

# **DEPARTMENT OF CHEMISTRY**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**OUTCOME BASED EDUCATION (OBE) SYLLABUS**

**B.Sc. ALLIED CHEMISTRY SYLLABUS**

**2020 - 2021 BATCH**



**DWARAKA DOSS GOVERDHAN DOSS VAISHNAV COLLEGE  
(AUTONOMOUS)**

College with Potential for Excellence

Linguistic Minority Institution Affiliated to University of Madras

**E.V.R. PERIYAR HIGH ROAD,**

**ARUMBAKKAM, CHENNAI – 600106, TAMILNADU.**

**COURSE TITLE: ALLIED PAPER CHEMISTRY – I (For Mathematics & Physics)**

<b>Course Code :</b>	<b>Credits : 04</b>
<b>L:T:P:S : 4:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVE:**

*To impart basic knowledge in nuclear chemistry, industrial chemistry, thermodynamics, chemical kinetics photochemistry and fundamental organic chemistry.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	define various terms in nuclear chemistry and distinguish their application (K1, K2)
<b>CO2</b>	identify the chemical compounds used in fuels, fertilizers and polymer (K1)
<b>CO3</b>	analyze hardness water and the importance of water treatment techniques (K4)
<b>CO4</b>	describe the types of reagent and reaction and differentiate their nature based on polar effects (K1, K4)
<b>CO5</b>	predict the feasibility of thermal reaction from the concepts of entropy, enthalpy and internal energy (K2)
<b>CO6</b>	explain the basic concepts of chemical kinetics & photochemistry and calculate the order of the reaction (K2, K3)

**MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:**

<b>CO/PO/PSO</b>	<b>PO</b>								<b>PSO</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>CO1</b>	3	2	3	2	2	2	2	2	3	2	3	2	2
<b>CO2</b>	3	3	3	2	2	2	3	2	3	3	2	3	2
<b>CO3</b>	3	3	3	2	2	2	3	2	3	3	2	3	3
<b>CO4</b>	3	3	3	2	2	3	3	2	3	2	3	3	2
<b>CO5</b>	3	3	3	2	2	3	2	2	3	3	3	2	2
<b>CO6</b>	3	3	3	3	2	3	3	2	3	3	3	2	3

**STRONGLY CORRELATED -3, MODERATELY CORRELATED – 2, WEAKLY CORRELATED -1**

S. NO	CONTENTS OF MODULE	Hrs	Cos
1	<b>NUCLEAR CHEMISTRY</b> 1.1 Fundamental particles of Atom-Definition and classification; Isotopes, isobars, isotones, nuclear isomers–Definition and examples. 1.2 Comparison of chemical and nuclear reactions: Nuclear reactions-Writing equation for nuclear reactions-Nuclear Fission-Nuclear Fusion; Natural radioactivity- Radioactive series including Neptunium series- group displacement law (Soddy Fajan’s Law) 1.3 Nuclear stability-Nuclear binding energy, $n/p$ ratio, simple calculations. 1.4 Application of radio isotopes –as traces in medicine-agriculture-industry- mutation of crops – pest control-radiocarbon dating. Three Stage nuclear program of India.	15	CO1
2	<b>INDUSTRIAL CHEMISTRY</b> 2.1 Fuels – classification – Preparation and uses of water gas, producer gas, liquefied petroleum gas, gobar gas, compressed natural gas, Rocket fuels (elementary ideas only) 2.2 Fertilizers – Classification – urea, superphosphate, Triple super phosphate, Potassium nitrate – manufacture and uses 2.3 Silicones – Preparation, properties and applications. 2.4 Hardness of water: temporary and permanent hardness, disadvantages of hard water – softening of hard water – Zeolite (permutit) process – demineralization process and reverse osmosis 2.5 Purification of water for domestic use: use of chlorine, Ozone and UV light –Significance of BOD and COD (Basic ideas only).	15	CO2, CO3
3	<b>FUNDAMENTAL OF ORGANIC CHEMISTRY</b> 3.1 Hybridization in methane, Ethane, Ethylene, acetylene, benzene. 3.2 Classification of reagents – Electrophiles, Nucleophiles and Free radical 3.3 Classification of reactions: Addition, Substitution, Elimination, Condensation, and Polymerization. Oxidation Reduction – Elementary ideas only.	15	CO4

	<p>3.4 Polar Effects: Inductive effect, Inductometric effect, Resonance effect, Mesomeric effect- Hyper-conjugation, Steric effect-applications.</p> <p>3.5 Electrophillic substitution mechanism in benzene-alkylation, acylation, Nitration, Sulphonation and Halogenation</p>		
4	<p><b>THERMODYNAMICS</b></p> <p>4.1 Definition of certain terms – system, surroundings-difference between heat and work, boundary -Thermodynamic state, thermodynamic equilibrium, processes, Reversible and Irreversible process- Heat and work</p> <p>4.2 Internal energy- First law of thermodynamics-Limitations of I Law, Need for II Law – Different Statements of II Law</p> <p>4.3 Carnot cycle – Efficiency of heat engine – Carnot theorem.</p> <p>4.4 Entropy – Definition – Unit and change of entropy for phase transformation.</p> <p>4.5 Free energy – Nature of process in terms of Free energy and entropy – Statement of Third Law (Planck’s statement only)</p>	15	CO5
5	<p><b>CHEMICAL KINETICS AND PHOTOCHEMISTRY</b></p> <p>5.1 Rate of chemical reaction–Differential rate expression- Order and Molecularity of reaction – integrated rate expression for first and zero order reactions-Half life period.</p> <p>5.2 Effect of temperature on rate of a reaction – Activation energy-Arrhenius equation</p> <p>5.3 Catalyst-types-positive catalyst-negative catalyst-auto catalyst-induced catalyst-promoters-inhibitors – Homogeneous and Heterogeneous catalysis (Definition &amp; examples only) - Enzyme catalysis-Michealis Menton Equation.</p> <p>5.4 Photochemistry: Statement of Grotthus – Draper Law, Stark – Einstein’s Law, Beer-Lambert’s law, Quantum yield. Hydrogen chlorine reaction &amp; Hydrogen bromine reaction (No derivation is required)</p> <p>5.5 Definition with examples of Photosensitization-photosynthesis-Phosphorescence-Fluorescence-Chemiluminescence-Bioluminescence</p>	15	CO6

**REFERENCE BOOKS:**

1. Dr. Veeriyar V., Text Book of Ancillary Chemistry, Highmount Publishing House, Chennai – 14 Edition 2006.
2. Vaithyanathan S. and others, Textbook of Ancillary Chemistry, Priya Publications, Karur – 2- Edition –2006.
3. Soni P.L. and others, Textbook of Organic Chemistry, Sultan Chand and Company, New Delhi, Edition – 2006.
4. Soni P.L. and others, Textbook of Inorganic Chemistry, Sultan Chand and Company, New Delhi, Edition – 2006
5. Puri B.R. Sharma and pathania, Text book of Physical Chemistry, Vishal Publishing Co., New Delhi, Edition – 2006.

## ASSESSMENT PATTERN

### CIE- Continuous Internal Evaluation (40 Marks)

Bloom's Category	CIA I	CIA II	CIA III	ESE
<b>Marks (out of 50)</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>100</b>
Remember	20	20		40
Understand	20	20		40
Apply	10	10	5	20
Analyze			5	
Evaluate				
Create				

### ESE- Semester End Examination (100 Marks; weightage 60%)

Bloom's Category	Weightage %
Remember	38.1
Understand	38.1
Apply	21.4
Analyse	2.4
Evaluate	
Create	

**COURSE TITLE: ALLIED PAPER CHEMISTRY – I (For Botany Major)**

<b>Course Code :</b>	<b>Credits : 04</b>
<b>L:T:P:S : 4:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVE:**

*To impart basic knowledge in nuclear chemistry, industrial chemistry, thermodynamics, Botany and environment and fundamental organic chemistry.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Discuss the applications of nuclear energy for useful purposes and radio isotopes in medical and industrial field and also explain the radio activity, predict the products in nuclear reactions
<b>CO2</b>	Predict the geometry of organic compounds by using concept of hybridization and analyze the various types of organic reactions like addition, substitution, elimination...etc. and Assess the mechanism of reactions like nitration, halogenation, and alkylation.
<b>CO3</b>	Calculate the efficiency of heat engine and Predict the spontaneity of various thermodynamic processes using the concepts such as entropy, Gibbs free energy and enthalpy.
<b>CO4</b>	Outline the different types of fuels and its applications and convert hard water into soft water from the concepts of zeolite, reverse osmosis and demineralization processes.
<b>CO5</b>	Demonstrate the usage of various types of preservatives to preserve the specimens and explain the environmental pollutions like water pollution, soil pollution, air pollution and its adverse effects.

**MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:**

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO1</b>	3	3	3	2	2	3	3	2	3	3	3	3	2
<b>CO2</b>	3	3	3	3	2	2	2	2	3	3	3	3	2
<b>CO3</b>	3	3	3	2	2	2	2	2	3	2	3	3	3
<b>CO4</b>	3	2	2	1	2	3	2	2	3	3	3	3	3
<b>CO5</b>	3	3	2	3	3	2	3	2	3	2	3	3	2

**STRONGLY CORRELATED -3, MODERATELY CORRELATED – 2, WEAKLY CORRELATED -1**

S. NO	CONTENTS OF MODULE	Hrs	COs
1	<b>Nuclear Chemistry</b> 1.1 Fundamental particles of Atom-Definition and classification; Isotopes, isobars, isotones, nuclear isomers-Definition and examples. 1.2 Comparison of chemical and nuclear reactions: Nuclear reactions-Writing equation for nuclear reactions-Nuclear Fission-Nuclear Fusion; Natural radioactivity- Radioactive series including Neptunium series- group displacement law (Soddy Fajan's Law) 1.3 Nuclear stability-Nuclear binding energy, $n/p$ ratio, simple calculations. 1.4 Application of radio isotopes –as traces in medicine-agriculture-industry- mutation of crops - pest control-carbon dating. III Stage nuclear developments in India	15	CO1
2	<b>Industrial Chemistry</b> 2.1 Fuels – classification – Preparation and uses of water gas, producer gas, liquefied petroleum gas, gobar gas, compressed natural gas, Rocket fuels (elementary ideas only) 2.2 Fertilizers – Classification – urea, superphosphate, Triple super phosphate, Potassium nitrate - manufacture and uses 2.3 Silicones – Preparation, properties and applications. 2.4 Hardness of water: temporary and permanent hardness, disadvantages of hard water – softening of hard water – Zeolite (permutit) process – demineralization process and reverse osmosis 2.5 Purification of water for domestic use: use of chlorine, Ozone and UV light –Significance of BOD and COD (Basic ideas only).	15	CO2
3	<b>Fundamental of Organic Chemistry</b> 3.1 Hybridization in methane, Ethane, Ethylene, acetylene, benzene. 3.2 Classification of reagents – Electrophiles, Nucleophiles and Free radical 3.3 Classification of reactions: Addition, Substitution, Elimination, Condensation, and Polymerization. Oxidation Reduction - Elementary ideas only.	15	CO3

	<p>3.4 Polar Effects: Inductive effect, Inductometric effect, Resonance effect, Mesomeric effect- Hyper-conjugation, steric effect-applications.</p> <p>3.5 Electrophillic substitution mechanism in benzene-alkylation, acylation, Nitration, Sulphonation and Halogenation</p>		
4	<p><b>Unit 4 Thermodynamics</b></p> <p>4.1 Definition of certain terms – system, surroundings-difference between heat and work, boundary -Thermodynamic state, thermodynamic equilibrium, processes, Reversible and Irreversible process- Heat and work</p> <p>4.2 Internal energy- First law of thermodynamics-Limitations of I Law, Need for II Law – Different Statements of II Law</p> <p>4.3 Carnot cycle – Efficiency of heat engine – Carnot theorem.</p> <p>4.4 Entropy – Definition - Unit and change of entropy for phase transformation.</p> <p>4.5 Free energy - Nature of process in terms of Free energy and entropy – Statement of Third Law (Planck’s statement only)</p>	15	CO4
5	<p><b>Unit 5 Chemistry In Botany And Environment</b></p> <p><b>(15 Hours)</b></p> <p>5.1 Phytochemicals- Elementary study.</p> <p>5.2 Preservation of biological specimens – Role of Mercuric chloride – Uses of Formalin, transeau solution, alcohol and FAA in preserving specimens.</p> <p>5.3 Role of Crystal violet and Iodine in the preparation of Gram stains. Classification of soil based on pH. Chemical treatment of soil for cultivation. Role of natural manures.</p> <p>5.4 Chemical fumigants, preservatives, insecticides and plant growth regulators – Elementary study.</p> <p>5.5 Types of pollutions: Water pollution, air pollution, soil pollution sources, preventive measures-adverse effects-greenhouse effect-eutrophication- acid rain- chloro fluoro carbon emission-global warming. Treatment of nuclear wastes-its adverse effects. Concept of Carbon sink and Carbon neutrality – Photosynthesis - Basic ideas.</p>	15	CO5



## REFERENCE BOOKS:

1. Dr. Veeriyar V., Text Book of Ancillary Chemistry, Highmount publishing house, Chennai – 14 Edition 2006.
2. Vaithyanathan S. and others, Textbook of Ancillary Chemistry, Priya Publications, Karur – 2- Edition –2006.
3. Soni P.L. and others, Textbook of Organic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006.
4. Soni P.L. and others, Textbook of Inorganic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006
5. Puri B.R. Sharma and pathania, Text book of physical chemistry, Vishal Publishing Co., New Delhi, Edition – 2006.
6. Dara S.S., Textbook of Environmental Chemistry and pollution Control – S.Chand and Co., NewDelhi, Edition 2006.

**This assessment pattern is for theory papers of UG and PG programme**

## ASSESSMENT PATTERN

### IE- Continuous Internal Evaluation (40 Marks)

Bloom's Category	CIA I	CIA II	CIA III	ESE
<b>Marks (out of 50)</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>100</b>
Remember	20	20		40
Understand	20	20		40
Apply	10	10	5	20
Analyze			5	
Evaluate				
Create				

### ESE- Semester End Examination (100 Marks; weightage 60%)

Bloom's Category	Weightage %
Remember	38.1
Understand	38.1
Apply	21.4
Analyse	2.4
Evaluate	
Create	

**COURSE TITLE: ALLIED CHEMISTRY-II (For Mathematics and Physics)**

<b>Course Code:</b>	<b>Credits:04</b>
<b>L:T:P:S: 4:0:0:0</b>	<b>CIA Marks:40</b>
<b>Exam Hours:03</b>	<b>ESE Marks:60</b>

**Learning Objective:**

*To impart basic knowledge in Co-ordination chemistry, Bimolecular, Phase study, electrochemistry and analytical Chemistry*

**Course Outcomes:** At the end of the Course, the Student will be able to:

<b>CO1</b>	Deduce the basic principles and reaction involving coordination compounds and illustrate the biological role of coordination complexes.
<b>CO2</b>	Infer the structure and functions of simple and essential biomolecules.
<b>CO3</b>	Evaluate the phase rule and reduced phase rule to simple binary systems.
<b>CO4</b>	Implement electrochemical series and types of cells to devise electroplating process and conductometric titrations.
<b>CO5</b>	Describe the principles of volumetric analysis and summarize chromatographic separations and purification techniques.

**MAPPING OF COURSE OUTCOMES TO PROGRAMME OUTCOMES**

<b>CO/PO/PSO</b>	<b>PO</b>								<b>PSO</b>				
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>CO1</b>	3	2	2	2	2	2	2	2	3	2	2	3	1
<b>CO2</b>	3	2	2	2	2	3	2	2	3	2	3	3	1
<b>CO3</b>	3	3	3	2	2	2	2	2	3	3	3	3	3
<b>CO4</b>	3	2	3	3	2	3	3	2	3	2	2	1	2
<b>CO5</b>	3	3	2	3	2	2	2	2	3	3	3	2	3

**STRONGLY CORRELATED -3, MODERATELY CORRELATED – 2, WEAKLY CORRELATED -1**

S. No.	CONTENTS OF MODULE	Hrs	COs
1	<p><b>Co-Ordination Chemistry</b></p> <p>1.1 Introduction-some basic definitions: central metal ion, ligand, oxidation state of central metal ion, coordination sphere, Coordination number-classification of ligands- Nomenclature (simple complexes)– Chelation (EDTA and its applications)</p> <p>1.2 Theories of Bonding: Postulates of Werner’s theory, Sidgwick theory (Effective Atomic Number –EAN rule), Pauling’s Valence Bond Theory– geometry, hybridization and magnetic property of <math>[\text{Ni}(\text{CO})_4]</math>, <math>[\text{Ni}(\text{CN})_4]^{2-}</math>, <math>[\text{Co}(\text{CN})_6]^{3-}</math>- Merits and demerits of Werner and Pauling’s Valence Bond Theory.</p> <p>1.3 Applications of co-ordination of compounds: Qualitative analysis - separation of copper and cadmium ions using KCN, identification of metal ions like Cu and Fe- quantitative analysis, estimation of Nickel using DMG and estimation of aluminium using oxine.</p> <p>1.4 Bio-inorganic complexes: Hemoglobin and chlorophyll- central metal ion, oxidation state, ligand, coordination sites, Biological role (elementary idea only). Blue baby syndrome-(elementary idea)</p>	15	CO1
2	<p><b>Biomolecules</b></p> <p>2.1 Classification, preparation and reactions of glucose and fructose. Discussion of open and ring structure of glucose, mutarotation. Interconversion of glucose to fructose and vice versa</p> <p>2.2 Preparation and properties of sucrose-Properties of starch.</p> <p>2.3 Cellulose and derivatives of cellulose. RNA and DNA (elementary idea only).</p> <p>2.4 Amino acids: Classification, preparation, and properties of glycine and alanine (Gabriel Phthalimide synthesis and Strecker’s synthesis only) – preparation of dipeptide using Bergman method. Proteins and enzymes (elementary idea)</p>	15	CO2
3	<p><b>Phase Study</b></p> <p>3.1 Phase rule: Definition of terms-Phase, Component, Degrees of freedom</p> <p>3.2 Application of phase rule to water and <math>\text{CO}_2</math> system</p> <p>3.3 Reduced phase rule and its application to Pb-Ag system.</p> <p>3.4 Freezing mixtures –NaCl-water system</p> <p>3.5 Freezing mixtures and soldering</p>	15	CO3
4	<b>Electrochemistry</b>	15	CO4

	<p>4.1 Galvanic cells – <i>emf</i> – standard electrode potential – reference electrodes. Difference between electrolytic cell and galvanic cell.</p> <p>4.2 Electrochemical series and its applications –Determination of <math>p^H</math> using hydrogen electrode. Different type of cells, primary cell, Secondary cell-Lead acid battery merits and demerits Nickel-cadmium battery-fuel cells (<math>H_2</math>-<math>O_2</math> fuel cells and its advantages-advantage over heat engine)</p> <p>4.3 Corrosion and its prevention- Electroplating process: Nickel and Chrome plating</p> <p>4.4 Conductometric titrations- Buffer solution – Henderson’s equation. Application of pH and buffer in biological processes.</p>		
5	<p><b>Analytical Chemistry</b></p> <p>5.1 Concentration terms: Molarity, Normality, molality, formality and mole fraction (elementary problems), Principle of volumetric analysis.</p> <p>5.2 Separation techniques: extraction, solvent extraction, distillation, fractional distillation</p> <p>5.3 Purification techniques: factors affecting purity of a compound – crystallization-fractional crystallization-sublimation.</p> <p>5.4 Chromatographic separations – Principles and application of column, paper, thin layer and ion-exchange chromatography.</p>	15	CO5

#### REFERENCES:

1. Dr. Veeriyar V., Text Book of Ancillary chemistry , Highmount publishing house, Chennai – 14 Edition 2006
2. Vaithyanathan S. and others, Textbook of Ancillary Chemsitry, Priya Publications, Karur – 2- Edition –2006.
3. Soni P.L. and others, Textbook of Organic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006.
4. Soni P.L. and others, Textbook of Inorganic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006
5. Puri B.R. Sharma and pathania, Text book of physical chemistry, Vishal Publishing Co., New Delhi, Edition – 2006.
6. Dara S.S., Textbook of Environmental Chemistry and pollutuion Control – S.Chand and Co., NewDelhi, Edition 2006.

## ASSESSMENT PATTERN

### CIE- Continuous Internal Evaluation (40 Marks)

Bloom's Category	CIA I	CIA II	CIA III	ESE
<b>Marks (out of 50)</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>100</b>
Remember	20	20		40
Understand	20	20		40
Apply	10	10	5	20
Analyze			5	
Evaluate				
Create				

### ESE- Semester End Examination (100 Marks; weightage 60%)

Bloom's Category	Weightage %
Remember	38.1
Understand	38.1
Apply	21.4
Analyse	2.4
Evaluate	
Create	

**Course Title: ALLIED PAPER CHEMISTRY – II (For Botany)**

<b>Course Code :</b>	<b>Credits : 04</b>
<b>L:T:P:S : 4:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

***Learning objective:** To impart basic knowledge in nuclear chemistry, industrial chemistry, thermodynamics, Botany and environment and fundamental organic chemistry.*

**Course Outcomes: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Predict the geometry of coordination compounds using the concept of hybridization and estimate the metal ions like nickel, aluminum etc., present in the given sample gravimetrically by converting them into coordination compounds
<b>CO2</b>	Explain various types of sugars and amino acids and the inter conversions, preparation and properties of sugars.
<b>CO3</b>	Analyse the adulterants in various food samples like sugar, salt, turmeric powder, honey etc., and the need for Choice of proper balanced diet from calorific values of different food
<b>CO4</b>	Demonstrate the usage of herbs like thulasi, kezhaneli, neem as remedies for common diseases and Explain the importance of chemistry in Siddha, Ayurveda and homeopathy medicines
<b>CO5</b>	Explain the various volumetric solutions and estimate the amount of solute present in the given solution by volumetric principles –separate the organic compounds by using chromatographic techniques like column, paper, thin layer chromatography.

**MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:**

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO1</b>	3	3	3	2	2	3	3	2	3	3	3	2	3
<b>CO2</b>	3	3	3	3	2	2	2	2	3	3	2	3	3
<b>CO3</b>	3	3	3	2	2	2	2	2	3	3	3	3	2
<b>CO4</b>	3	2	2	1	2	3	2	2	3	3	3	3	2
<b>2CO5</b>	3	3	2	3	3	2	3	2	3	3	3	3	3

**STRONGLY CORRELATED -3, MODERATELY CORRELATED – 2, WEAKLY CORRELATED -1**

Sl NO	CONTENTS OF MODULE	Hrs	Cos
1	<b>Co-Ordination Chemistry</b> 1.1 Definition of terms-classification of Ligands-Nomenclature (Elementary treatment only)-chelation –examples. 1.2 Werner's theory – Effective Atomic Number – 1.3 Pauling's theory – geometry and hybridization of $[\text{Ni}(\text{CO})_4]$ , $[\text{Ni}(\text{CN})_4]^{2-}$ , $[\text{Co}(\text{CN})_6]^{3-}$ Merits and demerits of Werner and Pauling's Theory – Biological role of haemoglobin and chlorophyll, (Elementary idea only)– 1.4 Estimation of Nickel using DMG and estimation of Aluminium using Oxine	15	CO1
2	<b>Biomolecules</b> 2.1 Classification, preparation and reactions of glucose and fructose Discussion of open and ring structure of glucose, mutarotation. Interconversion of glucose to fructose and vice versa – 2.2 Preparation and properties of sucrose. Properties of starch. Cellulose and derivatives of cellulose ,chitin .( Properties – Hydrolysis , Methylation , and acetylation) 2.3 Amino acids: Classification, Isoelectric point –Zwitter ion –primary and secondary structure of aminoacids-hydrolysis. 2.4 Preparation, and properties of glycine and alanine (Strecker's and Gabriel phthalimide synthesis )– preparation of dipeptide using Bergman method.	15	CO2
3	<b>Food Chemistry</b> 3.1 Calorific value of food –examples –Balanced diet –sources-oils and fats-definition- Iodine value of oil 3.2 Adulteration - Common adulterants in food –examples-Test for detection of some common adulterants(sugar , salt, coffee, milk , tea, chilli powder, turmeric powder, honey, pepper, edible oil) 3.3 Food colours , food flavours –Types –health effects. 3.4 Preservatives and its types –adverse health effects due to preservatives	15	CO3
4	<b>Medicinal Chemistry</b>	15	CO4

	4.1 Medicinal herbs –types –importance 4.2 Occurance - Medicinal properties and some chemical components of thulasi, Kezhanelli , neem , aloe vera and Turmeric-significance. 4.3 Natural remedies for common disease –common cold –allergies-dengue-digestion problems – (preparation and administration of natural recipes) 4.4 Importance of chemistry in siddha, Ayurveda and homeopathy medicines-advantages and disadvantages.		
<b>5</b>	<b>Analytical Chemistry</b> 5.1 Principle of volumetric analysis – volumetric law – molarity , normality (elementary problems) 5.2 Separation techniques – extraction –solvent extraction - distillation –fractional distillation– 5.3 Purification techniques – factors affecting purity of a compound – crystallization-fractional crystallization-sublimation. 5.4 Chromatographic separations – Principles and application of column, paper, and thin layer chromatography.	<b>15</b>	<b>CO5</b>

#### REFERENCE BOOKS:

1. Dr. Veeriyar V., Text Book of Ancillary Chemistry, Highmount publishing house, Chennai – 14 Edition 2006.
2. Vaithyanathan S. and others, Textbook of Ancillary Chemistry, Priya Publications, Karur – 2- Edition –2006.
3. Soni P.L. and others, Textbook of Organic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006.
4. Soni P.L. and others, Textbook of Inorganic chemistry, Sultan Chand and Company, New Delhi, Edition – 2006
5. Puri B.R. Sharma and pathania, Text book of physical chemistry, Vishal Publishing Co., New Delhi, Edition – 2006.
6. Dara S.S., Textbook of Environmental Chemistry and pollution Control – S.Chand and Co., NewDelhi, Edition 2006.



## ASSESSMENT PATTERN

### CIE- Continuous Internal Evaluation (40 Marks)

Bloom's Category	CIA I	CIA II	CIA III	ESE
<b>Marks (out of 50)</b>	<b>50</b>	<b>50</b>	<b>10</b>	<b>100</b>
Remember	20	20		40
Understand	20	20		40
Apply	10	10	5	20
Analyze			5	
Evaluate				
Create				

### ESE- Semester End Examination (100 Marks; weightage 60%)

Bloom's Category	Weightage %
Remember	38.1
Understand	38.1
Apply	21.4
Analyse	2.4
Evaluate	
Create	

**COURSE TITLE: ALLIED CHEMISTRY PRACTICALS  
(PHYSICS, MATHEMATICS AND BOTANY)**

<b>Course Code :</b>	<b>Credits : 04</b>
<b>L:T:P:S : 4:0:0:0</b>	<b>CIA Marks : 40</b>
<b>Exam Hours : 03</b>	<b>ESE Marks : 60</b>

**LEARNING OBJECTIVE:**

*To enable the students to estimate the given substance volumetrically and analyze the organic compounds qualitatively.*

**COURSE OUTCOMES: At the end of the Course, the Student will be able to:**

<b>CO1</b>	Define the various terms and outline the principles of volumetric analysis (K1, K4)
<b>CO2</b>	Perform the volumetric analysis and estimate the quantity present (K2)
<b>CO3</b>	Identify and analyze organic compounds (K2)

**MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES:**

CO/PO/PSO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
<b>CO1</b>	3	3	2	1	2	2	3	1	3	3	3	2	3
<b>CO2</b>	3	3	2	2	3	2	3	2	3	3	2	2	3
<b>CO3</b>	3	3	2	2	3	2	3	2	3	3	2	2	3

**STRONGLY CORRELATED -3, MODERATELY CORRELATED – 2, WEAKLY CORRELATED -1**

SI NO	CONTENTS OF MODULE	Hrs	COs
1	<b>Volumetric Analysis</b> 1. Estimation of Sodium hydroxide using standard sodium carbonate 2. Estimation of Hydrochloric acid using Oxalic acid. 3. Estimation of Borax using standard sodium carbonate 4. Estimation of Ferrous sulphate using Ferrous ammonium sulphate. 5. Estimation of Oxalic acid using standard Mohr's salt. 6. Estimation of Ferrous ion using diphenylamine as internal indicator. 7. Estimation of temporary and permanent hardness of Water* 8. Estimation of zinc using standard magnesium sulphate * Not given for exam	9	CO1
2	<b>Organic analysis</b> Analysis of aldehyde (aromatic), Carbohydrate (reducing sugars only), Carboxylic acid (both saturated and unsaturated), Phenol, Aromatic Amine, Aliphatic Diamide. Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.	9	CO2, CO3

For practical examination procedure for experiments will be provided for the students at the time of examination. The purpose of giving procedure is to emphasize analytical approach during practical.

#### REFERENCE BOOKS:

1. N. S. Gnanapragasam, G. Ramamurthy Organic Chemistry Lab Manual , S. Viswanathan Printers & Publishers Pvt. Ltd. Reprint 1996
2. A. I. Vogel, A Text Book of Quantitative Inorganic Analysis, Longman Publishers 6<sup>th</sup> Edn., 2009

## ASSESSMENT PATTERN

### CIE- Continuous Internal Evaluation (40 Marks)

Bloom's Category	MODEL	ESE
<b>Marks (out of 50)</b>	<b>60</b>	<b>60</b>
Remember		
Understand		
Apply	30	30
Analyze	30	30
Evaluate		
Create		

### ESE- Semester End Examination (100 Marks; weightage 60%)

Bloom's Category	Weightage %
Remember	
Understand	
Apply	50
Analyse	50
Evaluate	
Create	