume ration, functions , density and specific gravity of solutions, problems Chemical Stoichiometry – Empirical and Molecular Formulas, Stoichiometric Calculations.</p> <p><b>Assignment No-4</b>  <b>Question Bank</b>  <b>Online Internal Exam(Google Form)</b></p>	06L

**K.T.S.P. Mandal's**  
**Sahebraoji Buttepatil Mahavidyalaya, Rajgurunagar.**  
**Teaching Plan 2020-2021 Class: F. Y. B. Sc. Chemistry, Sem.-II**  
**Name of Paper: Organic Chemistry (Paper II)**  
**No. of Lectures allotted per week: 03**  
**Name of Teacher: Prof. M. P. Kolhe**

Month	Name of Chapter	Topic Covered	Lectures
May-2021	Aromatic hydrocarbons	Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. Reactions (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene). <b>Assignment No-1</b>	07 L
May-2021	Alkyl and Aryl Halides	Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution. Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by -OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides <b>Assignment No-2</b>	12 L
Jun -2021	Alcohols, Phenols and Ethers (Upto 5 Carbons)	Alcohols: Preparation: Preparation of 1o, 2o and 3o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO4, acidic dichromate, conc. HNO3). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement. Phenols: (Phenol case) Preparation: Cumen hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben-Hoesch Condensation, Schotten -	12L

		Baumann Reaction. Ethers (aliphatic and aromatic) <b>Assignment No-3</b> <b>Internal Exam</b>	
<b>Jun -2021</b>	Aldehydes and ketones (aliphatic and aromatic)	(Formaldehyde, acetaldehyde, acetone and benzaldehyde) Preparation: from acid chlorides and from nitriles. Reactions – Reaction with HCN, ROH, NaHSO <sub>3</sub> , NH <sub>2</sub> -G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemenson reduction and Wolff Kishner reduction. Meerwein-Ponndorf Verley reduction. <b>Assignment No-4</b> <b>Online Internal Exam</b>	05 L



**K.T.S.P.Mandal'S**  
**Sahebraoji ButtePatil Mahavidyala Rajgurunagar,**  
**Teaching Plan Year 2020-2021**  
**Class: F. Y. B. Sc. Chemistry, Term: I<sup>st</sup>**  
**Name of Paper: Chemistry practical**                      **No. of Lectures allotted per Batch: 04**

Sl. No.	Month	Name of Practicals
<b>Section A: Chemical and Lab Safety (Compulsory)</b>		
1.	May	Toxicity of the compounds used in chemistry laboratory.
2.	May	Safety symbol on labels of pack of chemicals and its meaning
3.	May	What are MSDS sheets? Find out MSDS sheets of at least hazardous chemicals (K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub> , Benzene, cadmium nitrate, sodium metal, etc.)
4.	May	Precautions in handling of hazardous substances like Conc. acids, ammonia, organic solvents, etc. Section
<b>B: Physical Chemistry a. Thermochemistry(Any three)</b>		
5.	May	Determination of heat capacity of calorimeter for different volumes
3.	May	Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
4.	May	Determination of integral enthalpy of solution of salts (KNO <sub>3</sub> , NH <sub>4</sub> Cl).
5.	May	Measurement of the pH of buffer solutions and comparison of the values with theoretical values
6.	May	Sodium acetate-acetic acid and determine its buffer capacity
<b>C: Organic Chemistry (Five experiments)</b>		
Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)		
7.	June	Compound 1
8.	June	Compound 2
9.	June	Compound 3
<b>Separation of constituents of mixtures by Chromatography</b>		
10.	June	(a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography
11.	June	(b) Identify and separate the sugars present in the given mixture by paper chromatography.
12.	June	<b>Assignment</b> Online Internal Examination

**K.T.S.P.Mandal'S**  
**Sahebraoji ButtePatil Mahavidyala Rajgurunagar,**  
**Tal. Khed Dist. Pune**  
**Teaching Plan Year 2020-2021**

**Class: F. Y. B. Sc. Chemistry, Term:II<sup>nd</sup>**

**Name of Paper: Chemistry practical**

**No. of Lectures allotted per Batch: 04**

Sl. No.	Date	Name of Practicals
<b>Section A: Inorganic Chemistry I. Volumetric Analysis (Any Three)</b>		
1.	May	Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture
2.	May	Estimation of oxalic acid by titrating it with KMnO <sub>4</sub>
3.	May	Estimation of water of crystallization in Mohr's salt by titrating with KMnO <sub>4</sub>
4.	May	Synthesis of potash alum from aluminum metal (scrap Aluminum metal)
5.	May	Synthesis of Mohr's Salt [(FeSO <sub>4</sub> ) (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> ]•6H <sub>2</sub> O 3) Preparation of Dark red inorganic pigment (Cu <sub>2</sub> O) 4) Synthesis of FeSO <sub>4</sub> •7H <sub>2</sub> O
6.	May	Estimation of Cu (II) from brass alloy by iodometrically.
<b>Section B: Organic Chemistry</b>		
<b>Purification of organic compounds by crystallization (from water and alcohol) and distillation. (Two Compounds)</b>		
8.	June	Compound 1
9.	June	Compound 2
10.	June	Bromination of acetanilide using KBr and Ceric ammonium nitrate in aqueous medium.(Green Chemistry Approach)
11.	June	<b>Assignment</b> Online Internal Examination

**K.T.S.P. Mandal's**  
**Sahebraoji ButtePatil Mahavidyalaya, Rajgurunagar, Tal. Khed Dist. Pune**  
**Teaching Plan - 2020 -2021 Class: S. Y. B. Sc. Sem.-I**  
**Name of Paper: Physical & Analytical Chemistry (Paper I) No. of**  
**Lectures allotted per week: 04**  
**Name of Teacher: Prof. Kolhe M.P.**

Month	Chapter	Topic Covered	Lectur es
Sep-2020	Elementary chemical Kinetics	Introduction to chemical Kinetics, molecularity & Order of reaction, reaction rates,rate laws, rate constant & its significance. Integrated rate law expression & its characteristics –first order, second order(single reactant,two reactant involved ),examples of 1 <sup>st</sup> &2 <sup>nd</sup> order reaction, pseudo molecular reactions, factors affecting rate of reaction, measurement of rate of reaction,numericals. <b>Assignment No-1</b>	10L
Oct-2020	Photochem istry	Introduction,thermal reactions & photochemical reactions, law of photochemistry,quantum yield, measurement of quantum yield,types of photochemical reactions- photosynthesis, photolysis, photocatalysis, photosensitization,photo-physical processes fiuorescence,phosphorescence,quenching,chemilumini scence,numerical. <b>Assignment No-2</b>	10L
Nov-2020	Distributio n Law	Nernst distribution Law, statement & thermodynamic proof of Nernst distribution Law, association & dissociation of solute in solvent, application of distribution Law,Numericals <b>Assignment No-3</b> <b>Internal Test No-1</b>	4L
Dec-2020	Introductio n to Analytical Chemistry	Introduction,chemical analysis,application of chemical analysis,sampling ,types of analysis, common techniques, instrumental methods ,other techniques, factors affecting on choice of method	3L

<b>Jan-2021</b>	Errors in Quantitative Analysis	Introduction, Error, accuracy, precision, methods of expressing accuracy & precision, classification of errors, significant figures & computation, distribution of random errors, mean & standard deviations, reliability of results, Numericals	<b>5L</b>
<b>Feb-2021</b>	Inorganic Qualitative Analysis	Basic principle, common ion effect, solubility, solubility product, preparation of original solution, classification of basic radicals in groups, separation of basic radicals, removal of interfering anions (phosphate & borate), detection of acidic radicals	<b>8L</b>
<b>Feb-2021</b>	Analysis of Organic Compounds (Qualitative and Quantitative)	<p><b>(A) Qualitative:</b> Types of organic compounds, characteristic tests &amp; classifications, reaction of different functional groups, analysis of binary mixtures.</p> <p><b>(B) Quantitative:</b></p> <p>i) Analysis: estimation of C, H, (O) by combustion tube, detection of nitrogen, sulphur, halogen &amp; phosphate by Lassaigne's test.</p> <p>ii) Estimation of nitrogen by Duma's, Kjeldahl's method, estimation of halogen, Sulphur &amp; phosphate by carious method.</p> <p>iii) Determination of empirical &amp; molecular formula, Numerical problems.</p> <p><b>Online Internal Exam</b></p>	<b>8L</b>

**K.T.S.P.MANDAL'S  
SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,  
RAJGURUNAGAR  
DEPARTMENT OF CHEMISTRY  
S.Y.B.Sc. Teaching plan 2020-2021  
Name of Paper- Organic and Inorganic chemistry (Paper II) No. of  
Lectures allotted per week-04 SEM – I  
Name of teacher- Prof. Kolhe M.P.**

Month	Chapter	Topic	L
Sep-2020	Stereoisom-erism	Introduction to optical isomerism: Chirality, optical activity and polarimetry, enantiomers, absolute configuration, R/S system nomenclature with wedge and Fischer representation of two chiral centres, erythro, threo, meso-diastereomers with R/S configuration. Stereoisomerism Baeyer's strain theory, heat of combustion, cycloalkanes, factors affecting the stability of conformation, Conformation of cyclohexane - equatorial and axial bonds, Monosubstituted cyclohexane stability with -CH <sub>3</sub> and - C(CH <sub>3</sub> ) <sub>3</sub> substitutes. Structures of geometrical isomers of dimethylcyclohexane only <b>Assignment No-1</b>	12
Oct-2020	Organic reaction Mechanism	Introduction, types of reagents—electrophile, nucleophile and free radical. Types of organic reactions: Addition, Elimination (elimination and Hofmann elimination), substitution (aliphatic electrophilic and nucleophilic, aromatic electrophilic) and rearrangement. Mechanism: (i) Aldol condensation (ii) Markovnikov and anti-Markovnikov addition reaction (iii) Saytzeff and Hoffmann elimination (iv) S <sub>N</sub> and S <sub>N</sub> reactions (v) Hofmann rearrangement <b>Assignment No-2</b>	12
Nov-2020	General Principles of Metallurgy	Introduction, occurrence of metals, ores and minerals, types of ores, operations involved in metallurgy, crushing, comminution, various methods of concentration such as hand picking, gravity separation, magnetic separation. Froth flotation, Calcinations, Roasting etc. Reduction, various methods of reduction such as smelting, Aluminothermic process and	06

		electrolytic reduction, Refining of metals, various methods of refining such as poling, liquation, electrolytic and vapour phase refining (Van Arkel Process). Aims: To study principles and process of metallurgy. <b>Assignment No-3</b>	
<b>Dec-2020</b>	<b>Metallurgy of Aluminium (Electrometallurgy):</b>	Occurrence, Physiochemical principles, Extraction of Aluminium, Purification of bauxite by Baeyer's process, Electrolysis of alumina, application of aluminum and its alloys. Aims: To study metallurgy of Aluminium. Objectives: A student should be able - To know physico-chemical principles involved in electrometallurgy. To understand electrolysis of alumina and its refining. To explain the uses of Aluminum and its alloys. <b>Assignment No-4</b>	<b>04</b>
<b>Jan-2021</b>	<b>Metallurgy of Iron and Steel (Pyrometallurgy)</b>	Occurrence, concentration, calcination, smelting physiochemical principles, reactions in the blast furnace, wrought iron, manufacture of steel by Bessemer and L.D. process, its composition and applications. <b>Internal Exam</b>	<b>08</b>
<b>Feb-2021</b>	<b>Corrosion and Passivity</b>	Definition of corrosion, Types of corrosion, Atmospheric, Immersed, Mechanism of electrochemical corrosion, Factors affecting corrosion-position of metal in E. C. S., purity effect of moisture, effect of oxygen, pH, physical state of metal, methods of protection of metal from corrosion- alloy formation, <b>Passivity</b> : Definition, Theories of passivity - (i) Oxide film theory (ii) Gaseous film theory (iii) Physical film theory, Valence theory, Catalytic theory, Allotropic theory, Electrochemical passivity. <b>Online Internal Examination</b>	<b>06</b>



		<b>Assignment No-2</b>	
<b>June-2021</b>	Introduction to volumetric analysis	<p>Analytical Chemistry</p> <p>Introduction, methods of expressing concentrations, primary &amp; secondary standard solutions, Apparatus used &amp; their calibration; burettes microburettes, volumetric pipettes, graduated pipettes, volumetric flask, methods of calibration, instrumental &amp; non-instrumental analysis-principles &amp; types</p>	<b>6L</b>
<b>June-2021</b>	Non Instrumental volumetric analysis	<p>Indicators –theory of indicators, acid base indicators, mixed &amp; universal indicators</p> <p>Acid –Base titrations: Strong acid- Strong base, Weak acid- Strong base, Weak acid-weak base titration, Displacement titrations, polybasic acid titration, (Discuss titration with respect to neutralization &amp; equivalence point determination &amp; limitations) Redox titrations: Principle of redox titration, detection of equivalence point using suitable indicators.</p> <p>Complexometric titrations: Principle, EDTA titrations, choice of indicators, Iodometry &amp; Iodimetry; principle, detection of end point, difference between Iodometry &amp; Iodimetry, Standardisation of sodium thiosulphate solution using potassium dichromate &amp; iodine method, Applications-estimation of <math>\text{Cl}_2</math></p> <p><b>Online Internal Test</b></p>	<b>18 L</b>



**K.T.S.P.MANDAL'S  
SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,  
RAJGURUNAGAR  
DEPARTMENT OF CHEMISTRY**

(S.Y.B.Sc.)

**Teaching plan 2020-2021 Sem- II**

**Name of Paper -Organic and Inorganic chemistry (Paper II)**

**No. of Lectures allotted per week-04**

**Name of teacher -Prof. Kolhe M.P.**

<b>Month</b>	<b>Chapter</b>	<b>Topic</b>	<b>L</b>
May-2021	<b>Reagents in Organic Synthesis</b>	Catalytic hydrogenation including liquid phase hydrogenation, Birch reduction, $\text{NaBH}_4$ , $\text{LiAlH}_4$ , $\text{Sn/HCl}$ , Oxidation reagents: $\text{KMnO}_4$ , $\text{K}_2\text{Cr}_2\text{O}_7$ , Jones reagent, PCC, Per acids, $\text{OsO}_4$	<b>08</b>
May-2021	<b>Chemistry of heterocyclic compounds with one hetero atom.</b>	Definition and classification of heterocyclic compounds, nomenclature and aromatic character. Synthesis of Pyrrole, Furan, Thiophene, Pyridine and their reactions: Nitration, Sulphonation, Acylation and Catalytical reduction. Structure and synthesis of quinoline and Isoquinoline. <b>Assignment No-1</b>	<b>06</b>
June-2021	<b>Introduction of Biomolecules</b>	Carbohydrates: Definition, classification, reaction of monosaccharide (glucose)- oxidation, reduction, osazone and ester formation, isomerization, Killiani- Fischer synthesis and Ruff degradation, Configuration of D/L configuration of (+) Glucose, Fischer-Haworth and chair formulae, Brief account of disaccharides: Sucrose, cellobiose, maltose and lactose. Polysaccharides: Starch, cellulose and glycogen. Amino acids: Fischer projection, relative configuration, classification, structures and reactions of amino acids, Properties and chemical reactions with amino and carboxylic group. Proteins:	<b>10</b>

		Formation of Peptide linkage, $\alpha$ -helical conformation, $\beta$ -pleated structure, primary, secondary, tertiary and quaternary structure of proteins. <b>Assignment No-2</b>	
<b>June-2021</b>	<b>Chemistry of d-block elements</b>	Position of d-block in periodic table, electronic configuration, trends in properties of these elements w.r.t.(a) size of atoms & ions (b) reactivity (c) catalytic activity (d) oxidation state (e) complex formation ability (f) colour (g) magnetic properties (h) non-stoichiometry (i) density, melting & boiling points	<b>06</b>
<b>June-2021</b>	<b>Organometallic Chemistry</b>	Definition of Organometallic compounds and Organometallic chemistry, CO as a $\pi$ -acid donor ligand, binary metal carbonyls, methods of synthesis; (a) Direct reaction (b) Reductive carbonylation (c) Photolysis and thermolysis. Molecular and electronic structures (18 electron rule) of metal carbonyls. Homogenous catalysis-Hydroformylation (Oxo Process) and Wacker Process. <b>Assignment No-3</b> <b>Internal Exam</b>	<b>06</b>
<b>June-2021</b>	<b>Acids, Bases and Solvents</b>	Definition of acids and bases, Arrhenius theory, Lowry-Bronsted theory, Lewis concept, Lux-Flood theory, strength of acids and bases, trends in the strength of hydracids and oxyacids, Properties of solvents, M.P-B.P range, dipole moment, dielectric constant, Lewis acid-base character and types of solvents	<b>06</b>
<b>June-2021</b>	<b>Chemical Toxicology</b>	Toxic chemicals in the environment, Impact of toxic chemistry on enzymes.Biochemical effect of Arsenic, Cadmium, Lead, Mercury, Biological methylation <b>Online Internal Examination</b>	<b>06</b>

**K.T.S.P.MANDAL'S  
SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,  
RAJGURUNAGAR**

**DEPARTMENT OF CHEMISTRY (S.Y.B.Sc.)**

**Teaching Plan Year 2020-2021**

**Class: S. Y. B. Sc. Chemistry, Term: I<sup>st</sup> and II<sup>nd</sup>**

**Name of Paper: Chemistry practical No. of Lectures allotted per batch: 04**

<b>Sr.No.</b>	<b>Date</b>	<b>Name of Practicals</b>
1.	May	To determine critical solution temperature of phenol water system
2.	May	Determination of solubility of benzoic acid at different temperature and to determine $\Delta H$ of dissociation process.
3.	May	To study neutralization of acid (HCl) base (NaOH) and $\text{CH}_3\text{COOH}$ by NaOH and $\text{H}_2\text{SO}_4$ by NaOH.
4.	May	To determine the rate constant (or to study kinetic s) of acid catalyzed ester hydrolysis.
5.	May	To determine the rate constant of base catalyzed ester hydrolysis.
6.	May	Inorganic Qualitative Analysis Mixture No. 1
7.	May	Mixture No. 2
8.	June	Mixture No. 3
9.	June	Mixture No. 4
10.	June	Mixture No. 5
11.	June	Organic qualitative analysis of Binary Mixtures Mixture No. 1
12.	June	Mixture No. 2
13.	June	Mixture No. 3
14.	June	Mixture No. 4
15.	June	Organic Preparation Pthalic anhydride to pthalamide
16.	June	Glucose to osazone
17.	June	Estimation of sodium carbonate content of washing soda
18.	June	a) Preparation of standard 0.05 N oxalic acid solution and standardization of approx. 0.05N $\text{KMnO}_4$ solution. b) Determination of the strength of given $\text{H}_2\text{O}_2$ solution with standard 0.05 N $\text{KMnO}_4$ solution.
19.	June	Estimation of Aspirin from a given tablet and find errors in quantitative analysis
20.	June	Iodometric estimation of copper
21.	June	Internal Examination

**K.T.S.P.MANDAL'S**  
**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,**  
**RAJGURUNAGAR**  
**DEPARTMENT OF CHEMISTRY**  
**Teaching Plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.-III**  
**Name of Paper: Physical Chemistry**  
**No. of Lectures allotted per week:04**  
**Name of Teacher: Prof. M.P.Kolhe**

<b>Month</b>	<b>Name of Chapter</b>	<b>Topic Covered</b>	<b>Lectures</b>
<b>Sep-2020</b>	Chemical Kinetics	Recapitulation of Chemical Kinetics, Third order reaction, Derivation of integrated rate law for third order reaction with equal initial concentration, characteristics of third order reaction, examples of third order reaction, Methods to determine order of reaction using Integrated rate equation method, Graphical method, Half-life method, Differential method. Effect of temperature on reaction rate, Arrhenius equation, related numerical. <b>Assignment No.1</b>	<b>10 L</b>
<b>Oct-2020</b>	Electrolytic Conductance	Recapitulation of Electrolytic conductance, Specific and equivalent conductance, Variation of equivalent conductance with concentration, Kohlrausch's law and its applications to determine a. Equivalent conductance at infinite dilution of a weak electrolyte, b. The ionic product of water, c. Solubility of sparingly soluble salts, Migration of ions and ionic mobilities, absolute velocity of ions, Transport number determination by Hittorf's method and moving boundary method, Relation between ionic mobility, ionic conductance and transport number, Ionic theory of conductance, Debye-Huckel-Onsager equation and its validity.	<b>14L</b>

		Activity in solution, fugacity and activity coefficient of strong electrolyte. <b>Assignment No.2</b>	
<b>Nov-2020</b>	Investigations of Molecular structure.	Molar refraction, Electrical polarization of molecules, Permanent dipole moment, Determination of dipole moment, Molecular spectra - Rotational, vibrational and Raman spectra. <b>Assignment No.3</b> <b>Internal Exam</b>	<b>16L</b>
<b>Dec-2020</b> <b>Jan-2021</b>	Phase Rule	Definitions, Gibb's phase rule, one component system (moderate pressure only) for sulphur and water system,  two component system for silver- lead and zinc-Cadmium. <b>Assignment No.4</b> <b>Online Internal Examination</b>	<b>04L</b>

**K.T.S.P.MANDAL'S**  
**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,**  
**RAJGURUNAGARD**  
**DEPARTMENT OF CHEMISTRY**  
**Teaching Plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry Sem.-III**  
**Name of Paper: Inorganic Chemistry**  
**No. of Lectures allotted per week : 04**  
**Name of Teacher : Prof. Kolhe M.P.**

Month	Name of Chapter	Topic Covered	No. of Lect.
Sep-2020	<b>Molecular Orbital Theory</b>	Limitations of VBT, Need of MOT, Rules of LCAO combination, Different types of combination of Atomic orbital(AO's): S-S, S-P, P-P and d-d, Non-bonding combination orbitals(formation of NBMO), M.O. Energy level diagram, bond order, Energy ( $\beta$ ) and magnetic behavior for molecules or ions: H <sub>2</sub> , H <sub>2</sub> <sup>+</sup> , He <sub>2</sub> <sup>+</sup> , Li <sub>2</sub> , Be <sub>2</sub> , B <sub>2</sub> , C <sub>2</sub> , N <sub>2</sub> , O <sub>2</sub> , O <sub>2</sub> <sup>+</sup> , O <sub>2</sub> <sup>-</sup> , O <sub>2</sub> <sup>2-</sup> , F <sub>2</sub> , Ne <sub>2</sub> , M.O. energy level diagram, for heteronuclear diatomic molecule like CO, NO, HCl, HF, CO <sub>2</sub> , NO <sub>2</sub> . <b>Assignment- 1</b>	12 L
Oct-2020	<b>Introduction to coordination chemistry</b>	Coordination no., charge on the complex ion, oxidation no. of Metal ion, first and second coordination sphere, Ligands, IUPAC nomenclature of coordination compounds, Different geometries of coordination compounds with C.N.= 4 to C.N.=10 and examples of each geometry. <b>Assignment- 2</b>	02 L
Nov-2020	<b>Werner's theory of coordination compounds</b>	Assumptions, Werner's formulation of Coordination compounds, Physical and chemical test to support his formulation of ionizable and non-ionizable complexes, Stereoisomerism in complexes with C.N.4 and C.N. 6 to identify the correct geometrical arrangement. <b>Assignment- 3,</b>	02 L

<b>Dec-2020</b>	<b>Isomerism in coordination complexes</b>	Definition of isomerism in complexes, types of isomerism, structural & stereoisomerism & its types.	04 L
	<b>Sedgwick theory</b>	Concept of Sedgwick's model, EAN rule, Calculations of EAN value for different complexes and stability of complexes, Advantages and Drawbacks of Sedgwick's theory. <ul style="list-style-type: none"> <li>• <b>Surprise test.</b></li> </ul>	02 L
<b>Jan-2021</b>	<b>Paulings valence bond theory</b>	Introduction to VBT, representation of tetrahedral, square planer, trigonalbipyramidal and octahedral complexes with examples, Inner and outer orbital complexes, Electro neutrality principle, Multiple bonding( $d\pi-p\pi$ and $d\pi-d\pi$ ), Limitations of VBT. <ul style="list-style-type: none"> <li>• <b>Assingment-4</b></li> <li>• <b>Internal Examination -1</b></li> </ul>	08 L
<b>Jan-2021</b>	<b>Crystal field theory</b>	Introduction & Need to CFT, shape & degeneracy of d-orbital, splitting of d- orbital, CFSE, calculation of CFSE, calculation of 10 Dq and factors affecting magnitude of 10Dq, d-d transitions and colour of the complexes, Jahn-Teller distortion theorem, Nephelauxatic effect. Problems on 10 dq value.	10 L
<b>Feb-2021</b>	<b>Molecular orbital theory of coordination complex</b>	Introduction, Assumptions, MO treatment to octahedral complexes with sigma bonding, Formation of MO's from metal orbitals, Charge transfer spectra, Formation of complex without pi-bonding. <ul style="list-style-type: none"> <li>• <b>Online Internal Examination</b></li> </ul>	04 L

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**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,**  
**RAJGURUNAGAR**  
**DEPARTMENT OF CHEMISTRY**  
**Teaching Plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.-III**  
**Name of Paper: Organic Chemistry**  
**No. of Lectures allotted per week:04**  
**Name of Teacher : Prof. Kolhe M.P.**

Month	Name of Chapter	Topic Covered	Lectures
Sep-2020	Strength of organic acids and bases	<i>p</i> ka, origin of acidity, influence of solvent, simple aliphatic saturated and unsaturated acids, substituted aliphatic acid, phenols, aromatic carboxylic acids, <i>p</i> ka and temperature, <i>p</i> kb, aliphatic and aromatic bases, heterocyclic bases, acid base catalysis.	03 L
Oct-2020	Stereochemistry of disubstituted cyclohexane	Introduction, 1,1-alkyl disubstituted cyclohexane; Dimethyl cyclohexane 1,2; 1,3 and 1,4-Geometrical isomerism, Optical isomerism, stability of conformation, energy calculations	06 L
Nov-2020	Reactions of unsaturated hydrocarbons and carbon oxygen double bond	<p>a) Reaction of Carbon-Carbon double bond: Introduction, Mechanism of electrophilic addition to C=C bond. Orientation &amp; reactivity, Rearrangements, (Support for formation of carbocation). Addition of hydrohalogen, Anti Markownikoff's addition (peroxide effect) with mechanism, Addition of halogens (dl pairs and meso isomers), hypohalous acids (HOX), Hydroxylation (Mechanism of cis and trans 1,2-diols). Hydroboration- Oxidation (Formation of alcohol), Hydrogenation (Formation of alkane), Ozonolysis (formation of aldehydes &amp; ketones)</p> <p>b) Reactions of Carbon –Carbon triple bond: Addition of hydrogen, halogens, halogen acids, water and formation of metal acetylides and its application.</p> <p>c) Reactions of Carbon –Oxygen double bond: Introduction, Structure of carbonyl group, reactivity of carbonyl group, addition of Hydrogen cyanide, alcohols, thiols, water, ammonia derivatives, Cannizzaro and Reformaski reactions with mechanism.</p>	15L



<b>Dec-2020</b>	<ul style="list-style-type: none"> <li><b>Elimination Reactions</b></li> </ul>	Introduction; 1,1; 1,2 elimination, E1, E2 and E1cB mechanism with evidences, Hoffmann and Saytzeff's elimination, reactivity effect of structure, attacking and leaving groups.	<b>6L</b>
<b>Jan-2021</b>	<ul style="list-style-type: none"> <li><b>Aromatic Electrophilic and Nucleophilic substitution reactions</b></li> </ul>	Introduction, arenium ion mechanism, Effect of substituent group (Orientation, o/p directing and meta directing groups). Classification of substituent groups (activating and deactivating groups) Mechanism of – Nitration, Sulfonation, Halogenation, Fridel-Crafts reactions, Diazo Coupling reactions, Ipso-substitution. Addition- elimination (S <sub>N</sub> Ar), S <sub>N</sub> 1, Elimination- addition (Benzyne) S <sub>N</sub> R1 reactions, reactivity.	<b>10 L</b>
<b>Feb-2021</b>	<ul style="list-style-type: none"> <li><b>Nucleophilic – substitution at aliphatic carbon .</b></li> </ul>	Introduction, nucleophile and leaving group, mechanism of nucleophilic substitution reaction . S <sub>N</sub> <sup>1</sup> and S <sub>N</sub> <sup>2</sup> reaction ,its kinetics mechanism stereo chemistry and comparison of S <sub>N</sub> <sup>1</sup> and S <sub>N</sub> <sup>2</sup> reactions	<b>08L</b>

**K.T.S.P. MANDAL'S  
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RAJGURUNAGAR**

**DEPARTMENT OF CHEMISTRY**

**Teaching Plan 2020-2021 Class: T. Y. B. Sc. Sem.-III**

**Name of Paper: Analytical Chemistry**

**No. of Lectures allotted per week: 04**

**Name of Teacher : Prof. kolhe M.P.**

Month	Name of Chapter	Topic Covered	Lectures
Sep-2020	<b>Gravimetric Analysis</b>	Common ion effect and solubility product principles, Conditions for good precipitation, Factors affecting precipitation like acid, temperature, nature of solvent, Super saturation and precipitation formation, Precipitation from homogeneous solution and examples, Co-precipitation, postprecipitation and remedies for their minimization, Washing of precipitate and ignition of precipitate, Brief idea about method of filtration and drying of precipitate, Introduction to electrogravimetry: principle, applications, electrolytic separations of Cu and Ni, Numerical problems only on gravimetric analysis. <b>Assigment No-01</b>	<b>12 L</b>
Oct-2020	<b>Thermal methods of analysis</b>	Principle of thermal analysis, classification of thermal techniques, Principle, instrumentation and applications of TGA and DTA, factors affecting the thermal analysis, numerical problem. <b>Assigment No-02</b>	<b>06 L</b>

Dec-2020	<b>Spectrophotometry</b>	Introduction, Electromagnetic spectrum, Interaction of electromagnetic radiations with the matter, Mathematical Statement and derivation of Lambert's Law and Beer's Law, Terminology involved in spectrophotometric analysis, Instrumentation of single beamcolorimeter, Instrumentation of single and double beam spectrophotometer, Principle of additivity of absorbance and simultaneous determination, Spectrophotometric Titrations, Experimental Applications- Structure of organic compounds, Structure of complexes, Numerical Problems <b>Assigment No-03</b>	<b>10 L</b>
Jan-2021	<b>Polarography</b>	Introduction to voltammetric methods of analysis, Principles of polarographic analysis, Dropping Mercury Electrode, Instrument and working of polarographic apparatus, Ilkovic equation and quantitative analysis, Polarogram and chemical analysis, Analysis of mixture of cations, Factors affecting polarographic wave, Quantitative Applications, Numerical Problems. <b>Assigment No-04</b> <b>Online Internal Test</b>	<b>08 L</b>
Feb-2021	<b>Atomic Absorption Spectroscopy</b>	Introduction and theory of atomic absorption spectroscopy, Instrumentation of single beam atomic absorption Spectrophotometer, Measurement of absorbance of atomic species by AAS,Spectral and Chemical Interferences, Qualitative and Quantitative Applications of AAS. Numerical <b>Assigment No-05</b>	<b>06 L</b>

<b>Feb-2021</b>	<b>Flame Emission Spectroscopy</b>	Introduction and theory of atomic emission spectroscopy, Instrumentation of single beam flame emission spectrophotometer, Measurement of emission of atomic species, Interferences in emission spectroscopy, Methods of analysis-calibration curve method, Standard addition method, and internal, standard method, Qualitative and Quantitative Applications of FES, Numerical Problems. <b>Assignment No-06</b> <b>Online Internal Examination</b>	<b>06 L</b>
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**K.T.S.P.MANDAL'S  
SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,  
RAJGURUNAGAR**

**DEPARTMENT OF CHEMISTRY**

Teaching plan 2020-2021 Class: T. Y. B. Sc. Sem.-III

Name of Paper -Industrial chemistry No.of Lectures allotted per week -04

Name of teacher- Prof. M. P. Kolhe

Month	Chapter	Topic	No. of Lect.
Sep-2020	Modern Approach to Chemical Industry	Introduction, basic requirements of chemical industries, chemical production, raw materials, unit process and unit operations, Quality control, quality assurance, process control, research and development, pollution control, human resource, safety measures, classification of chemical reactions, batch and continuous process, Conversion, selectivity and yield, copy right act, patent act, trade marks.	08
Oct-2020	Agro chemicals	General introduction and scope of agrochemicals, meaning and examples of: Insecticides, Herbicides, Fungicides, Rodenticides, Pesticides, Plant growth regulators. Pesticide formulation, slow release pesticide formulations, storage stability test, and Industrial entomology. Advantages and disadvantages of agrochemicals. Structure,: DDT, BHC, Warfarin, Aldrin, Endosulphan, synthesis and application: DDT, BHC and Endosulphan. Biopesticides like Neem oil <ul style="list-style-type: none"> <li>• Assignment- 1</li> <li>• Internal Examination -1</li> </ul>	08
Nov-2020	Manufacture of Basic Chemical	Ammonia: Physicochemical principles involved, Manufacture of ammonia by modified Haber-Bosch process, its uses. Sulphuric acid: Physicochemical principles involved, Manufacture of sulphuric acid by contact process, its uses, Nitric acid Physicochemical principles involved, Manufacture of nitric acid by Ostwald's process, its uses. <ul style="list-style-type: none"> <li>• Assignment- 2</li> </ul>	08

<b>Dec-2020</b>	<b>Petrochemicals and eco-friendly fuels</b>	<p>Introduction, occurrence, composition of petroleum, resources, processing of petroleum, calorific value of fuel, cracking, octane rating (octane number).petroleum refineries, applications of petrochemicals, synthetic petroleum, lubricating oils &amp; additives</p> <p><i>Fuels and eco-friendly fuels:</i> liquid, gaseous fuel (LPG, CNG), fossil fuels, diesel, bio diesel, gasoline, aviation fuels. Use of solar energy for power generation</p>	<b>08</b>
<b>Jan-2021</b>	<b>Food and Starch Industry</b>	<p>Definition and scope, nutritive aspects of food constituents, , food deterioration factors and their control; (b) Preservation and processing: Heat and cold preservation and processing, cold storage, food dehydration and concentration, various foods, their processing and preservation methods, fruits, beverages, cereals, grains, legumes and oil seeds; (c) Food additives: Enhancers, sugar substitutes, sweeteners, food colors</p> <p>Chemistry of starch, manufacturing of industrial starch and its applications, characteristics of some food starches, non-starch polysaccharides-cellulose- occurrence.</p> <ul style="list-style-type: none"> <li>• <b>Assignment- 3</b></li> </ul>	<b>08</b>
<b>Feb-2021</b>	<b>Cement and Glass industry</b>	<p>Introduction, Importance, composition of portland cement, raw materials, proportioning of raw materials, setting and Hardening of cement, reinforced concrete</p> <p>.Introduction, importance, physical and chemical properties of glass, chemical reaction, annealing of glass Special glasses: colored, safety, hard, borosilicate, optical, photosensitive, conducting, glass laminates.</p> <ul style="list-style-type: none"> <li>• <b>Assignment- 4</b></li> <li>• <b>Online Internal Examination</b></li> </ul>	<b>08</b>

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SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA,  
RAJGURUNAGAR**

**DEPARTMENT OF CHEMISTRY**

**Teaching Plan Year (2020-2021)**

**Class: T. Y. B. Sc. Chemistry, Sem.-III Name of Paper: Organic Chemistry**

**No. of Lectures allotted per week:02**

**Name of Teacher : Prof. Kolhe M.P.**

Month	Name of Chapter	Topic Covered	No. of Lect.
Sep-2020	Soil Chemistry	Role of agriculture chemistry : Scope and importance of agricultural chemistry Agricultural chemistry and other science Definition of soil, Soil components- mineral component, organic matter or humus, soil atmosphere, soil water, soil microorganism Physical properties of soil- soil texture, soil structure, soil color, soil temp, soil density, porosity of soil. Surface soil and sub-soil Chemical properties of soil, soil reactions and solutions Factor controlling soil reaction, buffering capacity, importance of buffer action in agriculture, ion exchange	10 L
Oct-2020	Problematic Soil and Soil testing	Acid soil- formation of acid soil, effect of soil acidity of soil, reclamation of acidic soil 2.2 Alkali Soil- formation of alkali soil, reclamation of alkali soil 2.3 Classification of alkali soil- saline soil, saline alkali soil, non-saline alkali soil 2.4 Calcareous soils 2.5 Introduction to soil testing 2.6 Objectives of soil testing 2.7 Phases of soil testing- collection of soil sample, analysis in the laboratory and fertilizer applications	10 L
Nov-2020	Quality of Irrigation Water	Sources of Water- Atmospheric water, Surface Water, Stored Water, Ground Water 3.2 Impurities in Water, Water quality, related problems in public health, environment and agriculture. Analysis of irrigation Water (ppm, meq/lit.epm) 3.4 Dissolved constituents and their functions Major constituents- Ca, Mg, Na, K, Carbonate, bicarbonate, sulfate, Chloride and nitrate Minor constituents- B, Si, nitrite, Sulfide and fluoride 3.5 Water quality standard- total soluble salt (TSS), sodium adsorption ratio (SAR), Exchangeable sodium percentage (ESP), Residual sodium carbonate, salinity classes for irrigation water.	08 L

Dec-2020	Plant Nutrients	Need of plant nutrients, forms of nutrients updates, nutrient absorption by plants 4.2 Classification of essential nutrients 4.2.1 Primary nutrients (N, P, K), its role and deficiency symptoms in plants 4.2.2 Secondary nutrients, (Ca, Mg, S), its role and deficiency symptoms in plants 4.2.3 Micronutrients, General functions of micronutrients (Zn, Fe, Mn, Cu, B, Mo, Cl) 4.3 Effect of environmental condition, nutrient uptake.	08 L
Jan-2021	Fertilizers and Manures	Fertilizers 5.1 Introduction, Classification & application of fertilizers 5.2 Time and methods of fertilizers 5.3 Factors affecting efficiency of fertilizers 5.4 Vermicompost preparation, effect of vermicompost on soil fertility 5.5 Synthetic fertilizers definition, comparison of synthetic fertilizers with organic fertilizers , environmental effect of synthetic fertilizers Manures 5.6 Introduction, Definition and classification of manures 5.7 Effect of bulky organic manures on soil, farm yard manures (FYM), Factors affecting on FYM, method of preparation, losses during handling and storage 5.8 Biogas plant. Human waste, sewage and sludge, types of sludge, carbon nitrogen ratio, sewage irrigation and uses 5.9 Green manuring, types of green manuring, characteristics, advantages and disadvantages of green manuring 6.0 Biofertilizers: definition, classification, role & advantages	06 L
Feb-2021	Protection of Plants	Pesticide Classification and mode of action 7.1 Insecticide- Definition, Classification, chemical properties, elemental composition, mode of action of synthetic and plant originated compounds organophosphates, malathion, parathion, carbamates  7.2 Fungicides- Definition, Classification, Chemical properties, mode of action of S & Cu fungicides 7.3 Herbicides- Definition,, Classification, composition, mode of action of Selective and non-selective herbicides	06 L



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**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA, RAJGURUNAGAR**  
**DEPARTMENT OF CHEMISTRY**

**Teaching Plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.-IV**

**Name of Paper: Physical Chemistry**

**No. of Lectures allotted: 04**

**Name of Teacher: Prof.Kolhe M.P.**

<b>Month</b>	<b>Name of Chapter</b>	<b>Topic Covered</b>	<b>Lect ures</b>
<b>May - 2021</b>	<b>Electrochemical Cells</b>	Reversible and irreversible cells, EMF and its measurements, Standard cells, cell reaction and EMF, Single electrode potential and its calculation, Calculation of cell EMF, Thermodynamics of cell EMF, Types of electrodes, Classification of electrochemical cells with and without transference, Applications of EMF measurement- i) Solubility product of sparingly soluble salt, ii) Determination of pH, iii) Potentiometric titration. <b>Assignment No.1</b>	<b>10 L</b>
<b>May - 2021</b>	<b>Nuclear Chemistry</b>	The atom, nucleus and outer sphere, classification of nuclides, nuclear stability and binding energy. Discovery of radioactivity, types of radioactivity, general characteristics of radioactive decay and decay kinetics, Measurements radioactivity, gaseous ion collection method, proportional and G.M. counter. Applications of radioactivity- Radiochemical principles in the use of tracers, Typical applications of radioisotopes as a tracer i) Chemical investigations- reaction mechanism, ii) Structure determination- phosphorus pentachloride and thiosulphate ion iii) Age determination- by Carbon-14 dating	<b>18L</b>

		and Uranium-Lead/ Thorium-Lead Ratio iv) Medical applications-Assess the volume of blood in patients body, Goiter. <b>Assignment No.2</b>	
<b>June-2021</b>	<b>Crystal structure</b>	Crystallization and fusion process, Crystallography, Crystal systems,- Properties of crystals, Crystal lattice and unit cell,-Crystal structure analysis by X ray - The Laue method and Braggs method, - X-ray analysis of NaCl crystal system, - Calculation of d and $\lambda$ for a crystal system. <b>Assignment No.3</b> <b>Internal Exam</b>	<b>10L</b>  <b>04L</b>
<b>June - 2021</b>	<b>Quantum Chemistry</b>	Concept of quantization, atomic spectra (no derivation), wave particle duality, uncertainty principle, wavefunction and its interpretation, well-behaved function, Hamiltonian (energy) operator, formulation of Schrodinger equation, particle in box (1D, 2D and 3D box) (no derivations), sketching of wavefunction and probability densities for 1D box, correspondence principle, degeneracy(lifting of degeneracy), applications to conjugated systems, harmonic oscillator, wavefunction and probability densities (no derivation), zero point energy and quantum tunneling. <b>Assignment No.4</b> <b>Online Internal Examination</b>	<b>04L</b>

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**SAHEBRAOJI BUTTEPATIL MAHAVIDYALAYA RAJGURUNAGAR**  
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Teaching plan 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.-IV

Name of Paper: Inorganic Chemistry

No. of Lectures allotted per week: 04

Name of Teacher: Prof. Kolhe M.P.

Month	Name of Chapter	Topic Covered	Lectures
May-2021	Chemistry of f-block elements	<p>Introduction of f-block elements</p> <p><b>I. Lanthenides-</b> Position of periodic table, name, E.C, oxidation state, occurrence, Lanthanide contraction, applications of lanthanides.</p> <p><b>II. Actinides</b> -Name and electronic Configuration of actinides, general methods of preparation of transuranic elements, IUPAC nomenclature of super heavy elements, comparison bet<sup>n</sup> Lanthanide &amp; actinides.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-1</b></li> </ul>	08L
May-2021	Metals, Semiconductors and Super conductors	<p>Metallic bonding, Band theory in metals with respect to Na along with n (E) &amp; N(E) diagrams, Semiconductors &amp; their types, N &amp; P type semiconductors ZnO and NiO, Applications of superconductors.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.- 2</b></li> </ul>	10L
May-2021	Bioinorganic Chemistry	<p>Introduction, Role of metals in bioinorganic chemistry, Metalloproteins, Bioinorganic Chemistry of Fe: Bioinorganic Chemistry of Co.</p>	06L
June-2021	Ionic Solids	<p>Crystalline and amorphous solids, crystal structures simple cubic, BCC &amp; FCC, Voids in crystal structure, Palings univalent and crystal radii, Born-Lande equation, Born Haber cycle and its applications, schottky &amp; Franckel defect.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-3</b></li> </ul>	06L

<b>June - 2021</b>	<b>Homogeneous Catalysis</b>	Definition, types of homogeneous catalysts, Catalytic Reactions such as: <ol style="list-style-type: none"> <li>a. Wilkinson's Catalysis</li> <li>b. Zeigler Natta Catalysis</li> <li>c. Monsanto acetic acid synthesis</li> </ol> <ul style="list-style-type: none"> <li>• <b>Internal -1</b></li> </ul>	<b>06L</b>
<b>June - 2021</b>	<b>Heterogeneous Catalysis</b>	Def <sup>n</sup> , types of heterogeneous catalysts, Catalytic Reactions: <ol style="list-style-type: none"> <li>i. Synthesis of terephthalic acid from xylene using ZSM-5</li> </ol> Synthesis of benzoic acid from toluene using KMnO <sub>4</sub> Hydrogenation of alkene to alkane using Raney Ni catalyst Synthesis of p-aminophenol from nitrobenzene using Pd/C catalyst Cyclization. <ul style="list-style-type: none"> <li>• <b>Assignment no.-4</b></li> </ul>	<b>08L</b>
<b>June - 2021</b>		Biodiesel synthesis- transesterification reaction. Special guidance with respect to Examination. <ul style="list-style-type: none"> <li>• <b>Online Internal Examination</b></li> </ul>	<b>04L</b>

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**Teaching Plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.-IV**

**Name of Paper: Organic Chemistry**

**No. of Lectures allotted per week: 04**

**Name of Teacher :Prof.M.P.Kolhe**

<b>Month</b>	<b>Name of Chapter</b>	<b>Topic Covered</b>	<b>Lect ures</b>
<b>May-2021</b>	<b>Carbanions and their reactions</b>	Introduction, Formation and stability of Carbanion. Reactions involving carbanions and their mechanisms: Aldol, Claisen, Dieckmann and Perkin condensations. Synthesis and Synthetic applications of Malonic ester, Acetoacetic ester and Wittig reagent.	<b>06 L</b>
<b>May-2021</b>	<b>Retrosynthetic analysis and applications</b>	Introduction, Different terms used – Disconnection, Synthons, Synthetic equivalence, FGI, TM. One group disconnection, Retrosynthesis and Synthesis of target molecules: Acetophenone, Crotonaldehyde, Cyclohexene, Benzylbenzoate, and Benzyl diethyl malonate	<b>05 L</b>
<b>May-2021</b>	<b>Rearrangement reactions</b>	Introduction, Mechanism of rearrangement reaction involving carbocation, nitrene and oxonium ion intermediate. Beckmann, Bayer-Villiger, Pinacol-pinacolone, Curtis, Favorski, Claisen rearrangement	<b>06 L</b>
<b>June-2021</b>	<b>Spectroscopic methods in structure determination of Organic compounds</b>	Introduction, meaning of spectroscopy, nature of electromagnetic radiation, wave length, frequency, energy, amplitude, wave number, and their relationship, different units of measurement of wavelength frequency, different regions of electromagnetic radiations. Interaction of	<b>24 L</b>

<p><b>June-2021</b></p>		<p>radiation with matter. Excitation of molecules with different energy levels, such as rotational, vibrational and electronic level. Types of spectroscopy and advantages of spectroscopic methods</p> <p><b>A) Ultra Violet Spectroscopy</b> Introduction, nature of UV, Beer's law, absorption of UV radiation by organic molecule leading to different excitation. Terms used in UV Spectroscopy- Chromophore, Auxochrome, Bathochromic shift (Red shift), hypsochromic shift (Blue shift), hyperchromic and hypochromic effect. Effect of conjugation on position of UV band. Calculation of <math>\lambda_{max}</math> by Woodward and Fisher rules for dienes and enone systems, Colour and visible spectrum, Applications of UV Spectroscopy- Determination of structure, Determination of stereo chemistry (Cis and trans)</p> <p><b>B) Infra red Spectroscopy</b> Introduction, Principle of IR Spectroscopy, Fundamental modes of vibrations (<math>3N-6</math>, <math>3N-5</math>) Types of vibrations (Stretching and bending), Hooke's law, Condition for absorption of IR radiations, vibration of diatomic molecules. Regions of IR Spectrum: fundamental group region, fingerprint region aromatic 29 region, Characteristic of IR absorption of functional groups: Alkanes, alkenes, alkynes, alcohol, ethers, alkyl-halides, carbonyl compounds (-CHO, C=O, -COOR-COOH), amines, amides and</p>	
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		<p>Aromatic Compounds and their substitution Patterns. Factors affecting on IR absorption: Inductive effect, resonance effect, hydrogen bonding. Application of IR Spectroscopy in determination of structure, chemical reaction and hydrogen bonding.</p> <p><b>C) PMR Spectroscopy</b> Introduction, Principles of PMR Spectroscopy, Magnetic and nonmagnetic nuclei, Precessional motion of nuclei without mathematical details, Nuclear resonance, chemical shift, shielding, &amp; deshielding effect. Measurement of chemical shift, delta and Tau-scales. TMS as reference and its advantages, peak area, integration, spin-spin coupling, coupling constants, <i>J</i>-value (Only first order coupling be discussed)</p> <p><b>D) Problems based on U.V., I.R. and PMR</b></p>	
<b>June-2021</b>	<b>Natural Products</b>	<p><b>Terpenoids:</b> Introduction, Isolation, Classification. Citral- structure determination using chemical and spectral methods, Synthesis of Citral by Barbier and Bouveault Synthesis.</p> <p><b>Alkaloids:</b> Introduction, extraction, Purification, Some examples of alkaloids and their natural resources. Ephedrine- structure determination using chemical methods. Synthesis of Ephedrin by Nagi.</p>	<b>07 L</b>

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DEPARTMENT OF CHEMISTRY**

**Teaching Plan 2020-2021 Class: T. Y. B. Sc. Sem.-IV**

**Name of Paper: Analytical Chemistry**

**No. of Lectures allotted per week: 04**

**Name of Teacher: Prof. Kolhe M.P.**

<b>Month</b>	<b>Name of Chapter</b>	<b>Topic Covered</b>	<b>L</b>
<b>May-2021</b>	<b>Chromatography</b>	Introduction and classification of chromatographic methods, Principle of chromatographic analysis with match box model, Theoretical plates and column efficiency, Theory, Principle, technique and applications of- Column Chromatography, Ion exchange Chromatography, Thin layer Chromatography, Paper Chromatography, Numerical Problems. <b>Assignment No-1</b>	<b>08 L</b>
<b>May-2021</b>	<b>Gas Chromatography</b>	Introduction, Theory, Principle, GSC and GLC, Separation mechanism involved in GSC and GLC, Instrumentation of Gas chromatography, Working of gas chromatography, Gas chromatogram and qualitative-quantitative analysis, Applications of gas chromatography.	<b>10 L</b>
<b>May-2021</b>	<b>Nephelometry and Turbidimetry Internal Examination - 01</b>	Introduction, Principles and instrumentation of Nephelometric and Turbidimetric analysis, Difference between Nephelometric and Turbidimetric measurements, Choice between Nephelometry and Turbidimetry, Factors affecting Nephelometric and Turbidimetric measurements, Quantitative Applications, Numerical Problems. <b>Assignment No-2</b>	<b>09L</b>



<b>June-2021</b>	<b>High Performance Liquid Chromatography</b>	Introduction, Need of liquid chromatography, Separation mechanism involved in adsorption and partition HPLC, Instrumentation and working of HPLC, Applications of HPLC, Introduction to supercritical fluid chromatography	<b>09L</b>
<b>June-2021</b>	<b>Electrophoresis</b>	Introduction, Principle and theory of electrophoresis, Different types of electrophoresis techniques, Moving Boundary Electrophoresis, Zone electrophoresis- Paper, Cellulose acetate and Gel electrophoresis, Applications of electrophoresis <b>Assignment No-3</b> <b>Internal Exam</b>	<b>06L</b>
<b>June-2021</b>	<b>Solvent Extraction</b>	Introduction, Principle of solvent extraction, Distribution coefficient, distribution ratio, relationbetween Distribution coefficient and distribution ratio, factors affecting solvent extraction,percentage extracted, solvent extraction method, separation factor, batch extraction, counter currentextraction, application of solvent extraction, numerical problems.	<b>08 L</b>

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**DEPARTMENT OF CHEMISTRY**  
**Teaching plan 2020-2021 Class: - T.Y.B.Sc. Sem IV**  
**Name of Paper - Industrial chemistry**  
**No. of Lectures allotted per week-04**  
**Name of teacher -Prof.Kolhe M.P.**

Month	Chapter	Topic	No.Of Lect
May-2021	Polymer chemistry	<p>Classification of Polymers: Organic and Inorganic polym</p> <p>Basic concepts, nomenclature, degree of polymerization, classification of polymerization reactions, thermodynamic and transport properties of polymer, <i>Commercial polymers and their importance:</i></p> <p>(a) Nylon, polyesters (terylene and dacron), rubber, vulcanization of rubber, synthetic rubber, Bun 2-N rubber, copolymers of butadiene, PVC, acrylic, teflon, polyethylene and acrylonitrile; (b) Silicone polymers: silicone oils, rubber, grease and resin; (c) Resins: Phenol-formaldehyde resins, urea-formaldehyde resins, epoxy resins, melamine-formaldehyde resins</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-1</b></li> </ul>	10L
May-2021	Sugar and Fermentat i-on Industry	<p>Sugar:-Occurrence, Manufacturing of refine cane sugar from sugar cane, general idea of carbonation and sulphitation processes and their comparison, by-product and their use.</p> <p>Fermentation- Introduction, importance, Basic requirement of fermentation process, Manufacture of industrial alcohol from molasses, fruits, food grains, &amp; ethylene, Manufacturing of wine, beer, whisky, rum ; importance Power alcohol</p>	08L
May - 2021	Soap, detergents and Cosmetics	<p>Chemistry of soap, row material, chemical reaction, types of soap.</p> <p>Meaning of the terms detergent and surfactants, emulsion and emulsifying agents, wetting and non- wetting, hydrophobic and hydrophilic nature, amphipathic structures, types of surfactants, raw materials for detergents, washing action of soaps and detergents, detergent builders, additives.</p> <p>Raw materials: emulsifiers (natural, synthetic and finely)</p>	8 L

		<p>dispersed solids), lipid components (oils, waxes, fats), humectants, colours (dyes and pigments), preservatives and antioxidants.</p> <p>Cosmetics for skin: Types and problems of skin, key ingredients of skin cleansing, toners, moisturizers, nourishing, protective sunscreen, talcum powder and bleaching products. (c) Hair care: classification, ingredients, special additives for conditioning and scalp health, hair colourants (temporary, semi-permanent and gradual colourants), the plant materials (herbs) used in hair cosmetics.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-2</b></li> </ul>	
<b>June-2021</b>	<b>Dyes and paints</b>	<p><i>Dyes:</i> Introduction, classification of dyes: Structures and applications, nitro, nitroso, azo, heterocyclic, phthalenes, xanthenes, rhodamines, thiazine, cyanine, anthraquinone, indigoids, thioindigoids, phthalocyanines, wet dyes.</p> <p><i>Paints:</i> Introduction of paints, ingredients and classification, new technologies; properties of coatings; solvents, plasticizers, dyes and bioactive additives; <i>Pigments:</i> Introduction, classification and general physical properties.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-3</b></li> </ul>	<b>08 L</b>
<b>June-2021</b>	<b>Chemistry of pharmaceutical industries</b>	<p><i>General aspects of drug action:</i> Introduction, classification, nomenclature, structure-activity relationship, action of drugs, factors affecting drug action, metabolism of drugs, chemical structures, methods of production and pharmacological activity. Meaning of the terms: Prescriptions, doses, analgesic, antipyretic, diuretic, anesthetics, antibiotics, anti-inflammatory, anti-viral, tranquilizer, antiulcer, antialergic and bronchodilators, cardiovascular, cold preparations, anti-hypertensive, cough preparation, anti-neoplastic, sedative and hypnotics, steroidal, contraceptive, histamine and antihistamine.</p> <p>Synthesis and uses: Paracetamol, Aspirin, Sulphanilamide.</p> <ul style="list-style-type: none"> <li>• <b>Assignment no.-4</b></li> </ul>	<b>08 L</b>
<b>June-2021</b>	<b>Pollution prevention and waste management</b>	<p>Introduction, importance of waste management, concept of atom economy, Terms involved in waste minimization: source reduction, recycling, product. changes, source control, use and reuse, reclamation, assessment procedures, types of wastes, treatment and disposal of industrial waste. Treatment of wastes or effluents with organic impurities.</p> <ul style="list-style-type: none"> <li>• <b>Online Internal Examination</b></li> </ul>	<b>06 L</b>

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DEPARTMENT OF CHEMISTRY**

**Teaching plan 2020-2021**

**Name of Paper - Dairy Chemistry(T.Y.B.Sc.) Sem IV**

**No. of Lectures allotted per week-04**

**Name of teacher- Prof.Kolhe M.P.**

<b>Month</b>	<b>Name of Chapter</b>	<b>Topic Covered</b>	<b>No. of Lect.</b>
<b>May-2021</b>	Market Milk	Introduction, Definition, constituents of milk of different species such as cow, buffalo, goat, etc., Chemical composition of milk of Indian breed and foreign breeds of cow, factor affecting composition of milk, characteristics of milk of different mammals, physicochemical properties of milk, acidity, pH, density, specific gravity, color and flavor of milk, food and nutritive value of milk. Microbiology of milk, growth of microorganism, stages of growth, product of microbial growth, destruction of microorganisms growth.	10 L
<b>May-2021</b>	Common Dairy Processes	Cream separation- Basic principles, gravity creaming water dilution and centrifugal creaming method, construction of centrifugal separator, factors affecting percentage of fat, speed of machine, temp. of milk, rate of inflow amount of flushing water formation of separator slime Pasteurization of milk, flow sheet diagram, process receiving milk, preheating filtration, clarification, cooling and storage raw milk, standardization, pasteurization, homogenization, packing and storage, uses of milk.	06 L
<b>May-2021</b>	Special Milks	Sterilized milk- Definition, method of manufacture in detail, Advantages and disadvantages. 2. Homogenized milk,- Definition, merits and demerits factor influencing homogenization, Process of manufacture. 3. Soft curd milk- Definition, characteristics, method of preparation of soft curd milk. 4. Flavored milk- Definition, types, method of manufacture flow sheet diagram. 5. Vitaminised / irradiated milk- - Definition, method of manufacture. 6. Fermented milk-Definition, method of	08 L

		manufacture. 7. Standardized milk- Definition, method of manufacture.	
<b>May-2021</b>	Milk proteins, Carbohydrates and Vitamins	Milk proteins- importance of proteins found in the milk-casein, albumin and globulin, composition, nomenclature, properties and uses. 2. Carbohydrates- importance of lactose, classification, properties, nutritive value of lactose use of lactose. 3. Vitamins- importance, definition, 74 properties nutritive value of vitamins, Vit-A, Vit-B, B2, B6, B12, Vit-C (Ascorbic acid) & Vitamin-D. 4. Food and nutritive value of milk, milk & public health	08 L
<b>June-2021</b>	Preservatives & Adulterants in Milk	Preservation of milk- Introduction, Common preservatives are used. 2. Adulterants Introduction, Modes of Adulteration and their detection such as skimming, addition of separated milk, Water, Starch and cane sugar.	06 L
<b>June-2021</b>	Milk Products	Cream, Butter, Cheese and Ice-Cream. 1. Cream- Definition, Classification, Composition, Food & Nutritive value, Physicochemical properties, Manufacture and uses of cream. 2. Butter- Definition, Classification, Composition, Food & nutritive value, Physicochemical properties, Manufacture and uses of Butter selection of milk/cream. Preheating of milk, Separating of milk, neutralization of cream, Pasteurization of cream, Cooking & ageing, ripening of cream, salting of butter, washing of butter, packaging & Storage, use of butter. 3. Cheese- Definition, Classification, Food & nutritive value, properties, Manufacture and uses of cheese. 4. Ice- cream- Definition, Classification, Composition, Food & Nutritive value, Manufacture, packing, hardening & Storage, uses of Ice-cream	08 L
<b>June-2021</b>	Dried Milk Products	Introduction, butter milk powder, whey powder, cream powder, infant milk powder, Shrikand powder, Ice-cream mix powder, cheese powder.	4 L

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**Teaching plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry, Sem.: I<sup>st</sup> and II<sup>nd</sup>**

**Name of Paper: Physical Chemistry Practical's**

**No. of Lectures allotted per batch: 04**

**Batches: A**

S.N.	Date	Name of Practical's
1.	May	To study the effect of concentration of the reactants on the rate of hydrolysis of an ester.
2.	May	To compare the relative strength of HCl and H <sub>2</sub> SO <sub>4</sub> by studying the kinetics of hydrolysis of an ester
3.	May	To determine the energy of activation of the reaction between potassium iodide and potassium persulphate
4.	May	To determine the order of reaction between K <sub>2</sub> S <sub>2</sub> O <sub>8</sub> and KI by half-life method.
5.	May	To determine the molecular weight of a high polymer by using solutions of different concentrations
6.	May	To investigate the adsorption of oxalic acid /acetic acid by activated charcoal and test the validity of Freundlich / Langmuir isotherm
7.	June	To study the effect of addition of salt on critical solution temperature of phenol water System
8.	June	To determine the specific refractivity's of the given liquids A and B and their mixture and hence determine the percentage composition their mixture C.
9.	June	To determine the molecular refractivity of the given liquids A, B, C and D.
10.	June	Determination of $\lambda_{max}$ and concentration of unknown solution of KMnO <sub>4</sub> in 2 N H <sub>2</sub> SO <sub>4</sub>
11.	June	Determination of $\lambda_{max}$ and concentration of unknown solution of CuSO <sub>4</sub> .
12.	June	To prepare standard 0.2 M Na <sub>2</sub> HPO <sub>4</sub> and 0.1 M Citric acid solution, hence prepare four different buffer solutions using them. Determine the pka value of these and unknown solutions.
13.	June	To determine the concentrations of strong acid and weak acid present in the mixture by titrating with strong base.
14.	June	To determine the degree of hydrolysis of aniline hydrochloride
15.	June	To determine pka value of given weak acid by pH-metric

		titration with strong base.
16.	June	To determine pH of various mixtures of sodium acetate and acetic acid in aqueous solution and hence to find the dissociation of acetic acid.
17.	June	To determine the cell constant of the given cell using 0.01 M KCl solution and hence determine dissociation constant of a given monobasic weak acid.
18.	June	To estimate the amount of lead present in given solution of lead nitrate by conductometric titration with sodium sulphate.
19.	June	Journal Submission
20.	June	Internal Examination

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**Teaching plan Year 2020-2021 Class: T. Y. B. Sc. Chemistry Sem.: I<sup>st</sup> and II<sup>nd</sup>**

**Name of Paper: Inorganic Chemistry Practicals**

**No. of Lectures allotted per batch: 04**

**Batches: A**

Sl. No.	Date	Name of Practicals
1.	May	Qualitative Analysis Mixture No. 1
2.	May	Mixture No. 2
3.	May	Mixture No. 3
4.	May	Mixture No. 4
5.	May	Mixture No. 5
6.	May	Mixture No. 6
7.	May	Volumetric Estimations Mn by volhard method
8.	May	Analysis of Alkali mixture by Volumetric method
9.	May	Estimation of % purity of given sample of Sodium Chloride
10.	May	Inorganic preparations Preparation of $[\text{Ni}(\text{NH}_3)_6]^{2+}$
11.	May	Preparation of $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$ and estimation of Copper Idometrically
12.	May	Preparation of Crystals of Potash alum and estimation of aluminum volumetrically.
13.	May	Gravimetric estimations Fe as $\text{Fe}_2\text{O}_3$
14.	June	Nickel as Ni – DMG
15.	June	Gravimetric estimation of Ba as $\text{BaSO}_4$ using homogeneous precipitation method
16.	June	Colorimetric Estimations Iron
17.	June	Cobalt
18.	June	Separation of binary mixture of cations by Column Chromatography
19.	June	Separation of binary mixture of cations by Column Chromatography
20.	June	Internal Examination



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**Teaching plan Year 2020-2021**

**Class: T. Y. B. Sc. Chemistry Sem.: I<sup>st</sup> and II<sup>nd</sup>**

**Name of Paper: Organic Chemistry Practicals**

**No. of Lectures allotted per batch: 04**

**Batches: A**

<b>Sr. No.</b>	<b>Date</b>	<b>Name of Practical's</b>
1.	May	Separation of Binary Mixtures and Qualitative Analysis Mixture No. 1
2.	May	Mixture No. 2
3.	May	Mixture No. 3
4.	May	Mixture No. 4
5.	May	Mixture No. 5
6.	May	Mixture No. 6
7.	May	Mixture No. 7
8.	May	Mixture No. 8
9.	June	Organic Estimations i. Estimation of acetamide.
10.	June	ii. Estimation of Ethyl benzoate.
11.	June	iii. Determination of Molecular weight of Monobasic acids by Volumetric Methods.
12.	June	iv. Determination of Molecular weight of Dibasic acids by Volumetric Methods
13.	June	Organic Preparations Benzoquinone from Hydroquinone (Oxidation by $\text{KBrO}_3/\text{K}_2\text{CrO}_3$ )
14.	June	P-nitroacetanilide from Acetanilide (Nitration)
15.	June	P-Iodonitrobenzene from P-Nitroaniline (Sandmeyer Reaction)
16.	June	Benzoic acid from Ethyl benzoate (Ester hydrolysis)
17.	June	Internal Examination

**Prof.Kolhe M.P.**

**Head of the Department**