SRI A.S.N.M GOVERNEMENT COLLEGE (A), PALAKOL, W.G.Dt (Affiliated to Adikavi Nannaya University, Rajahmundry) (Reaccredited with NAAC "B" Grade with 2.61 CGPA points) DEPARTMENT OF CHEMISTRY

B.Sc (Chemistry) (For M.P.C, M.C.Cs, B.Z.C, H.B.C, A.Z.C) Syllabus and Model Papers

 Employability	
Entrepreneurship	
Skill Development	

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to Adikavi Nannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) I B.Sc. SEMESTER - I (Wef 2020-21 batch)

Paper I - Inorganic & Physical Chemistry

60hrs (4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. Understand the basic concepts of p-block elements

2. Explain the difference between solid, liquid and gases in terms of intermolecular interactions.

3. Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses.

INORGANICCHEMISTRY 24 h

UNIT-I

8h **Chemistryofp-blockelements**

Group13:Preparation&structure of Diborane, Borazine

Group14: Preparation, classification and uses of silicones

Group15: Preparation & structures of Phosphonitrilic halides $\{(PNCl_2)_n where n=3, 4\}$

Group 16: Oxides and Oxoacids of Sulphur (structures only)

Group17:Pseudohalogens, StructuresofInterhalogencompounds.

UNIT-II

Chemistryofd-blockelements: 6h

Characteristicsofd-blockelements with special reference to electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states.

Chemistryoff-blockelements: 6h

Chemistryoflanthanides-

electronicstructure, oxidationstates, lanthanidecontraction, consequences of lanthanidecontractio n, magnetic properties. Chemistry of actinides-electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

Theoriesofbondinginmetals

4h

ValencebondtheoryandFreeelectrontheory, explanation of thermalandelectrical conductivity of metals based on these theories, **Band theory**- formation of bands, explanationofconductors, semiconductors and insulators.

PHYSICALCHEMISTRY 36h

UNIT-III

Solid state 10h

Symmetry incrystals. Law of constancy of interfacial angles. The law of rationality ofindices. The law of symmetry. Miller indices, Definition of lattice point, space lattice, unitcell. Bravais lattices and crystal systems.X-ray diffraction and crystal structure.Bragg's law.Powdermethod.Defectsincrystals.Stoichiometricandnon-stoichiometric defects.

UNIT-IV

Gaseousstate 6h

Vander Waal's equation of state.Andrew's isotherms of carbon dioxide, continuity of state.Critical phenomena.Relationship between critical constants and vander Waal's constants.Lawofcorrespondingstates.Joule-Thomson effect.Inversiontemperature.

Liquid state 4h

Liquidcrystals, mesomorphicstate. Differences between liquidcrystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

UNIT-V

Solutions,Ionicequilibrium&dilutesolutions Solutions6h

Azeotropes-HCl-H₂O system and ethanol-water system. Partially miscible liquids-phenol-watersystem. Criticalsolutiontemperature(CST), Effectofimpurityonconsulatetemperature.

Immiscible liquids and steam distillation.Nernst distribution law.Calculation ofthepartition coefficient.Applications of distribution law.

Ionicequilibrium 3h

Ionic product, common ion effect, solubility and solubility product. Calculations based onsolubilityproduct.

Dilutesolutions 7h

Colligative properties- RLVP, Osmotic pressure, Elevation in boing point and depression infreezingpoint.Experimentalmethodsforthedeterminationofmolarmassofanon-volatile solute using osmotic pressure, Elevation in boing point and depression in freezing point.Abnormalcolligativeproperties.Van't Hofffactor.

Additional Inputs:

Definition - classification of Organometallic compounds – preparation and properties alkyl magnesium

Co-curricularactivities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress ofstudent's learning

2. Class Tests, Work sheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinkingskills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adoptedby teachers throughout the semester.

Listof ReferenceBooks

- 1. Principlesofphysical chemistrybyPrutton andMarron
- 2. Solid StateChemistryand itsapplicationsbyAnthonyR.West
- 3. Textbook ofphysicalchemistrybyKLKapoor
- 4. Textbook ofphysicalchemistrybySGlasstone
- 5. AdvancedphysicalchemistrybyBahland Tuli
- 6. InorganicChemistrybyJ.E.Huheey
- 7. Basic Inorganic ChemistrybyCottonand Wilkinson
- 8. Atextbookofqualitativeinorganicanalysis by A.I. Vogel
- 9. Atkins, P.W. & Paula, J. de Atkin's Physical Chemistry Ed., Oxford University Press

10thEd(2014).

- Castellan,G.W.PhysicalChemistry4thEd.Narosa(2004).
 Mortimer,R.G.PhysicalChemistry3rdEd.Elsevier:NOIDA,UP(2009).
- 12. Barrow, G.M. Physical Chemistry

LABORATORYCOURSE -I 30hrs(2h/w) Practical-IAnalysisofSALTMIXTURE (Attheend ofSemester-I)

Course outcomes:

At the end of the course, the student will be able to;

- 1. Understand the basic concepts of qualitative analysis of inorganic mixture
- 2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

AnalysisofSALT MIXTURE 50M

Analysisofmixturesaltcontainingtwoanionsandtwocations(Fromtwodifferentgroups)fromthefo llowing:

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

Cations:Lead,Copper,Iron,Aluminium,Zinc,Nickel,Manganese,Calcium,Strontium, Barium,Potassium andAmmonium.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points)

MODEL PAPER THREE YEAR B. Sc. DEGREE EXAMINATION FIRST YEAR EXAMINATIONS SEMESTER I

Paper–I: Inorganic & Physical Chemistry

Time:3Hrs.

PART-A

Max. Marks:75

Answer ALL the questions. Each carries TEN marks5 X 10 =50 Marks

1.(a). ExplainClassification, Preparations & uses of Silicones

(**OR**)

(b). (i)WhatarePseudohalogens.

(ii)Explain the Structures of anyone AX3&AX5 interhalogen compounds.

2.(a). What is Lanthanide Contraction? Explain the consequences of Lanthanide Contraction.

(OR)

(b).(i)Explain themagnetic properties of d-block elements.

(ii) Explain about Conductors, Semi-Conductors& Insulators using BandTheory.

3. (a). WriteanessayonCrystal defects.

(OR)

(b). What is Bragg's Law. Explain the determination of structure of a crystal by powder method.

4. (a).Derive the relationship between Critical constants & Vanderwaal constants

(**OR**)

- (b). (i)Writeany5 differencesbetweenliquidcrystals&liquids,solids (ii) WritetheapplicationsofLiquidcrystals.
- 5. (a).ExplainNernst distributionLaw.Explainitsapplications

(OR)

(b).Whatarecolligativeproperties. Writeexperimentalmethodsfordetermination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point.

PART-B

AnsweranyFIVEofthefollowingquestions.EachcarriesFIVEmarks5 X5=25 Marks

6. Explainthepreparation&structuresofPhosphonitriliccompounds.

7. Explain in brief, catalytic properties & stability of various oxidation states of d-block elements.

8. WriteshortnoteonBravais lattices and crystal systems.

9. WhatareSmectic&NematicliquidCrystals?Explain.

10. Writeaccount onCommonion effect&Solubilityproduct.

11. DescribeAndrew'sisothermsofcarbondioxide.

12. ExplainActinideContraction.

13. ExplainthestructureofBorazine.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to Adikavi Nannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) I. B.Sc. SEMESTER – II (W.E.F 2020-21 batch) Paper II (Organic & General Chemistry) 60hrs (4h/w)

Course outcomes:

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At the end of the course, the student will be able to;

1. Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt.

2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.

3. Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution.

4. Correlate and describe the stereochemical properties of organic compounds and reactions.

ORGANIC CHEMISTRY36h

UNIT-I

Carbon-Carbon sigma bonds (Alkanes and Cycloalkanes) 12h

General methods of preparation of alkanes- Wurtz and WurtzFittig reaction, Corey House synthesis, physical and chemical properties of alkanes, Isomerism and its effect on properties, Free radical substitutions; Halogenation, concept of relative reactivity v/s selectivity. Conformational analysis of alkanes (Conformations, relative stability and energy diagrams of Ethane, Propane and butane).General molecular formulae of cycloalkanes and relative stability, Baeyer strain theory, Cyclohexane conformations with energy diagram, conformations of monosubstituted cyclohexane.

UNIT-II

Carbon-CarbonpiBonds(Alkenesand Alkynes)12hGeneral methods of preparation, physical and chemical properties.Mechanismof E1,E2,E1cbreactions, Saytzeff and Hoffmann eliminations, ElectrophilicAdditions, mechanismMarkownikoff/Antimarkownikoff additionwith suitable examples, synand anti-addition;addition of H2, X2, HX. oxymercuration-demercuration, hydroboration-oxidation, ozonolysis,hydroxylation, Diels Alderreaction, 1,2-and 1,4-addition reactions in conjugated dienes.Reactions of alkynes; acidity, electrophilicand nucleophilic additions, hydration to formcarbonylcompounds, Alkylation of terminal alkynes.

UNIT-V

Benzeneand itsreactivity

Concept of aromaticity, Huckel's rule-application to Benzenoid (Benzene, Naphthalene) and Non-

Benzenoidcompounds(cyclopropenylcation,cyclopentadienylanionandtropyliumcation)Reacti ons-Generalmechanismofelectrophilicaromaticsubstitution,mechanismofnitration, Friedel-Craft's alkylation and acylation. Orientation of aromatic substitution-ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic

12h

interpretation of various groups like NO₂and Phenolic). Orientation of (i) Amino, methoxy and methylgroups (ii) Carboxy, nitro, nitrile, carbonyland sulphonic acid groups Halogens.

24h

(Explanation bytakingminimum of oneexample from each type)

GENERALCHEMISTRY

UNIT-IV

Surfacechemistry 6h

Colloids-Coagulationofcolloids- Hardy-Schulzerule.Stability ofcolloids, Protectionof Colloids, Gold number.

Adsorption- Physicalandchemicaladsorption, Langmuiradsorptionisotherm, applications of adsorption

ChemicalBonding 6h

Valence bond theory, hybridization, VB theory as applied to ClF_3 , $Ni(CO)_4$, Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo-nuclear and hetero-nuclear diatomic molecules (N_2 , O_2 , CO and NO).

HSAB 2h

Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard and Soft-Softcombinations.

UNIT-V

Stereochemistryof carboncompounds

10h

Opticalisomerism:Opticalactivity-wavenatureoflight,planepolarisedlight,opticalrotationand specificrotation.

Chiral molecules- definition and criteria(Symmetry elements)- Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lacticacid, Alanine, Tartaricacid, 2,3-dibromopentane.

D, L,R, SandE, Z-configurationwithexamples.

DefinitionofRacemic mixture–Resolution ofracemicmixtures (any3techniques)

Molecularrepresentations-Wedge, Fischer, NewmanandSaw-Horseformulae.

Additional Inputs:

Types of bond fission and organic reagents i.e. Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like H₂O,NH₃& AlCl₃.

Types of Organic reactions : Addition, Substitution, Elimination and rearrangement.

Co-curricularactivities andAssessmentMethods

- 1. Continuous Evaluation: Monitoring the progress ofstudent's learning
- 2. Class Tests, Work sheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinkingskills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adoptedby teachers throughout the semester.

List of Reference Books Theory:

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd.

(PearsonEducation).

2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

3. Finar, I.L.OrganicChemistry(Volume2:StereochemistryandtheChemistryofNatural Products), DorlingKindersley(India)Pvt.Ltd. (PearsonEducation).

4. Eliel, E. L. & Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994. Kalsi, P. S.

5. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Practical:

1. Ahluwalia, V.K.&Aggarwal, R.ComprehensivePracticalOrganicChemistry:Preparation andQuantitativeAnalysis, UniversityPress(2000).

2. Ahluwalia, V.K. & Dhingra, S. Comprehensive Practical Organic Chemistry: Qualitative Analysis, UniversityPress (2000).

3. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. Practical Organic Chemistry, 5thEd., Pearson (2012).

AdditionalResources:

1. Solomons, T. W. G.; Fryhle, C. B. & Snyder, S. A. Organic Chemistry, 12th Edition,

2. Wiley.Bruice,P. Y. Organic Chemistry, EighthEdition, Pearson.

3. Clayden, J.; Greeves, N.&Warren, S.Organic Chemistry, Oxford.

4. Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, Third Edition, NewAgeInternational.

5. Gunstone, F.D. Guidebookto Stereochemistry, PrenticeHallPress, 1975.

LABORATORY COURSE –II30hr (2h/w) Practical-IIVOLUMETRIC ANALYSIS

(At the end of Semester-II)

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionicequilibria

3. Learn and identify the concepts of a standard solutions, primary and secondary standards

4. Facilitate the learner to make solutions of various molar concentrations. This may include: Theconcept of the mole; Converting moles to grams; Converting grams to moles; Defining concentration; Dilution of Solutions; Making different molar concentrations.

VolumetricAnalysis 50 M

1. Estimationofsodiumcarbonateandsodiumhydrogencarbonate presentin amixture.

2. DeterminationofFe(II) usingKMnO₄withoxalicacidasprimarystandard.

3. Determination of Cu(II) using $Na_2S_2O_3$ with $K_2Cr_2O_7$ as primary standard.

4. Estimationofwaterofcrystallization inMohr'ssaltbytitratingwithKMnO4

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry)

(Accredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER THREE YEAR B. Sc. DEGREE EXAMINATION FIRST YEAR EXAMINATIONS SEMESTER II Paper –II: INORGANIC & ORGANIC CHEMISTRY Maximum Marks: 75

PART-A

AnswerALLthequestions. EachcarriesTENmarks5X10=50 Marks

1. (a). (i)WritethepreparationofalkanesbyWurtzandCorey-Housereaction.

(ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity infree radical substitutions.

(OR)

(b). (i)ExplainBaeyerStrainTheory

Time: 3 hours

(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energyprofilediagram.

2. (a).(i)Write anytwo methodsofpreparation of alkenes.

(ii) Explain the mechanism of Markownikiff and Anti-Markownikoff additionofHBr to alkene.

(OR)

(b).(i)Explaintheacidityof1-alkynes

(ii) Howwillyouprepareacetaldehydeand acetonefromalkynes?

(iii) Writealkylationreactionofterminalalkyne.

3.(a). Define Huckel rule of aromatic compounds. What are benzenoid and non-benzenoid aromaticcompounds? Give examples.

(OR)

(b). Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.

4.(a).(i)DefineHardy-Schulzerule&Gold number.

(ii) Differentiate Physisorption& Chemisorption. Explain Langmuir adsorption isotherm.

(OR)

 $(b). Construct the Molecular Orbital diagram for O_2 and NO and explain their bond order and magnetic property.$

5.(a).Defineracemicmixture.Explainanytwotechniquesforresolutionofracemic mixture.

(OR)

(b).(i)DefineOpticalactivityandSpecificrotation.

(ii)DrawtheR-&S-isomersofAlanine,Glyceraldehyde.

(iii)Writethe E-& Z-isomersof 2-butene

PART-B

Answer any **FIVE** questions. Each question carries **5** marks

5X5=25 Marks

7. Explain1,2-&1,4-additionreactions of conjugated dienes.

8. Explain theorientation effect of halogenson monosubstituted benzene.

6. Writedifferentconformations of n-butane. Explain their relative stability...

- 9. Explain the mechanism of E_1 CB elimination reaction.
- 10. Explain the structure of ClF_3 by Valency Bond theory.
- 11. WhatareHard&softacids &bases?Explain withexamples.
- 12. Draw the Wedge, Fischer, Newmann& saw-Horse representations for Tartaricacid.
- 13. DefineEnantiomersand Diastereomersandgivetwoexamplesforeach.

SRIASNM GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to Adikavi Nannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) II. B.Sc. SEMESTER – III (Wef 2020-21 batch) 60hrs (4h/w) Paper III (Organic chemistry & Spectroscopy)

Course outcomes:

At the end of the course, the student will be able to;

1. Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups.

2. Use the synthetic chemistry learn tin this course to do functional grouptransformations.

3. To propose plausible mechanisms for any relevant reaction

ORGANIC CHEMISTRY

UNIT I

Chemistry of Halogenated Hydrocarbons 6h

Alkyl Halides: Methods of preparation and properties, nucleophilic substitution reactions-SN1, SN2 and SNi mechanisms with stereo chemical aspects and effect of solvent etc.; nucleophilic substitution vs. elimination, Williamson's synthesis. Aryl Halides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution, SN Ar, Benzyne mechanism. Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophilic substitution reactions.

Alcohols & Phenols

Alcohols: preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvet Blanc Reduction; Oxidation Of Diols By Periodic Acid AndleadTetraacetate, Pinacol- Pinacolone Rearrangement:

Phenols: Preparation And Properties; Acidity And Factors Affecting It, Ring substitution Reimer-Tiemann and Kolbe's-Schmidt Reactions, Fries and Claisen reactions. Rearrangement with mechanism;

UNITII

Carbonyl Compounds

Structure, reactivity, preparation and properties; Nucleophilic Addition, Nucleophilic Addition-elimination reactions with ammonia derivatives Mechanisms of Aldol and Benzoin Condensation, Claisan-Schmidt, Perkin, Cannizzaro and Wittig reaction, Beckmann Haloform Reaction And Baeyer Villiger oxidation, a- substitution reactions, oxidations and reductions (Clemmensen, wolf –kishner, with LiAlH₄&NaBH₄). Addition Reactions Of α , β unsaturated carbonyl compounds: Michael Addition. Active Methylene Compounds: Ketoenoltautomerism. Preparation And Synthetic Applications Diethyl malonate and ethyl acetoacetate.

UNIT III

10h

34h

6h

Carboxylic Acids and their Derivatives

General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituent acidic strength. Typical reactions of icarboxylic acids, hydroxy acids and unsaturated acids. Preparation And Reactions Of Acid Chlorides, anhydrides, esters and amides; Comparative study of nucleophilic substitution at acyl group-Mechanism of acidic and alkaline hydrolysis of esters, Claisen Condensation, Reformatsky reactions and Curtius Rearrangement Reactions involving H, OH and COOH groups- salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism). Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Arndt- Eistert synthesis, halogenation by Hell- Volhard-Zelinskyreaction.

SPECTROSCOPY

26h

UNIT IV 18h Molecular Spectroscopy: Interaction of electromagnetic radiation with molecules and various types of spectra;

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution.

Vibrational Spectroscopy: Classical Equation of Vibration, computation of force constant, Harmonic and anharmonic oscillator, Morse Potential curve, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental Frequencies, overtones and hot bands.

Electronic spectroscopy: Energy levels of molecular orbitals (σ , π , n). Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore.bathochromic and hypsochromic shifts. Beer-Lambert's law and itslimitations.

Nuclear Magnetic Resonance(NMR) spectroscopy: Principles of nuclear magnetic resonance, equivalent and non-equivalent protons, position of signals. Chemical shift, NMR splitting of signals- spin-spin coupling, coupling constants. Applications of NMR with suitable examples - ethyl bromide, ethanol, acetaldehyde, 1,1,2-tribromo ethane, ethyl acetate, toluene and acetophenone.

8h

UNIT V

Application of Spectroscopy to Simple Organic Molecules Application of visible, ultraviolet and Infrared spectroscopy in organic molecules.

Application of electronic spectroscopy and Woodward rules for calculating λ max of conjugated dienes and α , β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

Additional Inputs:

<u>Raman Spectra:</u> Introduction to Pure Rotational Raman spectra and Vibrational Raman spectra, Polarization of light and Raman effect.

Co-curricularactivities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress ofstudent's learning

- 2. Class Tests, Work sheets and Quizzes
- 3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinkingskills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adoptedby teachers throughout the semester.

REFERENCE BOOKS:

- 1. A TextBook of Organic Chemistry by Bahl and Arunbahl
- 2. A Textbook of Organic chemistry by I L FinarVol I
- 3. Organic chemistry by Bruice
- 4. Organic chemistry by Clayden
- 5. Spectroscopy by William Kemp
- 6. Spectroscopy by Pavia
- 7. Organic Spectroscopy by J. R. Dyer
- 8. Elementary organic spectroscopy by Y.R. Sharma
- 9. Spectroscopy by P.S.Kalsi
- 10. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
- 11. Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis XWebster

12. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. &Tatchell, A.R. Practical OrganicChemistry,5th Ed. Pearson (2012)

13. Ahluwalia, V.K. & Agarwal, R. Comprehensive Practical OrganicChemistry:Preparation andQuantitative Analysis, University Press (2000)

Practical – III Organic preparations and IR Spectral Analysis 30hrs(3h / w)

Course outcomes:

On the completion of the course, the student will be able to do the following:

- 1. How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- 2. How to calculate limiting reagent, theoretical yield, and percent yield

3. How to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately

4. How to dispose of chemicals in a safe and responsible manner

5. How to perform common laboratory techniques including reflux, distillation, crystallization, vacuum filtration.

6. How to create and carry out work up and separation procedures

7. How to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner

40M

Organicpreparations:

1. Acetylation of one of the followingcompounds:

amines (aniline, o-, m-, p- toluidine and o-, m-, p-anisidine) and phenols (β - naphthol, vanillin, salicylic acid) by any one method:

(a) Using conventionalmethod.

- (b) Using greenapproach
- 2. Benzoylation of one of the followingamines

(aniline, o-, m-, p- toluidine and o-, m-, p-anisidine)

3. Nitration of any one of the following: Acetanilide/nitrobenzene by conventionalmethod Salicylic acid by green approach (using ceric ammoniumnitrate).

IRSpectralAnalysis 10M

IR Spectral Analysis of the following functional groups with examples Hydroxylgroups Carbonylgroups Aminogroups Aromatic groups

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT

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Section – A

Answer ALL the questions. Each carries **TEN** marks $5 \times 10 = 50 \text{ M}$ 1. (a). Give the mechanism & stereochemistry of SN¹& SN² reactions of alkyl halides with suitable example.

(OR)

(b). Explain the following reactions withmechanism.

(i) Reimer-Tiemann reaction (ii) Fries rearrangement.

2. (a). Discuss the mechanism for followingreactions.

(i) Perkin reaction. (ii) Cannizaroreaction

(OR)

(b). Write the preparation and any three synthetic applications of diethyl malonate.

3. (a). Explain acid and base hydrolysis reaction of esters with mechanism.

(OR)

(b). Explain the mechanisms of Curtius rearrangement & Arndt –Eistert reaction.

4. (a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.

(ii) Explain different modes of vibrations & selection rules in IRspectroscopy.

(OR)

(b).(i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.(ii) Discuss the principle of NMR spectroscopy.

5. (a). Write Woodward-Fieser rules for calculating λmax for conjugated dienes and α,β –

Unsaturated carbonyl compounds , and apply them for one example each.

(OR)

(b). (i) What is Fingerprint region? Explain its significance with an example.

(ii) Write IR spectral data for any one alcohol, aldehyde and ketone

Section – B

Answer any FIVE of the following questions. Each carries FIVE marks. 5x5 = 25M

6. Discuss two methods for preparation of arylhalides.

7. Explain the mechanism for Pinacol-Pinacolonerearrangement

8. Discuss the mechanism for Baeyer-villiger oxidationreaction.

9. Explain the effect of substituents on acidic strength of mono-carboxylicacids.

10. Write the mechanism for Claisen Condensationreaction.

11. Write the selection rules in rotationalspectroscopy.

12. Explain Spin – Spin coupling and CouplingConstant.

13. Explain types of electronic transitions in UVspectroscopy.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) <u>II B.Sc.</u> SEMESTER – IV (Wef 2020-21 batch)

Paper IV (Inorganic, Organic and Physical Chemistry) 60hrs(4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions.

2. To understand the concept of quantum efficiency and mechanisms of photochemical reactions

UNITI:

8h

Organ metallic Compounds: Definition and classification of organometallic compounds on the basis of bond type, **Concept of hapticity** of organic ligands. Metal Carbonyls:18electronrule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. **General methods of preparation of mono and binuclear carbonyls** of 3d series.P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

UNIT II:

8h

Carbohydrates: Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth Projection And Conformational Structures; Interconversions of aldoses and ketoses; Kiliani-Fischer synthesis and Ruff degradation; Disaccharides– Elementary Treatment Of Maltose, lactose and sucrose. Polysaccharides–Elementary Treatment Of starch.

UNITIII:6h

Amino acids and proteins: Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker'ssynthesis

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating- peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

Heterocyclic Compounds

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, - dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan. Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

UNIT IV:

Nitrogen Containing Functional Groups: Preparation, properties and important reactions of nitro compounds, amines and diazonium salts.

Nitro hydrocarbons

3h

11h

5h

12h

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity - halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

Amines:

Introduction, classification, chirality in amines (pyramidal inversion), importance and general methods of preparation.

Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary amines using Hinsberg'smethod and Nitrous Acid. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann- Bromamide Reaction, Carbylamine Reaction, Mannich reaction, Hoffmann's exhaustive methylation, Hoffmann-elimination reaction and Cope elimination.

Diazonium Salts: Preparation and synthetic applications of diazonium salts including preparation of arenes, haloarenes, phenols, amino and nitro compounds. Coupling Reactions of Diazonium Salts (preparation of azodyes).

UNIT V:

Photochemistry

Difference between thermal and photochemical processes, Laws of photochemistry-Grothus- Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine and hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions- energy transfer processes (simple example).

Thermodynamics

The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes, State function. Temperature dependence of enthalpy of formation- Kirchoff's equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy

changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. Third law of thermodynamics, Nernst heat theorem, Spontaneous and non-spontaneous processes, Helmholtz and Gibbs energies-Criteria forspontaneity.

Additional Inputs:

Derivatives of Furan: Furfural preparations and properties.

Co-curricularactivities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress ofstudent's learning

2. Class Tests, Work sheets and Quizzes

3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinkingskills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adoptedby teachers throughout the semester.

REFERENCE BOOKS:

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- 7. A Text Book of Organic Chemistry by Bahl and Arunbahl
- 8. A Text Book of Organic chemistry by I L FinarVolI
- 9. A Text Book of Organic chemistry by I L FinarVolII
- 10. Advanced physical chemistry by GurudeepRaj

Practical – IV

Organic Qualitative analysis Lab

30hrs(3h / w)

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2. Determine melting and boiling points of organic compounds

3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

OrganicQualitativeanalysis50 M

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points)

MODEL PAPER THREE YEAR B.Sc DEGREE EXAMINATION SECOND YEAR EXAMINATIONS SEMESTER IV

Paper – IV: Inorganic, Organic & Physical Chemistry

Time:3Hrs.	Max. Marks: 75		
Section – A			
Answer ALL the questions. Each carries TEN marks.	5 X 10 = 50 M		
1.(a).What are organometallic compounds? Discuss their of type of bonds with examples.	r Classification on the basis		
(OR)			
(b).Discuss the general methods of preparations of mono	% bi-nuclear carbonyls of 3d		
series.			
2. (a). Discuss the constitution, configuration and ring size and Conformational structure of glucose.	ze of glucose. Draw the Haworth		

(**OR**)

(b). (i) Explain Ruff's degradation. (ii) Explain Kiliani- Fischer synthesis.

3. (a). What are amino acids? Write any three general methods of preparation of amino acids.

(**OR**)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole.

4. (a). Write the mechanism for the following.

(i) Nef reaction (ii) Mannich reaction

(**OR**)

(b).(i) Explain Hinsberg separation of amines.

(ii) Discuss any three synthetic applications of diazoniumsalts.

5. (a). What is quantum yield? Explain the photochemical combination of Hydrogen-Chlorine and Hydrogen - Bromine.

(**OR**)

(b). Define entropy. Describe entropy changes in the reversible and irreversibleprocess.

Section - B

Answer any FIVE of the following questions. Each carries FIVE marks. 5x5 = 25M

6. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.

7. What are epimers and anomers. Giveexamples.

8. Discuss about iso electric point and Zwitterion.

9. Discuss the Paul-Knorr synthesis of five membered heterocycliccompounds.

10. Explain Tautomerism shown by nitroalkanes

11. Discuss the basic nature ofamines.

12. Write the differences between thermal and photochemicalreactions.

13. Derive heat capacities and derive Cp - Cv = R

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) II.B.Sc. SEMESTER – IV (Wef 2020-21 batch)

Paper V (INORGANIC& PHYSICALCHEMISTRY) 60hrs(4h/w)

Course outcomes:

At the end of the course, the student will be able to;

1. Understand concepts of boundary conditions and quantization, probability distribution, mostprobablevalues, uncertainty and expectation values

2. Application of quantization to spectroscopy.

3. Various types of spectra and the irusein structure determination

INORGANIC CHEMISTRY

26h

UNIT I

Coordinator Chemistry 12h

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of octahedral geometry, Jahn-Teller distortion, square planar coordination.

UNITII

Inorganic Reaction Mechanism4h

Introduction to inorganic reaction mechanisms. Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, ligand substitution reactions -SN¹ and SN², Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications.

Stability of metalcomplexes2h

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

Bioinorganic Chemistry 8h

Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals, Sodium / K - pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating agents in medicine, Cis-platin as an anti- cancer drug. Iron and its application in bio-systems, Haemoglobin, Myoglobin.Storage and transfer ofiron.

PHYSICAL CHEMISTRY

UNIT-III

Phase rule6h

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezingmixtures.

UNIT IV

Electrochemistry14h

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution.Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsager's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conduct metric titrations.Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal- metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements - Potentiometric titrations.Fuel cells- Basic concepts, examples and applications.

UNITV

Chemical Kinetics

14h

The concept of reaction rates.Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half-life of a reaction.General methods for determination of order of a reaction.Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).Enzyme catalysis-Specificity,factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels-Menten equation- derivation, significance of Michaelis-Menten constant.

Additional Inputs:

Geo chemical effect of distribution of metals Sodium/K-pump, carbonic analydrase and carboxy peptidase.

Co-curricularactivities and Assessment Methods

- 1. Continuous Evaluation: Monitoring the progress ofstudent's learning
- 2. Class Tests, Work sheets and Quizzes
- 3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinkingskills and personality

4. Semester-end Examination: Critical Indicator of Student's Learning and Teaching Methods adoptedby teachers throughout the semester.

REFERENCE BOOKS:

- 1. Text book of physical chemistry by SGlasstone
- 2. Concise Inorganic Chemistry byJ.D.Lee
- 3. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
- 4. Advanced physical chemistry by GurudeepRaj
- 5. Principles of physical chemistry by Prutton and Marron
- 6. Advanced physical chemistry by Bahl andTuli
- 7. Inorganic Chemistry byJ.E.Huheey
- 8. Basic Inorganic Chemistry by Cotton and Wilkinson
- 9. A textbook of qualitative inorganic analysis by A.I.Vogel
- Atkins, P.W. & Paula, J.de Atkin's Physical Chemistry Ed., Oxford UniversityPress 10thEd(2014)
- 11. Castellan, G.W. Physical Chemistry 4th Ed. Narosa (2004)
- 12. Mortimer, R. G. Physical Chemistry3rdEd. Elsevier: NOIDA, UP(2009).
- 13. Barrow, G.M.Physical Chemistry

Practical – V

Conductometric and Potentiometric Titrimetry Lab 30hrs(3h / w)

Course outcomes:

At the end of the course, the student will be able to;

- 1. Use glassware, equipment and chemicals and follow experimental procedures in the Laboratory
- 2. Apply concepts of electrochemistry in experiments

3. Be familiar with electro analytical methods and techniques in analytical chemistry which Studyan analyte by measuring the potential (volts) and/or current (amperes) inan Electrochemicalcell containing the analyte

Conductometric andPotentiometricTitrimetry50 M

- 1. **Conductometric titration** Determination of concentration of HClsolution using standard NaOHsolution.
- 2. **Conductometric titration** Determination of concentration of CH₃COOH Solution using standard NaOHsolution.
- 3. **Conductometric titration** Determination of concentration of CH₃COOH and HCl in a mixture using standard NaOHsolution.
- 4. Potentiometric titration- Determination of Fe (II) using standard K₂Cr₂O₇solution.
- 5. Determination of rate constant for acid catalyzed esterhydrolysis.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points)

MODEL PAPER THREE YEAR B.Sc, DEGREE EXAMINATION SECOND YEAR EXAMINATIONS SEMESTER IV

Paper –V: Inorganic & Physical Chemistry

Time:3Hrs.

Max. Marks:75

Section - A

Answer ALL the questions. Each carriesTEN marks5 X 10 =50M

1. (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.

(OR)

(b). Define CFSE. Explain the factors affecting the magnitude of crystal field splitting energy.

2. (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of transeffect.

(OR)

(b). (i) Write the biological functions of Hemoglobin and Myoglobin.

(ii) Write a note on the use of chelating agents in medicines.

3. (a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

(OR)

(b).(i) Explain phase diagram for NaCl-watersystem.

(ii) Explain briefly about Freezing mixtures.

4. (a). Define Transport number. Write an experimental method for the determination of transport number by Hittorf method.

(OR)

(b). (i) Define single electrode potential.

(ii) Explain four types of electrodes with examples.

5. (a). Explain general methods for determination of order of a reaction.

(OR)

(b).Explain Collision theory and Activated complex theory of bimolecular reactions.

Section – B

Answer any FIVE of the following questions. Each carries FIVE marks. 5x5 = 25M

6. Write note on Jahn-Tellerdistortion

7. Explain Labile & inertcomplexes.

8. Explain Job's method for determination of composition of complex.

9. Explain Thermodynamic derivation of Gibb's phaserule.

10. Explain any two conductometric titrations.

11. Write note on Fuel Cells with examples and applications.

12. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.

13. Derive Michaelis- Mentenequation.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) SEMESTER-V

Paper - V (INORGANIC, PHYSICAL & ORGANIC CHEMISTRY)

INORGANIC CHEMISTRY45 hrs (3 h / w)

UNIT – I

Coordination Chemistry:

IUPAC nomenclature - bonding theories - **Review of Werner's theory and Sidgwick's concept** of coordination - **Valence bond theory** - geometries of coordination numbers 4-tetrahedral and square planar and 6-octahedral and its limitations, crystal filed theory - **splitting of dorbitals in octahedral, tetrahedral and square-planar complexes** - **low spin and high spin complexes** - factors affecting crystal-field splitting energy, merits and demerits of crystalfield theory. **Isomerism in coordination compounds** - structural isomerism and stereo isomerism, stereochemistry of complexes with 4 and 6 coordination numbers.

UNIT-II

1. Spectral and magnetic properties of metal complexes:

Types of magnetic behavior, spin-only formula, calculation of magnetic moments, experimental determination of magnetic susceptibility-Gouymethod.

2. Stability of metal complexes:

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method and mole ratio method.

ORGANIC CHEMISTRY

UNIT- III

Nitro hydrocarbons:

Nomenclature and classification-nitro hydrocarbons, structure -Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition and reduction.

UNIT – IV

Nitrogen compounds:

Amines (Aliphatic and Aromatic): Nomenclature, Classification into 1°, 2°, 3° Amines and Quarternary ammonium compounds. Preparative methods –

1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3.Hoffman's bromamide reaction (mechanism).

Reduction of Amides and Schmidt reaction. Physical properties and basic character -Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline - comparative basic strength of aniline, N-methylaniline and N,N-dimethyl aniline (in aqueous and non-aqueous medium), steric effects and substituent effects. Chemical

12h

8h

3h

4h

3h

properties a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg separation e) Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines). Electrophillic substitution of Aromatic amines – Bromination and Nitration.Oxidation of aryl and Tertiary amines, Diazotization.

PHYSICAL CHEMISTRY

UNIT- V

Thermodynamics 15h

The first law of thermodynamics-statement, definition of internal energy and enthalpy.Heat capacities and their relationship.Joule-Thomson effect coefficient.Calculation of w, for the expansion of perfect gas under isothermal and adiabatic conditions for reversible processes.State function.Temperature dependence of enthalpy of formation-Kirchoff s equation.Second law of thermodynamics.Different Statements of the law.Carnot cycle and its efficiency.Carnot theorem Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes.

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- 9.A Text Book of Organic chemistry by I L FinarVol I
- 10. Advanced physical chemistry by Gurudeep Raj

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MODEL PAPER

THREE YEAR B.Sc.DEGREE EXAMINATIONS

III B.Sc. SEMESTER V

PAPER V: INORGANIC, ORGANIC& PHYSICAL CHEMISTRY

Time:3Hrs.

Max. Marks:75

PART-A

Answer all questions. Each carries **TEN** marks. **5 x 10=50 Marks**

1. A) Explain the formation of $Fe(CN)_6^{4-}$ and $Fe(CN)_6^{3-}$ on the basis of Valence Bond Theory.

(OR)

B) Explain the sterio chemistry of complexes with 4 & 6 coordination numbers.

2. A)How do you Determine the magnetic susceptibility of metal complexes using Guoy balance method

(OR)

B) How do you Determine the composition of metal complexes using Job's method?

3. A) Write the methods of preparation of Nitroalkanes.

(OR)

B) Explain the Mannich reaction and Micheal addition

4. A) How amines are prepared from Gabriel synthesis and Hoffmann bromamide method?

(OR)

- B) Write any four electrophilic substitution reactions of aromatic amines.
- 5. A) Derive Kirkoff's equation .
- (OR)
- B) Describe the Carnot Cycle.

PART-B

Answer any FIVE of the following questions. Each carries FIVE marks. 5 x 5=25 Marks

6. Explain the EAN rule with suitable examples.

7. Explain the silent features of Crystal field theory.

8. Write the factors effecting stability of metal complexes?

9. Write Mechanism of Nefreaction.

- 10.Explain the basicity of amines.
- 11.Write a note on Diazotization.
- 12.State and explain Jouls- Thomson effect.
- 13. Write a note on Entropy.

SRI A S N M GOVERNMENT COLLEGE, PALAKOL, W.G. DT (Affiliated to AdikaviNannaya University, Rajahmundry) (Accredited with NAAC "B" Grade with 2.61 CGPA points) SEMESTER-V

Paper - VI (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

INORGANIC CHEMISTRY45 hrs (3 h / w)

UNIT-I

1. Reactivity of metal complexes:

Labile and inert complexes, ligand substitution reactions - SN^1 and SN^2 substitution reactions of square planar complexes - Trans effect and applications of trans effect.

2.Bioinorganic chemistry:

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl⁻. Metalloporphyrins – Structure and functions of hemoglobin, Myoglobin and Chlorophyll.

PHYSICAL CHEMISTRY

UNIT-II

1. Chemical kinetics

Rate of reaction - Definition of order and molecularity. Derivation of rate constants for first, second, third and zero order reactions and examples. Derivation for time half change. Methods to determine the order of reactions.Effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy.

2. Photochemistry

Difference between thermal and photochemical processes Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence.Quantum yield-Photochemical reaction mechanism- hydrogen- chlorine, hydrogen- bromine reaction. Qualitative description of fluorescence, phosphorescence, Photosensitized reactions- energy transfer processes (simple example).

ORGANIC CHEMISTRY

UNIT- III

Heterocyclic Compounds

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. **Furan.** Thiophene and pyrrole - Aromatic character – **Preparation from 1,4,- dicarbonyl** compounds, Paul-Knorr synthesis.

Properties : Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity- Comparison with pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution reaction.

7h

4h

4h

5h

8h

UNIT-IV

Carbohydrates

Monosaccharides: (+) Glucose (aldo hexose) - Evidence for cyclic structure of glucose (some negative aldehydes tests and mutarotation) - Proof for the ring size (methylation, hydrolysis and oxidation reactions) - Pyranose structure (Haworth formula and chair conformational formula).

(-) Fructose (ketohexose) - Evidence of 2 - ketohexose structure (formation of pentaacetate, formation of cyanohydrin its hydrolysis and reduction by HI).Cyclic structure for fructose (Furanose structure and Haworth formula) - osazone formation from glucose and fructose – Definition of anomers with examples.

Interconversion of Monosaccharides: Aldopentose to Aldohexose (Arabinose to D- Glucose, D-Mannose) (Kiliani - Fischer method). Epimers, Epimerisation - Lobry de bruyn van Ekenstein rearrangement. Aldohexose to Aldopentose (D-Glucose to D- Arabinose) by Ruff degradation Aldohexose to Ketohexose [(+) Glucose to (-) Fructose] and Ketohexose to Aldohexose (Fructose to Glucose).

UNIT- V

Amino acids and proteins 7h

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and delta amino acids by heating peptide bond (amide linkage). Structure and nomenclature of peptides and proteins.

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- 3. Organic Chemistry by G.Mareloudan, Purdue Univ
- 4. Advanced Physical Chemistry by Atkins
- 5. Text book of physical chemistry by S Glasstone
- 7. Instrumentation and Techniques by Chatwal and Anand
- 8. Essentials of nano chemistry by pradeep
- 9. A Textbook of Physical Chemistry by Puri and Sharma
- 10. Advanced physical chemistry by Gurudeep Raj

LABORATORY COURSE – V Practical Paper – V Organic Chemistry

(At the end of semester V)30 hrs (3h / W)

Organic Qualitative Analysis:

50M

Analysis of an organic compound through systematic qualitative procedure for functional group identification including the determination of melting point and boiling point with suitable derivatives.

Alcohols, Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic Primary Amines, Amides and Simple sugars.

LABORATORY COURSE - VI

Practical Paper – VI Physical Chemistry

(At the end of semester V) 30 hrs (3h/W)

50M

1. Determination of rate constant for acid catalyzed ester hydrolysis.

2. Determination of molecular status and partition coefficient of benzoicacid in Benzene and water.

- 3. Determination of Surface tension of liquid
- 4. Determination of Viscosity of liquid.
- 5. Adsorption of acetic acid on animal charcoal, verification of Freundlisch isotherm.

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THREE YEAR B.Sc.DEGREE EXAMINATIONS SEMESTER --V

PAPER VI: INORGANIC, ORGANIC& PHYSICAL CHEMISTRY

Time:3Hrs.

Max. Marks:75

PART-A

Answer all Ouestions. Each carries Ten Marks

1. A) Discuss the ligand substitution reactions in metal complexes.

(**OR**)

B) Write the structure and functions of Hemoglobin.

2. A) What is first order reactions and Derive rateconstant, time for half change.

(**OR**)

B) What is quantum yield and explain the photochemical reaction between H_2 - Cl_2 & H_2 - Br_2

3.A) Discuss electrophilic substitution reactions in Pyrrole, Furan & Thiophene.

(**OR**)

B) Write any one method for preparation Pyridine and Illustrate the substitution reactions of Pyridine.

4. A) Discuss the structure of glucose.

(**OR**)

B) What are Epimers give example and write about the formation of Glucosazone.

5. A) Give any three methods of preparation of Alanine

(**OR**)

B) Discuss the general reactions amino and carboxylgroup.

PART-B

Answer any FIVE of the following questions. Each carries FIVE marks.5x5=25 Marks

6. Define Laible and inert complexes with suitable examples.

7. Explain the biological significance of Na and K

8. Define Order and Molecularity.

9. Write a note on Mutarotation.

10. What are the photosensitized reactions? Give one example.

11. Explain the nature of Pyrrole and Pyridine.

12. How to convert aldopentose(D-arabinose) to aldohexose (D-glucose, D-mannose)

13. Write note on Isoelectric point.

5x10=50 Marks

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UNIT-I

Quantitative analysis:

a) Importance in various fields of science, steps involved in chemical analysis. Principles of volumetric analysis :. Theories of acid-base, redox, complexometric, iodometric and precipitation titrations - choice of indicators for these titrations.

b) Principles of gravimetric analysis: precipitation, coagulation, peptization, coprecipitation, post precipitation, digestion, filtration and washing of precipitate, drying and ignition.

UNIT-II

Treatment of analytical data:

Types of errors, significant figures and its importance, accuracy - methods of expressing accuracy, error analysis and minimization of errors, precision - methods of expressing precision, standard deviation and confidence limit.

UNIT-III

Separation techniques in chemical analysis:

Introduction, principle, techniques, factors affecting solvent extraction, Batch extraction, continuous extraction and counter current extraction. Synergism., Application -Determination of Iron (III)

Ion exchange : Introduction, action of ion exchange resins, separation of inorganic mixtuers, applications, Solvent extraction: Principle and process.

UNIT-IV

Chromatography: Classification of chromatography methods, principles of differential migration adsorption phenomenon, Nature of adsorbents, solvent systems, Rf values, factors effecting Rf values.

Paper Chromatography: Principles, Rf values, experimental procedures, choice of paper and solvent systems, developments of chromatogram - ascending, descending and radial. Two dimensional chromatography - applications.

UNIT-V

Thin layer Chromatography (TLC): Advantages - Principles, factors effecting Rf values -Experimental procedures - Adsorbents and solvents - Preparation of plates - Development of the chromatogram - Detection of the spots - Applications - Column Chromatography: Principles - experimental procedures - Stationary and mobile Phases - Separation technique -Applications.HPLC : Basic principles and applications.

REFERENCE BOOKS

- 1. Analytical Chemistry by Skoog and Miller
- 2. A textbook of qualitative inorganic analysis by A.I. Vogel
- 3. Nanochemistry by Geoffrey Ozin and Andre Arsenault
- 4. Stereochemistry by D. Nasipuri
- 5. Organic Chemistry by Clayden

10 h

10 h

10 h

8 h

7 h

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Paper –VII A: ELECTIVE – ANALYTICAL METHODS IN CHEMISTRY hours Maximum Marks: 75

Time: 3 hours

PART-A

Answer ALL the questions. Each carries TEN marks. అన్ని ప్రశ్నలకు సమాధానము వ్రాయుము. ప్రతీ దానికి పది మార్కులు.

1. a) Describe the acid-base titrations. ఆమ్ల-క్షార అంశామపనాలు గూర్చి చర్చించుము.

(**OR**)

- b) Explain co-precipitation and post precipitation with suitable examples. సహాఅవక్షే పణము మరియు ఉత్తరావక్షే పణములను తగిన ఉదాహరణలతో వివరించండి.
- a) Define and explain the terms accuracy and precision.
 ఖచ్చితత్వ ముమరియు సునిశితత్వము అనుపదాలను నిర్వచించి, వివరించండి.

(**OR**)

- b) Discuss various types of errors. వివిధ రకాల దోషములను గూర్చి చర్చించుము.
- 3. a) Write the principle and applications of solvent extraction. ద్రావణినిష్కర్షణ యొక్క సూత్రమును మరియు అనువర్తనాలు వ్రాయండి.

(OR)

- b) Explain any two methods for solvent extraction. ద్రావణినిష్కర్షణయొక్కఏవైనారెండుపద్ధతులువివరించండి.
- a) What is chromatography? Briefly explain the classification of chromatography. క్రోమటోగ్రఫీ అనగానేమి? క్రోమటోగ్రఫీ వర్గీకరణమును గూర్చి క్లుప్తంగా వివరించండి.

(OR)

b) Explain the experimental procedure of paper chromatography. Write any two of its Applications.

పడ్రత్ పోల్లా స్టార్ట్ స్టార్ స్టార్ట్ స్ట

5. a) Explain the experimental procedure of Thin Layer Chromatography. Write any two of its applications. పలుచనిపొరక్రోమటో(గఫీయొక్క)పయోగపద్ధతినివివరించండి. దీనియొక్కఏవైనారెండుఅనువర్తనాలు

పలుచనిపొంకం మెటి (గెఫయుక్కట్రయాగిపెద్దతనివివరంచిండి. దనియుక్కవివైనారండుఅనువర్తినాలు వ్**రాయండి**.

(OR)

b) Discuss about column chromatography. స్థంబక్ రోమటోగ్రఫీనుగూర్చివిపులముగాచర్చించుము.

PART-B

Answer any FIVE of the following questions. Each carries FIVE marks. 5 x 5 = 25 Marks క్రరింది వానిలో ఏవైనా ఐదు ప్రశ్నలకు సమాధానము వ్రాయుము. (పతీ దానికి ఐదు మార్కులు.

- 6. Discuss the complexometric titrations with examples. సంశ్లేష్ఠ అంశమాపనాలు తగిన ఉదాహరణలతో చర్చించండి.
- Explain about precipitation and coagulation. అవక్షే పణము మరియు స్కంధనముఏలను గూర్చి వివరించండి.
- 8. Write about standard deviation. (కమవిచలనము గూర్చి వ్**రాయండి**.
- 9. How do you estimate Fe(III) using solvent extraction method? ద్రావణినిష్కర్షణ పద్ధతి ద్వారా Fe(III) ను ఎట్లా నిర్ణయిస్తారు

5 x 10 = 50 Marks

- 10. Describe the development of chromatogram in paper chromatography. పుత్రకరోమటోగ్రఫీలో క్రోమటోగ్రామ్యికాసమును గూర్చి చర్చించుము.
- 11. What are the factors affecting R_f values? R_f విలువలను ప్రభావితముచేయు అంశాలేవి?
- 12. Write any two adsorbents and solvents used in thin layer chromatography. పలుచనిపొరక్రోమట్(గఫీలో ఉపయోగించే అధిశోషకములను మరియు ద్రావణిలు ఏవైనా రెండేసి వ్రాయండి. 13. Write the applications of high performance liquid chromatography.
- అధిక పని తీరు ద్రవక్రోమటోగ్రఫీ యొక్క అనువర్తనాలు వ్రాయండి.

CHEMISTRY LABORATORY COURSE - VII-A

(At the end of semester VI) 30 hrs (3 / w)

50 Marks

1. Identification of amino acids by paper chromatography,

2. Determination of Zn using EDTA

3. Determination of Mg using EDTA

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PAPER: VIII A- CLUSTER ELECTIVE -1: POLYMER CHEMISTRY

UNIT-I

Introduction of polymers:

Basic definitions, degree of polymerization classification of polymers - Natural and Synthetic polymers, Organic and Inorganic polymers, Thermoplastic and Thermosetting polymers, Plastics, Elastomers, Fibres and Resins, Linear, Branched and Cross Linked polymers, Addition polymers and Condensation Polymers, mechanism of polymerization. Free radical, ionic and Zeigler – Natta polymerization.

UNIT-II

Techniques of Polymerization: Bulk polymerization, solution polymerization, suspension and emulsion polymerization. Molecular weights of polymers: Number average and weight average molecular weights Determination of molecular weight of polymers by Viscometry and Osmometry methods.

UNIT-III

Kinetics of Free radical polymerization, Glass Transition temperature (Tg) and Determination of Tg: Free volume theory, WLF equation, factors affecting glass transition temperature (Tg).

UNIT-IV

Polymer additives: Introduction to plastic additives – fillers, Plasticizers and Softeners, Lubricants and Flow Promoters, Anti aging additives, Flame Retardants, Colourants, Blowing agents, Cross linking agents, Photo stabilizers, Nucleating agents.

UNIT-V

Polymers and their applications:

Preparation and industrial applications of Polyethylene, Polyvinyl chloride, Teflon, Terelene, Polyacrylonitrile, Nylon6,6 and silicones.

REFERENCE BOOKS

1. Seymour, R.B. & Carraher, C.E. Polymer Chemistry: An Introduction, Marcel Dekker, Inc. New York, 1981.

2. Odian, G. Principles of Polymerization, 4th Ed. Wiley, 2004.

3. Billmeyer, F.W. Textbook of Polymer Science, 2nd Ed. Wiley Interscience, 1971.

4. Ghosh, P. Polymer Science & Technology, Tata McGraw-Hill Education, 1991.34

5. Lenz, R.W. Organic Chemistry of Synthetic High Polymers. Interscience Publishers, NewYork, 1967.

9 h

8 h

12 h

6 h

10 h

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Paper – VIII A: CLUSTER-1: POLYMER CHEMISTRY

Time: 3 hours

PART-A

Maximum Marks: 75

Answer ALL the questions. Each carries TEN marks. అన్ని ప్రశ్నలకు సమాధానము వ్రాయుము. ప్రతీ దానికి పది మార్కులు. 5 x 10 = 50 Marks

1. a) Give an account of classification of polymers. పాలిమర్త వర్తీకరణను తెల్పుము.

(OR)

- b) Write the mechanism of free radical polymerization. స్వేచ్ఛాప్రాతిపదక పొలిమరికరణమును చర్యావిదానముతో వ్రాయండి.
- 2. a) How is molecular weight of a polymer determined by viscometry? స్నిగ్గతామాపకము ద్వారా పాలిమర్ అణుభారాన్ని ఎట్లా నిర్ణయీస్తారు?

(OR)

- b) Give an account on bulk and solution polymerization techniques. బల్క్మరియుద్రావణపొలిమరికరణపధ్ధతులనుతెల్పుము.
- 3. a) Discuss the kinetics of free radical polymerization. స్పేచ్ఛా ప్రాతిపదక పొలిమరికరణమును గతికశా(స్త్రము ద్వారా చర్చించండి.

(OR)

- b) What is glass transition temperature? How is it measured? గాజు పరివర్తన ఉష్ణోగ్రత అనగానేమి? దీనిని ఎట్లా నిర్ణయిస్తారు?
- 4. a) Discuss the use of fillers and plasticizers in improving the properties of polymers. పాలిమర్థర్మాలను వృద్ధి చెందించుటలో ఫిల్టర్లు మరియు ప్లాస్టిసైజర్ల ఉపయోగాల గూర్చి చర్చించండి.

(OR)

- b) Write notes on flame retardants and cross linking agents. ఉష్ణనిరోధకాలు మరియు వ్యత్యస్థపాలిమర్ల గూర్చి వ్యాఖ్య వ్రాయండి.
- 5. a) Write the preparation and industrial applications of polythene, Teflon. పాలిథిన్, టెఫ్లాన్ల తయారీ మరియు పరిశ్రమలలో వాటి ఉపయోగాలను వ్**రాయండి**.

(OR)

b) Write the preparation and industrial applications of Terelene, Nylon-6,6. ెటర్లిన్, నైలాన్-6,6ల తయారీ మరియు పరిశ్రమలలో వాటి ఉపయోగాలను వ్రాయండి.

PART-B

Answer any FIVE of the following questions. Each carries FIVE marks. 5 x 5 = 25 Marks క్రరింది వానిలో ఏవైనా ఐదు (పశ్నలకు సమాధానము వ్రాయుము. (పతీదానికి ఐదు మార్కులు.

- 6. What are thermo plastics and thermo setting? ధర్మోప్లాస్టిక, మరియు ధర్మోసెట్టింగ్లు అనగానేమి?
- Write about condensation polymerization. సంఘనన పొలిమరికరణమునుగూర్చివ్రాయండి.
- 8. Define number average and weight average molecular weights. సంఖ్యా సగటు అణుభారాము మరియు భారసగటు అణుభారములనునిర్వచించండి.
- 9. Write a note on emulsion polymerization. ఎమల్షన్ఫోలిమరికరణముపై ఒక వ్యాఖ్య వ్రాయండి.

- 10. Give the Williams-Landel-Ferry equation. విలియమ్స్-లాండ్లి-ఫెర్రి సమీకరణము తెల్పుము.
- 12. What are the factors effecting Tg.?
- Tg. నుప్రభావితముచేయుతింశాలేవి?
 13. Write any two applications of PVC and PAN.
 PVCమరియు PAN లఏవైనారెండుఅనువర్తనాలువ్రాయండి.

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UNIT – I Introduction to spectroscopic methods of analysis:

Recap of the spectroscopic methods covered in detail in the core chemistry syllabus: Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental methods. Consideration of electromagnetic radiation.

UNIT – II Molecular spectroscopy:

Infrared spectroscopy:

Interactions with molecules: absorption and scattering, Means of excitation (light sources), separation of spectrum (wavelength dispersion, time resolution), detection of the signal (heat, differential detection), interpretation of spectrum (qualitative, mixtures, resolution), advantages of Fourier Transform (FTIR), Samples and results expected, Applications: Issues of quality assurance and quality control.

UNIT – III

UV-Visible/ Near IR – emission, absorption, fluorescence and photoaccoustic, Excitation sources (lasers, time resolution), wavelength dispersion (gratings, prisms, interference filters, laser, placement of sample relative to dispersion, resolution), Detection of signal (photocells, photomultipliers, diode arrays, sensitivity and S/N), Single and Double Beam instruments, Interpretation (quantification, mixtures, absorption vs. fluorescence and the use of time, photoaccoustic, fluorescent tags).

UNIT - IV Separation techniques

Chromatography: Gas chromatography, liquid chromatography, supercritical fluids, Importance of column technology (packing, capillaries), Separation based on increasing number of factors (volatility, solubility, interactions) with stationary phase, size, electrical field), Detection: simple vs. specific (gas and liquid), Detection as a means of further analysis (use of tags and coupling to IR and MS).

Mass spectroscopy: Making the gaseous molecule into an ion (electron impact, chemical ionization), Making liquids and solids into ions (electrospray, electrical discharge, laser desorption, fast atom bombardment), Separation of ions on basis of mass to charge ratio, Magnetic, Time of flight, Electric quadrupole. Resolution, time and multiple separations, Detection and interpretation (how this is linked to excitation).

10 h

15 h

4 h

8 h

UNIT – V Elemental analysis

Mass spectrometry (electrical discharges).

Atomic spectroscopy: Atomic absorption, Atomic emission, and Atomic fluorescence. Excitation and getting sample into gas phase (flames, electrical discharges, plasmas), Wavelength separation and resolution (dependence on technique), Detection of radiation (simultaneous/scanning, signal noise), Interpretation (errors due to molecular and ionic species, matrix effects, other interferences).

NMR spectroscopy: Principle, Instrumentation, Factors affecting chemical shift, Spin coupling, Applications.

REFERENCE BOOKS

- 1. Skoog, D.A., Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.
- 2. Willard, H.H., Merritt, L.L., Dean, J. & Settle, F.A. Instrumental Methods of Analysis, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988.
- 3. P.W. Atkins: Physical Chemistry.
- 4. G.W. Castellan: Physical Chemistry.
- 5. C.N. Banwell: Fundamentals of Molecular Spectroscopy.
- 6. Brian Smith: Infrared Spectral Interpretations: A Systematic Approach.
- 7. W.J. Moore: Physical Chemistry

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Time: 3 hours Maximum Marks: 75

PART-A

Answer ALL the questions. Each carries TEN marks. అన్ని ప్రశ్నలకు సమాధానము వ్రాయుము. ప్రతీ దానికి పది మార్కులు. 5 x 10 = 50 Marks

1. a) Write about classification of analytical methods. విశ్లేషణ పద్ధతుల వర్గీకరణను గూర్చి వ్**రాయండి**.

(OR)

- b) Explain the classification of errors. దోషాల వర్శీకరణను వివరించండి.
- 2. a) Describe the absorption and scattering behavior of molecules. అణువుల శోషణము మరియు పరిక్షేపణ ప్రవర్తనంను చర్చించుము.

(**OR**)

- b) Write the applications of IR spectroscopy. IR వర్ణ పట శా(స్తము యొక్క అనువర్తనాలు వ్రాయండి.
- 3. a) Give detailed account on photocells, photo multipliers and diode-array detectors. కాంతి ఘటాలు, కాంతి వర్దకాలు మరియు డయోడ్-ఎర్రె లను గూర్చి క్లుప్తంగా తెల్పుము.

(**OR**)

- b) How do you differentiate absorption and fluorescence? శోషణము మరియు ప్రతిదీప్తి లను వేరుగా ఎట్లా గుర్తిస్తారు?
- 4. a) Discuss the principle and uses of gas-liquid chromatography. వాయు ద్రవక్ రోమటోగ్రఫీ యొక్క సూత్రమును మరియు అనువర్తనాలు చర్చించండి.

(**OR**)

- b) Explain the principle of mass spectrometry. ద్రవ్యరాశి వర్ణ పట శాగ్రస్తము యొక్క సూత్రమును వివరించండి.
- 5. a) Describe the various activities involved in AAS analysis. AAS విశ్లేషణ లో ఇమిడి వున్న వివిధ క్రియాశీల దశలను వర్ణించుము.

(**OR**)

b) Explain the principle and instrumentation of NMR spectroscopy. NMR వర్జపట శా(స్త్రములోఇమిడివున్న సూత్రమును మరియు పరికర అమరికను వివరించండి

PART-B

Answer any FIVE of the following questions. Each carries FIVE marks. 5 x 5 = 25 Marks క్రరింది వానిలో ఏవైనా ఐదు (పశ్నలకుసమాధానము వ్రాయుము. (పతీ దానికి ఐదు మార్కులు.

- 6. Explain about significant figures with examples. సార్గక సంఖ్యలు ఉదాహరణలతో వివరించండి.
- 7. What are the advantages of FTIR? FTIR యొక్క ఉపయోగాలేమిటి?
- 8. Discuss the various techniques of wavelength dispersion. తరంగ దైర్యం విక్షేపణ యొక్క వేరు వేరు పద్ధతులను గూర్చి చర్చించండి.
- 9. How double beam instruments are superior to single beam instruments?

ద్వికిరణ పుంజ వర్ణ పట మాపకము, ఏక కిరణపుంజ వర్ణ పట మాపకము కంటే ఏవిధంగా మెరుగైనది?

- 10. What is electrophoresis? How is it used in DNA analysis? ఎలే(క్రోఫోరేసిస్ అనగానేమి? ఇది DNA విశ్లేషణలో ఏవిధముగా ఉపయోగపడును?
- 11. Describe the procedure for column packing. స్థంబ సంపుటికరణ విధానమును వర్ణించుము.
- 12. What are the factors affecting chemical shift? రసాయన స్థానంతిరికరణను ప్రభావితముచేయుఆంశాలుఏవి?
- 13. Discuss the principle involved in voltametry. వోల్జామేట్రి లో ఇమిడి వున్న సూత్రమును చర్చించండి.

SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS) PALAKOL, W.G. Dt. (Affiliated to Adikavi Nannaya University, Rajahmundry) (Reaccredited with NAAC "B" Grade with 2.61 CGPA points) **DEPARTMENT OF CHEMISTRY** SYLLABUS FOR VI SEMESTER **III B.Sc. CHEMISTRY** PAPER-VIII A: CLUSTER ELECTIVE -3: ANALYSIS OF DRUGS, FOODS, DAIRY **PRODUCTS & BIO-CHEMICAL ANALYSIS**

UNIT-I

10 h

Analysis of the following drugs and pharmaceuticals preparations: (Knowledge of molecular formula, structure and analysis).

Analysis of analgesics and antipyretics like aspirin and paracetamol.

Analysis of antimalerials like choloroquine.

Analysis of drugs in the treatment of infections and infestations: Amoxycillin, chloramphenicol, penicillin, tetracycline.

Anti tuberculous drug- isoniazid.

UNIT - II

Analysis of the following drugs and pharmaceuticals preparations:

(Knowledge of molecular formula, structure and analysis)

Analysis of antihistamine drugs and sedatives like allegra, zyrtec (citrizine), alprazolam, trazodone, lorazepem, ambien (zolpidem), diazepam.

UNIT - III

Analysis of anti epileptic and anti convulsant drugs like phenobarbital and phenacemide. Analysis of cardiovascular drugs like atenolol, norvasc (amlodipine).

Analysis of lipitor (atorvastatin) - a drug for the prevention of productin of cholesterol. Analysis of diuretics like furosemide (Lasix).

Analysis of prevacid (lansoprazole) - a drug used for the prevention of production of acids in stomach.

UNIT – IV

10 h Analysis of Milk and milk products: Acidity, total solids, fat, total nitrogen, proteins, lactose, phosphate activity, casein, choride.

Analysis of food materials - Preservatives: Sodium carbonate, sodium benzoate, sorbic acid. Coloring matters - Briliant blue FCF, fast green FCF, sunset yellow FCF.

Flavoring agents - Vanilla, diacetyl, isoamyl acetate, limonene.

Adulterants in rice and wheat, wheat floor, coconut oil, coffee powder, tea powder, milk.

UNIT - V

Clinical analysis of blood: Composition of blood, clinical analysis, trace elements in the body.

Estimation of blood chlolesterol, glucose, enzymes, RBC & WBC, Blood gas analyser.

6 h

10 h

9 h

REFERENCE BOOKS

- 1. F.J. Welcher Standard methods of analysis.
- 2. A.I.Vogel A text book of quantitative Inorganic analysis-ELBS.
- 3. F.D. Snell & F.M. Biffen Commercial methods of analysis-D.B.Taraporavala & sons.
- 4. J.J.Elving and I.M.Kolthoff Chemical analysis A series of monographs on analytical chemistry and its applications -- Inter Science- Vol I to VII.
- 5. Aanalytical Agricultrual Chemistry by S.L.Chopra & J.S.Kanwar -- Kalyani Publishers
- 6. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi, CBS Publishers and Distributors, New Delhi.
- 7. G.Ingram- Methods of organic elemental micro analysis- Chapman and Hall.
- 8. H.Wincciam and Bobbles (Henry J)- Instrumental methods of analysis of food additives.
- 9. H.Edward-The Chemical analysis of foods; practical treatise on the examination of food stuffs and the detection of adulterants.
- 10. The quantitative analysis of drugs- D.C.Garratt-Chapman & Hall.
- 11. A text book of pharmaceutical analysis by K.A.Connors-Wiley-International.
- 12. Comprehensive medicinal chemistry-Ed Corwin Hansch Vol 5, Pergamon Pres

SRI A.S.N.M. GOVERNMENT COLLEGE (AUTONOMOUS) PALAKOL, W.G. Dt. (Affiliated to Adikavi Nannaya University, Rajahmundry) (Reaccredited with NAAC "B" Grade with 2.61 CGPA points) MODEL PAPER **THREE YEAR B.Sc. DEGREE EXAMINATION** FINAL YEAR EXAMINATIONS SEMESTER VI Paper – VIII A: CLUSTER-3: ANALYSIS OF DRUGS, FOODS, DAIRY PRODUCTS & **BIO-CHEMICAL ANALYSIS**

Time: 3 hours

Maximum Marks: 75

PART-A

Answer ALL the questions. Each carries TEN marks. అన్ని స్థిపిలకు సమాధానము వ్**రాయుము.** స్థిపీ దానికి పది మార్కులు.

1. a) Write the preparation and usage of Chloroquine.

5 x 10 = 50 Marks

క్లోరోక్విన్తయారీ మరియు ఉపయోగాలు వ్**రాయండి**.

(**OR**)

- b) Write the preparation and usage of Pencilline. పెన్సిల్లిన్రయారీ మరియు ఉపయోగాలు వ్**రాయండి**
- 2. a) Write the preparation and analysis of allegra. ఆల్చేగ తయారీ మరియు విశేషణ విదానమును వ్రాయండి.

(OR)

- b) Write the preparation and analysis of diazepam. డైజేపం తయారీ మరియు విశ్లేషణ విధానమును వ్**రాయండి**.
- 3. a) Describe the analysis of any one cardiovascular drug. ఏదైనా ఒక కార్డియోవాస్కులర్ ఔషధము యొక్క విశ్లేషణ విధానమును వర్ణించుము.

(**OR**)

- b) Describe the analysis of Lasix. లాసిక్స్ యొక్క విశ్లేషణ విధానమును వర్ణించుము.
- 4. a) Give an account of analysis of milk with respect to fat casein. పాలలోనికేసిన్ను విశ్లేషణ గూర్చి విఫులంగా తెల్పుము.

(**OR**)

- b) Explain the procedure for the estimation of any two colouring agents. ఏవైనా రెండు వర్ణ కారకాలను నిర్ణయించు పద్ధతులను వివరించండి.
- 5. a) Write an essay on composition of blood. రక్తము యొక్క సంఘటనముపై వ్యాసము వ్**రాయండి**.

(**OR**)

b) Give in detail the estimation of cholesterol and glucose of blood. రక్షములోని గ్లూకోజ్మరియు కొలె[స్టాల్నిర్ణయించు పద్ధతులను గూర్చి సంగ్రహముగా తెల్పుము.

PART-B

Answer any **FIVE** of the following questions. Each carries **FIVE** marks. 5 x 5 = 25 Marks క్రింది వానిలో ఏవైనా **ఐదు** (పశ్నలకుసమాధానము వ్**రాయుము. (పతీ దానికి ఐదు** మార్కులు.

- 6. Write the preparation of Paracetmol. పారాసిటమాలయారీ వ్**రాయండి**.
- 7. Write the analysis of any one of the antihistamine drugs. ఏదైనా ఒక అంటిహిస్టమిన్ ఔషధము యొక్క విశ్లేషణ విధానమును వ్**రాయండి**.
- 8. How is lansoprazole estimated? లాన్ఫాప్రోజోల్సు ఏవిధింగా నిర్ణయిస్తారు?
- 9. Give some preservatives used in food materials. ఆహారపదార్థములలో వాడుకొన్ని నిల్వ కారకలను తెల్పుము.
- 10. What are flavouring agents? Give examples.

సుగంధ కారకాలు అనగానేమి? ఉధాహరణలిమ్ము.

- 11. How are wheat and wheat flour adulterated? గోధుమలు మరియు గోధుమపిండి ఏవిధముగా కల్లీ చేయబడును?
- 12. What are the trace elements present in the body? మానవ శరీరంలోని సూక్ష్మమూలకాలు ఏవి?
- 13. How do you estimate the RBC & WBC in the blood? రక్తములోని RBC & WBC ఏవిధముగా నిర్ణయిస్తారు?

I. LABORATORY COURSE

Practical Paper - VIII-A-1/VIII-B-1/VIII-C-1

(at the end of semester VI) **30 hrs (2 h / W)**

1. Preparation of Aspirin

2. Preparation of Paracetamol

3. Preparation of Acetanilide

4. Preparation of Barbutiric Acid

5. Preparation of Phenyl Azo β -naphthol

SCHEME OF VALUATION

For Record - 10 Marks

For Viva-voce - 5 Marks

For Practical - 35 Marks

Splitting of Practical Marks

i) Procedure	: 20 Marks
ii) Equation	: 5 Marks
iii) M.P.	: 5 Marks
iv) Report of yield	: 5 Marks

II. LABORATORY COURSE

Practical Paper - VIII-A-2/VIII-B-2/VIII-C-2

(at the end of semester VI) **30 hrs (2 h / W)**

1. Electrochemistry:

i) Determination of redox potential of Fe^{2+}/Fe^{3+} by potentiometric titration of ferrous ammonium sulphate vs. $K_2Cr_2O_7$.

2. pH metry:

i) Preparation of phosphate buffer solutions.

ii) pH metric titration of weak acid, acetic acid with strong base, NaOH and calculation of dissociation constant.

3. Colorimetry:

i) Verification of Beer-Lambert law for KMnO₄ and determination of concentration of the given solution.

ii) Verification of Beer-Lambert law for K₂Cr₂O₇ and determination of concentration of the given solution.

iii) Verification of Beer-Lambert law for CuSO₄ and determination of concentration of the given solution.

iv) Composition of complex of Cu^{2+} -EDTA disodium salt.

SCHEME OF VALUATION

For Record - 10 Marks

For Viva-voce - 5 Marks For Practical - 35 Marks

Splitting of Practical Marks

i) Procedure in first 10 min		: 5 Marks
ii) Formula with Units		: 5 Marks
iii) Neat Tabulation and Correct Ca	alculation.	: 5 Marks
En	ror < 10%	: 20 Marks
Err	ror 10-15%	: 15 Marks
Err	ror >15%	: 10 Marks (Minimum Marks)

III. LABORATORY COURSE

VIII-A-3/VIII-B-3/VIII-C-3 Practical:- Project Work