DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2017-18

Class : B.SC-F.Y
Title of the Paper & No.: Physical+Inorganic Chemistry II & IV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2017-18

Physical +Inorganic Chemistry Paper no.II Semester-I

Month	Course content	Expected Periods
July	**(Section –A: Physical Chemistry)** **Unit I: Mathematical concept and SI Units** Logarithm: Rules of logarithm, Characteristic and Mantissa, Change of sign and base, Numerical problems.Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and OH.Graphical representation: Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept and Numerical Problems.Derivative: Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions.Integration: - Rules of integration, Algebraic and exponential functions.Permutation, combinations and Probability, Numerical Problems. **(A) SI Units:** International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.	07
July	**Unit II: Surface Chemistry** Introduction,Adsorption, mechanism of adsorption, factors affecting adsorption. Difference between adsorption and absorption. Types of adsorption: Physical adsorption and chemical adsorption. Adsorption of gaseous by solids. Adsorption isotherm, Types of adsorption isotherm: i)Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation).	06
Aug.	**Unit V:** **A) S-Block Elements:** General characteristics of S-block elements Variation in properties of S-block elements, atomic radii, ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA. **Unit III: Gaseous State** Kinetic molecular theory of gases -Postulates of kinetic molecular theory of gases. Derivation of kinetic gas equation. Ideal and non-ideal gases. Deviation of gases from Ideal behavior and Compressibility factor (Z). Derivation of Van der waals equation, Units for Van der waals constants. Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Vander Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals constants.Liquefaction of gases, Linde's method, Claude's method. Molecular velocities-Root mean square, average and most probable velocities, Relation between molecular velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.Numerical on Vander Waals constants and Critical constants, Root mean square velocities.	10 10

Jan.	**Unit- IV: Catalysis** Introduction to Catalyst and Catalysis.Catalyst-Type of catalyst, positive and negative catalyst with examples.Catalysis:-Type of catalysis, homogenous and heterogeneous catalysis with examples Autocatalysis- explanation with examples. Characteristics of catalytic reactions. Promoters: - Definition, example, explanation of promotion action.Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.Acid – Base catalysis, General Acid-Base catalysis,examples. Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.Applications of catalysis in industries.	**07**
Feb.	**Unit-VI : Chemical Bonding –II** ***Concept of hybridization:*** Definition and explanation of dsp2 hybridization by taking example of [Ni(CN)4]-2, sp3d hybridization by taking example PCl5, Sp3d2 hybridization by taking example SF6. Sp3d3 hybridization by taking example IF7. ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH4, NH3, and H2O. Limitations of VSEPR theory. ***Molecular Orbital Theory:*** Basic principle of MOT, LCAO, Bonding and anti- bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order, Molecular orbital diagram of homo nuclear diatomic molecules such as H2, N2, O2, and Ne2And CO.	**05**

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Sept.	**(Part –II: Inorganic Chemistry)** **[B]Theory of Gravimetric Analysis** a)Introduction , definition of gravimetric analysis.b) Steps involved in gravimetrc analysisc) Precipitation, Conditions for Prcipitation d) types of precipitates. e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product.f) Different Steps involved in gravimetric analysis:i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying, v) Ignition& Inceneration, vi) Weighing.	**05**	**04**
	Physical +Inorganic Chemistry Paper no.IX Semester-IV		
Nov. **Dec.**	**Part I (Physical Chemistry)** **Unit:-I Chemical Kinetics:** 1.1 Introduction: Rate of reaction, Definition and units of rate constant,Factors affecting rate of reaction, Order and Molecularity of reaction.1.2 Zero order reaction: Rate expression and Characteristics.1.3 First order reaction: Rate expression and Characteristics.1.4 Pseudounimolecular reactions.1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants. Characteristics of second order reaction.1.6 Methods of determination of order of a reaction.1.7 Collision theory of reaction rates.1.8 Effect of temperature on reaction rates and Arrhenius equation.1.9 Numericals on first order reactions, half-life method.	**10**	**09**
Dec.	**Unit:-II Electrochemistry:** 2.1 Introduction, Conduction of electricity, Types of conductors: electronic and electrolytic.2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units.2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance.2.4 Conductivity cell, Cell constant and its determination.2.5 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations. Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, Debye-Huckel Onsager's equation and its verification. 2.6 Migration of ions, Transport number.2.7 Numericals on Specific conductance, Equivalent conductance and cell constant.	**06**	**07**
Jan.	**Unit:-III** 3.1 Kohlrausch's law, Applications of Kohlrausch's law:i)Determination of equivalent conductance at infinite dilution of weak electrolytes.ii) Determination of degree of dissociation. iii) Determination of solubility of sparingly soluble salts. iv) Determination of absolute ionic mobility. v) Determination of ionic product of water.3.2 Conductometric titrations: (i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv) Weak acid against weak base. (v) Precipitation titration. 3.3 Advantages of conductometric titrations.	**06**	**07**
Jan.	**Part II : Inorganic Chemistry** **[A] Chemistry of Non-transition elements** a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics.b) Zeolite: Definition,preparation,classification and applications. Ultramarine. c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC). d) Fullerene: Preparation, properties, structure and applications.	**05**	**05**
Feb.	**Part I (Physical Chemistry)** **Unit:-IV Photochemistry:** 3.1 Introduction to photochemistry, types of chemical reactions, difference between thermal and photochemical reactions.3.2 Lambert-Beer Law: Light absorption by solution, molar extinction coefficient, transmittance, absorbance, optical density. 3.3 Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law of photochemical equivalence. 3.4 Quantum yield, experimental determination of quantum yield. High and low quantum yield reactions. Reasons for high and low quantum yield. 3.5 Jablonski diagram with various Processes occurring in the excited state. (internal Qualitative description of Fluorescence, phosphorescence, non-radiative processes Conversion, inter- system crossing).Photosensitized reactions. Chemiluminescence. 3.6 Numericals on quantum yield.	**08**	**07**

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DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2017-18

Class : B.SC-T.Y
Title of the Paper & No.: Organic+Inorganic Chemistry XII & XIV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2017-18			
	Organic +Inorganic Chemistry Paper no.XII Semester-V		
Month	**Course content**	**Expected Periods**	**Actual Periods**
June July	**Section – A (Organic Chemistry)** **Unit – I Heterocyclic Compounds** i) Introduction, classification and nomenclature.ii) Molecular orbital structures, resonance structures and reactivity of furan, pyrrole, thiophene and pyridine. iii) General mechanism of electrophilic substitution reactions of furan, pyrrole, thiophene & pyridine.[A] Five-membered heterocycles (1) Furan: (Oxole) 1.1.1Synthesis from: a) Mucic acid b) Succinaldehyde1.1.2 Physical Properties 1.1.3 Chemical Properties:a) Electrophilic Substitution reactions : i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft's acylation v) Gattermann-Koch reaction vi) Gomberg reaction vii) Reaction with n-butyl lithium b) Reduction c) Diel's-Alder reaction (2) Pyrrole : (Azole)1.2.1 Synthesis from: a) Acetylene b) Furan c) Succinimide 1.2.2 Physical properties 1.2.3 Chemical properties: a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-craft acylation v) Gattermann reaction vi) Reimer-Tiemann reaction vii) Coupling reaction b) Reduction c) Ring expansion reaction d) Acidic character (3) Thiophene (Thiole) 1.3.1 Synthesis from: a) Acetylene b) n-butane c) Sodium Succinate 1.3.2 Physical properties 1.3.3 Chemical properties a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft acylation v) Chloromethylation vi) Mercuration vii) Reaction with n-butyl lithium b) Reduction	**06**	**07**
July	**Unit – II : [B] Six-membered heterocyclic compounds** (1) Pyridine: (Azine) 2.1.1 Synthesis from: a) Acetylene b) β -picoline c) Pentamethylenediamine hydrochloride 2.1.2 Physical properties 2.1.3 Chemical properties: a) Electrophilic Substitution reactions: i) Nitration ii) Sulphonation iii) Bromination b) Nucleophilic Substitution reactions: (General mechanism) i) Amination ii) Reaction with KOH iii) Reaction with n-butyl lithium c) Reduction d) Oxidation e) Basic Character [C] Condensed heterocyclic compounds: (1) Indole : (Benzopyrrole) Synthesis by : a) Fischer's Indole Synthesis b) Bischler's Indole Synthesis (2) Quinoline: (Benzopyridine) Synthesis by: a) Skraup Synthesis b) Friedlander Synthesis	**04**	**04**
Aug.	**Section – B (Inorganic Chemistry)** **Unit–V: Coordination Chemistry (Part-I)** 5.1.1 Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound. 5.1.2 Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere. 5.1.3 Nomenclature: Rules of nomenclature of coordination compounds, and its applications to nomenclature of simple and bridging complex compounds. 5.1.4 Werner's theory of coordination compound, postulates, applications with reference to CoCl3.6NH3, CoCl3.5NH3, CoCl3.4NH3, CoCl3.3NH3. 5.1.5 Chelating agents and its classification, difference between metal complex and metal chelate complex. 5.1.6 Isomerism: structural isomerism, ionization, hydrate, linkage, coordination isomerism, geometrical isomerism, optical isomerism in 4 and 6 coordination	**10**	**09**

Dec. **Jan.**	nuclear resonance. 2.5 Equivalent and non-equivalent protons 2.6 Number of absorption singals in the following compounds : a) Acetone b) Cyclobutane c) Methanol d) Ethylbenzene e) Ethyamine f) Mesitylene g) Diethylether 2.7 Shielding and deshielding effects : (Example of Acetylene and Benzene) 2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale 2.9 TMS as reference, Advantages of TMS. 2.10 Peak area (integration) & spin-spin Splitting (n+1) rule 2.11 Definition of coupling constant : (J-values) of first order coupling 2.12 Interpretation of PMR Spectra of following compounds : a) Ethyl bromide b) Ethyl alcohol c) Acetaldehyde d) 1,1,2-tribromo ethane e) Ethyl acetate f) Toluene g) Acetophenone h) Ethylamine i) Acetic acid j) Benzoic acid **(B)** Problems pertaining to the structure elucidation of simple organic compounds using PMR- Spectrosopic data (Supporting IR and UV data to be given) ORGANIC COMPOUNDS : a) n-propyl alcohol b) Iso-Propyl alcohol c) ter.butyl alcohol d) Acetic acid e) Ethylamine f) Ethyl cyanide g) Ethyl methyl ketone h) Ethyl acetate i) Ethyl benzene j) Phenyl acetaldehyde k) Phenol l) Ethyl methyl ether m) Ethylene glycol n) Propionamide o) Propionaldehyde structures.	**04**	**08** **03**
Jan.	**Section –B : Inorganic Chemistry** **Unit-V: Coordination theory (Part-II)** 5.1.1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT. 5.1.2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planarcomplex. Definition of CFSE, calculations of CFSE for octahedral and tetrahedralcomplexes. 5.1.3) Factors affecting 10 Dq or magnitude of crystal field splitting : Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes. 5.1.4) Applications of CFT. 5.1.5) John teller effect in octahedral complexes of Cu++. 5.1.6) Limitations of CFT.	**10**	**10**
Feb.	**Section – A (Organic Chemistry)** **Unit – III: Amino acids and Peptides** **(A) Amino Acids:** 3.1.1 Introduction & classification (acidic, basic and netural). 3.1.2 Dipolar nature of amino acids : Zwitter ion, iso electric point. 3.1.3 Methods of Preparation of α -amino acids : a) From α -halo acids b) By Gabriel's Phthalimide Synthesis c) By Strecker's Synthesis 3.1.4 Chemical Properties of α -amino acids : a) Reactions due to –NH2 group b) Reactions due to –COOH group c) Reactions due to both –NH2 and –COOH groups 3.1.5 Reagents used for identification of amino acids **(B) Peptides:** 3.2.1 Introduction, classification and nomenclature 3.2.2 N-terminus and c-terminus protecting agents 3.2.3 Synthesis of peptides from amino acids : (di- & tri-) a) By protecting – NH2 group (Using carbobenzoxyl chloride) b) By protecting – COOH group (Using benzyl alcohol) 3.2.4 Use of DCC (Dicyclohexyl Carbodiimide) as reagent for peptide bond formation	**06**	**05**
Feb.	**Unit – IV: Molecular Rearrangements** 4.2.1 Introduction, classification of rearrangements: On the basis of migratory group (a)Electrophilic rearrangement (ex. Pinacole – Pinacolone rearrangement) (b) Nucleophilic rearrangement (ex. Favroskii rearrangement) (c)Free Radical rearrangement (ex. PhotoFries rearrangement)(d)Aromatic rearrangement (ex Stevens rearrangement)	**04**	**05**
Mar.	**Section –B : Inorganic Chemistry** **Unit- VI: Electronic Spectra of Transition Metal complexes:** 5.2.1) Types of electronic transition 5.2.2) Selection rule for d-d transistion 5.2.3) Spectroscopic ground state and spectro-chemical series 5.2.4) Orgel energy level diagram or d1and d9 states 5.2.5) Discussion of electronic spectrum of [Ti (H2O)6]3+complex ion	**05**	**05**

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Class : B.SC-F.Y
Title of the Paper & No.: Physical+Inorganic Chemistry II & IV
Name of the Teacher : Mr. G. D. Kottapalle

Physical +Inorganic Chemistry Paper no.II Semester-I

Month	Course content	Expected Periods
July	**(Section –A: Physical Chemistry)** **Unit I: Mathematical concept and SI Units** Logarithm: Rules of logarithm, Characteristic and Mantissa, Change of sign and base, Numerical problems.Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and OH.Graphical representation: Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept and Numerical Problems.Derivative: Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions.Integration: - Rules of integration, Algebraic and exponential functions.Permutation, combinations and Probability, Numerical Problems. **(A)** International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.	07
July	Introduction,Adsorption, mechanism of adsorption, factors affecting adsorption. Difference between adsorption and absorption. Types of adsorption: Physical adsorption and chemical adsorption. Adsorption of gaseous by solids. Adsorption isotherm, Types of adsorption isotherm: i)Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation).	06
Aug.	**A)** General characteristics of S-block elements Variation in properties of S-block elements, atomic radii, ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA. Kinetic molecular theory of gases -Postulates of kinetic molecular theory of gases. Derivation of kinetic gas equation. Ideal and non-ideal gases. Deviation of gases from Ideal behavior and Compressibility factor (Z). Derivation of Van der waals equation, Units for Van der waals constants. Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Vander Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals constants.Liquefaction of gases, Linde's method, Claude's method. Molecular velocities-Root mean square, average and most probable velocities, Relation between molecular velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.Numerical on Vander Waals constants and Critical constants, Root mean square velocities.	10 10

Jan.	**Unit- IV: Catalysis** Introduction to Catalyst and Catalysis.Catalyst-Type of catalyst, positive and negative catalyst with examples.Catalysis:-Type of catalysis, homogenous and heterogeneous catalysis with examples Autocatalysis- explanation with examples. Characteristics of catalytic reactions. Promoters: - Definition, example, explanation of promotion action.Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.Acid – Base catalysis, General Acid-Base catalysis,examples. Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.Applications of catalysis in industries.	**07**
Feb.	**Unit-VI : Chemical Bonding –II** ***Concept of hybridization:*** Definition and explanation of dsp2 hybridization by taking example of [Ni(CN)4]-2, sp3d hybridization by taking example PCl5, Sp3d2 hybridization by taking example SF6. Sp3d3 hybridization by taking example IF7. ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH4, NH3, and H2O. Limitations of VSEPR theory. ***Molecular Orbital Theory:*** Basic principle of MOT, LCAO, Bonding and anti- bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order, Molecular orbital diagram of homo nuclear diatomic molecules such as H2, N2, O2, and Ne2And CO.	**05**

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Sept.	**(Part –II: Inorganic Chemistry)** **[B]Theory of Gravimetric Analysis** a)Introduction , definition of gravimetric analysis.b) Steps involved in gravimetrc analysisc) Precipitation, Conditions for Prcipitation d) types of precipitates. e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product.f) Different Steps involved in gravimetric analysis:i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying, v) Ignition& Inceneration, vi) Weighing.	**05**	**04**
	Physical +Inorganic Chemistry Paper no.IX Semester-IV		
Nov. **Dec.**	**Part I (Physical Chemistry)** **Unit:-I Chemical Kinetics:** 1.1 Introduction: Rate of reaction, Definition and units of rate constant,Factors affecting rate of reaction, Order and Molecularity of reaction.1.2 Zero order reaction: Rate expression and Characteristics.1.3 First order reaction: Rate expression and Characteristics.1.4 Pseudounimolecular reactions.1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants. Characteristics of second order reaction.1.6 Methods of determination of order of a reaction.1.7 Collision theory of reaction rates.1.8 Effect of temperature on reaction rates and Arrhenius equation.1.9 Numericals on first order reactions, half-life method.	**10**	**09**
Dec.	**Unit:-II Electrochemistry:** 2.1 Introduction, Conduction of electricity, Types of conductors: electronic and electrolytic.2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units.2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance.2.4 Conductivity cell, Cell constant and its determination.2.5 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations. Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, Debye-Huckel Onsager's equation and its verification. 2.6 Migration of ions, Transport number.2.7 Numericals on Specific conductance, Equivalent conductance and cell constant.	**06**	**07**
Jan.	**Unit:-III** 3.1 Kohlrausch's law, Applications of Kohlrausch's law:i)Determination of equivalent conductance at infinite dilution of weak electrolytes.ii) Determination of degree of dissociation. iii) Determination of solubility of sparingly soluble salts. iv) Determination of absolute ionic mobility. v) Determination of ionic product of water.3.2 Conductometric titrations: (i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv) Weak acid against weak base. (v) Precipitation titration. 3.3 Advantages of conductometric titrations.	**06**	**07**
Jan.	**Part II : Inorganic Chemistry** **[A] Chemistry of Non-transition elements** a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics.b) Zeolite: Definition,preparation,classification and applications. Ultramarine. c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC). d) Fullerene: Preparation, properties, structure and applications.	**05**	**05**
Feb.	**Part I (Physical Chemistry)** **Unit:-IV Photochemistry:** 3.1 Introduction to photochemistry, types of chemical reactions, difference between thermal and photochemical reactions.3.2 Lambert-Beer Law: Light absorption by solution, molar extinction coefficient, transmittance, absorbance, optical density. 3.3 Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law of photochemical equivalence. 3.4 Quantum yield, experimental determination of quantum yield. High and low quantum yield reactions. Reasons for high and low quantum yield. 3.5 Jablonski diagram with various Processes occurring in the excited state. (internal Qualitative description of Fluorescence, phosphorescence, non-radiative processes Conversion, inter- system crossing).Photosensitized reactions. Chemiluminescence. 3.6 Numericals on quantum yield.	**08**	**07**

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Title of the Paper & No.: Organic+Inorganic Chemistry XII & XIV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2018-19			
	Organic +Inorganic Chemistry Paper no.XII Semester-V		
Month	**Course content**	**Expected Periods**	**Actual Periods**
June **July**	**Section – A (Organic Chemistry)** **Unit – I Heterocyclic Compounds** i) Introduction, classification and nomenclature.ii) Molecular orbital structures, resonance structures and reactivity of furan, pyrrole, thiophene and pyridine. iii) General mechanism of electrophilic substitution reactions of furan, pyrrole, thiophene & pyridine.[A] Five-membered heterocycles (1) Furan: (Oxole) 1.1.1Synthesis from: a) Mucic acid b) Succinaldehyde1.1.2 Physical Properties 1.1.3 Chemical Properties:a) Electrophilic Substitution reactions : i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft's acylation v) Gattermann-Koch reaction vi) Gomberg reaction vii) Reaction with n-butyl lithium b) Reduction c) Diel's-Alder reaction (2) Pyrrole : (Azole)1.2.1 Synthesis from: a) Acetylene b) Furan c) Succinimide 1.2.2 Physical properties 1.2.3 Chemical properties: a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-craft acylation v) Gattermann reaction vi) Reimer-Tiemann reaction vii) Coupling reaction b) Reduction c) Ring expansion reaction d) Acidic character (3) Thiophene (Thiole) 1.3.1 Synthesis from: a) Acetylene b) n-butane c) Sodium Succinate 1.3.2 Physical properties 1.3.3 Chemical properties a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft acylation v) Chloromethylation vi) Mercuration vii) Reaction with n-butyl lithium b) Reduction	**06**	**07**
July	**Unit – II : [B] Six-membered heterocyclic compounds** (1) Pyridine: (Azine) 2.1.1 Synthesis from: a) Acetylene b) β -picoline c) Pentamethylenediamine hydrochloride 2.1.2 Physical properties 2.1.3 Chemical properties: a) Electrophilic Substitution reactions: i) Nitration ii) Sulphonation iii) Bromination b) Nucleophilic Substitution reactions: (General mechanism) i) Amination ii) Reaction with KOH iii) Reaction with n-butyl lithium c) Reduction d) Oxidation e) Basic Character [C] Condensed heterocyclic compounds: (1) Indole : (Benzopyrrole) Synthesis by : a) Fischer's Indole Synthesis b) Bischler's Indole Synthesis (2) Quinoline: (Benzopyridine) Synthesis by: a) Skraup Synthesis b) Friedlander Synthesis	**04**	**04**
Aug.	**Section – B (Inorganic Chemistry)** **Unit–V: Coordination Chemistry (Part-I)** 5.1.1 Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound. 5.1.2 Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere. 5.1.3 Nomenclature: Rules of nomenclature of coordination compounds, and its applications to nomenclature of simple and bridging complex compounds. 5.1.4 Werner's theory of coordination compound, postulates, applications with reference to CoCl3.6NH3, CoCl3.5NH3, CoCl3.4NH3, CoCl3.3NH3. 5.1.5 Chelating agents and its classification, difference between metal complex and metal chelate complex. 5.1.6 Isomerism: structural isomerism, ionization, hydrate, linkage, coordination	**10**	**09**

	Organic +Inorganic Chemistry Paper no.XIV Semester-VI		
Nov. Dec.	**Section – A (Organic Chemistry)** **Unit – I Spectroscopic Methods:** i) Introduction, Electromagnetic radiations; Characteristics of EMR :- a) Wave length b) Wave number c) Frequency d) Energy of EMR ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods. **(A) U. V. Spectroscopy:** 1.1.1 Introduction. 1.1.2 Absorption of U.V.radiations : Beer-Lambert Law and Molar Absorption. 1.1.3 Types of Electronic Transitions. 1.1.4 Terms used in U.V.Spectroscopy : Chromophore, Auxochrome,Bathochromic. Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects. 1.1.5 Effect of conjugation on position of U.V. and Visible bands. 1.1.6 Calculation of λ max by Woodward – Fieser rules for conjugated dienes and enones. 1.1.7 Spectral problems based on U.V. **(B) I.R. Spectroscopy:** 1.2.1 Introduction 1.2.2 Principle of IR Spectroscopy. 1.2.3 Fundamental Modes and types of Vibrations. Hooke's Law. 1.2.4 Conditions for absorption of IR-radiations. 1.2.5 IR Spectrum : Functional group region and Fingerprint region. 1.2.6 Characteristic absorption of various functional groups. 1.2.7 Interpretation of IR spectra of following organic compounds : a) Ethane b) Ethene c) Ethyne d) Benzene e) 1-propanol f) 2-propanol g) t-butyl alcohol h) Phenol i) Acetone j) Acetophenone k) Acetaldehyde l) Benzaldehyde m) Benzoic acid n) Methylbenzoate o) Phenylcyanide	08	09
Dec. Jan.	**Unit – II: (A) NMR – Spectroscopy:** 2.1 Introduction 2.2 Principle of NMR Spectroscopy 2.3 Magnetic and non-magnetic nuclei 2.4 PMR-Spectroscopy :- Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance. 2.5 Equivalent and non-equivalent protons 2.6 Number of absorption singals in the following compounds : a) Acetone b) Cyclobutane c) Methanol d) Ethylbenzene e) Ethyamine f) Mesitylene g) Diethylether 2.7 Shielding and deshielding effects : (Example of Acetylene and Benzene) 2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale 2.9 TMS as reference, Advantages of TMS. 2.10 Peak area (integration) & spin-spin Splitting (n+1) rule 2.11 Definition of coupling constant : (J-values) of first order coupling 2.12 Interpretation of PMR Spectra of following compounds : a) Ethyl bromide b) Ethyl alcohol c) Acetaldehyde d) 1,1,2-tribromo ethane e) Ethyl acetate f) Toluene g) Acetophenone h) Ethylamine i) Acetic acid j) Benzoic acid **(B)** Problems pertaining to the structure elucidation of simple organic compounds using PMR- Spectrosopic data (Supporting IR and UV data to be given) ORGANIC COMPOUNDS : a) n-propyl alcohol b) Iso-Propyl alcohol c) ter.butyl alcohol d) Acetic acid e) Ethylamine f) Ethyl cyanide g) Ethyl methyl ketone h) Ethyl acetate i) Ethyl benzene j) Phenyl acetaldehyde k) Phenol l) Ethyl methyl ether m) Ethylene glycol n) Propionamide o) Propionaldehyde structures.	08 04	08 03
Jan.	**Section –B : Inorganic Chemistry** **Unit-V: Coordination theory (Part-II)** 5.1.1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT. 5.1.2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planarcomplex. Definition of CFSE, calculations of CFSE for octahedral and tetrahedralcomplexes. 5.1.3) Factors affecting 10 Dq or magnitude of crystal field splitting : Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes. 5.1.4) Applications of CFT. 5.1.5) John teller effect in octahedral complexes of Cu++. 5.1.6) Limitations of CFT.	10	10
Feb.	**Section – A (Organic Chemistry)** **Unit – III: Amino acids and Peptides** **(A) Amino Acids:** 3.1.1 Introduction & classification (acidic, basic and netural). 3.1.2 Dipolar nature of	06	05

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2019-20

Class : B.SC-F.Y
Title of the Paper & No.: Physical+Inorganic Chemistry II & IV
Name of the Teacher : Mr. G. D. Kottapalle

Physical +Inorganic Chemistry Paper no.II Semester-I

Month	Course content	Expected Periods
July	**(Section –A: Physical Chemistry)** **Unit I: Mathematical concept and SI Units** **(A)Mathematical concept** Logarithm: Rules of logarithm, Characteristic and Mantissa, Change of sign and base, Numerical problems.Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and OH.Graphical representation: Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept and Numerical Problems.Derivative: Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions.Integration: - Rules of integration, Algebraic and exponential functions.Permutation, combinations and Probability, Numerical Problems. B SI unit International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.	07
July	II surface chemistry Introduction,Adsorption, mechanism of adsorption, factors affecting adsorption. Difference between adsorption and absorption. Types of adsorption: Physical adsorption and chemical adsorption. Adsorption of gaseous by solids. Adsorption isotherm, Types of adsorption isotherm: i)Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation).	06
Aug.	unit-V A) s-Block elements General characteristics of S-block elements Variation in properties of S-block elements, atomic radii, ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA. III Gaseous State Kinetic molecular theory of gases -Postulates of kinetic molecular theory of gases. Derivation of kinetic gas equation. Ideal and non-ideal gases. Deviation of gases from Ideal behavior and Compressibility factor (Z). Derivation of Van der waals equation, Units for Van der waals constants. Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Vander Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals constants.Liquefaction of gases, Linde's method, Claude's method. Molecular velocities-Root mean square, average and most probable velocities, Relation between molecular velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.Numerical on Vander Waals constants and Critical constants, Root mean square velocities.	10 10

Jan.	IV Introduction to Catalyst and Catalysis.Catalyst-Type of catalyst, positive and negative catalyst with examples.Catalysis:-Type of catalysis, homogenous and heterogeneous catalysis with examples Autocatalysis- explanation with examples. Characteristics of catalytic reactions. Promoters: - Definition, example, explanation of promotion action.Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.Acid – Base catalysis, General Acid-Base catalysis,examples. Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.Applications of catalysis in industries.	**07**
Feb.	II ***Concept of hybridization:*** Definition and explanation of dsp2 hybridization by taking example of [Ni(CN)4]-2, sp3d hybridization by taking example PCl5, Sp3d2 hybridization by taking example SF6. Sp3d3 hybridization by taking example IF7. ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH4, NH3, and H2O. Limitations of VSEPR theory. ***Molecular Orbital Theory:*** Basic principle of MOT, LCAO, Bonding and anti- bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order,Molecular orbital diagram of homo nuclear diatomic molecules such as H2, N2, O2, and Ne2And CO.	**05**

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Digambarrao Bindu College, Bhokar,
Dist. Nanded.

Sept.	**[B]Theory of Gravimetric Analysis** a)Introduction, definition of gravimetric analysis.b) Steps involved in gravimetrc analysisc) Precipitation, Conditions for Prcipitation d) types of precipitates. e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product.f) Different Steps involved in gravimetric analysis:i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying, v) Ignition& Inceneration, vi) Weighing.	**05**	**05**
	Physical +Inorganic Chemistry Paper no.IX Semester-IV		
Nov. **Dec.**	**(Part I-Physical Chemistry)** **Unit:-I Chemical Kinetics:** 1.1 Introduction: Rate of reaction, Definition and units of rate constant,Factors affecting rate of reaction, Order and Molecularity of reaction.1.2 Zero order reaction: Rate expression and Characteristics.1.3 First order reaction: Rate expression and Characteristics.1.4 Pseudounimolecular reactions.1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants. Characteristics of second order reaction.1.6 Methods of determination of order of a reaction.1.7 Collision theory of reaction rates.1.8 Effect of temperature on reaction rates and Arrhenius equation.1.9 Numericals on first order reactions, half-life method.	**10**	**09**
Dec.	**Unit:-II Electrochemistry:** 2.1 Introduction, Conduction of electricity, Types of conductors: electronic and electrolytic.2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units.2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance.2.4 Conductivity cell, Cell constant and its determination.2.5 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations. Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, Debye-Huckel Onsager's equation and its verification. 2.6 Migration of ions, Transport number.2.7 Numericals on Specific conductance, Equivalent conductance and cell constant.	**06**	**07**
Jan.	**Unit:-III** 3.1 Kohlrausch's law, Applications of Kohlrausch's law:i)Determination of equivalent conductance at infinite dilution of weak electrolytes.ii) Determination of degree of dissociation. iii) Determination of solubility of sparingly soluble salts. iv) Determination of absolute ionic mobility. v) Determination of ionic product of water.3.2 Conductometric titrations: (i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv) Weak acid against weak base. (v) Precipitation titration. 3.3 Advantages of conductometric titrations.	**06**	**07**
Feb.	**Unit:-IV Photochemistry:** 3.1 Introduction to photochemistry, types of chemical reactions, difference between thermal and photochemical reactions.3.2 Lambert-Beer Law: Light absorption by solution, molar extinction coefficient, transmittance, absorbance, optical density. 3.3 Laws of photochemistry: Grothus-Drapper law, Stark-Einstein law of photochemical equivalence. 3.4 Quantum yield, experimental determination of quantum yield. High and low quantum yield reactions. Reasons for high and low quantum yield. 3.5 Jablonski diagram with various Processes occurring in the excited state. (internal Qualitative description of Fluorescence, phosphorescence, non-radiative processes Conversion, inter- system crossing).Photosensitized reactions. Chemiluminescence. 3.6 Numericals on quantum yield.	**08**	**07**
	Name of the Teacher: Dr. P. D. Tawade		
Jan.	**Part II : Inorganic Chemistry** **[A] Chemistry of Non-transition elements** a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics.b) Zeolite: Definition,preparation,classification and applications. Ultramarine. c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC). d) Fullerene: Preparation, properties, structure and applications.	**05**	**05**

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2019-20

Class : B.SC-T.Y
Title of the Paper & No.: Organic+Inorganic Chemistry XII & XIV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2019-20			
	Organic +Inorganic Chemistry Paper no.XII Semester-V		
Month	**Course content**	**Expected Periods**	**Actual Periods**
June **July**	**Section – A (Organic Chemistry)** **Unit – I Heterocyclic Compounds** i) Introduction, classification and nomenclature.ii) Molecular orbital structures, resonance structures and reactivity of furan, pyrrole, thiophene and pyridine. iii) General mechanism of electrophilic substitution reactions of furan, pyrrole, thiophene & pyridine.[A] Five-membered heterocycles (1) Furan: (Oxole) 1.1.1Synthesis from: a) Mucic acid b) Succinaldehyde1.1.2 Physical Properties 1.1.3 Chemical Properties:a) Electrophilic Substitution reactions : i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft's acylation v) Gattermann-Koch reaction vi) Gomberg reaction vii) Reaction with n-butyl lithium b) Reduction c) Diel's-Alder reaction (2) Pyrrole : (Azole)1.2.1 Synthesis from: a) Acetylene b) Furan c) Succinimide 1.2.2 Physical properties 1.2.3 Chemical properties: a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-craft acylation v) Gattermann reaction vi) Reimer-Tiemann reaction vii) Coupling reaction b) Reduction c) Ring expansion reaction d) Acidic character (3) Thiophene (Thiole) 1.3.1 Synthesis from: a) Acetylene b) n-butane c) Sodium Succinate 1.3.2 Physical properties 1.3.3 Chemical properties a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft acylation v) Chloromethylation vi) Mercuration vii) Reaction with n-butyl lithium b) Reduction	**06**	**07**
July	**Unit – II : [B] Six-membered heterocyclic compounds** (1) Pyridine: (Azine) 2.1.1 Synthesis from: a) Acetylene b) β -picoline c) Pentamethylenediamine hydrochloride 2.1.2 Physical properties 2.1.3 Chemical properties: a) Electrophilic Substitution reactions: i) Nitration ii) Sulphonation iii) Bromination b) Nucleophilic Substitution reactions: (General mechanism) i) Amination ii) Reaction with KOH iii) Reaction with n-butyl lithium c) Reduction d) Oxidation e) Basic Character [C] Condensed heterocyclic compounds: (1) Indole : (Benzopyrrole) Synthesis by : a) Fischer's Indole Synthesis b) Bischler's Indole Synthesis (2) Quinoline: (Benzopyridine) Synthesis by: a) Skraup Synthesis b) Friedlander Synthesis	**04**	**04**
Aug.	**Section – B (Inorganic Chemistry)** **Unit–V: Coordination Chemistry (Part-I)** 5.1.1 Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound. 5.1.2 Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere. 5.1.3 Nomenclature: Rules of nomenclature of coordination compounds, and its applications to nomenclature of simple and bridging complex compounds. 5.1.4 Werner's theory of coordination compound, postulates, applications with reference to CoCl3.6NH3, CoCl3.5NH3, CoCl3.4NH3, CoCl3.3NH3. 5.1.5 Chelating agents and its classification, difference between metal complex and metal chelate complex. 5.1.6 Isomerism: structural isomerism, ionization, hydrate, linkage, coordination	**10**	**09**

	Organic +Inorganic Chemistry Paper no.XIV Semester-VI		
Nov. **Dec.**	**Section – A (Organic Chemistry)** **Unit – I Spectroscopic Methods:** i) Introduction, Electromagnetic radiations; Characteristics of EMR :- a) Wave length b) Wave number c) Frequency d) Energy of EMR ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods. **(A) U. V. Spectroscopy:** 1.1.1 Introduction. 1.1.2 Absorption of U.V.radiations : Beer-Lambert Law and Molar Absorption. 1.1.3 Types of Electronic Transitions. 1.1.4 Terms used in U.V.Spectroscopy : Chromophore, Auxochrome,Bathochromic. Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects. 1.1.5 Effect of conjugation on position of U.V. and Visible bands. 1.1.6 Calculation of λ max by Woodward – Fieser rules for conjugated dienes and enones. 1.1.7 Spectral problems based on U.V. **(B) I.R. Spectroscopy:** 1.2.1 Introduction 1.2.2 Principle of IR Spectroscopy. 1.2.3 Fundamental Modes and types of Vibrations. Hooke's Law. 1.2.4 Conditions for absorption of IR-radiations. 1.2.5 IR Spectrum : Functional group region and Fingerprint region. 1.2.6 Characteristic absorption of various functional groups. 1.2.7 Interpretation of IR spectra of following organic compounds : a) Ethane b) Ethene c) Ethyne d) Benzene e) 1-propanol f) 2-propanol g) t-butyl alcohol h) Phenol i) Acetone j) Acetophenone k) Acetaldehyde l) Benzaldehyde m) Benzoic acid n) Methylbenzoate o) Phenylcyanide	**08**	**09**
Dec.	**Unit – II: (A) NMR – Spectroscopy:** 2.1 Introduction 2.2 Principle of NMR Spectroscopy 2.3 Magnetic and non-magnetic nuclei 2.4 PMR-Spectroscopy :- Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance. 2.5 Equivalent and non-equivalent protons 2.6 Number of absorption singals in the following compounds : a) Acetone b) Cyclobutane c) Methanol d) Ethylbenzene e) Ethyamine f) Mesitylene g) Diethylether 2.7 Shielding and deshielding effects : (Example of Acetylene and Benzene) 2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale 2.9 TMS as reference, Advantages of TMS. 2.10 Peak area (integration) & spin-spin Splitting (n+1) rule 2.11 Definition of coupling constant : (J-values) of first order coupling 2.12 Interpretation of PMR Spectra of following compounds : a) Ethyl bromide b) Ethyl alcohol c) Acetaldehyde d) 1,1,2-tribromo ethane e) Ethyl acetate f) Toluene g) Acetophenone h) Ethylamine i) Acetic acid j) Benzoic acid	**08**	**08**
Jan.	**(B)** Problems pertaining to the structure elucidation of simple organic compounds using PMR- Spectrosopic data (Supporting IR and UV data to be given) ORGANIC COMPOUNDS : a) n-propyl alcohol b) Iso-Propyl alcohol c) ter.butyl alcohol d) Acetic acid e) Ethylamine f) Ethyl cyanide g) Ethyl methyl ketone h) Ethyl acetate i) Ethyl benzene j) Phenyl acetaldehyde k) Phenol l) Ethyl methyl ether m) Ethylene glycol n) Propionamide o) Propionaldehyde structures.	**04**	**03**
Jan.	**Section –B : Inorganic Chemistry** **Unit-V: Coordination theory (Part-II)** 5.1.1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT. 5.1.2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planarcomplex. Definition of CFSE, calculations of CFSE for octahedral and tetrahedralcomplexes. 5.1.3) Factors affecting 10 Dq or magnitude of crystal field splitting : Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes. 5.1.4) Applications of CFT. 5.1.5) John teller effect in octahedral complexes of Cu++. 5.1.6) Limitations of CFT.	**10**	**10**
Feb.	**Section – A (Organic Chemistry)** **Unit – III: Amino acids and Peptides** **(A) Amino Acids:**	**06**	**05**

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2020-21

Class : B.SC-F.Y
Title of the Paper & No.: Physical+Inorganic Chemistry II & IV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2020-21

Physical +Inorganic Chemistry Paper no.II Semester-I

Month	Course content	Expected Periods
Sept.	**(Section –A: Physical Chemistry)** **Unit I: Mathematical concept and SI Units** **(A)Mathematical concept** Logarithm: Rules of logarithm, Characteristic and Mantissa, Change of sign and base, Numerical problems.Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and OH.Graphical representation: Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept and Numerical Problems.Derivative: Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions.Integration: - Rules of integration, Algebraic and exponential functions.Permutation, combinations and Probability, Numerical Problems. **(B)SI Units:** International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.	07
Oct.	**Unit II: Surface Chemistry** Introduction,Adsorption, mechanism of adsorption, factors affecting adsorption. Difference between adsorption and absorption. Types of adsorption: Physical adsorption and chemical adsorption. Adsorption of gaseous by solids. Adsorption isotherm, Types of adsorption isotherm: i)Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation). **Unit V: [A] S-Block Elements:** General characteristics of S-block elements Variation in properties of S-block elements, atomic radii, ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.	06 10
Nov.	Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA. **Unit III: Gaseous State** Kinetic molecular theory of gases -Postulates of kinetic molecular theory of gases. Derivation of kinetic gas equation. Ideal and non-ideal gases. Deviation of gases from Ideal behavior and Compressibility factor (Z). Derivation of Van der waals equation, Units for Van der waals constants. Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Vander Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals constants.Liquefaction of gases, Linde's method, Claude's method.	10
Dec.	Molecular velocities-Root mean square, average and most probable velocities, Relation between molecular velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.Numerical on Vander Waals constants and Critical constants, Root mean square velocities.	

	catalysis with examples Autocatalysis- explanation with examples. Characteristics of catalytic reactions. Promoters: - Definition, example, explanation of promotion action.Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.Acid – Base catalysis, General Acid-Base catalysis,examples. Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.Applications of catalysis in industries. **Unit-VI : Chemical Bonding –II** ***Concept of hybridization:*** Definition and explanation of dsp2 hybridization by taking example of [Ni(CN)4]-2, sp3d hybridization by taking example PCl5, Sp3d2 hybridization by taking example SF6. Sp3d3 hybridization by taking example IF7. ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH4, NH3, and H2O. Limitations of VSEPR theory.	**05**
May.	**Molecular Orbital Theory:** Basic principle of MOT, LCAO, Bonding and anti- bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order,Molecular orbital diagram of homo nuclear diatomic molecules such as H2, N2, O2, and Ne2And CO.	

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	4.2 Phase equilibria of one component system: Water system, Sulphursystem. 4.3 Phase equilibria of two component system: Pb-Ag system, significance of lead – silver system. 4.4Solubility of partially miscible liquids: Critical solution temperature (CST) OR Consolute temperature, upper critical solution temperature (UCST).Lowers critical solution temperature(LCST). 4.5 Phenol water system. Effect of impurities on critical solution temperature. **Part II (Inorganic Chemistry)** **Unit:- V [B] Theory of Gravimetric Analysis.** a) Introduction , definition of gravimetric analysis. b) Steps involved in gravimetric analysis c) Precipitation, Conditions for Precipitation d) Types of precipitates. e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product. f) Different Steps involved in gravimetric analysis: i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying,v) Ignition &Inceneration,vi) Weighing.	**05**	**05**
	Physical +Inorganic Chemistry Paper no.IX Semester-IV		
Feb.	**(Part I-Physical Chemistry)** **Unit:-I Chemical-Kinetics: -** 1.1 Introduction: Rate of reaction, Definition and units of rate constant, Factors affecting rate of reaction, Order and Molecularity of reaction. 1.2 Zero order reaction: Rate expression and Characteristics. 1.3 First order reaction: Rate expression and Characteristics. 1.4 Pseudounimolecular reactions. 1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants. 1.6 Characteristics of second order reaction. 1.7 Methods of determination of order of a reaction. 1.8 Arrhenius equation. 1.9 Numericals on half-life method. **Unit:-II Electrochemistry:-** **2.1 Introduction, Types of conductors: electronic and electrolytic.** 2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units. 2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance. 2.4 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations.	**10** **06**	**09** **06**
Mar.	2.5Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, 2.6 Debye-Huckel Onsager's equation and its verification. 2.7 Numericals on Specific conductance, Equivalent conductance and cell constant. **Unit:-III Electrochemistry:-II** 3.1 Kohlrausch's law, Applications of Kohlrausch's law: i) Determination of equivalent conductance at infinite dilution of weak electrolytes. ii) Determination of degree of dissociation. iii) Determination of solubility of sparingly soluble salts. iv) Determination of absolute ionic mobility. v) Determination of ionic product of water. 3.2 Conductometric titrations: (i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv)weak acid against weak base(v) Precipitation titration 3.3 Advantages of conductometric titrations.	**06**	**07**
Apr.	**Part II (Inorganic Chemistry)** **Unit:-V [A] Chemistry of Non-transition elements:** a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics. b) Zeolite: Definition, preparation, classification and applications. Ultramarine. c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC).	**05**	**04**

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2020-21

Class : B.SC-T.Y
Title of the Paper & No.: Organic+Inorganic Chemistry XII & XIV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2020-21			
	Organic +Inorganic Chemistry Paper no.XII Semester-V		
Month	**Course content**	**Expected Periods**	**Actual Periods**
June **July**	**Section – A (Organic Chemistry)** **Unit – I Heterocyclic Compounds** i) Introduction, classification and nomenclature.ii) Molecular orbital structures, resonance structures and reactivity of furan, pyrrole, thiophene and pyridine. iii) General mechanism of electrophilic substitution reactions of furan, pyrrole, thiophene & pyridine.[A] Five-membered heterocycles (1) Furan: (Oxole) 1.1.1Synthesis from: a) Mucic acid b) Succinaldehyde1.1.2 Physical Properties 1.1.3 Chemical Properties:a) Electrophilic Substitution reactions : i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft's acylation v) Gattermann-Koch reaction vi) Gomberg reaction vii) Reaction with n-butyl lithium b) Reduction c) Diel's-Alder reaction (2) Pyrrole : (Azole)1.2.1 Synthesis from: a) Acetylene b) Furan c) Succinimide 1.2.2 Physical properties 1.2.3 Chemical properties: a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-craft acylation v) Gattermann reaction vi) Reimer-Tiemann reaction vii) Coupling reaction b) Reduction c) Ring expansion reaction d) Acidic character (3) Thiophene (Thiole) 1.3.1 Synthesis from: a) Acetylene b) n-butane c) Sodium Succinate 1.3.2 Physical properties 1.3.3 Chemical properties a) Electrophilic substitution reactions: i) Nitration ii) Sulphonation iii) Halogenation iv) Friedel-Craft acylation v) Chloromethylation vi) Mercuration vii) Reaction with n-butyl lithium b) Reduction	**06**	**07**
July	**Unit – II : [B] Six-membered heterocyclic compounds** (1) Pyridine: (Azine) 2.1.1 Synthesis from: a) Acetylene b) β -picoline c) Pentamethylenediamine hydrochloride 2.1.2 Physical properties 2.1.3 Chemical properties: a) Electrophilic Substitution reactions: i) Nitration ii) Sulphonation iii) Bromination b) Nucleophilic Substitution reactions: (General mechanism) i) Amination ii) Reaction with KOH iii) Reaction with n-butyl lithium c) Reduction d) Oxidation e) Basic Character [C] Condensed heterocyclic compounds: (1) Indole : (Benzopyrrole) Synthesis by : a) Fischer's Indole Synthesis b) Bischler's Indole Synthesis (2) Quinoline: (Benzopyridine) Synthesis by: a) Skraup Synthesis b) Friedlander Synthesis	**04**	**04**
Aug.	**Section – B (Inorganic Chemistry)** **Unit–V: Coordination Chemistry (Part-I)** 5.1.1 Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound. 5.1.2 Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere. 5.1.3 Nomenclature: Rules of nomenclature of coordination compounds, and its applications to nomenclature of simple and bridging complex compounds. 5.1.4 Werner's theory of coordination compound, postulates, applications with reference to CoCl3.6NH3, CoCl3.5NH3, CoCl3.4NH3, CoCl3.3NH3. 5.1.5 Chelating agents and its classification, difference between metal complex and metal chelate complex. 5.1.6 Isomerism: structural isomerism, ionization, hydrate, linkage, coordination	**10**	**09**

	Organic +Inorganic Chemistry Paper no.XIV Semester-VI		
Nov. Dec.	**Section – A (Organic Chemistry)** **Unit – I Spectroscopic Methods:** i) Introduction, Electromagnetic radiations; Characteristics of EMR :- a) Wave length b) Wave number c) Frequency d) Energy of EMR ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods. **(A) U. V. Spectroscopy:** 1.1.1 Introduction. 1.1.2 Absorption of U.V.radiations : Beer-Lambert Law and Molar Absorption. 1.1.3 Types of Electronic Transitions. 1.1.4 Terms used in U.V.Spectroscopy : Chromophore, Auxochrome,Bathochromic. Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects. 1.1.5 Effect of conjugation on position of U.V. and Visible bands. 1.1.6 Calculation of λ max by Woodward – Fieser rules for conjugated dienes and enones. 1.1.7 Spectral problems based on U.V. **(B) I.R. Spectroscopy:** 1.2.1 Introduction 1.2.2 Principle of IR Spectroscopy. 1.2.3 Fundamental Modes and types of Vibrations. Hooke's Law. 1.2.4 Conditions for absorption of IR-radiations. 1.2.5 IR Spectrum : Functional group region and Fingerprint region. 1.2.6 Characteristic absorption of various functional groups. 1.2.7 Interpretation of IR spectra of following organic compounds : a) Ethane b) Ethene c) Ethyne d) Benzene e) 1-propanol f) 2-propanol g) t-butyl alcohol h) Phenol i) Acetone j) Acetophenone k) Acetaldehyde l) Benzaldehyde m) Benzoic acid n) Methylbenzoate o) Phenylcyanide	08	09
Dec. Jan.	**Unit – II: (A) NMR – Spectroscopy:** 2.1 Introduction 2.2 Principle of NMR Spectroscopy 2.3 Magnetic and non-magnetic nuclei 2.4 PMR-Spectroscopy :- Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance. 2.5 Equivalent and non-equivalent protons 2.6 Number of absorption singals in the following compounds : a) Acetone b) Cyclobutane c) Methanol d) Ethylbenzene e) Ethyamine f) Mesitylene g) Diethylether 2.7 Shielding and deshielding effects : (Example of Acetylene and Benzene) 2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale 2.9 TMS as reference, Advantages of TMS. 2.10 Peak area (integration) & spin-spin Splitting (n+1) rule 2.11 Definition of coupling constant : (J-values) of first order coupling 2.12 Interpretation of PMR Spectra of following compounds : a) Ethyl bromide b) Ethyl alcohol c) Acetaldehyde d) 1,1,2-tribromo ethane e) Ethyl acetate f) Toluene g) Acetophenone h) Ethylamine i) Acetic acid j) Benzoic acid **(B)** Problems pertaining to the structure elucidation of simple organic compounds using PMR- Spectrosopic data (Supporting IR and UV data to be given) ORGANIC COMPOUNDS : a) n-propyl alcohol b) Iso-Propyl alcohol c) ter.butyl alcohol d) Acetic acid e) Ethylamine f) Ethyl cyanide g) Ethyl methyl ketone h) Ethyl acetate i) Ethyl benzene j) Phenyl acetaldehyde k) Phenol l) Ethyl methyl ether m) Ethylene glycol n) Propionamide o) Propionaldehyde structures.	08 04	08 03
Jan.	**Section –B : Inorganic Chemistry** **Unit-V: Coordination theory (Part-II)** 5.1.1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT. 5.1.2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planarcomplex. Definition of CFSE, calculations of CFSE for octahedral and tetrahedralcomplexes. 5.1.3) Factors affecting 10 Dq or magnitude of crystal field splitting : Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes. 5.1.4) Applications of CFT. 5.1.5) John teller effect in octahedral complexes of Cu++. 5.1.6) Limitations of CFT.	10	10
Feb.	**Section – A (Organic Chemistry)** **Unit – III: Amino acids and Peptides** **(A) Amino Acids:**	06	05

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2021-22

Class : B.SC-F.Y
Title of the Paper & No.: Physical+Inorganic Chemistry II & IV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2021-22

Physical +Inorganic Chemistry Paper no.II Semester-I

Month	Course content	Expected Periods
Sept.	**(Section –A: Physical Chemistry)** **Unit I: Mathematical concept and SI Units** **(A)Mathematical concept** Logarithm: Rules of logarithm, Characteristic and Mantissa, Change of sign and base, Numerical problems.Definition of pH and pOH, Relation between pH and POH, Numerical Problems based on pH and OH.Graphical representation: Rules for drawing graph, coordinates etc., Equation of straight lines, slope and intercept and Numerical Problems.Derivative: Rules of differentiation, partial differentiation, Algebraic, logarithmic and exponential functions.Integration: - Rules of integration, Algebraic and exponential functions.Permutation, combinations and Probability, Numerical Problems. **(B)SI Units:** International systems of units, derived units, subsidiary units, prefixes used in SI units, internal conversions of these units.	07
Oct.	**Unit II: Surface Chemistry** Introduction,Adsorption, mechanism of adsorption, factors affecting adsorption. Difference between adsorption and absorption. Types of adsorption: Physical adsorption and chemical adsorption. Adsorption of gaseous by solids. Adsorption isotherm, Types of adsorption isotherm: i)Freundlich adsorption isotherm ii) Langmuir adsorption isotherm (Derivation). **Unit V: [A] S-Block Elements:** General characteristics of S-block elements Variation in properties of S-block elements, atomic radii, ionization potential, colour of flame, reducing property and metallic property, diagonal relationship between Li and Mg, Points of difference between Li and other alkali metals. General study of hydrides of IA and IIA group. General studies of Oxides IA and IIA group, Basic strength of hydroxides of alkali and alkaline earth metals , Carbonates and bicarbonates of alkali and alkaline earth metals.	06 10
Nov.	Complexes of alkali metals with salicylaldehyde ,acetylacetone. wrap around complexes with polydentate ligand such as crown ether and cryptate. Complexes of alkaline earth metals such as beryllium oxalate ion, chlorophyll and complex of calcium with EDTA. **Unit III: Gaseous State** Kinetic molecular theory of gases -Postulates of kinetic molecular theory of gases. Derivation of kinetic gas equation. Ideal and non-ideal gases. Deviation of gases from Ideal behavior and Compressibility factor (Z). Derivation of Van der waals equation, Units for Van der waals constants. Critical phenomenon-The P-V isotherms of Carbon dioxide, application of Vander Waals' equation to the isotherms of Carbon dioxide, relation between critical constants and Van der Waals constants.Liquefaction of gases, Linde's method, Claude's method.	10
Dec.	Molecular velocities-Root mean square, average and most probable velocities, Relation between molecular velocities, qualitative discussion of the Maxwell's distribution of molecular velocities.Numerical on Vander Waals constants and Critical constants, Root mean square velocities.	

	catalysis with examples Autocatalysis- explanation with examples. Characteristics of catalytic reactions. Promoters: - Definition, example, explanation of promotion action.Catalytic poisoning: - Definition, example, explanation of catalytic poisoning.Acid – Base catalysis, General Acid-Base catalysis,examples. Enzyme catalysis, examples, mechanism of enzyme catalysis, characteristics of enzyme catalysis.Applications of catalysis in industries. **Unit-VI : Chemical Bonding –II** ***Concept of hybridization:*** Definition and explanation of dsp2 hybridization by taking example of [Ni(CN)4]-2, sp3d hybridization by taking example PCl5, Sp3d2 hybridization by taking example SF6. Sp3d3 hybridization by taking example IF7. ***VSEPR Theory:*** Postulates and explanation, Applications in explaining geometry and bond angle in molecules such as CH4, NH3, and H2O. Limitations of VSEPR theory.	**05**
May.	**Molecular Orbital Theory:** Basic principle of MOT, LCAO, Bonding and anti- bonding molecular orbital, Energy level diagram for molecular orbital. Rules for adding electrons in MO's, Bond order,Molecular orbital diagram of homo nuclear diatomic molecules such as H2, N2, O2, and Ne2And CO.	

Sign of Teacher

Assistant Professor
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Head

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	4.2 Phase equilibria of one component system: Water system, Sulphursystem. 4.3 Phase equilibria of two component system: Pb-Ag system, significance of lead – silver system. 4.4Solubility of partially miscible liquids: Critical solution temperature (CST) OR Consolute temperature, upper critical solution temperature (UCST).Lowers critical solution temperature(LCST). 4.5 Phenol water system. Effect of impurities on critical solution temperature. **Part II (Inorganic Chemistry)** **Unit:- V [B] Theory of Gravimetric Analysis.** a) Introduction , definition of gravimetric analysis. b) Steps involved in gravimetric analysis c) Precipitation, Conditions for Precipitation d) Types of precipitates. e) Factors affecting precipitation such as temperature and pH, Solubility and Solubility Product. f) Different Steps involved in gravimetric analysis: i) Precipitation, ii) Digestion , iii) Filtration & Washing, iv) Drying,v) Ignition &Inceneration,vi) Weighing.	**05**	**05**
	Physical +Inorganic Chemistry Paper no.IX Semester-IV		
Feb.	**(Part I-Physical Chemistry)** **Unit:-I Chemical-Kinetics: -** 1.1 Introduction: Rate of reaction, Definition and units of rate constant, Factors affecting rate of reaction, Order and Molecularity of reaction. 1.2 Zero order reaction: Rate expression and Characteristics. 1.3 First order reaction: Rate expression and Characteristics. 1.4 Pseudounimolecular reactions. 1.5 Second order reaction: Derivation of rate constant for equal and unequal concentrations of the reactants. 1.6 Characteristics of second order reaction. 1.7 Methods of determination of order of a reaction. 1.8 Arrhenius equation. 1.9 Numericals on half-life method. **Unit:-II Electrochemistry:-** **2.1 Introduction, Types of conductors: electronic and electrolytic.** 2.2 Conductance of electrolytes: Conductance, Specificresistance, Specific conductance, Equivalent conductance, Molecular conductance and their units. 2.3 Variation of specific and equivalent conductance with dilution, Equivalent conductance at infinite dilution. Effect of temperature on conductance. 2.4 Strong and weak electrolyte. Arrhenius theory of electrolytic dissociation and its limitations.	**10** **06**	**09** **06**
Mar.	2.5Debye-Huckel theory of strong electrolytes. Relaxation effect and electrophoretic effect, 2.6 Debye-Huckel Onsager's equation and its verification. 2.7 Numericals on Specific conductance, Equivalent conductance and cell constant. **Unit:-III Electrochemistry:-II** 3.1 Kohlrausch's law, Applications of Kohlrausch's law: i) Determination of equivalent conductance at infinite dilution of weak electrolytes. ii) Determination of degree of dissociation. iii) Determination of solubility of sparingly soluble salts. iv) Determination of absolute ionic mobility. v) Determination of ionic product of water. 3.2 Conductometric titrations: (i) Strong acid against strong base. (ii) Strong acid against weak base (iii) Weak acid against strong base. (iv)weak acid against weak base(v) Precipitation titration 3.3 Advantages of conductometric titrations.	**06**	**07**
Apr.	**Part II (Inorganic Chemistry)** **Unit:-V [A] Chemistry of Non-transition elements:** a) Silicates: Definition, Basic Unit of silicate and classification on the basis of basic unit and their characteristics. b) Zeolite: Definition, preparation, classification and applications. Ultramarine. c) Carbide: Definition, classification, preparation, properties and structure of ionic or salt like carbides (CaC2), Metallic carbide (TiC) and covalent carbides (SiC).	**05**	**04**

DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF CHEMISTRY

ANNUAL TEACHING PLAN-2021-22

Class : B.SC-T.Y
Title of the Paper & No.: Organic+Inorganic Chemistry XII & XIV
Name of the Teacher : Mr. G. D. Kottapalle

ANNUAL TEACHING PLAN 2021-22			
	Organic +Inorganic Chemistry Paper no.XII Semester-V		
Month	**Course content**	**Expected Periods**	**Actual Periods**
Sept.	**Section – A (Organic Chemistry)** **Unit: I Heterocyclic Compounds** Introduction, definition, nomenclature and classification. Simple five membered heterocycles with one hetero atom: Furan, Thiophene and Pyrrole. Aromatic character and molecular orbital picture of Furan, Thiophene and Pyrrole. General mechanism of electrophilic substitution reaction with reactivity. Preparation and chemical properties of five membered heterocycles. 1) Furan: Synthesis from: a) Mucic acid b) Succinaldehyde. Physical Properties, Chemical Properties: Nitration, Gatterman-Koch reaction, Gomberg reaction, Diels-Alder reaction and Reduction reaction. 2) Pyrrole: Synthesis from: a) Furan b) Succinamide. Physical properties, Chemical Properties: Sulphonation, Gatterman Reaction, Reimer-Tiemann reaction, Ring Expansion, Coupling reaction and Reduction reaction. 3) Thiophene: Synthesis from: a) n-Butane b) Sodium Succinate, Physical properties. Chemical Properties: Halogenation, Chloromethylation, Mercuration, Reaction with n-Butyl Lithium and Reduction reaction. **Unit: II Six Membered Heterocycles: Pyridine** Introduction, Nomenclature, Aromatic character, Basic character and comparison with Pyrrole , General Mechanism for electrophilic substitution reaction and nucleophilic substitution reaction Synthesis from: a) Acetylene b) Pentamethylene diamine hydrochloride c) β-Picoline	**06** **04**	**06** **04**
Oct.	Chemical Properties: Nitration, Sulphonation, Halogenation, reaction with KOH, Amination reaction. **Section – B (Inrganic Chemistry)** **Unit–V: Coordination Chemistry (Part-I)** 1) Introduction: addition or molecular compound, double salt, coordination compound. Comparison of double salt and coordination compound. 2) Terminology: complex ion, central metal atom, ligand, types of ligands, coordination number and coordination sphere. 3) Nomenclature: Rules of nomenclature of coordination compound, and its applications to nomenclature of simple and bridging complex compounds. 4) Werner's theory of coordination compound, postulates, applications with reference to CoCl3.6NH3, CoCl3.5NH3, CoCl3.4NH3, CoCl3.3NH3. 5) Chelating agents and its classification, difference between metal complex and metal chelate complex. 6) Isomerism: Structural isomerism, ionization, hydrate, linkage, coordination isomerism, Geometrical isomerism, optical isomerism in 4 and 6 coordination complex. 7) E. A. N. of metal complexes. **Unit: III Synthetic Drugs and Dyes** (1) **Synthetic Drugs**: Introduction, Definition of drugs, qualities of good drug, Classification of drugs based on therapeutic action. a) Pharmacodynamic agents :	**10** **10**	**11** **09**

	Organic +Inorganic Chemistry Paper no.XIV Semester-VI		
Feb.	**Section – A (Organic Chemistry)** **Unit-I: Spectroscopic Methods: 08 Periods** i) Introduction, Electromagnetic radiations; Characteristics of EMR: a) Wave length b) Wave number, c) Frequency, d) Energy of EMR. ii) Electromagnetic spectrum; Meaning of Spectroscopy, types of Spectroscopy and advantages of Spectroscopic methods. **(A) Ultraviolet Spectroscopy:** 1.1.1 Introduction. 1.1.2 Types of Electronic Transitions. 1.1.3 Terms used in UVSpectroscopy: Chromophore, Auxochrome, Bathochromic Shift, Hypsochromic Shift, Hypochromic and Hyperchromic effects. 1.1.4 Effect of conjugation on position of UV and Visible bands. 1.1.5 Calculation of λmax by Woodward-Fieser rules for conjugated dienes and enones. 1.1.6 Spectral problems based on UV. **(B) Infra-Red Spectroscopy:** 1.2.1Introduction. 1.2.2 Theory of molecular vibrations (Basic Principles and Types of Vibrations). 1.2.3 Functional group region and Fingerprint region. 1.2.5 Characteristic absorption of various functional groups. 1.2.6 Interpretation of IR spectra of following organic compounds: a) Ethane, b) Ethene, c) Ethyne, d) Benzene, e) 1-Propanol, f) 2-Propanol, g) t-Butyl alcohol, h) Phenol, i) Acetone, j) Acetophenone, k) Acetaldehyde, l) Benzaldehyde, m) Benzoic acid, n) Methylbenzoate and o) Phenylcyanide. **Unit – II: (A) NMR-Spectroscopy: 08 Periods** 2.1 Introduction 2.2 Principle of NMR Spectroscopy 2.3 Magnetic and non-magnetic nuclei 2.4 PMR-Spectroscopy:Spinning nuclei, magnetic moment and magnetic field, precessional motion, energy states for proton in magnetic field (Orientations) and nuclear resonance. 2.5 Equivalent and non-equivalent protons. 2.6 Number of absorption signals in the following compounds:a) Acetone, b) Cyclobutane, c) Methanol, d) Ethylbenzene, e) Ethyamine, f) Mesitylene, g) Diethylether	**08** **08**	**08** **08**
Mar.	2.7 Shielding and deshielding effects: (Example of Acetylene and Benzene) 2.8 Chemical shift, measurement of chemical shift by delta scale and tau scale 2.9 TMS as reference, Advantages of TMS. 2.10 Peak area (integration) andSpin-spin splitting (n+1) rule. 2.11 Interpretation of PMR Spectra of following compounds: a) Ethyl bromide, b) Ethyl alcohol, c) Acetaldehyde, d) 1,1,2-tribromo ethane, e) Ethyl acetate, f) Toluene, g) Acetophenone, h) Ethylamine, i) Acetic acid, j) Benzoic acid. **(B) Applications of IR, UV and NMR for identification of simple organic molecules: 04 Periods** OrganicMolecules: a) n-Propyl alcohol, b) i*so*-Propyl alcohol, c) *tert*-Butyl alcohol, d) Acetic acid, e) Ethylamine, f) Ethyl cyanide, g) Ethyl methyl ketone, h) Ethyl acetate, i) Ethyl benzene, j) Phenyl acetaldehyde, k) Phenol, l) Ethyl methyl ether, m) Ethylene glycol, n) Propionamide and o) Propionaldehyde. **Section – B (Inorganic Chemistry)** **Unit-V: Coordination theory (Part-II) 10 Period** 1) Valence bond theory of coordination compounds: Postulates, inner orbital and outer orbital complexes of coordination number 4 and 6. Limitations of VBT. 2) Crystal field theory: Shape of d-orbital's, postulates, splitting of d-orbital in octahedral complexes, tetrahedral complexes, tetragonal and square planar complexes.Definition of CFSE, calculations of CFSE for octahedral and tetrahedral complexes. 3) Factors affecting 10 Dq or magnitude of crystal field splitting: Nature of ligand, oxidation state of metal ion, size of d orbital, geometry of complexes. 4) Applications of CFT. 5) John teller effect in octahedral complexes of Cu++. 6) Limitations of CFT.	**04** **10**	**03** **11**