MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: I**

Course Title: Inorganic & Physical Chemistry **Course Code: 20CHCCIP13**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To impart basic knowledge on p-, d-, and f-block elements · To understand the theories of bonding in metals.
- To learn various concepts of solid state, liquid state and gaseous state.
- To study solutions and colligative properties

Course outcomes

CO1: Describe the basic concepts of p-, d-, and f- block elements

CO2: Summarize the theories of bonding in metals

CO3: Explain laws, relations, concepts relevant to solid, liquid and gaseous states

CO4: Outline the behaviour of different liquid systems and explain colligative properties

CO5: Solve concept-based problems

UNIT-I Chemistry of p-block elements (10 Hrs.)

Group 13: Preparation & structure of Diborane, Borazine

Group 14: Preparation, and uses of silicones

Group 15: Preparation & structures of Phosphonitrilic halides $\{(PNCl_2)_n$ where n=3, 4

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

Group 17: Pseudohalogens, Structures of Interhalogen compounds.

Chemistry of d-block elements

Characteristics of d- block elements with special reference to electronic configuration, variable valence, magnetic properties,catalytic properties and ability to form complexes. Stability of various oxidation states

UNIT-II Chemistry of f-block elements (10Hrs.)

Chemistry of lanthanides - electronic structure, oxidation states, lanthanide contraction, consequences of lanth anide contraction, magnetic properties. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

Theories of bonding in metals

Valence bond theory and Free electron theory, explanation of thermal and electrical conductivity of metals based on these theorie s, Band theory- formation of bands, explanation of conductors, semiconductors and insulators.

UNIT-III Solid State (9 Hrs.)

Symmetry in crystals. Law of constancy of interfacial angles. The law of rationality of indices. The law of symmetry . Miller indices, Definition of lattice point, space lattice, unit cell. Bravais lattices and crystal systems. X- ray diffraction and crystal structure. Bragg' s law. Powder method. Defects in crystals. Stoichiometric and non - stoichiometric defects.

Liquid State

Liquid crystals, mesomorphicstate. Differences between l iquid crystal and solid/liquid. Classification of liquid crystals into Smectic and Nematic. Application of liquid crystals as LCD devices.

UNIT-IV Gaseous State (9 Hrs.)

Van der W aal' s equation of state. Andrew' s isotherms of carbon dioxide, continuity of state. Critical phenomena. Relationship between critical constants and Vander Waal' s constants. Law of corresponding states. Joule- Thomson effect. Inversion temperature.

Solutions

Azeotropes- HCl- H2O system and ethanol - water system. Partially miscible liquids: Phenol - water system. Critical solution temperature (CST), Effect of impurity on consulate temperature. Immiscible liquids and steam distillation.Nernst di stribution law. Calculation of the partition coefficient. Applications of distribution law.

UNIT-V Dilute Solutions **(10 Hrs.)**

Colligative properties- RLVP, Osmotic pressure, Elevation in boing point and depression in freezing point.

osmotic pressure - Determination of molecular weight of non - volatile solute, experimental determination of osmotic pressure by Berkeley & Hartley's method

Elevation in boiling point, Derivation of relation between molecular weight and elevation in boiling point, Experimental determination by Cottrell's method;depression in freezing point, Derivation of relation between molecular weight and depression in freezing point, Experimental determination by Beckmann's method.

Abnormal colligative properties. Van't Hoff factor.

Ionic equilibrium

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

Hands on / Skill based learning **(12 Hrs.)**

1. **Skill:** Identify the Industrial and real time applications of conductor, semiconductor and insulator materials.
   Student Activity: Video/PPT making on the Industrial and real time applications of conductor, semiconductor and insulator materials.
2. **Skill:** Experiential learning through simple experiments on colligative properties / steam distillation / common ion effect and solubility product.
   Student activity: Perform experiments on the chosen topic followed by report writing.
3. **Skill:** Problem solving
   Student activity: Submission of assignment with solutions for concept based problems.

Prescribed Text Book

1. Unified Chemistry, Vol I, By Dr.O.P.Agarwal, Jai Prakash Nath publications, Meerut.

Reference Books

1. Principles of physical chemistry by Prutton and Marron
2. SolidState Chemistry and its applications by Anthony R. West

3. Text book of physical chemistry by K L Kapoor
4. Text book of physical chemistry by S Glasstone
5. Advanced physical chemistry by Bahl and Tuli
6. Inorganic Chemistry by J.E.Huheey
7. Basic Inorganic Chemistry by Cotton and Wilkinson

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: I**

Course Title: Analysis of Salt Mixture - Practical **CourseCode:20CHP1SM12**

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To Understand the basic concepts of qualitative analysis of inorganic mixture.
- To adapt systematic procedure for mixture analysis ofinorganic salts.

Course outcomes

CO1: Analyze inorganic Mixture by adapting systematic procedure.

CO2: Apply the concepts of common ion effect and solubility product in mixture analysis.

CO3: Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.

Analysis of Salt Mixture

(Minimum six mixtures should beanalyzed)

Analysis of mixture salt containing two anions and two cations (From two different groups) from the following:

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

Cations: Lead, Copper, Iron, Aluminium, Cobalt, Zinc, Nickel Manganese, Calcium, Strontium, Barium, Potassium and Ammonium.

MARIS STELLA COLLEGE(AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: II**

CourseTitle: Organic & General Chemistry **Course Code:20CHCCOG23**

No. of Hours: 60 **LTP: 400** **Credits: 3**

Objectives

- To learn preparatory methods, physical & chemical properties of alkanes, cycloalkanes, Halogen compounds, alkenes and alkynes.
- To understand the theoretical concepts involved in carbon -carbon single bond formation and carbon-carbon double bond formation
- Tolearn different aspects of addition, substitution, elimination reactions
- To study concepts of aromaticity, orientation in aromatic substitution
- To learn the basic concepts of colloids, adsorption and titrimetric analysis
- To understand stereochemistry of carbon compounds

Course outcomes

CO1: Describe the preparations, properties of cycloalkanes, halogenated hydrocarbons, alkenes and alkynes.

CO2: Outline the mechanisms pertinent to addition, substitution, elimination reactions.

CO3: Explain the concepts of aromaticity, orientation and stereoisomerism.

CO4: Describe colloidal systems, isotherms and different types of volumetric titrations.

CO5: Solve concept-based problems.

UNIT- I Cycloalkanes, halogenated hydrocarbons (10 Hrs.)

Cycloalkanes and relative stability; Baeyerstrain theory, conformations of Cyclohexane.

Alkyl halides: Methods of preparation – halogenation of alkanes; Chemical properties – i) nucleophilic substitution reactions – S*N*1,S *N*2 with mechanism, stereochemical aspects;ii) Williamson's synthesis.
Aryl halides: Nucleophilic aromatic substitution –Benzyne mechanism; Relative reactivity of alkyl, allyl, benzyl, vinyl and aryl halides towards nucleophllic substitution reactions.

UNIT-II Alkenes and Alkynes (8 Hrs.)

General methods of preparation of alkenes – Dehydrohalogenation of alkyl halides - Mechanism of E1, E2, E1 cb reactions; Saytzeff and Hoffmann
eliminations; Physical properties - Chain, position, functional and geometrical isomerism; Chemical properties: Electrophilic Additions (Markownikoff /Anti markownikoff's addition) mechanism - with addition of H_2,X_2,HX; Oxymercuration followed by reduction(i.e demercuration); Hydroboration followed by oxidation; ozonolysis; Diels Alder reaction - 1,2and1,4–addition reactions in conjugated dienes.
Reactions of alkynes: Acidity, electrophilic additions – X_2 , HX, HOX and nucleophilic additions – H_2O, HCN, ROH,CH_3COOH; Alkylation of terminal alkynes (i.e formation of higher alkynes).

UNIT-III Benzene and its reactivity (10 Hrs.)

Concept of aromaticity, Huckel' s rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenylcation, cyclopentadienyl anion and tropyliumcation)
Reactions - General mechanism of electrophilic aromatic substitution, mechanism of nitration, Friedel - Craft' s alkylation and acylation. Orientation of aromatic substitution - ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO2 and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbon yland sulphonic acid groups (i ii) Halogens. (Explanation by taking minimum of one example from each type)

UNIT-IV Surface chemistry (10 Hrs.)

Colloids- Coagulation of colloids- Hardy- Schulze rule. Stability of colloids, Protection of Colloids, Gold number;

Adsorption- Physical and chemical adsorption, Langmuir adsorption isotherm, applications of adsorption.

Chemical Bonding

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).

Principles of Volumetric Analysis: Theories of acid - base, redox, complexometric, iodometric and precipitation ti trations, choic e of indicators for these titrations.

UNIT-V Stereochemistry of carbon compounds (10 Hrs.)

Molecular representations- Wedge, Fischer, Newman and Saw- Horse formulae.

Optical isomerism: Optical activity- wave nature of light, plane polarised light, optical rotation and specific rotation.

Chiral molecules- definition and criteria(Symmetry elements) - Definition of enantiomers and diastereomers – Explanation of optical isomerism with examples- Glyceraldehyde, Lactic acid, Alanine, Tartaric acid, 2,3 - dibromopentane.D,L, R, S and E,Z - configuration with examples.Definition of Racemic mixture – Resolution of racemic mixtures (any 3 techniques)

Hands on / Skill based learning (12 Hrs.)

1. **Skill:** Identify the Industrial applications of alkenes in polymers
   Student Activity: Prepare Video/ PPT on real time applications of alkenes in polymers through industry exposure.
2. **Skill:** Experiential learning through simple experiments on applications of Colloids / adsorption / Volumetric titrations.
   Student activity: Perform experiments in the lab on the chosen topic followed by report writing.
3. **Skill:** Hands on training in model preparations for molecular

representations and stereoisomers using ball and stick Kit. **Student activity:** Assemble and present the model for the molecule asked by course teacher for assessment.

4. **Skill:** Problem solving

   Student activity: Submission of assignment with solutions for concept-based problems.

Prescribed Text Book

1. Unified Chemistry, Sem II, Paper II by Dr.O.P. Agarwal, Jai Prakash Nath Publications, Meerut.

Reference Books

1. Morrison, R. N. & Boyd, R. N. Organic Chemistry, Dorli ng Kindersley (India) Pvt. Ltd. (PearsonEducation).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 2): Stereochemistry and the Chemistry of Natural Products), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Eliel, E. L. &Wilen, S. H. Stereochemistry of Organic Compounds; Wiley: London, 1994. Kalsi, P. S. Stereochemistry Conformation and Mechanism; New Age International, 2005.

Additional Resources

1. Solomons, T. W. G.; Fryhle, C.B. &Snyder, S. A. Organic Chemistry, 12th Edition, Wiley. Bruice, P. Y. Organic Chemistry, Eighth Edition, Pearson.
2. Clayden, J.; Greeves, N.&W arren, S. Organic Chemistry, Oxford.
3. Nasipuri, D. Stereochemistry of Organic Compounds: Principles and Applications, ThirdEdition, NewAge International.
4. Gunstone, F. D. Guidebook to Stereochemistry, Prentice Hall Press, 1975.

MARIS STELLA COLLEGE(AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: II**

Course Title: Volumetric Analysis - Practical **Course Code: 20CHP2VA22**

No. of Hours: 30 **LTP: 002** **Credits: 2**

Objectives

- To experiment with different types of volumetric analysis.
- To understand about primary, secondary standard materials.
- To learn preparation of standard solutions , solutions of different concentrations.

Course outcomes

CO1: Estimate the amount of substances by volumetric analysis.

CO2: Explain principle of volumetric titrations, functionality of indicators

CO3: Prepare standard solutions and solutions of different concentrations.

Volumetric analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.
2. Determination of Fe (II) using $KMnO_4$ with oxalic acid as primary standard.
3. Determination of Cu (II) using $Na_2S_2O_3$ with K2Cr2O7 as primary standard.
4. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$
5. Determination of total hardness of water sample (Complexometric titration)

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Chemistry **Semester: III**

Course Title: Organic Chemistry & Spectroscopy **Course Code: 20CHCCOS33**

No. of Hours: 60 Hrs **LTP: 400** **Credits: 3**

Objectives:

- To study the basic chemistry of alcohols, phenols, carbonyl compounds, active methylene compounds, carboxylic acids and their derivatives.
- To understand the basic concepts of electronic, IR and NMR spectroscopy

Course outcomes

CO1: Elaborate synthesis and characteristic properties of alcohols, phenols, carbonyl compounds, active methylene compounds, carboxylic acids and their derivatives.

CO2: Outline the mechanisms of certain chemicalreactions.

CO3: Apply spectroscopy to analyze molecular structure

CO4: Solve concept based problems

UNIT – I Alcohols & Phenols (10 Hrs.)

Alcohols: Preparation - hydroboration reaction, Grignard synthesis of alcohols;Physical properties - hydrogen bonding - Intra & Intermolecular, Effect of hydrogen bonding on boiling point & water solubility; Relative reactivity of 1°, 2°, 3° alcohols ; Chemical properties

- a) Bouveault- Blanc Reduction b) Oxidation of diols by per iodic acid and lead tetra acetate, c) Pinacol Pinacolone rearrangement;

Phenols: Preparation-i) from diazonium salt ii) from aryl sulphonates iii) from cumene. Properties - Acidity and factors effecting it; Ring substitution reactions - Reimer-Tiemann, Kolbe's-Schmidt Reactions with mechanism, Rearrangement reactions -Fries, Claisen rearrangements with mechanism.

UNIT-II Carbonyl Compounds (10 Hrs)

Structure, Reactivity; Preparation- Synthesis of Aldehydes from acid chlorides, synthesis of aldehydes and ketones using 1, 3 -dithianes, synthesis of ketones from nitriles and from carboxylic acids;

Properties:

A) Nucleophilic additions - with a) $NaHSO_3$ b) HCN c) RMgX d) NH_2OH e) $PhNHNH_2$ f) 2,4-DNPH

B) Named reactions with mechanism – Aldol condensation, Benzoin condensation, Perkin reaction, Cannizzaro reaction, Wittig reaction, Beckmann rearrangement, haloform reaction

C) Oxidation-Baeyer- Villiger oxidation

D) Reduction-Clemmensen, Wolf -Kishner, with $LiAlH_4$, $NaBH_4$

E) Additionreaction - Michaeladdition.

Activemethylenecompounds

Keto - enol tautomerism. Malonic ester - Preparation from acetic acid and synthesis of propionic acid, n -butyric acid, succinic acid, adipic acid, crotanic acid and barbituric acid. Acetoacetic ester – Preparation by Claisen condensation and Synthesis of propionic acid, iso - butyric acid, succinic acid, adipic acid, crotonic acid and 4 -methyl uracil.

UNIT-III Carboxylic acids and their Derivatives (9 Hrs.)

General methods of preparation: Aliphatic carboxylic acids - a) Hydrolysis of Nitriles, amides, b) Hydrolysis of esters c) Carbonation of Grignard reagents; Aromatic carboxylic acids – a) Oxidation of side chain, b) Kolbe's Schmidt's reaction

Physical properties: Hydrogen bonding, dimeric association, acidity - strength of acids with examples of trimethyl acetic acid & trichloro acetic acid.

Chemical properties of A) Monocarboxylic acids: salt formation, anhydride formation, acid chloride formation, amide formation and esterification (mechanism); B) Dicarboxylic acids: salt formation, anhydride formation, acid chloride formation, amide formation and esterification; C) Hydroxy acids: action of heat reaction of α, β and γ - hydroxy acids; D) Unsaturated acids (Maleic acid, Fumaric acid): Action

of heat, with alkaline KMnO4

Named reactions: Huns-Diecker reaction, Schimdt reaction, Arndt Eistert synthesis, Hell- Volhard - Zelinsky reaction.

Acid Derivatives

A) Acid Chlorides: Preparation from PCl_3; Rosenmund reduction, Hydrolysis

B) Anhydrides: Preparation from acetyl chloride; Friedel - Crafts acetylation

C) Esters: Preparation by esterification; acidic and alkaline hydrolysis of esters with mechanism, Reformatsky reaction

D) Amides: Preparation from ammonium salts; hydrolysis, Hoffmann degradation of amides

UNIT- IV Electronic Spectroscopy (9 Hrs.)

Interaction of electromagnetic radiation with molecules and types of molecular spectra. Energy levels of molecular orbitals (□□□□n).

Selection rules for electronic spectra. Types of electronic transitions in molecules, effect of conjugation. Concept of chr omop hore and auxochrome.

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

Infrared spectroscopy

Different regions in infrared radiations. Selection rules, modes of vibrations in diatomic and polyatomic molecules.Characteristic absorption bands of various functional groups - Fundamental frequencies, overtones and hotbands.

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).

UNIT- V Nuclear Magnetic Resonance (NMR) spectroscopy (10 Hrs.)

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

Hands on / Skill based learning (12 Hrs.)

1. **Skill:** Identification of alcohols, phenols in real time application.
   Student Activity: Identify for the composition of different cosmetics and disinfectants (sanitizers etc) for the presence of alcohols and phenols.[Submit document (PPT/ word doc)]
2. **Skill:** Experiential learning by identifying different acids in food stuffs.
   Student Activity: To identify the presence of different acids in various food stuffs through simple tests and submit the report in the format given by the faculty.
3. **Skill:** Spectral analysis
   Student Activity: Problem solving on spectral analysis followedby submission of assignment.

Prescribed Text Book

1. Unified Chemistry, Vol III, By Dr.O.P.Agarwal, Jai Prakash Nath publications, Meerut.

Reference Books

1. A Text Book of Organic Chemistry by Bahl and Arunbahl
2. A Text Book of Organic chemistry by I L FinarVol I
3. Organic chemistry by Bruice
4. Organic chemistry by Clayden
5. Spectroscopy by William Kemp
6. 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. Spectrometric Identification of Organic Compounds by Robert M
11. Silverstein, Francis X Webster
12. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)

10. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. &Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
11. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Pract ical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWAD– 8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: III**

Course title: Organic Preparations & IR Spectral analysis -Practical **Course Code: 20CHP3OS32**

No.of hours: 30 Hrs **LTP: 002** **Credits: 2**

Objectives

- To learn the basic laboratory techniques with reference to synthesis
- To use synthesis equipment
- To interpret IR spectra / data

Course outcomes

CO1: Perform common laboratory techniques including reflux,distillation, re-crystallization, vacuum filtration.

CO2: Handle reflux apparatus, M.P apparatus, Vacuum pump forfi ltration,electronic balance etc

CO3: Apply concepts of spectroscopy to analyz e spectra / data of different functional groups.

Organic preparations

1. Acetylation of one of the following compounds:
   Amines (aniline, o-, m-, ptoluidines and o-, m-, p- anisidine) and Phenols (β- naphthol, vanillin, salicylic acid) by any one method:
   a. Using conventional method.
   b. Using green approach
2. Benzolyation of one of the following amines
   (aniline, o-, m-, p- toluidines and o-, m-, p-anisidine)
3. Nitration of any one of the following:
   a. Acetanilide/nitrobenzene by conventional method b. Salicylic acid by green approach (using ceric ammonium nitrate).

4. IR Spectral Analysis

IR Spectral Analysis of the following functional groups with examplesa) Hydroxyl groups

b) Carbonyl groupsc) Amino groups

d) Aromatic groups

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: IV**

Course Title: Inorganic & Physical Chemistry **Course Code: 20CHCCIP43**

No. of Hours: 60 Hrs **LTP: 400** **Credits: 3**

Objectives

- To understand the various bonding theories of metal complexes, structures and stabilities.
- To study the inorganic reaction mechanism and biological significance of essential elements
- To learn the applications of phase rule to different systems and to realize the significance of freezing mixtures
- To get basic knowledge of electrochemistry and chemical kinetics.

Course outcomes

CO1: Summarize the terminology, nomenclature, stereo Chemistry, theories of bonding, and stability of complex compounds.

CO2: Elucidate the inorganic reaction mechanism path ways and Outline the role of essential elements in biological processes.

CO3: Apply phase rule to different systems mentioned.

CO4: Describe the electrochemical concepts and their applications in electro-analytical techniques.

CO5: Elaborate and deduce expressions for kinetics of chemical reactions.

CO6: Solve concept-based problems

UNIT–I Coordination Chemistry (10 Hrs.)

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 Theory: Crystal field effect, oc tahedral 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

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.

UNIT–II Inorganic Reaction Mechanism (10 Hrs.)

Introduction to inorganic reaction mechanisms, Concept of reaction pathways, transition state, intermediate and activated complex. Labile and inert complexes, l igand substitution reaction SN^1 and SN^2, Substitution reactions in square planar complexes, Trans - effect, theories of trans-effect and its applications.

Bioinorganic Chemistry

Metal ions present in biological systems, classification of elements according to their action in biological system. Geo chemical effect on the distribution of metals, Sodium/ K - pump, carbonicanhydrase and carboxypeptidase. Excess and deficiency of some trace metals: Copper, Calcium, Cobalt, iron. Toxicity of metal ions (Hg,Pb,Cd and As), reasons for toxicity. Use of chelating agents in medicine: Cisplatin as ananti-cancer drug. Haemoglobin, Myoglobin.

UNIT-III Phase rule (9 Hrs.)

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, de- silverisation of lead ii) NaCl-Water system, Congruent and incongruent melting point- Definition and examples for systems having congruent and incongruent melting point, freezing mixtures.

UNIT-IV Electrochemistry (9 Hrs.)

Specific conductance, equivalent conductance and molar conductance - Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch' s law and i ts applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel-Onsagar's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements - conductometric 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.

UNIT-V Chemical Kinetics (10 Hrs.)

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.

Hands on / Skill based learning (12 Hrs.)

1. **Skill:** Preparation of simple complexes; Interpretation of structure.
   Student Activity: Preparation of simple complexes in the laboratory followed by document submission in the prescribed format.
2. **Skill:** Identify the biological significance of trace metals
   Student activity: Preparation of short video / PPT/ word document on biological significance of trace metals.
3. **Skill:** Problem solving in electrochemistry & chemical kinetics
   Student activity: Submission of assignment with solutions for concept based problems in Electrochemistry and Chemical kinetics.

Prescribed Text Book

1. Unified Chemistry, Vol V, By Dr.O.P.Agarwal, Jai Prakash Nath publications, Meerut.

Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, PurdueUniv
4. Text book of physical chemistry by S Glasstone
5. Concise Inorganic Chemistry by J.D.Lee
6. Advanced Inorganic Chemistry Vol - I by Satyaprakash, Tuli, Basu and Madan
7. A Text Book of Organic Chemistry by Bahl and Arunbahl
8. A Text Book of Organic chemistry by I L Finar Vol I
9. A Text Book of Organic chemistry by I L Finar Vol 1
10. Advanced physical chemistry by Gurudeep Raj
11. Organicchemistry, VI Edition, L.G.Wade Jr and Maya Shankar Singh

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Chemistry **Semester: IV**

Course Title: Organic Qualitative Analysis - Practical **Course Code: 20CHP4OA42**

No. of Hours: 30 Hrs **LTP: 002** **Credits: 2**

Objectives

- To experiment with the reactions of different organic functional groups.
- To identify the organic functional group and name of the compound by using a systematic procedure.

Course outcomes

CO1: Adapt systematic procedure and perform organic compound analysis to identify the organic functional group and name of the compound.

CO2: Determine the boiling/melting point of the given organic compound.

Organic Qualitative analysis **50 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.

1. Carboxylic acids – acetic acid, bezoic acid, oxalic acid, succinic acid, phthalic acid
2. Phenols - Phenol, α-naphthol, β-naphthol
3. Aldehydes - acetaldehyde, benzaldehyde
4. Ketones - acetophenone, benzophenone
5. Carbohydrates – Glucose, Fructose
6. Amides - acetamide, urea, benzamide
7. Amines - Aniline

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA – 8

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SYLLABUS

Subject: Chemistry **Semester: IV**

Course Title: Inorganic, Organic & Physical Chemistry **Course Code: 20CHCCIO43**

No.of hours: 60 Hrs **LTP:400** **Credits: 3**

Objectives

- To learn the concepts of organometallic compounds, metal carbonyls and photochemistry.
- To understand carbohydrate and heterocyclic chemistry · To study the preparations, properties of amino acids, nitro compounds and amines with relevant mechanisms.
- To understand the concepts of thermodynamics and related laws

Course outcomes

CO1: Classify the organometallic compounds, Summarize the concepts of metal carbonyls and elaborate the photo processes & their applications

CO2: Discuss the molecular structure, physical and chemical properties of carbohydrates and heterocyclic compounds.

CO3: Elucidate the preparation, properties of amino acids, nitro compounds and amines with relevant chemical equations, mechanisms.

CO4: Deduce relations between the fundamental terms in thermodynamics and discuss the laws of thermodynamics.

CO5: Solve concept based problems

UNIT – I: Organo Metallic Compounds (10 Hrs.)

Definition and classification of organometallic compounds on the basis of bond type; Concept of hapticity of organic ligands.

Metal carbonyls: Pi-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies). 18electronrule, electron count for – Ni (CO)4, Cr(CO)6, Mn2(CO)10, Co2(CO)8. General methods of preparation – a) direct synthesis from metal and CO, b) Photo decomposition or thermal decomposition of primary carbonyls

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).

UNIT – II Carbohydrates (10 Hrs.)

Occurrence, classification and their biological importance. Mono saccharides: Constitution and absolute Configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses and ketoses; Killiani – Fischer synthesis and Ruff degradation;

Disaccharides: Elementary treatment of maltose, lactose and sucrose.

Polysaccharides: Elementary treatment of starch.

UNIT- III Amino acids (9 Hrs.)

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).

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.

UNIT- IV Nitrogen Containing Functional Groups (9 Hrs.)

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 Michael addition and reduction.

Amines

Introduction, classification; General methods of preparation- a) Ammonolysis of alkyl halides b) Gabriel Phthalimide synthesis with mechanism c) Hoffmann bromamide reaction with mechanism Properties: Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Chemical properties: a) Distinction between Primary, secondary and tertiary amines using Hinsberg's reagent and nitrous acid, b) Carbyl amine reaction c) alkylation d) acylation e) diazotization

UNIT- V Thermodynamics (10 Hrs.)

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 -

Kirchhoff'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, Spontaneous and non- spontaneous processes, Helmholtz and Gibbs energies - Criteria for spontaneity.

Hands on / Skill based learning (12 Hrs.)

1. **Skill:** Identify the real time applications of Fluorescence and Phosphorescence
   Student Activity: Short video making on real time applications of Fluorescence and Phosphorescence in different fields like road safety, chemical sensors, medicine, fluorescent labelling, dyes, biological detectors etc
2. **Skill:** Experiential learning by identifying carbohydrates in food stuffs.
   Student Activity: Identification of different sources of mono, di and poly sacharides and perform possible simple tests for carbohydrates for the chosen source followed by report writing.
3. **Skill:** Exposure to biological significance of amino acids, carbohydrates
   Student Activity: Peer teaching (Group activity) on 'sources and biological significance of amino acids, carbohydrates' followed by Quiz and submission of

quiz questions.

4. **Skill:** Problem solving on concepts of the course

   Student activity: Submission of assignment with solutions for concept based problems (i.e Problem Solving)

Prescribed Text Book

1. Unified Chemistry, Vol IV, By Dr.O.P.Agarwal, Jai Prakash Nath publications, Meerut.

Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. Text book of physical chemistry by S Glasstone
5. Concise Inorganic Chemistry by J.D.Lee
6. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Mada
7. AText Book of Organic Chemistry by Bahl and Arunbahl
8. A Text Book of Organic chemistry by I L Finar Vol I
9. A Text Book of Organic chemistry by I L Finar Vol II
10. Advanced physical chemistry by Gurudeep Raj
11. Organic chemistry, VI Edition, L.G.Wade Jr and Maya Shankar Singh

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: IV**

Course Title: Physical Chemistry - Practical **Course Code:20CHP5PC42**

No. of Hours: 30H **LTP: 002** **Credits: 2**

Objectives

- To understand the concepts of electrochemistry and their application in electro analytical techniques
- To learn experimental procedures and perform experiments in electro chemistry and chemical kinetics.

Course outcomes

CO1: Handle potentiometer, conductivity meter and perform experiments in electro chemistry.

CO2: Determine the order and average rate constant of chemical reactions

CO3: Use glassware, equipment, chemicals and follow experimental procedures in the laboratory.

Conductometry, Potentiometry and Kinetics **50 M**

1. **Conductometric estimation** of strength of CH3COOH Solution using standard NaOH solution.
2. **Conductometric estimation** of concentration of CH3COOH and HCl in a mixture using standard NaOH solution.
3. **Potentiometric estimation** of Fe (II) using standard K2Cr2O7 solution.
4. Determination of rate constant for acid catalyzed ester hydrolysis.
5. Determination of rate constant for the decomposition of H2O2 catalyzed by Fe^{3+}.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry - I

Course Code: 20CHSEC21AM3

No.of Hours: 45 **LTP:300** **Credits: 3**

Objectives

- To learn the common laboratory practices
- To know the fundamentals of data analysis.
- To understand the principle and experimental techniques of analytical methods
- To study the methods of determination of certain parameters in water analysis.

Course outcomes

CO1: Summarize general lab practices and concepts.

CO2: Explain various operations of gravimetric analysis.

CO3: Classify errors and describe basic methods, concepts in data analysis.

CO4: Discuss the principle, instrumentation and applications of spectrophotometry, Potentiometry, AAS.

CO5: Solve concept- based problems

UNIT-I: General lab Practices (9Hrs.)

1. Use of glassware for accurate and rough measurements, dilution of concentrated acids, methods of expressing concentration - Molarity, Molality, Normality, v/v, w/v, ppm and ppb, preparing solutions- Standard solution, primary standards and secondary standards.Dilutions – ug/ml solutions, preparation of acidic, basic buffer solutions
2. Simple purification and separation methods:Crystallization - choice of solvent, dissolution of sample at elevated temperature, hot filtration, crystallization on cooling, simple

distillation;Determination of melting and boiling points.

UNIT - II: Treatment of analytical data (9 Hrs.)

1. Errors-Types of errors (Determinate and indeterminate errors), methods of minimization of errors
2. Accuracy - methods of expressing accuracy;Precision - methods of expressing precision - standard deviation;Confidence limits, significant figures, and its importance

UNIT-III: Gravimetry, Potentiometry (10 Hrs.)

1. Gravimetric analysis: Precipitation, coagulation, peptization,co-precipitation, post precipitation, digestion, filtration, and washing of precipitate, drying and ignition.
2. Basic principle, brief discussion of reference electrodes -hydrogen electrodes, calomel electrode and glass electrode; potentiometric titration technique; location of end points; pH measurements; Applications -potentiometric titration of Fe(II) against standard $K_2Cr_2O_7$.

UNIT- IV: Spectrophotometry, AAS (8 Hrs.)

1. Spectrophotometry: Principle, Instrumentation: Single beam and double beam spectrometer, Beer- Lambert's law- Derivation and deviations from Beer-Lambert's law, applications of Beer-Lambert's law-Quantitative determination of Fe+2, Mn+2.
2. Atomic Absorption Spectroscopy: Principle, brief discussion of instrumentation with a block diagram -radiation source, atomization unit, oxidizing agents/fuels, chopper, monochromator, detectors and read out device. Application - determination of Mg in tap water

UNIT- V: Analysis of water (9 Hrs.)

1. Determination of dissolved solids, total hardness of water, turbidity, alkalinity
2. Dissolved oxygen, COD, BOD, determination of chloride using Mohr's method.

Co-curricular Activities

1. Invited lectures and presentations on related topics by field / industrial experts.
2. Assignments / Seminars / Quiz / PPT or video making on related topics, preparation of MCQs
3. Visits to labs/ industries

Prescribed Text book

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

Reference Books

1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, PurnenduK.Dasgupta and KevinA.Schug,Seventh edition, Wiley.
3. Quantitative analysis by R.A.DayJr. And A.L.Underwood, Sixth edition, Pearson.
4. Text book of Environmental Chemistry and Pollution Control by S.S.Dara and D.D.Mishra, Revised edition, S Chand & CoLtd.

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

BLUE PRINT

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry - I

Course Code: 20CHSEC21AM3

Time: 3 Hrs. **Max. Marks: 100**

SECTION – A

Answer ALL questions **20 x1 = 20 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 8 RBT2 – 8 RBT3 – 2 RBT4 – 2
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any FOUR questions **4 x 8 = 32 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 2 RBT2 – 2 RBT3 – 1 RBT4 – 1
22	II	8	
23	III	8	
24	IV	8	
25	V	8	
26	I / II / III / IV / V	8	

SECTION – C

Answer any FOUR questions **4 x 12 = 48 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 2 RBT2 – 2 RBT3 – 1 RBT4 – 1
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

SYLLABUS

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry–I-Practical

Course Code: 20CHP621AM2

No.of Hours: 45 **LTP:003** **Credits:2**

Objectives

- To handle analytical instruments – potentiometer, colorimeter etc.
- To carry out water analysis

Course outcomes

CO1: Handle instruments potentiometer, colorimeter etc.and perform experiments on them.

CO2: Analyze water samples for certain parameters.

List of Practicals (30 Hrs.)

1. Verification of Beer lambert's law for Potassium permanganate solution using colorimeter /spectrophotometer.
2. Potentiometric estimation of Fe(II) against standard Cr(VI) solution.
3. Determination of alkalinity of water sample
4. Determination of dissolved oxygen (DO)of water sample
5. Determination of Chemical Oxygen Demand (COD) of water sample
6. Determination of chloride in water sample using Mohr's method.

Hands on/ Skill based learning (15 Hrs.)

Activity: Analysis of potable ground water samples of students' locality.

Reference Book

Textbook of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

Scheme of Valuation

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry–I-Practical

Course Code: 20CHP621AM2

No.of Hours: 45 **LTP:003** **Credits: 2**

Practical	– – – 30M	––– Brief procedure	– 10M
		Tabulation	– 10M
		Calculation	– 5M
		Result	– 5M
Viva	––– 10M		
Record	––– 10M		
Total	––– 50M		

*Pass mark --- 20M

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry - II

Course Code: 20CHSEC22AM3

No.of Hours: 45 **LTP:300** **Credits: 3**

Objectives

- To understand the basic concepts of separation techniques – solvent extraction andvarious chromatographic methods.
- To learn ion exchange method

Course outcomes

CO1: Discuss basic principle, instrumentation, experimental procedures, applications of solvent extraction and chromatography methods (CC, PC, TLC, HPLC, GC).

CO2: Explain the concept of ion exchange method.

CO3: Solve concept-based problems.

UNIT-I: Chromatography-Introduction (9 Hrs.)

1. Chromatography - Introduction: Definition, principles of differential migration, Classification of chromatography methods based on stationary phase, mobile phase and principle.
2. Nature of adsorbents and solvent systems Rf values, factors affecting Rf values.

UNIT- II: PC, TLC (10Hrs.)

1. Paper Chromatography: Principle, experimental procedure - choice of paper and solvent systems, various modes of development- ascending, descending, radial/ Circular and two-dimensional, visualization techniques; Application – separation of amino acids.
2. Thin layer chromatography: Principle, Experimental procedure, preparation of plates, adsorbents and solvents, development of chromatogram, detection of spots, applications and advantages.

UNIT-III: Column chromatography (9 Hrs.)

1. Column chromatography: Principle, classification, Experimental procedure, stationary and mobile phases, development of the Chromatogram, applications.
2. HPLC: Basic principles, instrumentation –block diagram and applications.

UNIT - IV: Gas Chromatography (8 Hrs.)

1. Basic principle, Instrumentation- carrier gas, sample injection system, column materials, support materials (just mention their names only); working of G.C,
2. Detector systems- Flame ionization detector (FID), thermal conductivity detector (TCD), advantages of GC over other methods, Applications - separation of ink pigments by GC.

UNIT - V: Solvent Extraction, Ion Exchange (9Hrs.)

1. Solvent Extraction: Introduction, principle, factors affecting solvent extraction, Techniques of solvent extraction: Batch extraction, continuous extraction and counter current extraction. Synergism. Application-Determination of Iron (III).
2. Ion Exchange method: Introduction, action of ion exchange resins, applications.

Co-curricular Activities

1. Invited lectures and presentations on related topics by field / industrial experts.
2. Assignments / Seminars / Quiz / PPT or video making on related topics, preparation of MCQs
3. Visits to labs/ industries

Prescribed Text book

1. Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

Reference Books

1. Fundamentals of Analytical Chemistry by F.James Holler, Stanley R Crouch, Donald M.Westand Douglas A.Skoog, Ninth edition, Cengage.
2. Analytical Chemistry by Gary D.Christian, PurnenduK.Dasgupta and KevinA.Schug,Seventh edition, Wiley.
3. Quantitative analysis by R.A.DayJr. And A.L.Underwood, Sixth edition, Pearson.
4. Instrumental methods of analysis by H. Kaur
5. Separation methods by M.N. Sastry

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

(Affiliated to Krishna University, Machilipatnam)

BLUE PRINT

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry - II

Course Code: 20CHSEC22AM3

Time: 3 Hrs. **Max. Marks: 100**

SECTION – A

Answer ALL questions **20 x1 = 20 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
1	I	1	RBT1 – 8 RBT2 – 8 RBT3 – 2 RBT4 – 2
2	I	1	
3	I	1	
4	I	1	
5	II	1	
6	II	1	
7	II	1	
8	II	1	
9	III	1	
10	III	1	
11	III	1	
12	III	1	
13	IV	1	
14	IV	1	
15	IV	1	
16	IV	1	
17	V	1	
18	V	1	
19	V	1	
20	V	1	

SECTION – B

Answer any FOUR questions **4 x 8 = 32 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
21	I	8	RBT1 – 2 RBT2 – 2 RBT3 – 1 RBT4 – 1
22	II	8	
23	III	8	
24	IV	8	
25	V	8	
26	I / II / III / IV / V	8	

SECTION – C

Answer any FOUR questions **4 x 12 = 48 M**

Q. No.	UNIT	Marks Weightage	RBT LEVEL
27	I	12	RBT1 – 2 RBT2 – 2 RBT3 – 1 RBT4 – 1
28	II	12	
29	III	12	
30	IV	12	
31	V	12	
32	I / II / III / IV / V	12	

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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SYLLABUS

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry – II - Practical

Course Code: 20CHP722AM2

No.of Hours: 45 **LTP:003** **Credits: 2**

Objectives

- To handle laboratory equipment
- To carry out chromatography and solvent extraction experiments.

Course outcomes

CO1: Handle separatory funnel, TLC sheets, chromatography papers, applicator, UV chamber etc.

CO2: Perform experiments on PC, TLC and Solvent extraction.

List of Practicals (30 Hrs.)

1. Influence of nature of S.P and M.P on the separation of ink pigments by paper chromatography (Note: Use at least two different types of papers and solvents)
2. Separation of mixture of amino acids (Glycine, phenyl alanine) by paper chromatography
3. Preparation and purity check of benzanilide by TLC
4. Preparation and separation of mixture of 2,4-Dinitro phenyl hydrazones of acetone and butanone by TLC
5. Separation of benzophenone and benzoic acid by batch extraction
6. Separation of food dyes using Column Chromatography (Demo)

Hands on/ Skill based learning (15 Hrs.)

Activity:

1. Comparison of different modes of development in PCfor separation of black ink sample.
2. Separation of components in vegetable extracts by PC

MARIS STELLA COLLEGE (AUTONOMOUS), VIJAYAWADA-8

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Scheme of Valuation

Subject: Chemistry **Semester: V/VI**

Course Title: Analytical Methods in Chemistry – II - Practical

Course Code: 20CHP722AM2

No.of Hours: 45 **LTP:003** **Credits: 2**

Practical	– – – 30M –––	Theory & Principle	– 10M
		Procedure	– 10M
		Tabulation	– 5M
		Result	– 5M
Viva	––– 10M		
Record	––– 10M		
Total	––– 50M		

*Pass mark --- 20M