Sri Kaliswari College (Autonomous), Sivakasi

(Affiliated to Madurai Kamaraj University,

Re-Accredited with 'A' grade (CGPA 3.30) by NAAC)

Programme Scheme, Scheme of Examination and Syllabi

(For those who join from June 2018 and afterwards)

Department of Chemistry

PG Programme- M.Sc (Chemistry)

Curriculum Design and Development Cell

Sri Kaliswari College (Autonomous), Sivakasi
(Re-accredited with 'A' Grade with CGPA of 3.30 by NAAC)
Department of Chemistry

Members of Board of Studies (2018-2021)

S.No.	Board Members	Name and Designation
1.	Chairman of the Board	**Mrs. L. T. Parvathi** Head, Department of Chemistry Sri Kaliswari College (Autonomous), Sivakasi
2.	University Nominee	**Dr. M. Meenakshisundaram** Associate Professor Head, Department of Chemistry (PG) Ayya Nadar Janaki Ammal College Sivakasi.
3.	Academic Expert 1	**Dr. J. Rajula Jasmine Usha** Associate Professor Department of Chemistry Sarah Tucker College (Autonomous) Tirunelveli – 627 007
4.	Academic Expert 2	**Dr. I. Abul Kalam Azath** Assistant Professor Department of Chemistry Aditanar College of Arts & Science Tiruchendur – 628216
5.	Industrial Expert	**Mr. G. R. Vijay Kumar** Manager, Sri Annapurna Chemical Industries, Plot No. 104, Road No. 32, I. D. A. Kattedan, Hyderabad-500077, Telangana
6.	Alumnus	**Mr. M. Arunpandian** Research Scholar in Chemistry Kalasalingam University Krishnankoil
7.	Special Invitee	**Prof. S. Alagappan** R&D Lab Incharge Sri Kaliswari Fire Works Sivakasi
Members		
8.	Mrs. M. Murugalakshmi	Assistant Professor in Chemistry
9.	Mrs. C. Thangapriya	Assistant Professor in Chemistry
10.	Mrs. R. Vijayalekshmi	Assistant Professor in Chemistry
11.	Mr. S. Marikkani	Assistant Professor in Chemistry
12.	Dr. R. Ravichandran	Assistant Professor in Chemistry
13.	Mr. M. Nazeer	Assistant Professor in Chemistry
14.	Dr. P. Kaleeswaran	Assistant Professor in Chemistry

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
M.Sc Chemistry (Semester) - (2018-2020)
Objectives, Outcomes, Regulation

Programme Outcome for Postgraduate programmes

Knowledge

PO 1: Acquisition of advanced knowledge for higher studies and research.

PO 2: Synthesis of knowledge and critical thinking

Skills

PO 1: Life Skills and Skills for contribution to nation building.

PO 2: Acquisition of specialized skills for entrepreneurship/employability.

Attitude

PO 1: Acquisition of professional ethics and human values.

PO 2: National Integration and Social Commitment to Society

Programme Objectives:

- To introduce the basic concept in the advanced chemistry.
- To provide a thorough knowledge in the stereochemistry and structure of the compounds.
- To enhance the modern technological studies and its application in the chemistry
- To understand the basic theory to the advanced theory for interpreting the molecular structure.
- To enrich the advanced concept in the chemistry in the various fields.
- To improve the analytical and technical skill for suitable employability and research activites.

Programme Outcome for Postgraduate programmes

- Developing critical thinking.
- Effective language skills for reporting, designing documents and presentation.
- Progression to research programmes.
- Acquisition of advanced knowledge.
- Acquiring advanced leadership and team working.
- Highly developed oral and written communication.
- Appreciation of professional ethics, integrity, governance and responsibility.
- Qualifying for competitive examinations.

Programme Specific Outcome for M.Sc Chemistry

- Students are supposed to have an advanced depth and detailed functional knowledge of theoretical concepts and experimental methods of chemistry.
- Broaden their professional foundations through activities such as teaching, internships, and fellowships.
- Capable to conduct analysis and interpretation of experimental data
- Able to communicate scientific results in writing and in oral presentation.
- Achieve the basic tools needed to carry out independent chemical research.

- Proficient in specialized area of chemistry and successfully complete an advanced research project.
- Proficient to conduct risk assessments concerning the use of chemical substances and laboratory procedures.
- Self awareness, to interact with other people in team working, and to work independently.
- Ability to work in a chemical, analytical and other related field.
- Gain knowledge of specific skills in planning and conducting advanced chemical experiments and applying structural-chemical characterization techniques.
- Enable the students to be well prepared for the CSIR/UGC-JRF, NET, GATE, SET, TRB examinations.

Regulation:

Duration of the Programme: Two years (Equivalent to four semesters)

Eligibility:

A pass in B.Sc. Chemistry conducted by the colleges with Physics as ancilliary subjects or any other examination accepted by as equivalents thereto are eligible to join this course.

Medium of Instruction: English

Age Limit:

Max age limit : No age limit

Age Relaxation:

SC/ST/OBC/MBC/DNC & Women : 3 years age relaxation

Differently Abled Students : 5 years age relaxation

Transitory Permission:

Students joined from 2018 - 2020 may be permitted to write their examinations in this pattern up to April 2026.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

Choice Based Credit System

PG Programme – M.Sc

2018 - 2020

Scheme of Examination / Question Paper Pattern

Theory Examination

The Internal and External marks should be allotted in the ratio 25:75.

Internal Marks:

i. Test(3 Tests) : 15 Marks (Average of the best two tests)
ii. Assignment : 5 Marks (Average of two)
iii. Seminar : 5 Marks

Total : 25 Marks

External Question Paper Pattern:

The question paper for external exam will have three parts.

Time: 3 Hours Max. Marks: 75

Part – A (10 X 1 =10)

Question No.1 to 10 – All are Multiple Choices (2 Questions from Each Unit)

Part – B (5 X 7 =35)

Choosing Either (a) or (b) Pattern (One Question from Each Unit)

Question No. 11. (a) or 11. (b) - From Unit I
12. (a) or 12. (b) - From Unit II
13. (a) or 13. (b) - From Unit III
14. (a) or 14. (b) - From Unit IV
15. (a) or 15. (b) - From Unit V

Part – C (3 X 10 =30)

Answer any Three out of Five Questions (One Question from Each Unit)

Question No. 16 – 20.

16 - From Unit I
17 - From Unit II
18 - From Unit III
19 - From Unit IV
20 - From Unit V

Blue Print for Question Paper Setting

Component / Unit	Knowledge			Understanding			Higher objective			Total Marks
	PART A	PART B	PART C	PART A	PART B	PART C	PART A	PART B	PART C	
UNIT I	**1** (1) **2** (1)				**11a** (7)	**16** (10)		**11b** (7)		26
UNIT II	**3** (1) **4** (1)	**12a** (7)				**17** (10)		**12b** (7)		26
UNIT III	**6** (1)	**13a** (7)			**13b** (7)		**5** (1)		**18** (10)	26
UNIT IV	**8** (1)		**19** (10)		**14a** (7) **14b** (7)		**7** (1)			26
UNIT V	**9** (1) **10** (1)	**15a** (7)			**15b** (7)	**20** (10)				26
Total	8	21	10		35	30	2	14	10	130

- Knowledge based - 30%
- Understanding - 30%
- Higher Objective - 20%

Practical Examination

Internal (Regular Practicals 30 + Record 10) = 40 Marks
Examination External = 60 Marks
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100 Marks

Sri Kaliswari College (Autonomous)-Sivakasi
Department of Chemistry
Choice Based Credit System - Curriculum Pattern
PG Programme - M.Sc Chemistry
2018-2020

Semester	Course Code	Course Name	Hours	Credits
I	18PCHC11	Core Course - I: Concepts-Reaction Mechanism and Stereo Chemistry	4	4
	18PCHC12	Core Course - II : Bonding, Solid state and Term Symbols	4	4
	18PCHC13	Core Course - III : Thermodynamics, and Electrochemistry	4	4
	18PCHO11 18PCHO12 18PCHO13	Major Elective Course – I: 1. Principle and applications of Drug Design and Discovery 2. Green Chemistry 3. Computer Applications in Chemistry	6	4
	18PCHC1P	Core Course - IV: Organic Chemistry Practical - I	6	3
	18PCHC1Q	Core Course - V: Inorganic Chemistry Practical - I	6	3
		Total	30	22
II	18PCHC21	Core Course - VI : Reaction Mechanism and Natural Products	4	4
	18PCHC22	Core Course - VII : Coordination and Organometallic Chemistry	4	4
	18PCHC23	Core Course - VIII : Quantum, Macromolecules and Equilibria	4	4
	18PCHN21	Non-Major Elective Course: Chemistry for Healthy Living	6	4
	18PCHC2P	Core Course –IX: Inorganic Chemistry Practical - II	6	3
	18PCHC2Q	Core Course – X: Physical Chemistry Practical - I	6	3
		Total	30	22
III	18PCHC31	Core Course – XI: Organic Spectroscopy, Reagents and Synthetic methods	4	4
	18PCHC32	Core Course – XII: Physical Methods in Inorganic Chemistry	4	4
	18PCHC33	Core Course - XIII: Group Theory and Spectroscopy	4	4
	18PCHO31 18PCHO32 18PCHO33	Major Elective Course – II: 1.Geo Chemistry 2. Nano Chemistry 3. Research methodology	6	4

	18PCHC3P	Core Course – XIV: Organic Chemistry Practical - II	6	3
	18PCHC3Q	Core Course - XV: Physical Chemistry Practical - II	6	3
Total			30	22
IV	18PCHC41	Core Course – XVI : Photochemistry and Natural Products	5	5
	18PCHC42	Core Course – XVII : Nuclear and Bioinorganic Chemistry	5	5
	18PCHC43	Core Course - XVIII : Chemical Kinetics Surface and Photochemistry	5	5
	18PCHC4P	Core Course - XIX : Practical in Computational Chemistry	3	3
	18PCHJ41	Core Course - XX : Project/Review of Recent Aspects of Chemistry	12	6
		Total	30	24
Total			120	90

Semester	I	II	III	IV	Total
Credits	22	22	22	24	90

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
Choice Based Credit System - Curriculum Structure
PG Programme - M.Sc Chemistry
2018-2020

Subject	Sem I	Sem II	Sem III	Sem IV	Total Credits
Core Courses and Practicals	4(4) 4(4) 4(4) 6P(3) 6P(3)	4(4) 4(4) 4(4) 6P(3) 6P(3)	4(4) 4(4) 4(4) 6P(3) 6P(3)	5(5) 5(5) 5(5) 3P(3)	72
Major Elective Courses	6(4)	-	6(4)		8
Non- Major Elective	-	6(4)		-	4
Project	-	-	-	12(6)	6
Total hours per week	30	30	30	30	90 120

Sri Kaliswari College (Autonomous)-Sivakasi
Department of Chemistry
Choice Based Credit System-Curriculum Structure
UG Programme - B.Sc Chemistry
2018-2021

Part	Subject	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Credits
I	Tamil/Hindi	6(3)	6(3)	6(3)	6(3)	-	-	12
II	General English	6(3)	6(3)	6(3)	6(3)	-	-	12
III	Core Courses	3(3) 3(3) 2P(2)	3(3) 3(3) 2P(2)	3(3) 3(3) 2P(2)	3(3) 3(3) 2P(2)	4(4) 4(4) 4(4) 4P(4) 4P(4)	4(4) 4(4) 4(4) 4P(4) 4P(3)	71
	Allied Courses	6(5)	6(5)	4(3) 2P(-)	4(3) 2P(2+2)	-	-	20
	Optional Courses	-	-	-	4(3)	4(3)	4(3)	9
IV	Non-Major Elective	2(1)	2(1)	-	-	-	-	2
	Skill Based Courses	-	-	2(2)	-	2(1) 2(1)	2(2)	6
	Value Based Courses	-	-	2(1)	-	-	2(1)	2
	Environmental Studies	-	-	-	-	-	2(1)	1
	Enrichment Courses	2(1)	2(1)	-	-	-	-	2
	Disaster Manegement					1(1)		1
	Value Education					1(1)		1
V	Extension				(1)			1
Total hours (per week)		30	30	30	30	30	30	
Total								140 180

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)

Core Course I: Concepts - Reaction Mechanism and Stereo Chemistry (18PCHC11)
(For those who join from June 2018 and afterwards)

Credits : 4	**Int. Marks : 25**
Hours/Week : 4	**Ext. Marks : 75**
Duration : 60hrs	**Max. Marks : 100**

Course Objectives:

- Understand The Basic Concepts of Electronic Effects and Their Correlation Analysis.
- Understand The Mechanistic Evidence for Organic Reactions.
- Know The Concept of Stereochemistry.
- Understand The Mechanism of Aliphatic Electrophilic and Nucleophilic Substitution Reactions.
- Understand The Conformation of Organic Molecules.

Course Outcomes:

1. Get an Idea About The Basic Concepts of Organic Chemistry And Enhance The Knowledge on Chemical Reactivity By Theoretical Approach.
2. Enhance The Ideas About Order, Molecularity, Kinetics of Organic Reactions and its Kinetic Measurement and quantitative calculation of unknown compounds reactivity from the known data.
3. Gain Knowledge, mechanisms and applications of Various Aliphatic, Aromatic Substitution Reactions and Electrophilic Substitution Reactions.
4. Understand The Concepts of Chirality and its Operations in Organic Molecules Enhance its Application to various Natural Products.
5. Knowing The Concepts of Asymmetric Synthesis and Geometrical Isomerism to Synthesise Active Compounds.
6. Understand The Concepts of Conformation and its Application to Various Organic Molecules in Biological Chemical Fields.
7. Enhance The Knowledge on Stereo Chemical Aspects of Organic Compounds.

UNIT I **(12 hrs)**

Basic Concepts: Stability and Correlation Studies: Aromaticity-Huckel's Rule-Antiaromaticity-Homo-Aromaticity-Alternant and Non Alternant Hydrocarbons, Benzenoid and non benzenoid system – Generation, Structure- Stability And Reactivity of Carbocations-Carbanions, Free Radicals-Carbenes And Nitrenes.**Linear Free Energy Relations**: Hammette Equation- Significance of Σ, P Applications - Taft Equation.

UNIT II **(12 hrs)**

Heterocyclic Compounds: Nomenclature of Heterocyclic Compounds. Structure, Reactivity, Synthesis and Reactions of Pyrazole, Imidazole, Oxazole, Isoxazole, Thiazole, Isothiazole, Pyrimidine, Purine – Preparation And Reactions of Coumarins and Quinoxalines.

UNIT III **(12 hrs)**

Stereochemistry-I: Fischer, Newman, Sawhorse and Flying Wedge Projections of 1 and 2 Chiral Centers. **Optical Isomerism:** Elements of Symmetry and Chirality. D-L Conventions. CIP Rules, R-S and M-P Conventions-Chirality in Compounds With 1 and 2 Stereogenic Centre and in Allenes, Cycloalkanes and Spiranes (With a Stereogenic axis)-Cram's And Prelog's Rules. **Conformational Analysis:** Conformational Analysis of Cycloalkanes - Cyclohexane, Monosubstituted E.G., Methyl, Iso-Propyl, Tert-Butyl and Di-Substituted Cyclohexanes (E.G., Dialkyl, Dihalo, Diols) and Decalin - Conformational Free Energy-Curtin Hammet Principle.

UNIT IV **(12 hrs)**

Aliphatic Nucleophilic Substitution Reactions: The S_N^2, S_N^1, S_N1'and $S_N^{2'}$, S_N^i Mechanisms – Neighbouring Group Participation by Π And Σ Bonds – Reactivity Effects of Substrates - Attacking Nucleophile - Leaving Group And Reaction Medium In S_N2 and S_N1 Reactions.

UNIT V **(12 hrs)**

Aromatic Electrophilic, Nucleophilic Substitution Reactions: Aromatic Electrophilic Substitution Reactions Mechanisms of Nitration-Sulphonation-Haloganation-Friedal-Crafts Alkylation-Acylation and Diazonium Coupling - Orientation Effects of Mono Substituted Benzene-Ortho Para Ratio – Partial Rate Factor- Selectivity of Nucleophile-Chichibabin Reaction Aromatic Nucleophilic Substitution Reactions of Bimolecular – Uni Molecular and Benzyne Mechanisms.

Text Books:

1. Jerry March, "Advanced Organic Chemistry", John Wiley and Sons, 4th Edn., 2006.
2. I.L.Finar, "Organic Chemistry", Vol. I and II, 5th Edn. 1975.
3. R.T.Morrison, R.N.Boyd, "Organic Chemistry", Prentice-Hall, 6th Edn., 2001.

Unit	Text Book No.	Chapter	Page No.
I	1	5	165-202
		2	26-69
II	2	12	606-636
III	1	4	94-150
		2	156-211
		5	215-236
	2	4	69-110
IV	1	10	293-369
V	1	11	501-521
		13	641-653

Reference Books:

1. P.Sykes, "Guidebook to Organic Chemistry", Orient Longman, 1976.
2. E.S.Gould, "Mechanism and Structure in Organic Chemistry", Henry Holt and Co., New York, 1959.
3. J.Shorter, "Correlation Analysis in Organic Chemistry", Clarendon Press, Oxord, 1973.
4. Reinhard Brucker, "Advanced Organic Chemistry", Reaction Mechanisms, Academic Press, 4th Edn.,2002.
5. F.A.Carey, R.J.Sundberg, "Advanced Organic Chemistry", Part B, Plenum Puplishers, 2001.
6. H.O.House, "Modern Synthetic Reactions", W.A.Benjamin Inc., Califoria, 2nd Edn., 1972.
7. P.Ramesh, "Basic Principles of Organic Stereochemistry", Meenu Publications, Madurai, 2005.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)

Core Course -II: Bonding, Solid State and Term Symbols (18PCHC12)
(For those who join from June 2018 and afterwards)

Credits	**: 4**	**Int. Marks**	**: 25**
Hours/Week	**: 4**	**Ext. Marks**	**: 75**
Duration	**: 60hrs**	**Max. Marks**	**: 100**

Course Objectives:

- Understand the Basic Concepts of Electronic Effects and their Correlation Analysis.
- Understand the Mechanistic Evidence for Organic Reactions.
- Know the Concept of Stereochemistry.
- Understand the Mechanism of Aliphatic Electrophilic and Nucleophilic Substitution Reactions.
- Understand the Conformation of Organic Molecules.

Course Outcomes:

1. Understand the Concepts of Various Types of Solids and its Properties.
2. Deepen the Ideas of Properties of Solid into its Various Applications.
3. Understand the Concept of Theories on Chemical Bonding and its Usage in the Structure Detection of Inorganic Molecules.
4. Know The Concepts Involved in the Inorganic Polymer and Conducting Inorganic Polymers and Increase the Ideas of Electron Deficient Molecules, Cluster Compounds and its Chemical Reaction.
5. Know the Various Concepts of Acids and Bases, its Applications.
6. Understand the Concepts of Non-Aqueous Solvents and Term Symbols.

UNIT I **(12 hrs)**

CHEMICAL BONDING:V.B. Approach to Covalent Bonding - Heitler - London, Pauling- Slater Refinements, Concept of Hybridization - VSEPR Theory - Shapes of Molecules, Bent Rules, Electronegativity and Partial Ionic Character - **Molecular Orbital Theory:** Symmetry and Overlap of Atomic Orbitals - Symmetry of Molecular Orbitals -Sigma- Pi and Delta -Bondings - LCAO and MO Diagrams of Heteronuclear Diatomic (CO, NO, HF, ICl) and Triatomic Molecules (H_2O, BeH_2, CO_2), Polyatomic Molecule(NH_3), Bond Length, Bond Order and Bond Energy – Walsh Diagram For H_2O and BeH_2 Bonds - Multicenter - Synergic and Agostic Bonding-Lattice Energy - Born-Lande Equations (Determination of Lattice Energy For NaCl) – Born –Haber Cycle - Kapustinski Equation - Energetics of Dissolution of Ionic Compounds in Polar Solvents - Properties of Ionic Compounds- Hardness and Electrical Conductivity.

UNIT II **(12 hrs)**

Electrode Potential and Acid – Base Concepts: Concept of Oxidation and Reduction Potentials – Periodic Trends – Applications of Electrode Potentials in the Interpretation of Chemical Behaviour - **Electrode Potential Diagrams and Their Uses:** Latimer Diagram – Frost Diagram – Ellinghjam Diagram – Problems- **HSAB Concept:** Basis of HSAB Concept - Acid - Base Strength, Hardness and Softness, Symbiosis - Applications of HSAB Concept - Acid - Base Concept in Non-Aqueous Media - Reactions in BrF_3, N_2O_4, Anhydrous H_2SO_4, Liquid $SO_2$and CH_3COOH. Superacids.

UNIT III **(12hrs)**

Atomic Term Symbol: Ground and Higher States – Methods of Determining Ground State Term and Complete Terms – Pigeon Hole Diagram and Russel – Saunder Microstates Method For p^2 and d^2 Configuration Term Symbols for Non Equivalent Electrons-**Molecular Term Symbol:** Diatomic Molecules – Ground and Excited State - Polyatomic Molecule Like $H_2O$and NH_3.

UNIT IV **(12 hrs)**

Solid State Chemistry: Close Packing of Atoms and Ions – fcc - hcp and bcc - Types of Packing - Tetrahedral and Octahedral - Void Radius Ratio - Derivation - Its Influence on Structures –Crystal Structure of Compounds: Rock Salt - Calcium Chloride – Wurtzite - Zinc Blende –Rutile – Fluorite – Antifluorite - Cadmium Iodide and Nickel Arsenide - Spinels Normal and Inverse Types and Perovskite Structure-**Theory of Solids:** Free Electron Theory - Band Theory - MO Theory of Solids -**Dislocation in Solids:** Point - Line and Plane Defects - Superconductors – BCS Theory - Types of Superconductors - Preparation of HT Superconductors.

UNIT V **(12 hrs)**

Π- Bonding Effect and Cage Compounds: Effect of Π Bonding - **Comparison of Carbon and Silicon Compounds:** Pi Bonding and Possibility of Polymerisation - Halides of Carbon and Silicon - Structure and Reactivity –**Comparsion of Nitrogen and Phosphorous Compounds:** Elemental State – Oxides-Trialkyl Nitrogen and Phosphorous - Double Bond Character – Ylids - Pi Bonding in Boron Compounds - Stability of Oxyacids of Halogens - P_π-D_π Bonding Leading to Aromaticity in Inorganic Ring Compounds (Dewar Model of Pi Bonding) - Nomenclature and Classification of Boranes and Carboranes - Wade's Rule - Styx Number - Structure and Bonding in Diboranes – Preparation and Reactivity of B_2H_6, B_4H_{10}, B_6H_{10}, $(B_{12}H_{12})^{2-}$, $C_2B_{10}H_{12}$.

Text Books:

1. AskimK.Das and Mahua Das, "Fundamental concepts of Inorganic Chemistry",Vol 1, CBS Publishers and Distributors, 2015.
2. Askim K.Das and Mahua Das,"Fundamental concepts of Inorganic Chemistry", Vol2, CBS Publishers and Distributors, 2015.

Unit	Text Book No.	Chapter	Section	Page No.
I	2	9	9.3,9.4, 9.7, 9.10, 9.11, 9.12, 9.13	551-556, 557-569, 575-586, 589-600, 601-619, 620-668, 669-698
II	1	14	14.15	1473-1490
		15	15.7, 15.12	1566-1567, 1570-1572
		16	16.8, 16.17	1647-1655, 1719-1725
III	1	1	1.10	57-74
IV	2	11	11.7-11.11, 11.15	1003-1046, 1063-1075
V	2	10	10.7, 10.12	802-837, 900-910

Reference Books:

1. James E.Huheey, Ellen A.Keitler, Richard L.Keitler, "Inorganic Chemistry", Harper Collins College Publishers, New York, 4thEdn.2012.
2. P.W. Atkins, D.K. Shriver, C.H. Langfood, "Inorganic Chemistry", Oxford ELBS.U.K, 1990.
3. Gurdeep Raj "Advanced Inorganic Chemistry – Vol I", Goel Publishing House, Meerut, 2015.
4. F.A. Cotton, G. Wilkinson, "Advanced Inorganic Chemistry",John Wiley and sons, Singapore, 5thEdn,2003.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)

Core Course - III: Thermodynamics and Electrochemistry (18PCHC13)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 4 **Ext. Marks : 75**
Duration : 60hrs **Max. Marks : 100**

Course Objectives:

- To Know the Various Concepts Involved in Second and Third Law of Thermodynamics.
- To Learn Irreversible Thermodynamics and Important Concepts in Non Equilibrium Thermodynamics.
- To Understand The Concepts in Statistical Thermodynamics.
- To Various Laws of Electrochemistry and Theories of Indicator.
- To Know Concepts involved in Buffer, Electrolysis, pH.

Course Outcomes:

1. Understand the Concept of Laws of Thermodynamics and its Need in Chemistry.
2. Increase the Knowledge on the Need of Partial Molar Properties and Its Derivation, Irreversible Thermodynamics.
3. Deepen the Ideas of Statistical Thermodynamics By Various Statistical Theory and Heat Capacity Theories.
4. Gain Knowledge on Various Types of Conductance, Conductance Measurements and its Application.
5. To Know the Concepts of Electrolyte, Electrolysis and its Law, the Various Concepts Such as Common Ion Effect, pH Measurement.
6. To Gain the Knowledge on Indicators and the Theories Behind Indicator.
7. To Deepen the Idea of Theory of Strong Electrolyte and its Derivation.

UNIT I **(12 hrs)**

Thermodynamics-I: Second Law of Thermodynamics–Statement–Entropy-Definition and Derivation of The Concept of Entropy- Entropy Change in Different Process - Physical Significance (Illustrations With Unavailable Energy, Disorder And Probability)-Work and Gibbs Function- Gibbs-Helmholtz Equations - Variation of Free Energy Change With Temperature and Pressure- Maxwell Relations, Criteria for Reversible and Irreversible Process. **Partial Molar Properties:** Chemical Potential-Gibbs Duhem Equation-Variation of Chemical Potential With Temperature and Pressure-Clapeyron-Clausius Equation-Concepts of Fugacity and Activity-Determination of Fugacity by Graphical Method-Third Law of Thermodynamics-Statement-Nernst Heat Theorem - Determination of Absolute Entropies of Solids, Liquids and Gases-Test

of The Third Law- Exception to the Third Law-Residual Entropy-Calculation of Residual Entropy of CO, NO, N_2O and H_2-Unattainability of Absolute Zero, Entropies of Real Gases, Entropy Change in Chemical Reaction.

UNIT II **(12 hrs)**

Non-Equilibrium Thermodynamics: Introduction – Postulates of Local Equilibrium – Entropt Production – Forces and Fluxes - Onsager's Reciprocal Relations and Application - Proof of onsager Reciprocal Relationship –Wiener Theorem – Linear Laws – Stationary States. Endergonic & Exergonic Reactions, Standard State Free Energy Changes- ΔG, ΔG^0 and $\Delta G'^0$, Relationship Between Equilibrium Constant and $\Delta G'^o$, Feasibility of Reactions. **ATP:** Structure, Properties and Energy Currency of the Cell - Importance of Coupled Reactions, High Energy Compounds.

UNIT III **(12 hrs)**

Statistical Thermodynamics: Definition of State of a System – Ensembles(Micro, Macro and Grand Canonical)- Boltzmann Distribution Law and its Derivation – Boltzmann – Planck Equation – Partition Functions – Translational – Rotational - Vibrational, Electronic Partitian Function - Thermodynamics Properties From Partition Functions - Sackur-Tetrode Equation. **Quantum Statistics:** Fermi Dirac and Bose Einstein Statistics – Application of BE Statistics to Photon Gas-Application of FD Statistics to Electron Gas – Einstein's and Debye's Theories of Heat Capacities of Solids.

UNIT IV **(12 hrs)**

Electrochemistry I:Electrolysis: Movement of Ions During Electrolysis – Faraday's Law of Electrolysis – Conductance – Resistance - Specific Conductance – Electrolytic Conductance - Equivalent Conductance – Relation Between Molecular Conductance and Specific Conductance – Equivalent Conductance at Infinite Dilution – Conductance in Nonaqueous – Effect of Dielectric Constant – Effect of Viscosity – Walden's Rule - Onsager's Equation – Conductometric Titrations – Advantage of Conductometric Titration – Types of Conductometric Titrations – Replacement Titration – Precipitation Titration - Complexometric Titrations. **Strength of an Acid** – Methods of Comparing Relative Strength of Two Acids – Thomson's Thermal Method - Conductivity Method – Dissociation Constants Method – Ostwald's Volume Method- Dissociation Constant of Polybasic Acids - Common – Ion Effect – Applications of Common –Ion Effect – Solubility Product.

UNIT V **(12 hrs)**

Electrochemistry II:Ionic Product of Water: pH Value – Determination of pH Value – Colorimetric Method – EMF Method – Indicators – Theories of Indicators – Ostwald's Theory – Modern Quinoid Theory – Indicators and Acid – Base Titrations – Buffers – Buffer Capacity – Action of Buffers – Theories of Buffer. **Absolute Ionic Velocities** - Experimental Determination of Ionic Velocities- Ostwald's Dilution Law – Experimental Verification of The Dilution Law - Limitations of Ostwald's Dilution Law - Degree of Dissociation - Dissociation Constant - Arrhenius Theory of Electrolytic Dissociation – Evidence in Favour of the Theory – Limitations of Arrhenius Theory - Theory of Strong Electrolytes – Debye-Huckel Theory- Test

of Debye-Huckel Theory- Limiting Law - Debye- Huckel – Onsager's Equation - Relaxation Effect - Electrophoretic Effect – Applications of Debye-Huckel Equation - Determination of Thermodynamic Equilibrium – Effect of Ionic Strength on Ion Reaction Rate in Solution- Debye – Falkenhagen Effect – Wien Effect – Polorography.

Text Books:

1. Gurdeep Raj, "Advanced Physical Chemistry", GOEL Publishing House, Meerut, 39th Edition, 2015.
2. Puri, Sharma, Pathania, "Principles of Physical Chemistry", Vishal Publishing Co., 47th Edition, 2016.

Unit	Text Book No.	Chapter	Page No.
I	2	-	520,521-523,530,531-532,536-539,541,545,547,553-554,556,559-560,562
II	1	2	316 – 331
III	2	-	526-529,261-275,281,286,289,293,306-314
IV	1	20	1107-1108,1110-1113,1120-1124,1126-1127,1146-1148
V	1	20	1128-1133,1135,1140-1145,1155-1160,1161-1167,

Reference Books:

1. Kuriacose, Rajaram, "Thermodynamics Classical, Statistical and Irreversible", Shobanlal and Co Educational Publishers, Jalandhar, 2013.
2. D.N. Bajpai, "Advanced Physical Chemistry", S.Chand and Co. Private Limited, 2010.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme M.Sc
Semester I
(2018 -2020)
Major Elective Course-I: Drug Design and Discovery (18PCHO11)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Mark : 25**
Hours/Week : 6 **Ext. Mark : 75**
Duration : 90 hrs **Max. Mark : 100**

Course Objectives:

- To Enable Students Identify Lead Compounds.
- To Describe the Various Drug – Receptor Interactions.
- To Analyze Drug Molecules.
- To Enumerate Steps to Synthesize a Drug Molecule.

Course Outcomes:

1. Ability to Understand terms involved in Drug Design.
2. Enrich the Knowledge on Various Steps involved in Drug Discovery and its Molecular Interactions.
3. Gets an Idea about Retro Synthesis in Drug Designing.
4. Ability to Understand Computer Aided Drug Designing.
5. Understand the ideas of Quantum Computing Drug Design.
6. Enhance the Knowledge on Drug Designing.

UNIT I **(18 hrs)**

Drug Design and Discovery : Historical Background –General terminologies – Drug Targets: Lipids, Carbohydrates, Proteins, Enzymes and Nucleic Acids as Drug Targets and Receptors - Receptor Pharmocology – Agonists and Antagonists(Partial and Full) - Allosteric Modullators. **Pharmacokinetics and Pharmacodynamics:** Administration, Absorption, Distribution, Metabolism, Elimination of Drugs-Bioavailability of Drugs - Side Effects.

UNIT II **(18 hrs)**

Drug Identification and Validation: Steps in Drug Discovery – Leads Identification- Hits- Drug Validation-Natural Products as Drugs – Molecular Recognition in Drug Design – Thermodynamic Considerations – Physical Basis and Inter Molecular Interactions Between Drugs and Targets Like Electrostatic Interactions – Ionic Bondshydrogen Bonds – Inductive Interactions – Dispersive Forces. Stereochemistry in Drug Designing - Stereospecificity of Drug Targets – Eudesmic Ratio – Examples of Eutomers and Distomers.

UNIT III **(18 hrs)**

Retrosynthetic Strategies for Drug Synthesis: Introduction to Retrosynthetic Analysis and Disconnection Approach – Synthons Acceptor and Donor – Synthetic Equivalents-Umpolungs – Planning a Synthesis – Relay and Convergent Routes - Guidelines For Disconnection – One Group C-X and C-C Disconnections – Chemoselectivity - Two Group C-C Disconnections in Dicarbonyls.

UNIT IV **(18 hrs)**

Computer Aided Drug Design: Molecular Modeling in Drug Design – Energy Minimization Methods – Both Molecular Mechanics and Quantum Mechanical Methods – Energy Minimization – Conformational Analysis – Structure Based and Ligand Based Drug Design – QSAR – Parameters –Quantitative Models of QSAR – Hansch Methods – Free Wilson Model - 3D Pharmacophore Modeling – Docking – Rigid and Flexible Methods of Docking – Prediction of Binding Modes – Protein Ligand Binding Free Energies - Docking Score – Validation.

UNIT V **(18 hrs)**

Physico Chemical Parameters: Solubility – Partitian Coefficient – Ioniation - pKa – Hydrogen bonding – Surface activity – Applications – Complexation – Redox potential – Steric features - Bioisosterism.

Text Books:

1. Ratan kumar. "Fundamental of organic synthesis – The Retrosynthetic Analysis", New Central Book Agencies (P) Ltd., Kolkata, 2008.
2. K. Ilango, Text book of Medicinal Chemistry Volume I", Keerthi Publishers, Chennai, 2007

Unit	Text Book No.	Chapter	Page No.
I	1	2	10 - 19
		5	78 – 84
		10	143 – 147, 327 – 329
II	1	8	220 – 236, 152 – 153, 147 – 149, 221 – 226,
III	1	2	139 – 140, 153, 171, 172, 212 – 238, 154
IV	1	13	279, 335 - 342, 319 – 320, 331 – 334, 345
V	2	4	24 – 50

Reference Books:

1. Larsen Et Al, "Text Book of Drug Design and Discovery", London and Newyork, Taylor and Francis, 4th Edition, 2004.
2. S.S. Kadam, K. R. Mahadik, K. G. Bothara, "Principles of Medicinal Chemistry Volume 1 and 2", Nirali Prakashan Publication, 2010.
3. Andrew R. Leach, Valerie J Gillet, "An Introduction to Cheminformatics", , Springer, Netherland, Revised Edition 2007.
4. Graham L. Patrick, "An Introduction to Medicinal Chemistry", Oxford University, 4th Edition.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)
Major Elective Course-I: Green Chemistry (18PCHO12)
(For those who join from June 2018 and afterwards)

Credits : 4	**Int. Marks : 25**
Hours/Week : 6	**Ext. Marks : 75**
Duration : 90 hrs	**Max. Marks : 100**

Course Objectives:

- To Enrich the Knowledge of Principles of Green Chemistry and Atom Economy Reactions.
- To Help Learners to Plan the Synthesis of Organic Compounds with Green ChemistryApproach.
- To Learn Environmentally Friendly Reactions such as Sonochemical Reactions and Microwave Induced Reactions.
- To be Familiar with Greener Solvents in Chemistry.
- To Gain Knowledge in the Area of Synthesis of Organic Compound from Renewable Sources.

Course Outcomes:

1. Understanding The Requirement of Global Needs to Reduce the Pollution Created by the Various Chemical Industries.
2. New Method of Way and Technology for the Greener Environment and the Basic Principle of Green Chemistry.
3. Awareness about the Atom Economy of the Reaction and its Improvement for the Higher Efficiency of the Reaction.
4. Enrichment of Modern Technology like Microwave, Sonochemistry, One Pot Synthesis, Water Medium and the Solvent Free Medium.
5. Role of Greener Solvents, Catalyst and its Importance in the Synthetic Chemistry.
6. Techniques to Know the Reduction of Multistep Synthetic Process into one Pot Synthesis with Minimium Amount of Waste Disposal.

UNIT I **(18 hrs)**

Principles & Concept of Green Chemistry: Introduction – Concept and Anastas Twelve Principles- Atom Economy Reactions –Rearrangement Reactions-Addition Reactions-Atom Uneconomic-Sublimation-Elimination-Wittig Reactions- Designing a Green Synthesis-Choice of Starting Material-Choice of Reagents-Choice of Catalyst- Choice of Solvents- Green Synthesis of Paracetamol- Nicotinic Acid- Ibuprofen.

UNIT II **(18 hrs)**

Sonochemistry: Basic Concepts - Importance of Sonochemistry - Generation of Ultrasound - Magnetostriction Method & Piezoelectric Method - Sonochemical Yield-Ultrasound Assisted Reactions – Esterification, Reduction, Coupling Reactions - Strecker Synthesis, Reformatsky Reaction, Substitution Reaction, Cannizzaro Reaction, Barbier Reaction, Oxidation and Saponification.

UNIT III **(18 hrs)**

Microwave Induced Green Transformations: Design for Energy Efficient Transformations – **Microwave Technology in Chemistry:** Microwave Activation – Theory of Microwave Heating – Advantages of Microwave Heating Over Conventional Heating – Specific Effect of MW - Benefits and Limitations of Organic Synthesis under Microwave. **MW Assisted Reactions in Water:** Hydrolysis – Oxidation Of Toluene And Alcohol – **MW Assisted Reaction in Organic Solvent:** Esterification – Diels – Alder Reaction – *Ortho*ester Claisen Rearrangement - **Solvent Free Microwave Assisted Reactions:** Deacetylation – Alkylation of Reactive Methylene Group – Synthesis of Anhydride From Dicarboxylic Acid.

UNIT IV **(18 hrs)**

Green Solvents & Catalysts for Synthesis: Water as the Universal Solvent - Introduction- Reaction in Aqueous Phase-Peri Cyclic Reactions- Diel's Alder Reaction-Claisen Rearrangement. **Ionic Liquids:** Types, Preparation and Synthetic Applications – Characteristics and Synthetic Applications - Super Critical CO_2 - Polyethylene Glycol - Green Aspects of Catalysis - Use of Phase Transfer Catalysts for Green Synthesis - Mechanism for PTC Reaction – Advantages of PTC over Conventional Synthesis – Synthetic Applications – Darzen Reaction – Williamson's Ether Synthesis – Wittig Reaction – C – Alkylation – N – Alkylation.

UNIT V **(18 hrs)**

Renewable Feedstock and Sustainable Development: Introduction- Biomass: Advantages and Disadvantages Of Biomass as a Chemical Feedstock - Carbohydrate as a Feedstocks for Chemical Production-Lignin as a Renewable Feedstocks - Energy Conversion - Green Chemistry in Education-Industrial Aspects - Bio-Based Renewable-Green Engineering Education for Sustainability for Developing Countries.

Text Books:

1. V.K.Ahulwalia, "New Trends in Green Chemistry", Anamaya Publishers, New Delhi, Second Edition,2006.
2. V.K.Ahulwalia, Rajender S.Varma, "Green Solvents for Organic Synthesis", Narosa Publishing House, New Delhi, 2012.
3. Paul.T.Anastas "Green Chemistry"Oxford University Press,New Delhi, Second Edition,2006.

Unit	Text Book No.	Chapter	Page No.
I	1	-	3-11,240-249
II	1	-	73-85
III	1	-	59-70
IV	2	1.1-1.14,3.16-3.18,5.1-5.3,7.1-7.5,8.1-8.3	23-27,35-48,64-77,87-97,102-117
V	2	-	29-47

Reference Books:

1. Paul T.Anastas, Tracy C.Williamson, "Green Chemistry- Frontiers in Benign Chemical Synthesis and Processes", Oxford University Press, 1998.
2. Mike Lancaster, "Green Chemistry An Introductory Text", RSC publishing, 2nd edition, 2010.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester II
(2018 -2020)

Major Elective Course-I : Computer Applications in Chemistry (18PCHO13)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week :6 **Ext. Marks : 75**
Duration : 90hrs **Max. Marks : 100**

Course Objectives:

- To Know Basic Aspects of C Language and Programming.
- To Learn Chemdraw and Orgin Software.
- To Understand Chem 3D, Scifinder.

Course Outcomes:

1. Understand the Fundamental Concepts in C-Language.
2. Apply the C-Program to Calculate Various Parameters involved in Chemistry.
3. Understand the Basic Concepts of Chemdraw and Applications.
4. Gain the Basic Knowledge of Origin Software and its Applications.
5. Enhance the Knowledge of Application Oriented Chemistry Software Like Chem-3D, Scifinder.
6. Enrich the Knowledge on MS-Office, Powerpoint and Internet.

UNIT I **(18 hrs)**

Fundamentals of 'C' Language: Structure of a C Program – Data Types - Variables, Constants, Keywords, Operators, Expression-Control Structure – If, If - else, Nested If - else, While, do-While, for Loop, Nested for, goto, Continue, Break, and Switch Case Statements (Only Syntax With Simple Examples) - Functions – Library Function, User Defined Function. Arrays – Definition, Initialization, String and Character Arrays.

UNIT II **(18 hrs)**

C Programming: Calculation of Reduced Mass, Calculation of NMR Frequency of Hydrogen Using While Loop, Calculation of Second Order Rate Constant, Determination of RMS, Average and Most Probable Velocity- Determination of Inter Planar Distance – Determination Critical Pressure, Critical Temperature, Critical Volume of Methane – Determination of Linear and Non Linear Structure – Calculation of Surface Tension – Calculation of Ionic Strength – Vibrational Energy Level Calculation of HCl.

UNIT III **(18 hrs)**

Chem Draw Software: Introduction - Creating, Opening, Saving, Printing and Closing a Document – Tool Bar – Drawing Chemical Structure- Drawing Setting – Drawing Bonds, Drawing Rings, Drawing Acylic Chains, Automatic Warning- Convert Name to Structure and

Structure to Name - Drawing Captions and Atom Labels - Drawing Orbitals, Symbols, Arrows, Arcs and Other – Spectrum Structure Assignments Shapes.

UNIT IV **(18 hrs)**

Orgin Software: Orgin Software and its Application-Registering Origin - Origin Resources - Direct Support Resources for Origin - Online Resources for Origin - Origin File Types - Import Data - Graphs from Worksheet Data - Origin Gadgets - Data Analysis - Drawing Or Deleting Data Points in the Graph - Basic Math - Statistical Graphs. **Curve Fitting:** Linear and Polynomial Fit - Peak Analysis - Exporting Worksheets - Exporting Graphs and Layout Pages.

UNIT V **(18 hrs)**

Softwares: Chem3D's Graphical Interface – Window Object, Tool Palette, Cleaning a Structure, Selecting Atoms and Bonds-MS Word, MS Excel, MS Power Point – Opening, Saving, Printing – Drawing Plot using MS Excel – Short Cut Keys in MS Word – Sending E-Mail – Applications of Scifinder – Search Engine.

Text Books:

1. K. V. Raman, "Computers in Chemistry", Tata Mcgraw-Hill Publication.
2. User Manual, "CS Chem Draw 9.0".
3. Origin 9.1, "User Guide".
4. User Manual, "Molecular Modeling with Chem".

Unit	Text Book No.	Chapter	Section	Page No.
I	1	6	6.1 – 6.12	220 – 290
II	1	6	6.1 – 6.12	220 – 290
III	2	1	-	21 – 29
		3	-	59 – 71
		4	-	73 – 75
		6	-	93 – 108
		9	-	146 – 147
IV	3	2	2.6	6
		3	3.1 – 3.3	9 – 11
		6	-	23 – 25
		7	7.1 – 7.5	25 – 30
		8	8.1 – 8.6	31 – 44
		10	10.1 – 10.7	61 – 78
		13	13.1	113 -116
		14	14.1 – 14.8	117 – 136
		15	15.1 – 15.4	137 - 142
V	4	1	-	1 - 7

Reference Books:

1. Wilson, Stephen, “Chemistry by Computer” Plenum Press, 1986.
2. P. Riyazuddin, “Computers in Chemistry”, I.K. International Publishing House Pvt. Ltd., 2012.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)

Core Course IV: Organic Chemistry Practical - I (18PCHC1P)

(For those who join from June 2018 and afterwards)

Credits : 3 **Int. Marks : 40**
Hours/Week : 6 **Ext. Marks : 60**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To Know the Techniques involved in the Quantitative Analysis.
- To Learn Estimation of Organic Compounds.
- To Know about the Preparation of Organic Compounds.

Course Outcomes:

1. Learn the Importance of Quantitative and Qualitative Organic Analysis.
2. Enhancing the Skill for the Estimation through Iodometric Analysis and Bertrand's Method.
3. Report the Sample in a Systematic Way of Proceedings.
4. Knowing the Concept involved in the Multistep Synthesis.
5. Preparation of Disubstituted and Trisubstituted Organic Compound.
6. Applying the Knowledge of Directive Influencing Effect in the Organic Compound Preparation.
7. Learn How to Convert the Monosubstituted Compound into Di and Tri Substituted Compound.

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1. **Quantitative Analysis**

1. Estimation of Glucose by Lane and Eynon Method and Bertrand Method
2. Estimation of Glycine
3. Estimation of Formalin
4. Estimation of Methyl Ketone

2. Organic Preparation

1. *p*- Nitro Aniline from Acetanilide
2. *p*- Bromoaniline from Acetanilide
3. *m*-Nitrobenzoic Acid from Methyl Benzoate
4. Benzanilide frsom Benzophenone
5. *Sym*-Tribromobenzene from Aniline

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester I
(2018 -2020)
Core Course - V: Inorganic Chemistry Practical - I (18PCHC1Q)
(For those who join from June 2018 and afterwards)

Credits : 3 **Int. Marks : 40**
Hours/Week : 6 **Ext. Marks : 60**
Duration : 90hrs **Max. Marks : 100**

Course Objectives:

- To Know the Techniques involved in the Qualitative Analysis.
- To Learn Analyze the Mixture through Simple Tests.
- To Know about Familiar and Less Familiar Cations.

Course Outcomes:

1. Mastering the Techniques involved in the Qualitative Analysis.
2. Gets an idea About the Analysis involving Mixture of Familiar and Less FamiliarCations.
3. Learn the Importance of Group Separation for the Analysis of Cation.
4. Gaining the Way of reporting the Mixture in the Ordered Form.
5. Enrich the Skill to Identify the Cation by the Systematic Procedure.
6. Separation of Mixture of Metal ion through Volumetric Estimation.

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1. Semimicro Qualitative Analysis – Analysis of a Mixture Containing Two Cations one as less familiar and other as more familiar one.
   Less familiar are as follows:

   I Group – W, Ti
   IA Group – Se, Te
   II Group – Mo, Sn, Sb
   III Group –Th, Zr, Ce, V, U
   VI Group - Li

2. Estimation of the individual Metal ion in the given mixture (containing two metal ion) in the Presence of Another by EDTA through pH variation, Masking agent method.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester II
(2018 -2020)

Core Course – VI: Reaction Mechanism and Natural Products (18PCHC21)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 4 **Ext. Marks : 75**
Duration : 60 hrs **Max. Marks : 100**

Course Objectives:

- Understand the Basic Concepts of Electronic Effects and their Correlation Analysis.
- Understand the Mechanistic Evidence for Organic Reactions.
- Know the Concept of Stereochemistry.
- Understand the Mechanism of Aliphatic Electrophilic and Nucleophilic Substitution Reactions.
- Understand the Conformational structure of Organic Molecules.

Course Outcomes:

1. Understanding the Concepts of Various Types of Rearrangement Reactions involved in Organic Chemistry.
2. Enhance the ideas of Rearrangement Reactions into C-C, C-O, C-N Migration Reactions.
3. To Increase the Knowledge on Electrophilic and Nucleophilic Addition Reactions and Its Stereo Chemical Aspects.
4. Deepen the Ideas of Elimination Reactions and its Stereo Chemical Aspects into Various Types of Elimination Reactions.
5. Get ideas of the Classification of Terpenes and Structural Elucidation of Specific Terpenoids.
6. Understand the Structure and Synthesis of Various Vitamins.

UNIT I **(12 hrs)**

Molecular Rearrangements: Mechanism of the Following Rearrangements: Rearrangement of Carbo Cations- Pinacol-Pinacolone -Wagner-Meerwin- Demjanov- Dienone-Phenol- Carbanions- Favorski Fries Rearrangement- Benzil-Benzilic acid rearrangement - Baeyer-Villiger, Claisen; Wolff, Hofmann, Schmidt, Curtius, Beckmann and Stevens

UNIT II **(12 hrs)**

Addition and Elimination Reactions: Addition to Carbon-Carbon Multiple Bonds – Electrophilic, Nucleophilic and Free Radical Additions – Orientation of the Addition – Stereochemical Factors influencing the Addition of Bromine and Hydrogen Bromide, Hydroxylation, 1,2-Dihydroxylation, OSO_4– Hydroboration. **Addition to Carbonyl and**

Conjugated Carbonyl Systems: Mechanism of 1,2- and 1,4-Additions – Benzoin, Knoevenagel, Stobbe, Darzens Glycidic Ester Condensation and Reformatsky Reactions.

UNIT III **(12 hrs)**

Terpenes: Classification of Terpenes - Structure, Stereochemistry and Synthesis of α-Pinene, Camphor, Zingiberene, Squalene, Cadalene And Curcumene.

UNIT IV **(12 hrs)**

Vitamins: Structure and Synthesis of Vitamins A_1, B_1, B_2, B_3, C, E and H – Biological Role of Vitamins.

UNIT V **(12 hrs)**

Bio-Organic Chemistry: Proteins-Polypeptides and their Synthesis (upto a Tripeptide), Solid Phase Synthesis (Merrifield Synthesis), Determination of Primary Structure of Proteins (End Group Assay), Discussion on Secondary and Tertiary Structure of Proteins-Structure and Role of (Genetic Code) DNA and RNA-Protein Synthesis (Determination of Structure is not Required) Biosynthesis of Amino Acids (Phenylalanine, Alanine, Tyrosin only).

Text Books:

1. Jerry March, "Advanced Organic Chemistry", John Wiley and Sons, 4th Edn., 2006.
2. I.L.Finar, "Organic Chemistry", Vol. II, 5th Edn. 1975.

Unit	Text Book No.	Chapter	Page No.
I	1	18	51-57
II	1	15	734-758
		17	982-1010
III	2	8	354-459
IV	2	17	829-855
		7	311-314
		9	477-480
V	2	13	638-689

Reference Books:

1. E.L.Eliel, S.H Wilen, L.N Mandar, "Stereochemisstry of Carbon Compounds", John Wiley and Sons, 2003.
2. D.Nasipuri, "Stereochemistry of Organic Compounds - Principles and Applications", New Age International (P) Ltd., 2nd Edn, 1994.
3. P.S Kalsi, "Stereochemistry, Conformation And Mechanism", New Age International (P) Ltd., 4th Edn., 1997.
4. F.A Carey, R.J Sundberg, "Advanced Organic Chemistry - Part B", Plenum Publishers, 4th Edn., 2001.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester II
(2018 -2020)

Core Course – VII: Coordination and Bioinorganic Chemistry (18PCHC22)
(For those who join from June 2018 and afterwards)

Credits	**: 4**	**Int. Marks**	**: 25**
Hours/Week	**: 4**	**Ext. Marks**	**: 75**
Duration	**: 60 hrs**	**Max. Marks**	**: 100**

Course Objectives:

- To Understand Various Theories of Bonding in Coordination Compounds.
- To Know the Reaction Mechanism of Coordination Compounds.
- To Enhance Knowledge about Types of Magnetism, Pi Complexes and Isolobality.
- To Gain Knowledge about Metal Carbon Bond in Metal Carbon Bond in Organometallic Compounds, Multicentre Bonding and Quadruple Bond in Metal Clusters.
- To Enrich Awareness about Catalytic Applications of Organometallic Compounds in Industry.

Course Outcomes:

1. Apply the CFT and MO Theory for the Determination of Geometry of the Complexes.
2. Learn to Construct the MO Diagram for Sigma and Pi Bonded Complexes.
3. Intrepration of the Stability of Complex through EAN Rule.
4. Gain the Proficiency and Interpretation of Reaction Mechanism of Complexes.
5. Sketch the Multicentre Bonding Nature of Organometallic Compounds.
6. Gain the Knowledge in Applying Organometallic Compounds in the Synthesis of Petrochemical Products at the Large Scale.

UNIT I **(12 hrs)**

Theory of Bonding in Coordination Compounds: Stereoisomerism in Square Planar and Octahedral Complexes – Application of ORD & CD for the Determination of Absolute Configuration of Metal Complexes – **Stability of Complexes:** Step - Wise and Overall Stability Constant – Determination - Factors Affecting Stability Constant in Solution - **CFT:** Splitting of d-Orbitals in Octahedral – Tetrahedral - Square Planar - Square Pyramid and Trigonal Bipyramidal Geometries - Factors Affecting Crystal Field Splitting - CFSE Calculation in Terms of Dq in Octahedral and Tetrahedral Symmetry – Application of CFSE- Spectrochemical Series - Nephelauxetic Effect - **MO Theory:** Construction of MO Diagram for Sigma and Pi Bonded Octahedral and Tetrahedral Complex.

Unit II **(12 hrs)**

Types of Magnetic Behaviour in Coordination: Types of Magnetism - Magnetic Properties of Free Ions - Temperature Dependence of Magnetism (TDP) - Temperature Independent Paramagnetism (TIP) - Spin State Crossover, Antiferromagnetism - Inter and Intra Molecular Interaction. Application of Magnetic Measurements in the Determination of Structure of Transition Metal Complexes - **Pi-Complexes:** Pi Complexes With Sigma Base, Pi Acid Ligands - EAN Rule - Isolobal Relationship - Structure and Bonding of Metal Carbonyls - Metal Nitrosyls - Dinitrogen Complexes - Molecular Oxygen Complexes and Phosphine Complexes Using MO Theory

UNIT III **(12 hrs)**

Reaction Mechanism of Coordination compounds: Substitution Reactions of Octahedral Complexes - Labile - Inert Complexes – Mechanism, Evidence and Factors Affecting Acid Hydrolysis - Base Hydrolysis and Anation Reactions. Substitution Reactions of Square Planar Complexes - Factors Affecting Reactivity of Square Planar Complexes. **The Trans-Effect:** Theories and its Applications - Electron Transfer Reactions - Complementary and Non - Complementary Reactions - Outer Sphere and Inner Sphere Electron Transfer Mechanisms - Synthesis of Coordination Complexes Using Electron Transfer and Substitution Reactions.

UNIT III **(12 hrs)**

Bioinorganic Chemistry – I: Metalloporphyrins - Hemoglobin and Myoglobin - Structure and Work Functions - Synthetic Oxygen Carriers. **Cytochromes:** Structure and Work Functions in Respiration. **Chlorophyll:** Structure - Photosynthetic Sequence - Iron-Sulphur Protein (Non-Heme Iron Protein) - Copper Containing Proteins - Classification - Blue Copper Proteins - Structure of Blue Copper Electron Transferases - Copper Proteins as Oxidases – Cytochrome C Oxidase - Mechanistic Studies of C Oxidase – Hemocyanin - Copper Enzymes - Azurin, Plastocyanin.

UNIT IV **(12 hrs)**

Bioinorganic Chemistry – II: Inhibition and Poisoning - In-Vivo and In-Vitro Nitrogen Fixation. **Structure and Function of Biological Membranes:** Molecular Mechanism of Ion Transport Across The Membrane – Ionophores - Sodium and Potassium Ion Pumps, Calcium Pump. **Minerals in Diet:** Requirement of Various Minerals in Physiological and Biochemical Functions- Classification of Minerals According to Their Functions in the Body – Digestion and Absorption of Minerals – Mechanism of Iron Absorption – Ferroprotein Secretion.

Text Books:

1. G.Whitemore, “Advanced Reaction Mechanism”, IVY Publishing House,New Delhi.
2. Gopalan, Ramalingam, “Concise Coordination Chemistry”, Vikas Publishing House PVT LTD, 2014.

Unit	Book No.	Chapter	Page No.
I	1	1	1,3,20 - 22, 32 - 52
II	1	2	58 – 82
III	1	11	339 – 358
IV	2	40	1131 – 1149
V	2	10	296 - 312

Reference Books:

1. D.F. Shriver and P.W. Atkins, "Inorganic chemistry", Oxford University Press, 3rd edition, 1998.
2. James E.Huheey, Ellen A.Keitler, Richard L.Keitler, "Inorganic Chemistry", Harper Collins College Publishers, New York,4th Edn. , 2012.
3. Gurdeep Raj, "Advanced Inorganic Chemistry – Vol I", Goel Publishing House, Meerut, 2015.
4. F.A. Cotton, G. Wilkinson, "Advanced Inorganic Chemistry", John Wiley and sons, Singapore, 5th Edn, 2003.
5. Asim K. Das, "Inorganic Chemistry", Vol-III,Vol-IV, ,Vol-VI,CBS Publishers and Distributors, 2015.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester II
(2018 -2020)

Core Course –VIII: Quantum Mechanics, Macromolecules and Equilibria(18PCHC23)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 4 **Ext. Marks : 75**
Duration : 60 hrs **Max. Marks : 100**

Course Objectives:

- To Know about Terminologies involved in Quantum Mechanics.
- To Learn about Various Theorem in Quantum Chemistry.
- To Enhance the Knowledge in Macro Molecules.

Course Outcomes:

1. To Understand the Basic Concepts of Quantum Chemistry such as Operators, Uncertainty Principle.
2. To Know the Ideas of Postulates of Quantum Mechanics, Eigen Function, Orthonormal Set.
3. To Apply the Concepts of Quantum Mechanics into Particle in a Box, Ring, Rigid Rotator.
4. To Gain Knowledge on the Quantum Mechanical Concepts by Hydrogen Atom Problem, Shapes of Various Atomic Orbitals.
5. To Introduce the Concept of Phase Equilibria and its Application to Various one Component and Two Component System.
6. To Know the Concepts of Chemical Equilibrium and Various Relations involved in Chemical Equilibrium.

UNIT I **(12 hrs)**

Introduction To Quantum Mechanics: Particle and Wave Nature of Electron – de Broglie's Concept of Matter Waves - Derivation of de Broglie Equation – Photoelectric Effect – Compton Effect – Heisenberg's Uncertainty Principle – Operators- Linear Operators – Methods of Getting The Following Quantum Mechanical Operators - Position, Linear Momentum, Kinetic Energy, Potential Energy, Total Energy and Angular Momentum postulates of Quantum Mechanics – Hermitian Operator – Properties of Hermitian Operator(Two Theorem Only) - Proving the Quantum Mechanical Operators of Position,Linear Momentum, Kinetic Energy, Potential Energy, Total Energy are Hermitian- Commutator Algebra – Evaluation of Following Commutators [x,d/dx], [y,d/dx] and [d/dx,d^2/dx^2] - Postulates of Quantum Mechanics - Eigen

Function and Eigen Value (Problems Based on Eigen Value Equation) - Significance of Ψ and Ψ^2 - Orthogonality and Normalization of Wave Functions - Orthonormal Set.

UNIT II **(12 hrs)**

Application of Quantum Mechanics to Simple Systems: Derivation of Schrodinger Wave Equation – Application of SWE to Simple Systems – Free Particle Moving in One Dimensional Box – Particle Moving in 3D Box (Rectangular and Cubic Box) – Particle Moving in a Ring – Simple Harmonic Oscillator – Rigid Rotator – Spherical Harmonics – Hydrogen Atom Problem – Radial Wave Function – Radial Probability Distribution- Shapes of Various Atomic Orbitals.

UNIT III **(12 hrs)**

Approximation Methods in Quantum Mechanics: Need for Approximation Methods - Schrodinger Equation for He Atom and Other Many Electron System - Time Independent Perturbation Theory - First Order Correction Term for Energy and Wave Function (Derivation Required) - Application to Hydrogen Atom - Variation Theorem - Application to Hydrogen and He Atom- Hartee-Fock Self-Consistent Field (HFSCF) Method of Many Electron System and its Application to He Atom – Slater Determinants – Born-Oppenheimer Approximation – VB and MO Theories (Theory only & Applications not Included).

UNIT IV **(12 hrs)**

Macromolecules: Molecular Weight and Size of Polymers - Number Average, Weight Average Molecular Weights – Molecular Weights and Degree of Polymerization – Poly Dispersity. **Molecular Weight Determination:** Light Scattering Method, Viscosity, Osmotic Pressure Method, Sedimentation Method - Size of Polymer Molecules – Kinetics of Polymerization.

UNIT V **(12 hrs)**

Equilibria: Phase Equilibria - Three Component System - Formation of One Pair of Partially Miscible Liquids - Formation of Two Pairs of Partially Miscible Liquids -Formation of Three Pair of Partially Miscible Liquids - Two Salt and Water – No Chemical Combination – Double Salt Formed – One Salt Forms a Hydrate. **Chemical equilibria:** Dedonders Concept of Degree of Advancement of a Reaction - Derivation of Law of Mass Action - Experimental Verification of Law of Mass Action -Thermodynamic Derivation of Law of Mass Action - Derivation of Law of Mass Action from Chemical Potential – Van't Hoff Reaction Isotherm - Free Energy Change Method – Le Chatelier's Principle – Applications of Le Chatelier's Principle.

Text Books:

1. R. K. Prasad, "Quantum Chemistry", New Age International Limited Publishers, 4th Revised Edition Reprint 2015.
2. Puri, Sharma, Pathania, "Principles of Physical Chemistry", 47th Edition, Vishal Publishing Co., 2016.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	1	1.2, 1.3	8 – 14
I	1	2	2.1 – 2.3, 2.5, 2.6	16 – 20, 27 – 35
I	1	3	3.1 – 3.3	36 – 48
II	1	4	4.2,	83 – 95, 98 – 101
II	1	6	6.2 – 6.3	141 – 159
II	1	7	7.1	163 – 192
III	1	8	8.1, 8.2	207 – 227
III	1	9	9.1 – 9.4	247 – 274,
III	1	12	12.5 – 12.6	392 – 395, 416
IV	2	32	-	1201 - 1227
V	2	17	-	637 – 639
V	2	16	-	572 – 592

Reference Books:

1. N. Levine, "Quantum Chemistry", Printice Hall, 2003.
2. Donald A Mcquarrie, "Quantum Chemistry", Viva Books Private Limited, 2005.
3. D. N. Bajpai, "Advanced Physical Chemistry", S.Chand and Company Private Limited, 2010.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester II
(2018 -2020)

Non-Major Elective Course: Chemistry for Healthy Living (18PCHN21)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 6 **Ext. Marks : 75**
Duration : 90 hrs **Max. Marks : 100**

Course Objectives:

- To Enable the Calorie Requirement of Food.
- To Know the Essential of Proteins and Carbohydrates.
- To Know the Role of Vitamins.
- To Know the Mineral Requirement for Healthy Living.
- To Know Enzymes and Texture.

Course Outcomes:

1. Understand the Basic Concepts of Proteins.
2. Ability to Understand the Importance of Carbohydrate.
3. Able to Know the Analysis of Oils, Fats and Know the Economic Role of Oil Industries.
4. Gain the Knowledge on the Function of Enzymes.
5. Develop the Knowledge on Role of Vitamins in our Body.
6. Learn the Food Poisoning and First Aid to Food Poisoning.

UNIT I **(18 hrs)**

Recommended Dietary allowances (RDA): Factors affecting RDA – Principles of deriving RDA – Requirement and RDA – Balanced Diet. Carbohydrates: Classification – Functions – Digestion – Absorption – Maintenance of blood glucose level - Sources

UNIT II **(18 hrs)**

Vegetables: Introduction- Classification-Composition and nutritive value-Selection-Vegetable cookery- Storage of vegetables- Fungi as food-Algae as food **Fruits:** Classification-Composition and nutritive value- Post –harvest changes and storage- Enzymatic browning-Vegetables and fruits as functional foods.

UNIT III **(18 hrs)**

Milk and Milk Products: Composition-Physical Properties-Nutritive Value-Effect of heat-Effect of acid-Effect of enzymes-Effect of phenolic compounds and salts-Microorganisms-Milk Products-Milk substitutes-Role of milk and milk products in cookery

UNIT IV **(18 hrs)**

Proteins: Introduction-Chemical Composition- Nutritional Classification of amino acids-Functions-Specific functions of amini acids-Factors affecting Protein utillisation-Quality of Proteins-PDCAAS-Complementary Value of Proteins-Recommended dietary allowances.

UNIT V **(18 hrs)**

Food Preservation: Food Spolage- Methods of food preservation-Preservation by low temperature- Preservation by high temperature-Preservation by preservatives-Preservation by osmotic pressure-Preservation by dehydration-Food irradiation.

Text Books:

1. B. Srilakshmi, "Nutrition Science", New Age International Pvt Ltd., New Delhi, 2004.
2. B. Srilakshmi, "Food Science", New Age International Pvt Ltd., New Delhi, 2003.
3. .

Unit	Text Book No.	Chapter	Page No.
I	1	2	10 – 19
I	1	3	20 – 27, 38
II	2	8	171-211
III	2	5	97-122
IV	1	5	59-73
V	2	15	332-363

Reference Books:

1. Carl H. Snyder, "The Extraordinary Chemistry of Ordinary Things", John Wiley and Sons Inc., New York, 1992.
2. N. Krishnamoorthy, K. Jeyasubramanian and P. Valli Nayagam, "Applied Chemistry", Tata McGraw Hill, New Delhi, 1999.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

PG Programme – M.Sc

Semester II

(2018 -2020)

Core Course IX - Inorganic Chemistry Practical - II (18PCHC2P)

(For those who join from June 2018 and afterwards)

Credits : 3	**Int. Marks : 40**
Hours/Week : 6	**Ext. Marks : 60**
Duration : 90 hrs	**Max. Marks: 100**

Course Objectives:

- To Know about the Preparation of Inorganic Complexes.
- To Learn Estimation Method for Two Different Metal ions in the Qualitative Analysis Lab.
- To Get an Idea about Coordination Complexes.

Course Outcomes:

1. Mastering the Techniques Involved in the Qualitative Analysis.
2. Know How to Synthesis Inorganic Complex and its Condition to Maintain the Stability of it.
3. Separation of Mixture of Metal ion through Volumetric Estimation through precipitation method.
4. Importance of Complexing agent and the Role of Buffer Solution in the Precipitation of Metal ion.
5. Develop the Ideas of Gravimetric Estimations for the individual ion in the mixture of ions without the interference of other.
6. Gain the Knowledge of the condition for synthesizing the Coordination Complexes.

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1. **Inorganic Preparations**: Preparation of at least 8 Inorganic Complexes.
2. **Quantitative Analysis**:

   Separation and Estimation of Individual Metal ion in the Given Mixture by Volumetric and Gravimetric Methods.

Cu(II)	- Volumetric,	Ni(II) and Zn(II)	-	Gravimetry
Cu(II)	- Volumetric,	Ba(II) and Ca(II)	-	Gravimetry
Fe(II)	- Volumetric,	Ni(II) and Zn(II)	-	Gravimetry
Fe(II)	- Volumetric,	Cu(II) and Ni(II)	-	Gravimetry
Fe(II)	- Volumetric,	Cu(II) and Zn(II)	-	Gravimetry

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

PG Programme – M.Sc

Semester II (2018 -2020)

Core Course - X : Physical Chemistry Practical - I (18PCHC2Q)

(For those who join from June 2018 and afterwards)

Credits : 3	**Int. Marks : 40**
Hours/Week : 6	**Ext. Marks : 60**
Duration : 90 hrs	**Max. Marks : 100**

Course Objectives:

- To Develop Skill in Electrochemical Experiments.
- To Learn the Various Double Displacement Acid Base Titrations.
- To Develop Skill in Potentiometric and Conductometric Titrations.

Course Outcomes:

1. Pursuing the Role of Potentiometric Method to Study pH of the Buffer Solution.
2. Ability to Know the Solubility Product of Sparingly Soluble Salt through Potentiometric Method.
3. Enrich the Concept of Precipitation Titration of Halide Mixture *Via* Potentiometry.
4. Finding the Strength of the Mixture of Acid through Conductometric Method.
5. Impact of the Conductivity and Potentiometry Methods to Study the Electrical Properties of the Ionic Substance, Acids and Bases.
6. Interpretation of the Potentiometric Curve through First Order Derivative and Second Order Derivative.

I. Conductometric Experiments

(1) Double Displacement and Acid Base Titrations

(A) NH_4Cl / NaOH /Mixture of CH_3COOH & Hcl.

(B) NH_4Cl /NaOH / Mixture of NH_4Cl & Hcl.

(2) Precipitation Titration

(A) Na_2CO_3 / $Pb(NO_3)_2$ / Na_2CO_3

(B) K_2SO_4 / $Bacl_2$ / K_2SO_4

(3) Determination of Dissociation Constant of Weak Acids.

(4) Determination of Solubility Product of Sparingly Soluble Salts.

II. Potentiometric Methods

(1) Precipitation Titration: Ag^+ *Vs* Halide Mixture

(2) Redox Titrations:

(A) Permanganate *Vs* Iodide Ion

(B) Ceric Ammonium Sulphate *Vs* Ferrous Ion

(3) Determination of Dissociation Constant of Weak Acids.

(4) Determination of pH of Buffer Solutions.

(5) Determination of Solubility Product of Sparingly Soluble Salts.

III. Kinetic Experiments

1. Kinetics of acid hydrolysis os ester – Comparison of strengths of acids
2. Kinetics – Acid hydrolysis of ester – Determination of energy of activation (E_a)

IV. Titrations Using Ph Meter

Determination of First, Second and Third Dissociation Constants of Phosphoric Acid.

Sri Kaliswari College (Autonomous), Sivakasi
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Semester III
(2018 -2020)

Core Course– XI: Organic Spectroscopy, Reagents and Synthetic Methods (18PCHC31)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week : 4 **Ext. Marks : 75**
Duration : 60 hrs **Max. Marks : 100**

Course Objectives:

- To understand the basic concepts and application of UV, IR, ORD, PMR, ^{13}C NMR and mass spectroscopy of organic compounds.
- To learn the role of reagents in organic synthesis.
- To know the synthetic planning of organic compounds.
- To apply the various organic and inorganic reagents to synthesise the organic compounds.
- To enhance the synthetic route of the organic reaction through asymmetric synthesis.

Course Outcomes:

1. To gain the knowledge about UV and IR radiation and their applicationsin elucidating the structure.
2. To understand the significance of PMR and to elucidate the structure of organic molecules.
3. To understand the concept of mass spectroscopy and its fragmentation rule to find out the molecular weight and fragmentation pattern.
4. To know the application of Oxidation and reduction process in simple and complex organic molecules.
5. To create an idea about starting materials for the synthesis of simple and complex molecules.
6. To Know the concept of organic molecule activation and blocking the functional groups.

UNIT I **(12 hrs)**

Spectroscopy I: Ultraviolet - Visible Spectroscopy: Types of Electronic Transitions - Chromophores and Auxochromes - Factors Influencing Positions and Intensity of Absorption Bands - Absorption Spectra of Dienes - Polyenes and Unsaturated Carbonyl Compounds - Woodward - Fiser Rules. **IR Spectroscopy** - Vibrational Frequencies, Fundamental, Overtone, Combination bands and Factors Affecting them - Identification of

Functional Groups - Intra and Inter Molecular Hydrogen Bonding - Finger Print Region - Far IR Region - Metal Ligand Stretching Vibrations.

UNIT II **(12 hrs)**

Spectroscopy II: ^{1}H NMR Spectroscopy: Nuclear Spin - Magnetic Movement of a Nucleus - Nuclear Energy Levels in the Presence of Magnetic Field Relative Populations of Energy Levels - Macroscopic Magnetization - Basic Principles of NMR Experiments - CW and FT NMR -1H NMR - Chemical Shift and Coupling Constant - Factors Influencing Proton Chemical Shift and Vicinal Proton - Proton Coupling Constant - 1H NMR Spectra of Simple Organic Molecules Spin System - Spin Decoupling - Nuclear Overhauser Effect - Chemical Exchange. **^{13}C NMR:** Proton Decoupled and off - Resonance ^{13}C NMR spectra - Factors Affecting ^{13}C Chemical Shift-^{13}C NMR Spectra of Simple Organic Molecules.

UNIT III **(12 hrs)**

Mass spectrometry, CD and ORD: Principles - Measurement Techniques - Presentation of Spectral Data - Molecular Ions - Isotope Ions - Fragment Ions of Odd and Nitrogen Rule - Rearrangement Ions - Factors Affecting Cleavage Patterns - Simple and Multicentre Fragmentation - Mclafferty Rearrangement. Mass Spectra of Hydrocarbons – Alcohols – Phenols - Aldehydes and Ketones - Octant Rule - Cotton Effect - Axial Halo Ketone Rule - ORD and its Applications.

UNIT IV **(12 hrs)**

Oxidations and Reductions: Oxidation Reactions: Mechanism - Application and Stereochemistry Aspects of the Following Oxidation –Oxidation Reactions Involving CrO_3 - SeO_2 - Lead Tetraacetate - Periodic Acid - N-Bromosuccinimide – Oppenauer Oxidation. **Reduction Reactions:** Catalytic Hydrogenation – Reactions Involving $LiAlH_4$, DIBAL And Sodium Borohydride – Birch Reduction– Selectivity in Oxidation and Reduction - Reagents in Organic Synthesis – Gilman's Reagent – Lithium diisopropylamide – DCC - 1,3-Dithiane – Woodward And Prevost Hydroxylation – DDQ.

UNIT V **(12 hrs)**

Synthetic and Retero Synthetic Approach: Designing Organic Synthesis – Disconnection Approach – Synthons and Synthetic Equivalents. **One Group Disconnections:** Alcohol, Acid and Ketone – Functional Group Inter Conversions. **Asymmetric Synthesis:** Basic Principles – Stereoselective and Stereospecific Reactions – Reagents, Catalysts and their Applications (Wherever Applicable) in Alkylation and Hydrogenation – Jacobsen's Catalyst – Evan's Catalyst – Synthesis of Jasmone.

Text Books:

1. P. S. Kalsi "Spectroscopy of organic compounds" - New age international publishers 6th edition, New Delhi, 2009.
2. Jerry March, "Advanced organic chemistry Reactions Mechanisms and Structure,"John Wiley and Sons, 2012.

3. Stuart warren "Organic synthesis the Disconnection approach" Willey publishers, New Delhi, 2004.

Unit	Text Book No.	Chapter	Page No.
I	1	2	9-53
		3	65-154
II	1	4	185-341
		5	371-382
III	1	6	415-453
IV	2	19	1167-1168, 698-699,822-825,1169-1171,1162,781,783-789,451, 608-609
V	3	5	26-34
		6	41-50
		19	144-151
		28	229-240

Reference Books:

1. I. L.Finar, "Organic chemistry: Volume-2: Stereo chemistry and the chemistry of natural products", Pearson Education limited,London, 2003.
2. Robert M.Silverstein, Francis X. Webster, "Spectrometric Identification of Organic Compounds", John Wiley and Sons, Inc., 6th edn 2004.
3. William Kemp, "Organic Spectroscopy", ELBS, 3rd edn., 1991.
4. C.H.Depuy, O.L.Chapman, "Molecular Reaction and Photochemistry", Prentice Hall, 1972.
5. S.M.Mukherji, S.P.Singh, "Reaction Mechanism in Organic Chemistry", McMilan Indian Ltd., 1978.
6. R.T. Morrison, R.N. Boyd, "Organic Chemistry", Prentice – Hall of India, 6th edn., 2001.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

PG Programme – M.Sc

Semester III

(2018 -2020)

Core Course – XII: Physical Methods in Inorganic Chemistry (18PCHC32)

(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**

Hours/Week: 4 **Ext. Marks : 75**

Duration : 60 hrs **Max. Marks: 100**

Course Objectives:

- To gain knowledge in electronic spectra of transition complexes.
- To be familiar with application of IR spectra in the study of coordination compounds.
- To understand the structure of iron and tin complexes using Mossbauer spectroscopy.
- To know the principle and applications of NQR and PES.
- To enrich the photochemistry of transition metal complexes.

Course Outcomes:

1. Enrich the knowledge to interpret the electronic spectra of transition metal complexes.
2. Understanding the binding of ligand through IR studies and structural elucidation of iron and tin complexes through Mossbauer spectra.
3. Acquire knowledge in solving the structural problem of compounds using nmr spectroscopy.
4. Gain familiarity in elucidate the structure of paramagnetic complexes using ESR spectroscopy.
5. Identification of energy levels of compounds through photoelectron spectroscopy.
6. Gain indepth knowledge about the photochemical reactions of metal complexes.

UNIT I (**12 hrs)**

Electronic spectra of Transition metal complexes: Types of Transition - d-d Transition – Charge Transfer Transition – Selection Rules – Mechanism of Breakdown of Selection Rules – Bandwidths and Shapes – Jahn-Teller Effect- Orgel Diagram for d^n System – Tanabe-Sugano Diagram – Evaluation of 10Dq and B for Octahedral and Tetrahedral Complexes of $d^3$and d^8 Configurations.

UNIT II **(12 hrs)**

Application of IR Spectra in the Study of Coordination Compounds: Application to Metal Carbonyls, Nitrosyls, Carbonate, NH_3, H_2O, -OH, -CN, -SCN, $-NO_2$ – Geometrical and Linkage Isomerism — Stretching Mode Analysis of Metal Carbonyls. **Mossbauer Spectroscopy:** Mossbauer Effect - Resonance Absorption – Doppler Effect – Doppler Velocity – Experimental Technique of Measuring Resonance Absorption – Isomer Shift – Magnetic

Hyperfine Splitting – Application of Mossbauer Spectroscopy in the Study of Iron and Tin Complexes.

UNIT III **(12 hrs)**

NMR Spectroscopy: ^{1}H, ^{31}P, ^{19}F and ^{15}N – NMR – Introduction – Application in Structural Problem of the Compounds Like ClF_3, SF_6, PF_5, BrF_5, H_2PF_3, $PF_3(NH_2)_2$, P_4S_3, Cis and Trans $PtCl_2(PBu_3)(PPh_3)_3$–Dynamic NMR-NMR of Fluxional Molecules – Contact Shift and Shift Reagents. **ESR Spectroscopy:** Principles – Presentation of the Spectrum – Hyperfine Splitting – Evaluation of g and A Tensors – Values – Zero Field Splitting – Kramer's Degeneracy –Anisotropy and Hyperfine Splitting Constant. **ESR In The Study Of Transition Metal Complexes:** Bis(Salicylaldimine) Copper(II) - $[(NH_3)_5Co\text{-}O_2\text{-}Co(NH3)_5]$ and Mn^{2+} Complexes - Representative Spectra of Different d^n Systems of Td and Oh Complexes – Evaluation of Spin-Orbit Coupling.

UNITIV **(12 hrs)**

NQR Spectroscopy: Principles and Application. **Photoelectron Spectroscopy:** Theory – XPS – UV – PES – Instrumentation - Evaluation of Ionization Potential – Chemical Identification of Elements – Koopmann's Theorem – Chemical Shift – UPS – XPES of N_2, O_2 and HCl – Evaluation of Vibrational Constants from UPS – Spin – Orbit Coupling. **Auger Spectroscopy**: Principle and its Application.

UNIT V **(12 hrs)**

Photochemistry of Transition Metal Complexes: Photochemistry of Cr(III) Complexes - Photo-Substitutions - Properties of Ligand Field Excited States - Photo aquation Reactions - Photolysis Rule – Photoisomerization - Photo Racemisation - Photoanation Reactions – Sensitizer - Energy Transfer Process -Mechanism of Photosensitization - Photo Reactive Excited State -The Doublet Hypothesis - Role Of Quartet Excited States. **Photochemistry of Co(III) Complexes :** Introduction - Energy Level Diagram -Photo Aquations in Co(III) Amine -Co(III) Cyanide Complexes - Fe(II) Low Spin complexes - Photochemistry of $[Ru(Bpy)_3]^{2+}$-Photo Redox Properties of Ce(III) and Ce(IV) Complexes - Photochemistry of Cu(II) (1,3 Diketone) Complexes.

Text Books:

1. Asim K. Das, "Inorganic Chemistry", Vol-II, V and VIII, CBS Publishers and Distributors, 2015.
2. Gopalan and Ramalingam, "Concise Coordination Chemistry", Vikas Publishing House PVT LTD, 2014.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	7	7.4-7.13	882-943
II	1	12	12.1 12.4	1719-1778 1943-1986
III	1	12	12.2 12.3	1813-1870 1875-1900

IV	1	12	12.8 9.11	2031-2059 601-620
V	2	6	6.9	851-870

Reference Books:

1. JamesE.Huheey, Ellen A.Keitler and Richard L.Keitler, "Inorganic Chemistry", Harper Collins College Publishers, New York, 4thEdn., 2012.
2. P.W. Atkins, D.K. Shriver and C.H. Langfood, "Inorganic Chemistry", Oxford ELBS.U.K, 1990.
3. Adamson, "Concept of Inorganic Photochemistry", Wiley, New York, 1975.
4. R.S. Drago, "Physical Methods in Chemistry", Saunders Golden Sunburst Series, W.B.Saunders Company, London, 1997.
5. S.F.A.Kettle, "Cordination Chemistry"- Spectrum Academic Publishers Oxford, 1996.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester III
(2018 -2020)

Core Course – XIII: Group Theory and Spectroscopy (18PCHC33)
(For those who join from June 2018 and afterwards)

Credits	**: 4**	**Int. Marks**	**: 25**
Hours/Week	**: 4**	**Ext. Marks**	**: 75**
Duration	**: 60 hrs**	**Max. Marks**	**: 100**

Course Objectives:

- Understand the basic concepts of group theory.
- To know the application of group theory in spectroscopy, hybridization and HMO calculation.
- To understand the basic concepts in molecular spectroscopy, rotational and microwave spectroscopy.
- To know the principle and application of Raman, electronic and NQR spectroscopy.
- To know the principle and application of NMR and EPR spectroscopy.

Course Outcomes:

1. Gain knowledge on symmetry elements, point group and character table.
2. Develop the concepts of basic group theory in to various spectroscopy technic theoretical analysis.
3. Understand the concepts of quantum mechanics with group theory and HMO calculation.
4. Ability to understand the concepts of rotational spectroscopy and Infrared spectroscopy.
5. Gain knowledge of Raman spectroscopy, NQR and concepts involved.
6. Able to know the basics and advanced concepts involved in NMR and EPR.

UNIT I **(12 hrs)**

Symmetry in Molecule: Symmetry Operations. **Symmetry elements:** Rotational axis of symmetry – Plane of symmetry – Improper rotational axis – Inversion – Identity. **Properties of a group**: Closure rule – Associative rule – Identity rule – Inverse rule – Deducing the implied presence of other symmetry elements. **Types of Groups:**Abelian and Non-abelian groups - Classes and sub groups. **Groups Multiplication Table**: C_{2v}, C_{3v}. **Point Groups:** Classification of molecules into point groups (All point grouops). **Vector and Matrix Algebra**: Matrix representation of symmetry operations(E, C_n, σ, S_n and i). **Character Table:** Reducible and

Irreducible representations – Great Orthogonality Theorem – Characters – Construction of character tables (C_{2v}, C_{3v}, $C_{2h}$and C_{4v}).

UNIT II **(12 hrs)**

Normal Mode of Analysis: Direct product concept –Applications of group theory to normal modes of vibrations and to normal mode analysis of Water, Ammonia and *Trans* 1,2-dichloro ethylene. **Spectroscopy Application:** Application for spectral selection rules of vibration spectra – IR and Raman active fundamentals – Symmetry of molecular orbitals and symmetry selection rule for electronic transitions in formaldehyde. **Group Theory and Quantum Mechanics:** Wave functions as the basis of irreducible representation – Group theory applied to hybridization in Square Pyramidal, BF_3 and$[PtCl_4]^{2-}$ (Character Table should be given). **HMO theory**: HMO calculations and delocalization energy for Cyclopropenyl and 1,3-Butadiene systems.

UNIT III **(12 hrs)**

Electromagnetic spectrum: Region of the spectrum – Absorption and Emission of radiation – Einstein's coefficient – Width of spectral line – Intensity of spectral line. **Rotational spectroscopy:**Classification of molecules by moments of inertia - Rotational spectra of rigid diatomic molecules – Intensities of spectral line –Effect of isotopic substitution – Rotational Spectra of Polyatomic linear molecule – Chemical Analysis by rotational spectra. **Infrared spectroscopy**: Vibrational energy of a diatomic molecule – The simple harmonic oscillator – The anharmonic oscillator – Infrared selection rules – Diatomic vibrating rotator – Interation of rotation and vibration – Vibrations of polyatomic molecules – Overtone, Combination and difference bands – Coupling interaction – Fermi Resonance – Fourier transform infrared spectroscopy.

UNIT IV **(12 hrs)**

Raman spectroscopy: Theories of Raman scattering. **Pure Rotational Raman spectra:** Linear Molecule – Symmetric Top Molecule. **Vibrational Raman spectra**: Raman activity of vibration – Mutual exclusion – Rotational fine structure – Principle of Laser Raman spectra. **Electronic spectroscopy:**Electronic spectra of diatomic and polyatomic molecules - Intensity of vibrational electronic spectra – Franck-Condon principle – Rotation fine structure of electronic vibrational spectra –The Fortrat parabola – Dissociation and Predissociation spectra. **NQR:** Principles and Applications – Quadrupole moment and electrical field, Nuclear quadrupole resonance, Nuclear quadrupole coupling in atoms and molecules – Identification of ionic character and hybridization.

UNIT V **(12 hrs)**

NMR: Magnetic properties of nuclei – Resonance – Condition –NMR instrumentation – Relaxation processes – Bloch equations –Chemical shift – Spin-spin coupling, relaxation times, line shape and line width experimental technique –Double resonance technique – ENDOR – Over Hauser effect – FT-NMR spectroscopy – Lanthanide shift reagents – NMR imaging. **ESR**: Principles of ESR – g factor – Hyperfine structure – Fine Structure – Double Resonance in ESR – Techniques of ESR spectroscopy – ESR spectra of Hydrogen atom, Methyl radical, 1,4-

Benzosemiquinone radical anion, Naphthalene negative ion, Anthracene negative ion, Triphenylmethyl radical. **ESR of Anisotropic systems:** Zero field splitting and Krammer's degeneracyin ESR – Multi resonance techniques in ESR spectroscopy.

Text Books:

1. K. Veera Reddy, "Symmetry and Spectroscopy of molecules", New age International Publishers, 2nd Edition reprint, 2014.
2. A. SalahuddinKunju, G. Krishnan, "Group Theory and its Applications in Chemistry", PHI Learning Private Limited, Second Edition Reprint, 2015.
3. C. N. Banwell, "Fundamentals of molecular spectroscopy", Tata McGraw Hill Education Private Limited, 37th Reprint Edition, 2011.
4. Puri, Sharma, Pathania, "Principles of Physical Chemistry", - Vishal Publishing Co., 47th Edition, 2017.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	2	2.3 – 2.6	18 – 42
		3	3.1 – 3.5	43 – 69
		4	4.1 – 4.5	110 – 125
		5	5. 7 –5.8	135 – 145
		6	6.3 – 6.6	164 – 175
II	1	6	6.11	185 – 188
		7	7.1	190 – 198
			7.5	215 – 217
			7.12	239 – 242
		9	9.10.3 – 9.10.4	383 – 385
			9.11.1	386 – 388
	2	4	4.3	83 – 87
			4.8	92 – 95
III	3	1	1.3	5 – 9
			1.7	17 – 20
		2	2.1, 2.2, 2.3.3	31 – 42
			2.4.1	47 – 49
			2.6	52
		3	3.1 , 3.2	55 – 56
			3.4, 3.5	69 – 75
			3.8.3	93 – 96
IV	3	4	4.1 , 4.2 ,	100 – 116

			4.3	
		6	6.1	162 – 175
V	3	7	7.1.5 , 7.1.6	207 – 210
			7.2.1 , 7.2.3	215 – 228
			7.5.2 - 7.5.6	246 - 256
	4	7	-	381, 382, 385 – 387, 390 – 391, 393 – 396, 399 – 402.

Reference Books:

1. F.A.Cotton, "Chemical application of group theory", Wiley Eastern Ltd, 1971.
2. V.Ramakrishnan, M. S. Gopinathan, "Group theory in Chemistry", Vishal Publishing Co., 1988.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester III
(2018 -2020)

Major Elective Course-II: Geo Chemistry (18PCHO31)

(For those who join from June 2018 and afterwards)

Credits: 4 **Int. Marks : 25**
Hours/Week: 6 **Ext. Marks : 75**
Duration: 90hrs **Max. Marks : 100**

Course Objectives:

- To understand the origin and nature of the universe.
- To know about the analysis of the rock material through volumetric method.
- To learn about the method of rain water harvesting.
- To gain knowledge about the availability of fuel sources in India.
- To get idea about the global and space resource.

Course Outcomes:

1. Learning about the geochemical cycle and the hydrosphere of the universe.
2. Gaining idea in the availability of minerals and water resources in the universe.
3. Enhance the analytical technique of analyzing the rock material in the earth.
4. Applying the knowledge of volumetric analysis for the material analysis.
5. Knowing the sources of ground water and its quality.
6. Getting the awareness about the fuel sources in india.
7. Impact of the remote sensor system for the satellite launching and its operation.

UNITI **(18 hrs)**

Carbon, Earth and Life: Carbon-Basic Requirements of Life- Chemical Elements-Origin of Elements-First Organic Compounds- Origin of Life-Young Earth-Raw Material for Life-Evolution of Life and the Atmosphere-Geological Record of Oxygen Level-Major Contributors of Sedimentary Organic Matter-Evolution of Marine Life- Evolution of Terrestrial Life- Evolution of Life and Atmosphere.

UNITII **(18 hrs)**

Organic Matter and Geosphere: Carbohydrates-Amino acids-Proteins-Lipids-Tannins-Geochemical implication of Compositional Variation- Diagenesis-Introduction-Microbial Degradation of Organic Matter- Geo Polymer Formation-Humic Material- Classification-Composition and Structure-Formation of Humic Substances.

UNIT III **(18 hrs)**

Coal and Kerogen: Coal –Classification and Composition-Petrology- Van Krevelan Diagrams- Formation- Peatification- Bio Chemical Stage of Coalification- Geo Chemical Stage of Coalification. Kerogen- Introduction-Formation- Bio markers- Sulphur Incorporation-Geo Graphical Distribution of Coal and Kerogen.

UNITIV **(18 hrs)**

Categenesis and Metagenesis: Petroleum Generation- Kerogen Maturity- Petroleum Composition- Major Hydrocarbons in Oils- Bio Markers- Movement of Hydrocarbons from Kerogen- Mechanism of Expulsion-Secondary Migration- Post Generation Alteration of Petroleum- Migration- Bio Degradation- Water Washing- Thermo Chemical Sulphate Reduction-Gas diffusion- Carbon dioxide.

UNITV **(18 hrs)**

Carbon Cycle: Global Carbon Cycle- Bio Chemical Sub Cycle- Marine Bio Chemical Cycle- Geo Chemical Sub Cycle- Feed Back Mechanism of Long form Carbon Cycle- Changes in Carbon Reservoirs over Geo Logical Time – Secondary Preservation of Organic Carbon- Human Influences on the Carbon Cycle –Greenhouse Gas Sources and Fluxes – Atmospheric Concentrations of Carbon dioxide and Methane.

Text Books:

1. Stephen Killops, Vanessa Killops, "Introduction to Organic Geo Chemistry", Blackwell Publishing House, 2005.

Reference Books:

1. D.K Todd, "Groundwater Hydrology", Wiley reprint, 3rd edition, 2007.
2. R.C.Selley, "Elements of Petroleum Geology", Academic press, 2nd edition, 1998.
3. Sabbins, "Remote Sensing- Principles and Applications", waveland press, 3rd edition, 2007.

Unit	Text Book No.	Chapter	Page No.
I	1	1	1-23
II	1	2	35-43
		4	117-119
III	1	4	122-137
IV	1	4	144-162
V	1	6	246-254, 285-288

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester III
(2018 -2020)
Major Elective Course-II: Nano Chemistry (18PCHO32)
(For those who join from June 2018 and afterwards)

Credits : 4 **Int. Marks : 25**
Hours/Week: 6 **Ext. Marks : 75**
Duration: 90 hrs **Max. Marks : 100**

Course Objectives:

- To understand the development of nano chemistry.
- To know about the optical properties of nano particles.
- To learn about the synthesis of nano materials.
- To gain knowledge about the instrumentation used for nano material characterization.
- To get idea about the biological nano materials.

Course Outcomes:

1. Learning about the evolution of nano materials from nature.
2. Gaining idea in the potential uses of nano materials.
3. Knowing the kinetically confined synthesis of nano materials.
4. Applying the knowledge of instrumentation technique to characterize nano material.
5. Knowing the types of nano material and their application in various fields.
6. Getting the awareness about the nano biosensors and their diagnostic application.
7. Understanding the application of the nano medicine and molecular nano machines in medical field.

UNIT I **(18 hrs)**

Introduction to Nano Chemistry: Nano and Nature – Nano the Beginning. **SizeDependence of Properties:** Optical properties, Electrical properties, Magnetic properties, chemical, physical, catalytic and mechanical properties. Potential Uses of Nano Materials.

UNIT II **(18 hrs)**

Synthesis of Nanomaterials: General Approaches – Bottom Up and Top Down Approaches – Lithographic process – Sol-Gel Techniques – Plasma arc discharge method – Chemical Vapour Deposition Methods – Sonochemical Method – Kinetically Confined Synthesis of Nano Particles. Capping agent role in the synthesis of nanomaterials.

UNIT III **(18 hrs)**

Principle and Instrumentation: XRD – SEM – TEM – XPS – AFM – PES – Application to Nanomaterial Characterization.**Studying nature of Size effect:** UV – Visible – IR Absorption – Photoluminescence –Non Linear Optical Mixing – Photoconductivity.

UNIT IV **(18 hrs)**

Nanomaterials : Fullerenes – Preparation - Properties – Uses. **Carbon Nanotubes:** Types - Preparation - Properties – Application. **Nano Shells:** Types – Synthesis of Gold Nanoshell – Properties – Application . **Quantum Dots:** Preparation - Properties – Uses.

UNIT V **(18 hrs)**

Biological Nanomaterials : Nanosensor – Electrochemical Sensor – Sensor Based on Physical Properties – Nano Biosensor – Smart Dust. **Nanomedicine:** Introduction - Nanopores – Nanodrug for Oral Administration – Materials Used in Therapeutic Application. **Molecular Nanomachines :** Covalent and Non Covalent Approaches - Molecular Motor and Machines – Switches – Molecular Ratchet – Molecular Shuttles. Nanorobots and Nanoshells as Cancer therapy.

Text Books:

1. T. Pradeep, "Nano: The Essential", Mc Graw Hill, New Delhi, 2011.
2. K. K. Chattopadhyay, A. N. Banerjee, "Introduction to Nanoscience and Nanotechnology", PHL Learning Private Limited, 2009.

Unit	Text Book No.	Chapter	Section	Page No.
1	1	1	1.1	3-11
2	2	6	6.1 – 6.3	109 – 113
			6.4.4	127 – 131
			6.4.7	142 – 146
3	1	2	2.2.1	21 – 31
			2.2.2	34 – 37
			2.3.3	48 – 51
			2.5.4	62 – 68
			2.6	75 – 80
4	1	3	3.3	94
			3.5	96 – 98
			3.11	103
			3.12	104 – 105
		4	4.2	117 – 119
			4.6 – 4.9	122 – 124
		10	10.2	245 – 246
			10.2.2	249 – 250
			10.3.1-10.3.2	252 – 254
			10.5	257 – 259
5	1	12	12.8 – 12.9	293 – 295
			12.11	299
		14	14.2 – 14.5	317 - 327

Reference Books:

1. C.N.Rao, "The Chemistry of Nanomaterial", Wiley-VCH, 2004.
2. C.P.Poole, F.J.Owens, "Introduction to Nano technology", Wiley –VCH, 2003.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester III
(2018 -2020)

Major Elective Course-II : Research Methodology (18PCHO33)

(For those who join from June 2018 and afterwards)

Credits: 4 **Int. Marks: 25**
Hours/Week: 6 **Ext. Marks: 75**
Duration: 90 hrs **Max. Marks: 100**

Course Objectives:

- To know about the research and various steps in it.
- To learn about the research and its importance through the literature review by using search engine.
- To understand the basics of writing the thesis.
- To enrich their quality of the work through the patent rights and impact of the journal.
- To learn about the chem software used for the presentation of the dissertation.

Course Outcomes:

1. Learning the methods involved in the research methodology.
2. Knowing the methods of literature survey through various technics.
3. Identification of popular journals in chemistry and its importance.
4. Learn about the thesis writing method and its presentations.
5. Earned the method of writing the thesis in the universal format.
6. Knowing the e-learning technics for writing the paper in the journal.
7. Learning the pattern methods.

UNIT I **(18 hrs)**

Research Methodology: The Know How's of Research – Objectives – Types of Research – Steps Involved in Research – Identifying a Problem for Project- Evolving Strategies for Solving – Designing Feasible Experiments – Planning and Scheduling a Project.

UNITII **(18 hrs)**

Review of Literature: Sources of Literature - Primary – Secondary – Tertiary – Importance and Characters of Monographs, Journals, Notes and Communications - Methods of Literature Survey – Chemical Abstracts and Indexing – Computer Aided Searches – Use of Search Engines and Advanced Searches Using Google Scholar – Pubmed , RSC, PDB - Ordering and Scheming The Literature Review – Identification of Gaps in Literature. **Chemistry Journals:** Research Papers – Abstracts – Notes – Communications – Comments - Popular Articles - Selected Printed and Online Journals. **Categories:** Regional – National – International – Proceedings -Periodicity and Abbreviation of Journals - Journal Details and its Number.

UNIT III **(18hrs)**

Thesis writing method I: Thesis Layout - Writing Thesis - Structure of Thesis – Title - Manuscript Preparation – Abstract - Title Page – Font – Margins – Pagination – Spacing - Number Schemes –Punctuation - Spelling and Grammar – Quotations – Numbers - Headings and Subheadings – Abbrevations – Captilization – Diagram -Tables and Illustrations - Equation and Figures-Table of Content Preparation – Synopsis - Bibilography and Index - Plagiarism.

UNIT IV **(18hrs)**

Thesis writing method II: Structure of an Experimental Chapter – Format of Science Experiments - Linking the Chapters – Summary – Conclusion - Results and Discussions: **Reference Writing Format:** Format For Writing The Journals – Books - Thesis With Examples - Electronic Submission - Patent – IPR - Scopus Journal – DOI Number – Impact Factor - Converting Word into the PDF Document. **Documentation:** Methodology of Writing References - MLA and APA Style.

UNIT V **(18hrs)**

Literature review through e-learning: E-Learning Methodology:- Internet Sources – Search Engine - Applications of Internet in Chemistry – Websites in Literature Survey in Chemistry - Popular Websites in Chemistry - Data Bases in Chemistry – Downloading the Attachement - PDF Files - Opening, Browsing and Searching a Website - Literature Searching Online - Searching Information on a Selected Topic and Specific Compound - Key Words - Chem Software – Chem Office - ACD Lab - Origin - MS Word –Excel - Powerpoint.

Text Books:

1. Joseph Gibaldi, "MLA Handbook for Writers of Research Papers",EWP Affiliated East-West Press Pvt.Ltd., New Delhi, 5th edition, 2000.
2. Anderson,J Durston,D Poole,M "Thesis and Assignment writing", New Age International Pvt.Ltd, New Delhi, 1991.

Unit	Text Book No	Chapter	Section	Page No.
I	2	1	1.1-1.9	283-330
		12	12.1-12.6	330-333
II	2	1	7.2-7.9,	31 to 382
		2	2.1-2.9,	41-49
III	2	4	4.9-4.11,	189-191
		6	6.1-6.9	281-298
		7	7.2-7.9	426,381-467
		10	10.2-10.4	941-949
IV	1	6	6.1-6.4	42 - 60
V	1	7	7.1-7.5	341- 349

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

PG Programme – M.Sc

Semester III

(2018 -2020)

Core Course XIV: Organic Chemistry Practical - II (18PCHC3P)

(For those who join in 2018 onwards)

Credits : 3 **Int. Marks : 40**

Hours/Week : 6 **Ext. Marks : 60**

Duration : 90 hrs **Max. Marks : 100**

Aim and Objectives:

- To Know the Techniques involved in the Qualtitative Analysis.
- To learn the identification of Organic Compounds.
- To know about the Preparation of derivatives Organic Compounds.

Course Outcomes:

8. Learn the Importance of Qualitative Organic Analysis.
9. Enhancing the identification of functional group present in the organic compounds.
10. Report the Sample in a Systematic Way of Proceedings.
11. Applying the Knowledge of preparation of derivative of Organic Compound.

Qualitative Analysis

Separation and analysis of two component mixture.

Identification of the components and preparation of solid derivatives.

Sri Kaliswari College (Autonomous), Sivakasi

Department of Chemistry

PG Programme – M.Sc

Semester III (2018 -2020)

Core Course - XV: Physical Chemistry Practical - II (18PCHC3Q)

(For those who join from June 2018 and afterwards)

Credits : 3	**Int. Marks : 40**
Hours/Week : 6	**Ext. Marks : 60**
Duration : 90 hrs	**Max. Marks : 100**

Course Objectives:

- To Develop Skill in Electrochemical Experiments.
- To Learn the Various Double Displacement Acid Base Titrations.
- To Develop Skill in Adsorption and Kinetics experiment.

Course Outcomes:

1. Pursuing the Role of Potentiometric Method to Study redox titration.
2. Ability to Know the Dissociation constant of weak acid through Potentiometric and Conductometric Method.
3. Enrich the Concept of Adsorption study.
4. Finding the Strength of the Mixture of Acid chloride through Conductometric Method.
5. Interpretation of the Kinetics study.
6. Enrich the skill to develop the precipitation titration.

I. Conductometric Experiments

(1) Double Displacement and Acid Base Titrations

i. NH_4Cl /NaOH / Mixture of NH_4Cl & HCl.

(2) Precipitation Titration

i. K_2SO_4 / $BaCl_2$ / K_2SO_4

(3) Determination of Dissociation Constant of Weak Acids.

II. **Potentiometric Methods**

(1) Redox Titrations:

Ceric Ammonium Sulphate *Vs* Ferrous Ion

(2) Determination of Dissociation Constant of Weak Acids.

III. **Adsorption Experiments**

(1) Adsorption of oxalic acid on charcoal.

(2) Adsorption of acetic acid on charcoal.

IV. Kinetic Experiments

(1) Perdisulphate and iodide ion reaction: Study of primary salt effect and determination of theconcentration of given KNO_3

(2) Kinetics - Saponification of Ester- Determination of Ea by conductometry.

V. **Experiments based on UV – Visible and Infrared Spectrophotometers.**

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester IV
(2018 -2020)

Core Course – XVI: Photochemistry and Natural Products (18PCHC41)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int. Marks : 25**
Hours/Week : 5 **Ext. Marks : 75**
Duration : 75 hrs **Max. Marks : 100**

Course Objectives:

- To Study the structure of carbohydrates, proteins and nucleic acids.
- To Understand the photochemical and free radical reactions.
- To Know the feasibility of pericyclic reactions by molecular orbital approach.
- To Understand the structure and application of alkaloids, steroids, antibiotics and prostaglandins.
- To study the synthetic route for the antibiotics compounds and the chemistry of prostaglandins.

Course Outcomes:

1. To know the structure, biological significance and applications in biological system.
2. To understand the significance of various photo chemical reactions and to applied knowledge to prepare simple and complex molecules by photo chemical method.
3. To know the various methods to extract alkaloids and understand the structure and its applications.
4. To understand the structure of various steroids compounds and their biological important in Human being.
5. To gain the knowledge about the structure and their role to cure the various diseases.
6. To understand the protein structure and genetic materials in biological system.

UNIT I **(15 hrs)**

Carbohydrates, Proteins And Nucleic Acids: Carbohydrates: Disaccharides-Structure Elucidation of Sucrose, Maltose, and Lactose. **Polysaccharides:** General Methods for Determining 1,2- 1,4- and 1,6- Linkages in Polysaccharides (Smith Degradation) - End Group Analysis - A Brief Study of Starch and Cellulose. Proteins and Nucleic Acids: Classification of Proteins – Structure of Peptides – Chemistry of Glutathione and Oxytoxcin – An Elementary Treatment of Enzymes, Coenzymes and Nucleic Acids.

UNIT II **(15 hrs)**

Photochemistry: Electrocyclic Reactions – Cycloaddition Reactions and Sigmatropic Rearrangements – Frontier Molecular Orbital Approach, Huckel-Mobius Concept to the above Reactions. **Photochemical Reactions of Ketones:** Photosensitization – Norrish I and Norrish II Type Reactions – Paterno-Buchi Reactions – Photo Oxidation – Photo Reduction -

Photochemistry of Arenes. **Free Radicals:** Formation, Detection and Stability of Short and Long Lived Free Radicals. **Free Radical Reactions:** Halogenation, Addition, Oxidation, Reduction and Rearrangement Reactions – Barton, Sandmeyer, Gomberg, Bachmann, Ullmann, Pschorr and Hundsdiecker Reactions.

UNIT III **(15 hrs)**

Alkaloids: General Methods of Structural Determination - Hofmann, Emde and Von Braun Degrations - Structure Elucidation of Quinine, Papaverine, Atropine, Morphine, Reserpine and Piperine (Synthesis not required).

UNIT IV **(15 hrs)**

Steroids: Classification- Configurational Aspects of A/B Cis and A/B Trans Steroids - Structural Elucidation of Cholesterol, (Synthesis Not Necessary) Erogsterol and Vitamin D2. Male Sex Hormones - Androsterone and Testosterone. Female Sex Hormones - Oestrone, Equilenin and Progesterone. Basic idea about Adreno Cortical Hormones - Conversion of Cholesterol to Hormones.

UNIT V **(15 hrs)**

Antibiotics: Definition, Classification of Antibiotics, Structure, Stereochemistry and Synthesis of Penicillin, Chloroamphenicol and Terramycin. **Prostaglandins:** General Study of Prostaglandins- Chemistry of PGE1 and PGF1α.

Text Books:

1. I. L. Finar, "Organic chemistry: Volume-2: Stereo chemistry and the chemistry of natural products", - Pearson Education limited,London, 2003.

2.M. K. Jain and S.C Sharma "Modern Organic chemistry" Vishal Publishers, 2014.

3.P. S. Kalsi "organic reactions and their mechanisms" New age International publishers, 2010.

4.Gurdeep Chatwal "Organic chemistry of natural products" Himalaya publishing house, Mumbai, 2004.

Unit	Text Book No.	Chapter	Page No.
I	1	7	276-345
		13	638-689
		16	809-822
II	2	38	1225-1229
		47	1230-1240
		48	1241-1256
	3	15	543-568
		16	569-604
		17	605-682
III	1	14	696-761
	4	3	280-458
IV	1	11	517-604
V	1	18	865-883

Reference Books:

1. C.H.Depuy, O.L.Chapman, "Molecular Reaction and Photochemistry", Prentice Hall, 1972.

2. S.M.Mukherji, S.P.Singh, "Reaction Mechanism in Organic Chemistry", McMilan Indian Ltd., 1978.

3. R.T. Morrison, R.N. Boyd, "Organic Chemistry", Prentice – Hall of India, 6^{th} edn., 2001.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester IV
(2018 -2020)

Core Course –XVII : Nuclear and Organometallic Chemistry (18PCHC42)
(For those who join from June 2018 and afterwards)

Credits : 5 **Int. Marks : 25**
Hours/Week: 5 **Ext. Marks : 75**
Duration : 75 hrs **Max. Marks: 100**

Course Objectives:

- To enrich the knowledge about structure of nucleus and radioactive decay.
- To understand the nuclear fission, nuclear fusion and applications of radioactive isotopes.
- To know porphyrin ring system, photosynthesis, copper containing proteins and copper enzymes.
- To acquire knowledge in in – vivo & in – vitro nitrogen fixation, essential and trace elements and sodium and potassium ion pumps.
- To learn about the biologicaltoxicity of metals.

Course Outcomes:

1. Enrich the knowledge about parity, radioactivity secular and transient equilibria.
2. Understanding the applications of radioactive isotopes in various fields.
3. Acquire knowledge about compounds containing porphyrin ring system, mechanism of photosynthesis, biological functions of copper containing proteins and copper enzymes.
4. Gain familiarity in inhibition, poisonoing of the enzymes.
5. Enrich the awareness in chemotherapy and radiotherapy.
6. Expertise in anti rheumatic agents and psychopharmacological drugs.
7. Learn the structure and function of biological membranes and minerals in diet.

UNIT I **(15 hrs)**

Structure of Nucleus and Radioactivity Decay: Composition of The Nucleus – Nuclear Size, Shape and Density – Principal, Radial and Magnetic Quantum Numbers –Magnetic and Electric Property of Nucleus – Elementary Treatment of Shell (Independent Particle) Model – Nuclear Configuration – Parity and Its Conservation – Mass Defect and Binding Energy – Nuclear Forces Theory. **Radioactive Decay:** Group Displacement Law – Decay Series – Rate of Disintegration – Half Life – Average Life – Units of Radioactivity – Secular and Transient Equlibria – Nuclear Isomerism - Internal Conversion and Electron Capture.

UNIT II **(15 hrs)**

Nuclear Fission and Fusion and Application of Radio Active Isotopes: Bethe'sNotation of Nuclear Process - Nuclear Reaction Energies (Q Value) – Fission – Energy Release in Nuclear Fission – Mass Distribution of Fission Products – Theory of Nuclear Fission – Fissile and Fertile Isotopes – Energy from Nuclear Fusion - Thermonuclear Reactions in Stars – Power Nuclear Reactor – Breeder Reactor – Nuclear Reactorsin India.Application of

Radioactive Isotopes: Characteristics of Tracer Isotopes – Chemical Investigation – Age Determination – Medical Field – Agriculture – Industry – Analytical Application – Isotope Dilution Analysis – Neutron Activation Analysis – Biological Effects of Radiation – Waste Disposal Management.

UNIT III **(15 hrs)**

Organometallic Chemistry and Metal Clusters: Concept of Hapticity of Organic Ligands - **Metal Carbonyls:** 18 Electron Rule, Electron Count of Mononuclear - Polynuclear and Substituted Metal Carbonyls of 3d Series. Structures of Mononuclear and Binuclear Carbonyls of Cr, Mn, Fe, Co and Ni Using VBT. **II-Acceptor Behaviour of CO(MO Diagram of CO to be Discussed):** Synergic Effect and Use of IR Data to Explain Extent of Back Bonding - **Metal Alkyls:** Important Structural Features of Methyllithium (Tetramer) and Trialkylaluminium (Dimer) - concept of Multicentre Bonding in these Compounds - Role of Triethylaluminium in Polymerisation of Ethane - **Bonding and Structure of Following Clusters:** Dinuclear Clusters: Cu(II)Carboxylate, Chromium(II)Acetate - $[Mo2Cl8]^{4-}$ and $[Re2Cl8]^{4-}$ Trinuclear Clusters: [M3(CO)12] Where M=Fe, Ru, Os - Tetranuclear Clusters: [M4(CO)12] Where M= Co, Rh, Ir - Capping Rule-Polyatomic Zintl Ions - Encapsulation.

UNIT IV **(15 hrs)**

Application of Organometallic Compound in Industry: Synthesis – Properties - Structure and Bonding in Ferrocene – Arene – Olefin - Acetylene and Allyl Complexes - **Catalysis Using Organometallic Compounds:** Oxidative Addition – Reductive Elimination – Insertion Reaction – **Catalytic Mechanism in the Following Reactions:** Hydrogenation Of Olefins (Wilkinson Catalyst) – Tolman Catalytic Loops – Hydroformylation (Oxo Process) – Acetic Acid from Ethanol – Oxidation of Alkenes to Aldehydes and Ketone (Wacker Process) Catalysis in the Formation of Synthesis Gas - Homologation- Water Gas Shift Reaction- Synthetic Gasoline (Fischer-Tropsch and Mobil Process) – Olefin Polymerization (Ziegler – Natta) – Cyclo Oligomerisation of Acetylenes (Reppe's or Wilke's Catalysts) – Olefin Isomerisation Using Ni Catalyst.

UNIT V **(15 hrs)**

Metals in Medicine: Metal Toxicity and Homeostasis -Metal Deficiency and Diseases - Effect of Deficiency and Excess of Essential Metal Ions – Detoxification - **Cancer Therapy:** Cis-Platin and its Mode of Action. **Radiotherapy:** Radio-Pharmaceuticals - Technetium. **Chemotherapy:** Basics and Applications. **Anti Rheumatic Agents:** Gold Containing Drugs and their Action - Vanadium Based Diabetic Drugs. **Psychopharmacological Drugs:** Lithium Drugs and their Mode of Action. **Contrast Enhancing Agents for MRI:** MRI Imaging, Synthesis of Gadolinium Based Contrast Agents.

Text Books:

1. H.I. Arnikar, Essentials of Nuclear Chemistry, 3 rdEdn., Wiley Eastern Ltd., New Delhi, 1987.
2. Askim Das, "Supramolecular and Bioinorganic chemistry", CBS Publishers and Distributors, 2015.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	2	2.1 2.3-2.7 2.11,2.12	22-26 28-36 59-69
		4	4.4-4.8	77-82, 100-103 122-178
II	1	5	5.1-5.10	185-225
		6	6.1-6.3	240-244
		7	7.4-7.9	273-287
		10	10.1-10.7	358-419
III	2	5	5.5,5.9	123-142,148-157
		7	7.2, 7.5-7.6	177-202
		8	8.5	256-267
IV	2	8	8.2	240-246
V	2	12	12.1	337-339

Reference Books:

1. James E.Huheey, Ellen A.Keitler and Richard L.Keitler, "Inorganic Chemistry", Harper Collins College Publishers, New York, 4th Edn., 1993.
2. I. Bretini, ".Bioinorganic Chemistry", Viva Books Private Ltd, Chennai, 3rd Edn., 1998.
3. S.Glasstone, "Source book on Atomic energy", Van Nostrand Reinhold Company, New York, 1967.
4. G. Friedlander, J.W.Kennedy, E.S. Macias and J.M. Miller, "Nuclear and Radiochemistry", John Wiley and Sons Inc., New York, 1981.
5. U.N. Dash, "Nuclear Chemistry", Sultan Chand and sons, New Delhi, 1991.

Sri Kaliswari College (Autonomous), Sivakasi
Department of Chemistry
PG Programme – M.Sc
Semester IV
(2018 -2020)

Core Course – XVIII: Chemical Kinetics and Surface Chemistry (18PCHC43)
(For those who join from June 2018 and afterwards)

Credits	**: 5**	**Int. Marks**	**: 25**
Hours/Week	**: 5**	**Ext. Marks**	**: 75**
Duration	**: 75 hrs**	**Max. Marks**	**: 100**

Course Objectives:

- To know the concepts involved in kinetics.
- To know the theories of chemical kinetics.
- To understand the concepts involved in chain reaction.
- To know the various catalytic theory, types and enzyme catalysis.
- To understand the concepts involved in adsorption and study of its application.

Course Outcomes:

1. Enhance the concept of activation energy and activated complex by collision theory and gain the knowledge on collision theory and absolute reaction rate theory.
2. Deepen the basic ideas of molecularity by the study of various theories.
3. Enhance the knowledge on mechanism and kinetics of chin reaction and the application of steady state treatment.
4. Develop the theoretical knowledge on primary and secondary salt effect and kinetics of fast reaction by different techniques.
5. Gain proficiency in the theoretical aspects of homogeneous and heterogeneous catalysis and enhance the ideas of enzyme catalysis and acid-base catalysis.
6. Understand the characteristics and terms involved in adsorption.
7. Gain knowledge on various adsorption isotherms, B.E.T equation and applications of adsorption in everyday life.

UNIT I **(15 hrs)**

Theories of Kinetics: Effect of Temperature on Reaction Rate – Simple Collision Theory – Arrhenius Equation – Activated Energy and Chemical Reaction – Characteristics of an Activated Complex – Mathematical Treatment of Classical Collision Theory – Modified Collision Theory – ARRT – Statistical – Mechanical Derivation of the Rate Equation – Wyne – Joneand Erying Equation – Comparison of Collision Theory and Absolute Reaction Rate Theory.

UNIT II **(15 hrs)**

Reaction Kinetics: Unimolecular Reactions – Elementary Unimolecular Reactions – UnimolecularReactions in Free Radical Mechanism – Theories of Unimolecular Reactions – Perrin Theory – Lindemann's Theory – Mathematical Formutation of Lindemann's Theory – Criticism of Lindemann's Theory – Hinshelwood's Theory – RRK Theory – RRKM Theory – Slater's Treatment – Trimolecular Reactions – Trauz's Theory – Bodenstein's Theory.

UNIT III **(15 hrs)**

Chain reactions: Distinguishing Features of Chain Reactions – Mechanism of Chain Reactions – Detection and Estimation of Atoms and Radicals in Chain Reactions – Kinetics of Chain Reactions – Steady State Treatment – Examples – Decomposition of Ozone – Reaction between Hydrogen and Bromine. **Salt Effect:** Primary and Secondary Salt Effect. **Kinetics of Fast Reactions:** Flow Methods – Flash Photolysis – Shock Tube – Pulse Radiolysis – Chemical Relaxation Method.

UNIT IV **(15 hrs)**

Catalysis: Types of Catalysis – Homogeneous – Heterogeneous Catalysis – Characteristics of Catalysis – Theory of Homogeneous Catalysis – Theory of Heterogeneous Catalysis – Kinetics of Heterogenous Reactions – Effect of Temperature on Heterogenous Reactions – Absolute Rate Theory in Heterogenous Reactions – Classification of Catalysis. **Enzyme Catalysis:** Characteristics of Enzyme Catalysis – Factors Affecting the Rate of an Enzyme Reaction – Temperature, pH, Concentration of Substrate – Michaelisand Menten'sEquation. **Acid Base Catalysis**: Types of Acid Base Catalysis – Kinetics of Acid-Base Catalysis – Hammett and BronstedEquation.

UNIT V **(15 hrs)**

Adsorption: Characteristic of Adsorption – Sorption and Occlusion – Measurement of Adsorption Volumetric Method – Gravimetric Method – Various Adsorption Isotherm – Freundlish'sAdsorption Isotherum–LangumuirAdsorption Isotherm – B.E.T Equation – Determination of Surface Area – Harkins and Jura Method – Benton and White Method – B.E.T. Method – Point B-Method – From Permeability Method – Applications of Adsorption.

Text Books:

1. K. J. Laidler, "Chemical Kinetics", Pearson Education, Third Edition, Reprint 2004.
2. Gurdeep Raj, "Advanced Physical Chemistry", GOEL Publication, 37th Edition 2012.

Unit	Text Book No.	Chapter	Section	Page No.
I	1	13	13.18 – 13.2	704 – 721
II	1	13	13.21	721 – 730
	2	5	5.3.1 – 5.3.5	155 – 167
III	1	13	13.23 – 13.26	735 – 764
IV	1	15	15.1 – 15.7	841 – 872
V	1	16	16.1 – 16.4	873 – 879
			16.6 – 16.8	883 – 895

Reference Books:

1. D. N. Bajpai, "Advanced Physical Chemistry", S. Chand and Company, 2010.
2. Puri, Sharma, Pathania, "Principles of Physical Chemistry", Vishal Publishing Co, 47th Edition, 2016.

Sri Kaliswari College (Autonomous), Sivakasi
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PG Programme – M.Sc
Semester IV
(2018 – 2020)

Core Course- XIX: Practical in Computational Chemistry (18PCHC4P)

(For those who join from June 2018 and afterwards)

Credits : 3	**Int. Marks : 40**
Hours/Week : 3	**Ext. Marks : 60**
Duration : 45 hrs	**Max. Marks : 100**

Course Objectives:

- To learn the molecular weight determination experiment.
- To develop skill in electrochemical experiments.
- To develop skill in thermo chemical study.

Course Outcomes:

1. Knowing the importance of the various physical properties by practical.
2. Skill to determine the molecular weight of unknown substance by Rast method.
3. Pursuing the role of phase diagram to understand the simple eutectic method.
4. Improving skill on distribution properties.
5. Impact of the potentiometric method to study the redox reactions.
6. Develop the skill on thermo chemical experiments.

C Programming

1. Calculation of reduced mass
2. Calculation of NMR frequency of hydrogen
3. Calculation of second order rate constant
4. Determination of RMS, average and most probable velocity
5. Determination of inter planar distance
6. Determination critical pressure, critical temperature, critical volume of methane
7. Determination of linear and non linear structure
8. Calculation of surface tension
9. Calculation of ionic strength
10. Calculation of thermodynamic parameter

Chem draw

Draw the structure of following compounds and find its properties (Structure should be given)

Alkaloids, Terpenoids, Flavonoids, Steroids, Aminoacid

Microsoft Office

Draw graph using Excel (Given data)

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Core Course – XX: Project / Review of Recent Aspects of Chemistry (18PCHJ41)
(For those who join from June 2018 and afterwards)

Credits	**: 6**	**Int. Marks**	**: 40**
Hours/Week	**: 12**	**Ext. Marks**	**: 60**
Duration	**: 180 hrs**	**Max. Marks**	**: 100**

Course Objectives:

- To motivate fundamental knowledge in research.
- To initiate innovative thinking towards research.
- To gain fundamental analytical skill.

Course Outcomes:

1. Understanding the way about the literature survey.
2. Enhance the knowledge about published research works.
3. Learning the way of thesis writing.
4. Exploring the presentation skill of research work.
5. Articulate the interdisciplinary research work.
6. Knowing the instrumentation techniques for the research work.
7. Developing the skill to analyse the sample through the instrumentation techniques.
8. Apply the knowledge of theory to construct the scheme in research in the various fields.

Project work:

1. Each leaner can select for his / her research project in any one of the areas of chemistry in consultation with his / her guide and the head of the department.
2. The project report should be submitted to the principal through the head of the department of chemistry one week prior to the commencement of the summative examination. If a candidate fails to submit his/her project report on the date presented above, he / she may be permitted to submit the same 4 days prior to the date of viva-voce examination with a fine as prescribed by the college.
3. Each learner shall submit 2 copies of his / her project report for valuation.
4. The project report shall contain at least 25 pages excluding bibliography and appendices.
5. The project report shall be valued for a total of 100 marks out of which the external examiner and guide share 30 and 18 marks respectively. The sum of marks awarded by both the examiners shall be considered to be the final mark. For the pass in the project the learner shall secure a minimum of 24 marks. If the leaner fails to get the minimum pass mark in the project report he/ she shall be permitted to resubmit his / her project report once again within a period of 6 months after the publication of the result.
6. For those candidates who have passed in the evaluation of the project there will a viva-voce examination of the above. The viva-voce carried a minimum of 20 marks and it will be conducted jointly by the guide and the external examiner. The learner should secure a

minimum of 10 marks for a pass in the viva-voce examination failing which he / she would be required to reappear for the same after a month but within a period of 3 months for which he/ she will have to pay a fee as prescribed by the college.

7. Further for a pass in this paper as a whole, a leaner should secure atleast 50 marks in project report and viva – voce put together.