RAJAH SERFOJI GOVERNMENT COLLEGE
(AUTONOMOUS)
THANJAVUR – 613 005

PG & RESEARCH DEPARTMENT OF CHEMISTRY

SYLLABUS FOR
M.Sc. Degree Programme in Chemistry

Semester System (TWO YEAR PROGRAMME COURSE)

LOCF WITH CHOICE BASED CREDIT SYSTEM

Effective from the Academic Year 2022-2023

RAJAH SERFOJI GOVT. COLLEGE (A) - THANJAVUR - 05.

DEPARTMENT OF CHEMISTRY

BOARD OF STUDIES MEETING - 2022 REVIEW MEETING

DATE : 18.08.2022 TIME: 11.30 AM

PLACE : CHEMISTRY STAFF ROOM

The board of studies meeting in chemistry was held on 18.8.2022. A detailed discussion was held on the curriculum structure and the syllabi for B.Sc, M.Sc and M.phil chemistry. The board suggested valuable and appropriate modifications based on the premises of UGC-CBCS and LOCF.

After the detailed discussion the following resolutions were passed by the Board of Studies.

i) Resolved to approve the curriculum structure and the syllabi framed on the premises of UGC-CBCS and LOCF for B.Sc, M.Sc and M.Phil courses from the academic year 2022-2023.

ii) Resolved to add two Generic Elective papers in the curiculum structure and syllabus to the PG programme (Food and Adulterants) as per the UGC-CBCS and LOCF structure.

iii) Resolved to offer value added, and add on courses to UG and PG programs under credit accumulation system. Students can also do these courses through online platforms like SWAYAM and MOOCS.

iv) Resolved to include Internship, mini / Group projects in order to enhance students practical knowledge and Employability skills.

MEMBERS PRESENT

1. Prof. S.P. ELANGOVAN — CHAIRMAN
   ASSOCIATE PROFESSOR & HEAD
   DEPT. OF CHEMISTRY, RSGC-TNJ-05
   18/8/2022

2. DR. A. ILLANGOVAN — UNIVERSITY NOMINEE
   PROFESSOR,
   DEPARTMENT OF CHEMISTRY
   BHARATHIDASAN UNIVERSITY,
   TRICHIRAPPALLI - 24
   18.8.2022

3. Dr. K. KRISHNASAMY — SUBJECT EXPERT-I
   PROFESSOR OF CHEMISTRY
   DEPT. OF CHEMISTRY, ANNAMALAI UNIVERSITY
   CHIDAMBARAM.
   18/8/2022

4. Dr. R. THIRUNEELAKANDAN — SUBJECT EXPERT-II
   PROFESSOR OF CHEMISTRY
   DEPT. OF CHEMISTRY
   ANNA UNIVERSITY, BIT CAMPUS
   TRICHY-24.
   18/8/22.

5. Mr. SEKAR GANESAN — INDUSTRIALIST
   HEAD - SOUTH INDIA OPERATIONS
   BASF INDIA LTD - CHENNAI - 04

6. Dr. M. PUGAZHENTHI — ALUMNUS
   ASSISTANT PROFESSOR
   AVVM SRI PUSHPAM COLLEGE (A)
   POONDI - 05, THANJAVUR
   18/8/22

7. Dr. J. GNANASUNDARAM — MEMBER
   ASST. PROFESSOR OF CHEMISTRY
   DEPT. OF CHEMISTRY
   RSGC-TNJ.
   18.8.22

8. Dr. K. RAJARAJAN
   ASST. PROFESSOR OF CHEMISTRY
   18/8/22

9. Dr. N. INGARSAN — MEMBER
ASST. PROFESSOR OF CHEMISTRY — DEPT. OF CHEMISTRY RSGC-TNJ — 18/08/22

10. Prof. N. PUNITHA
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

11. Prof. M. ANITHA
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

12. Dr. P. SANGEETHA
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

13. Prof. M. MANGALAM
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

14. Prof. N. VIDHYUAATHA
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

15. Prof. K. VIJAYALAKSHMI
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

16. Dr. R. CHITHIRAVEL
ASST. PROFESSOR OF CHEMISTRY — " — 18/08/22

17. Dr. G. MANIMEGALAI
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

18. Dr. C. KATHIRAVAN
ASST. PROFESSOR OF CHEMISTRY — " — 18/08/22

19. Prof. R. RADHAKRISHNAN
ASST. PROFESSOR OF CHEMISTRY — " — 18.8.22

20. Dr. D. ILANGESWARAN
ASST. PROFESSOR OF CHEMISTRY — " — 18/8/22

21. Dr. S. SELVAKUMAR
ASST. PROFESSOR OF CHEMISTRY — " — 18/08/22

22	Prof. R. BALAJI ASST. PROFESSOR OF CHEMISTRY	MEMBER DEPT. OF CHEMISTRY RSGC-TNJ 18/8/22
23	Prof. A. SIVAKUMAR ASST. PROFESSOR OF CHEMISTRY	〃 18/8/22
24	Dr. T. RAJKUMAR ASST. PROFESSOR OF CHEMISTRY	〃
25.	Dr. S. LAWRENCE ASST. PROFESSOR OF CHEMISTRY	〃 18/08/22
26.	Dr. J. ELANGOVAN ASST. PROFESSOR OF CHEMISTRY	〃 18/8/22
27.	Dr. M. ELAMARAN ASST. PROFESSOR OF CHEMISTRY	〃 18/8/22

Rajah Serfoji Government College (Autonomous), Thanjavur – 613 005.

Circular

With reference to the Bharathidasan University letter Bharathidasan University letter No.51812/R/CCCD/L/2021 Dated16.02.2021 the following members of the Board of Studies of respective departments are nominated /to be nominated for the period from **04.02.2021 to 03.02.2024 (Three Years)**

Department of Chemistry

1	University Representative Nominee (Appointed by University)	Dr.A.Ilangovan Professor Department of Chemistry Bharathidasan University Tiruchirappalli - 620 024
2	**Two** Subject experts from outside of the college	a) Dr. K. Krishnasamy Professor of Chemistry Dept. of Chemistry Annamalai University Annamalai Nagar Chidambaram Mobile:99425 47856 b)Dr. R. Thiruneelakandan Professor of Chemistry Dept. of Chemistry University College of Engineering Anna University BIT Campus Trichy - 621 0024 Mobile:94430 92608
3	One representative from Industry/Corporate relating to placement	Mr.Sekar Ganesan Head - South India Operations BASF India Ltd. World No.1 Chemical Industry Chennai - 603 204 Mobile:99625 46541
4	One PG Meritorious alumnus	Dr.M.Pugazhenthi Assistant Professor Department of Chemistry AVVM Sri Pushpam College (Autonomous) Poondi - 613 503 Thanjavur Mobile:95664 22712

18.8.2022

18/8/2022

18/8/22

18/8/22

PRINCIPAL
PRINCIPAL
Rajah Serfoji Govt. College (Autonomous)
THANJAVUR-613 005.

Note: Copy of this letter will be given to HOD for file after getting approval from the Principal

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1	Graduate will to develop critical analysis and problem solving skills required in the field of Chemistry
2	Graduates will be able to prepare students with a working knowledge of experimental techniques and instrumentation required to work independently in research or industrial environments.
3	Graduates will be able to prepare the students to pursue higher studies and research to meet out academic demands of the country. .
4	Graduates will be able to prepare the students to successfully compete for current employment opportunities.

PROGRAMME OUTCOMES (POs)

Upon completion of the PG Degree Programme, students will be able to

PO1	Be capable of demonstrating comprehensive knowledge and understanding of the discipline that forms a part of an undergraduate programme of study and applying the knowledge in real life situations through critical thinking and analytical reasoning.
PO2	Become employable, entrepreneurs, or pursue higher education and further knowledge with scientific reasoning, problem solving capacity, communication and other generic skills and global competencies like digital literacy, ability to work in cooperation as a team.
PO3	Be a good citizen with multicultural competence, moral and ethical awareness, reflective thinking and leadership qualities in order to make progressive efforts to sustain environment, socio-cultural and economic fabric, and human values at the national as well as the global level.
PO4	To proceed with a sense of inquiry and to demonstrate capability for exploring specific areas of knowledge, for asking relevant/appropriate questions, problematizing, synthesizing and articulating; and to demonstrate an ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation in the fields of research and development
PO5	Become a lifelong learner through self-paced and self-directed learning aimed at intellectual development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Upon completion of the M.Sc. Degree programme, students will be able to

PSO1	engage in innovative and socially relevant research with ethical concern
PSO2	become well versed in the mechanisms of all types of high level and complicated chemical reactions
PSO3	Gain knowledge about the physical aspects of atomic structure,various energy transformation, molecular assembly in nano level and significance of electrochemistry.
PSO4	be aware of and handle the sophisticated instruments/equipment
PSO5	get sufficient expertise in the operational knowledge and laboratory skills in all major fields of chemistry

Rajah Serfoji Govt. College (Autonomous), Thanjavur – 613 005
M.Sc., Chemistry –LOCF with CBCS Pattern
(For the Candidates admitted from the academic year 2022 -2023 onwards)

Sem	Part	Course	Subject Code	Title of the Paper	Inst. Hrs.	Credit	Exam Hrs.	Marks		Total
								Int	Ext	
I	III	CC1	A1PCH1	Inorganic Chemistry I	6	4	3	25	75	100
	III	CC2	A1PCH2	Organic Chemistry I	6	4	3	25	75	100
	III	CC3	A1PCH3P	Inorganic Chemistry Practical I (6 Hrs)	6	4	6	40	60	100
	III	CC4	A1PCH4P	Organic Chemistry Practical I (6 Hrs)	5	4	6	40	60	100
	III	DEC1	**A1PCHEL 1A**	**Analytical Chemistry**	5	4	3	25	75	100
			A1PCHEL 1B	Solid State Chemistry						
			A1PCHEL 1C	Supramolecular Chemistry						
	IV	GEC1	A1PBCGE 1	Health Science & Nutrition	2	2	3	25	75	100
				Total	**30**	**22**				**600**
II	III	CC5	A2PCH5	Inorganic Chemistry II	6	4	3	25	75	100
	III	CC6	A2PCH6	Organic Chemistry II	6	4	3	25	75	100
	III	CC7	A2PCH7P	Inorganic Chemistry Practical II (6 Hrs)	6	4	6	40	60	100
	III	CC8	A2PCH8P	Organic Chemistry Practical II (6 Hrs)	5	4	6	40	60	100
	III	DEC2	**A2PCHEL2A**	**Physical Chemistry I**	5	4	3	25	75	100
			A2PCHEL2B	Pharmaceutical Chemistry						
			A2PCHEL2C	Bio-organic Chemistry						
	IV	GEC2	A2PBCGE2	Bioanalytical Chemistry	2	2	3	25	75	100
				Total	**30**	**22**				**600**
III	CC9	A3PCH9	Inorganic Chemistry III		6	5	3	25	75	100
	CC10	A3PCH10	Organic Chemistry III		5	4	3	25	75	100

	CC11	A3PCH11	Physical Chemistry II	5	4	3	25	75	100
	CC12	A3PCH12P	Physical Chemistry Non Electrical Practical **(6 Hrs)**	5	4	6	40	60	100
	DEC3	**A3PCHEL3A**	**Industrial Chemistry**	5	4	3	25	75	100
		A3PCHEL3B	Green Chemistry						
		A3PCHEL3C	Catalysis						
	SS1	A3PCHSS1	Soft Skills - I / Skill Based - I	2	2	3	25	75	100
	ECC1	A3PCHEC1	Green Chemistry	-	2	3	-	100	100
			Internship (Optional) (For UG Compulsory for PG)	-	2	-	-	-	-
			Total	**30**	**23**				**600**
IV	CC13	A4PCH13	Physical Chemistry – III	6	5	3	25	75	100
	CC14	A4PCH14P	Physical Chemistry Electrical Practical **(6 Hrs)**	6	4	6	40	60	100
	CC15	A4PCHPW	Project Work	4	4	-	20	80	100
	DEC4	**A4PCHEL4A**	**Applied chemistry**	6	4	3	25	75	100
		A4PCHEL4B	Scientific Research Methodology						
		A4PCHEL4C	Heterocyclic chemistry						
	DEC5	**A4PCHEL5A**	**Nano and Computational Chemistry**	6	4	3	25	75	100
		A4PCHEL5B	Chemistry of Nanoscience and Nanotechnology						
		A4PCHEL5C	Applied Organic chemistry						
	ECC2	A4PCHEC2	Applied Organic chemistry	-	2	3	-	100	100
	SS2	A4PCHSS2	Soft Skills - II / Skill Based - II	2	2	3	25	75	100
			Total	**30**	**23**				**600**
Grand Total					**90**				**2400**

	No.of Papers	Credit
Core Courses (2x5 Cr) (13x4 Cr)	15	62
Core Elective Courses	5	20
Generic Elective Supportive Courses	2	4
Soft Skills / Skill Based	2	4
*Extra Credit Course	2	8*
Total	**24**	**90**

GENERIC ELECTIVE COURSES (NON- MAJOR ELECTIVE)

(Offered to I-M.Sc Bio-Chemistry)

CODE	COURSE	TITLE	LECTURE	TUTORIAL	PRACTICAL	HRS	MARKS	TOTAL
							IE	WE
A5CHEL01	GE-1	Chemistry in Everyday Life	2	0	0	2	25	75
A6CHEL02	GE-2	Food and Adulterants	2	0	0	2	25	75

Semester	Code	Course	Title of the Paper	Hours/Week	Credits
I	A1PCH1	CC1	Inorganic Chemistry I	6	4

Course Objectives

- To learn about acids, bases, chains, rings and isopoly anions of inorganic compounds.
- To acquire the knowledge of ionic structure.
- To learn about nuclear chemistry.
- To study the various concepts and applications of metal ions in biological systems.
- To understand the various metallurgical processes

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Predict geometrics of simple molecules
CO2	Recognize and assign symmetry characteristics of molecules.
CO3	Identify and define various types of nuclear transmutation including fission and fusion.
CO4	Understand the metal complexes in biological system.
CO5	know the structure and bonding in molecules and ions

UNIT - I

Acids and bases: Bronstedand Lewis acids and bases, pH, pka acid-base concept. Non-protonic concepts of acid base reactions - Lux concept solvent ion theory of acids bases- liquid ammonia, acetic acid as solvents - bromine trifluoride, dinitrogen tetroxide, liquid hydrogen fluoride acid solvents - classification of acids and bases as hard or soft - acid base strength, hardness and softness - symbiosis - theoretical basis of hardness and softness - electronegativity hardness , softness.

Inorganic chains :chains - catenation - hetero-catenation- silicate minerals (names and structures only). **Rings**- phosphazenes - structure-craio and Paddock model -Dewar model.

Isopoly anions: basic building units of vanadates - molybdates - tungstate ions - heteropoly anions - structures only.

UNIT - II

Ionic bond and crystal structure: Close Packing of atoms and ions HCP and BCC type-radius ratio rules - calculation of some limiting radius ratio values for C.N. 3.(planar triangle), C.N. 4 (tetrahedral), C.N. 6 (octahedral),C.N.8(Cubic).

Classification of ionic structures: AX, AX_2, AX_3, types - AX type, ZnS, NaCl, CsCl, - structures only - AX_2 type - Fluorite, rutile, beta crystobalite, structures only - lattice energy- Born Lande equation -Madelung constant-derivation -important points arising from Born Lande equation - Schotky defect - Frenkel defect - explanation and calculation of no. of defects form per cm cube - metal excess defect F centers and interstitial ions -metal deficiency defects - positive ions absent - extra interstitial negative ions.

UNIT - III

Nuclear chemistry: Nuclear structure - Composition of nuclei-Properties of nucleus-different types of nuclear forces, and nuclear stability-nuclear models-liquid drop model, shell model of nucleus-Nuclear reactions - transmutation - stripping and pick up, fission, fusion, spallation, fragmentation reactions - scattering reactions - nuclear cross section -Nuclear reactors - neutron sources - gamma ray and x-ray sources - applications of nuclear science in agriculture and biology - neutron activation and isotope dilution analysis.

UNIT - IV

Bioinorganic chemistry: Introduction of bioinorganic chemistry, metal ions in biological systems, metal function in metalloproteins, functions of metallo enzymes. Bio-inorganic chemistry of toxic metals - lead, cadmium, mercury, iron, and copper. Detoxification by chelation therapy. Radiation risks. Bio inorganic chemistry of radio pharmaceuticals - technetium.

UNIT - V

Metallurgy and Metal clusters: Metallurgy of Zr, Ge, Be, Th, preparations and uses of their compounds. Metal clusters - classifications- binuclear clusters - structure of Re_2Cl_8, qualitative MO diagrams for rhenium complexes to explain the strength of quadraupole bond. Wade's rule.

References:

1. M. C. Day and J. Selbin, "Theoretical Inorganic Chemistry", Affiliated East West Press Pvt. Ltd. 2 nd ed., 1985.
2. F.A.Cotton and G.Wilkinson, " Advanced Inorganic Chemistry", 4 th ed., A Wiley - Interscience Publication, John -Wiley & Sons, USA.
3. J.E. Huheey, "Inorganic Chemistry" 3 rd . ed., Harper & Row publisher, Singapore. 4.
4. S. Glasstone, "Source Book on Atomic Energy", D.Van Nostrand, New York 1967 (Affiliated East-West Press, New Delhi 1969)
5. G.Friedlander, J.W. Kennedy and J.Miller, "Nuclear and Radiochemistry, 3 rd Ed., Wiley Interscience Publications, John Wiley & Sons, New York.
6. J.D. Lee, A New Concise Inorganic Chemistry, 4th Ed., ELBS, 1995.
7. B. Douglas, D. H. McDaniel and J. J. Alexander, "Concepts and Models of Inorganic Chemistry", 2 nd ed., John Wiley & Sons, New York.
8. Purcell and Kotz, "Inorganic Chemistry", Saunders Golden Sunburst Series, W. B. Saunders Company, Philadelphia.
9. R. W. Hay, "Bioinorganic Chemistry".
10. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, Panima Publishing Company, New Delhi, 1997.
11. W. Kaim and B. Schewederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, John Wiley & Sons, New York, USA.

Relationship matrix for Course outcomes, Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	2	3	2	2	2	2	2.2
CO-2	3	2	2	2	2	3	2	2	2	2	2.2
CO-3	3	3	2	2	2	2	3	2	2	2	2.3
CO-4	3	2	2	2	2	2	3	2	2	2	2.2
CO-5	3	2	2	2	2	3	3	2	2	2	2.3
Mean overall Score											2.24(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

Signature of the HOD
HEAD OF THE DEPARTMENT OF CHEMISTRY
RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/Week	Credits
I	A1PCH2	CC2	Organic Chemistry I	6	4

Course Objectives

- To know the methods of naming and reactive intermediates in organic compounds & reactions
- To understand the stereochemistry of Optical isomerism.
- To understand the stereochemistry of Geometrical isomerism, configuration of cyclic and bicyclic ring system and Dynamic stereo chemistry
- To learn the methods of determining the reaction mechanism.
- To impart knowledge about chemistry of natural products

Course Outcomes (CO)

At the completion of this course, students will

CO No.	CO-Statements
CO1	Acquire the skills for correct stereo chemical assignment and interpretation in rather simple organic molecules
CO2	Identify, classify and draw structures of organic molecules.
CO3	Apply the basic rules of organic nomenclature to interrelate between structures of organic molecules.
CO4	understand the Methods of determine reaction mechanism and rearrangements.
CO5	understand the structure and classification of starch, cellulose, amionoacids, proteins and nucleic acids.

UNIT - I

Nomenclature of organic compounds- Naming of linear and branched alkanes, alkenes, polynes and alkynes with and without functional groups by IUPAC nomenclature- aromatic and hetero aromatic systems- nomenclature of heterocycles having not more than two hetero atoms such as oxygen, nitrogen and sulphur- nomenclature of alicyclic, bicyclic and tricyclic compounds.

Reactive intermediates: free radicals-carbenes, nitrenes, -carbanions- carbonations and arynes-generation, stability, structure and reactivity-nonclassical carbocations.

Electronic effects: inductive effect, resonance effect, hyperconjugation (Baker-Nathan effect)- hydrogen bonding(inter and intra molecular). Umpoloung-carbonyl synthesis.

UNIT - II

Organic stereo-chemistry I : Optical isomerism: Chirality, symmetry elements, asymmetric and dissymmetric molecules- Newmann, Sawhorse, Fisher and flying wedge notations- represntation and inter-conversions.-types of molecules exhibiting optical activity- configurational nomenclature- D and L, & R-S nomenclature- of acyclic and cyclic chiral compounds- stereo chemistry of allenes, cumulenes and spirenes- biphenyls (atropisomerism)- stereochemistry of ansa compounds-cyclophanes and trans cyclo alkenes- definition of terms like prochirality, enantiotopic and diastereotopic groups faces- asymmetric synthesis-Cram's rule.

UNIT - III

Organic stereochemistry II :Geometrical isomerism: Eand Z nomenclature- determination of configuration of the geometrical isomers by physical, chemical and spectroscopic methods.

Configuration of cyclic and bicyclic ring systems: Cis and trans nomenclature of three, four, five six membered substituted cyclic systems-configuration of cyclohexane- mono and di substituted cyclohexanes- decalins.

Dynamic stereo chemistry : Quantitative correlation between conformation and reactivity- Winstein,Eliel equation- Curtin-Hammet principle- conformation, reactivity and mechanism of cyclic systems- saponification of an ester, esterification of an alcohol, chromic acid oxidation of cyclohexanols- deammination of 2-amino cyclohexanol- stereo specific and stereoselective reactions.

UNIT - IV

Methods of determine reaction mechanism: Thermodynamic and kinetic aspects of organic reactions- energy profile diagrams- intermediate versus transition states. Isotope effects- kinetic and non-kinetic methods of determination of reaction mechanism- product analysis and its importance- cross over experiments- isotopic labelling studies- Hammett equation and Taft equation only- ambident nucleophiles such as CN-,NO2-,phenoxide and ambident dianions. Williamson's ether synthesis. Preparation and synthetic utility of enamines, Finkelstein reaction, Wurtz coupling

A study of mechanismof the following rearrangements with mechanisms and applications: Beckmann, Curtius, Hofmann, Pinacol and pinacolene rearrangements.

UNIT - V

Natural products: Carbohydrates-polysaccharides-structure of starch, and cellulose, configuration of carbohydrates.

Peptides and proteins: Naturally occurring amino acids - their classifications - acid-base properties and their importance - primary, secondary and tertiary structures of proteins

Nucleic acids: chemistry of nucleic acids- structure of DNA, properties, biological implications of DNA, replication of DNA- structure of RNA- types of RNA- their functions - determining the base sequence of DNA.

A study of the following name reactions with mechanism and Applications: Dieckmann cyclization, , Sommelet reaction and Hell-volhard-zelinsky reaction

References:

1. R. Panico, WH. Powell, L. Jean, C.Richer, A Guide of IUPAC Nomenclature of Organic Compounds. 1993.
2. R.S. Cahn and O.C. Dermer, Introduction to Chemical Nomenclature, 5th Edn., Butterworths, 1997.
3. J. March, "Advanced Organic Chemistry : Reactions, Mechanisms and Structure",4th ed., Wiley, 1992.
4. R.K. Bansal, "Organic Reaction Mechanisms", Tata McGraw Hill, 1975.
5. P. S. Kalsi, "Organic Reactions and their Mechanisms", New Age International Publishers.
6. E.L.Eliel, "Spectrochemistry of Carbon Compounds", McGraw Hill, 1962.
7. D. Nasipuri, Stereochemistry of Organic Compounds.
8. I.L. Finar, "Organic Chemistry", Vol.II, 5 th ed., ELBS 1975.
9. R.T. Morrison and R.N.Boyd, "Organic Chemistry", 6 th ed., Allyn and Bacon.
10. F.A. Carey and R.J. Sunberg, "Advanced Organic Chemistry, Parts A & B, Plenum, 1984.
11. O.P. Agarwal, Chemistry of Organic Natural Products, Vol. I & II, Goel Publications, 1997.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	3	2	3	3	2	2	3	2	2.4
CO-2	3	2	2	3	2	2	2	2	3	2	2.3
CO-3	2	2	2	3	1	3	1	2	2	3	2.1
CO-4	3	2	2	3	2	2	3	2	2	3	2.4
CO-5	3	2	2	2	2	1	2	3	3	2	2.2
Mean overall Score											2.28(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

Signature of the HOD

HEAD OF THE DEPARTMENT OF CHEMISTRY
RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCH3P	CC3	Inorganic Chemistry Practical- I	6	4

Course Objectives

- To impart knowledge on Qualitative analysis of Inorganic mixture.
- To gain the depth knowledge in the Colorimetric estimation of different metals.

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO-1	Understand the basics of semi micro inorganic analysis.
CO-2	Explain the classification of metal cations into different groups.
CO-3	Examine a given inorganic mixture and find out the different groups of cations in it.
CO-4	Investigate the presence of trace metal ions using colorimetry.
CO-5	Assess and improve the water quality by eliminating the environmental pollutants.

1. Semi-micro qualitative analysis

A mixture containing two common and two rare cations.

2. Colorimetric estimation

a) Copper

b) Iron

c) Nickel

d) Chromium using photo electric colorimeter.

References:

1. Ramanujam V V, *Inorganic Semi Micro Qualitative Analysis*, 3rd Edition, National Publishing Company, Chennai, 1990.

2. Jeffery G H, Bassett J, Mendham J and Denney R C, *Vogel's Textbook of Quantitative Chemical Analysis*, 5thEdition, Longman Scientific & Technical, Essex, England, 1989.

3. Svehla G, *Vogel's Qualtitative Inorganic Analysis*, 7th Edition, Longmann, London, 1996.

4. Metz C and Castellion M E, *Chemistry: Inorganic Qualitative Analysis in the Laboratory*, Academic Press, New York, 1980.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	1	1	3	2	3	1	1	3	2	2.2
CO-2	2	2	3	3	1	2	2	3	3	1	2.3
CO-3	3	2	2	2	2	3	2	2	2	2	2.3
CO-4	3	2	2	3	2	3	2	2	3	2	2.3
CO-5	3	2	3	2	3	3	2	3	2	3	2.6
Mean overall Score											2.34(High)

Signature of the HOD

HEAD OF THE DEPARTMENT OF CHEMISTRY
RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCH4P	CC4	Organic Chemistry Practical- I	5	4

Course Objectives

- To impart knowledge on Qualitative analysis of organic mixture.
- To gain the depth knowledge in Single stage preparation of organic compounds.

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No	CO-Statements
CO-1	Familiarize the solubility nature of organic substances of different functional Group.
CO-2	Learn the pilot separation of bimixtures .
CO-3	Familiarize the systematic producers organic substances analysis.
CO-4	Learn two stage preparation involving molecular rearrangement oxidation .
CO-5	Know the preparation involving nitration and bromination.

1. Qualitative analysis of organic mixture

a) Pilot separation
b) Bulk separation
c) Analysis
d) Derivative
e) Determination of m.p or b.p of derivatives

2. Single stage preparation of organic compounds

a) Nitration: methyl m- nitrobenzoate from methyl benzoate.
b) Addition: Benzophenone oxime from benzophenone.
c) Chlorination cum diazotization : o-chloro benzoic acid from anthranilic acid.
d) Oxidation: p-benzoquinone from hydroquinone.
e) Diazotisation; Phenly azo 2-naphthol from aniline.

References:

1. Ganapragasm N S and Ramamurthy C, *Organic Chemistry Lab Manual*, 2nd Edition, Vishwanathan S Printers and Publishers (P) Ltd., Chennai, 2015.
2. Furniss B S, Hannaford A J, Smith P W G, and Tatchell A R, *Vogel's Textbook of Practical Organic Chemistry*, 5th Edition, Pearson publication.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	3	2	3	2	3	2	2	2.4
CO-2	2	1	3	3	1	2	2	3	3	2	2.2
CO-3	3	3	3	2	2	2	2	3	3	2	2.5
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean overall Score											2.5(High)

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THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCHEL1A	DEC1	Analytical Chemistry	5	4

Course Objectives

- To study about error analysis.
- To learn the Principle, experimental technique and application of Polarography.
- To learn the various quantitative measurement instruments.
- To give an important overview of separation techniques.
- To know the various advanced techniques..

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No	CO-Statements
CO-1	Understand the procedures and applications of the analytical techniques.
CO-2	Evaluate and interpret data using statistical method.
CO-3	Obtain a detailed knowledge about Atomic absorption spectroscopy for studying the concentration of various elements.
CO-4	Get a basic idea about polarography, its theory and applications.
CO-5	Use the polarographic technique for studying the chemical equilibria and rates of the reactions in solutions

UNIT - 1

Data Analysis: Accuracy and Precision - Significant Figures - Rounding Off - determinate Errors - Indeterminate errors - sways of Expressing accuracy - standard deviation - Propagation of errors - The Confidence Limit - Tests of Significance - Rejection of a Result:The Q Test - Statistics for Small Data Sets - Linear Least squares - The Correlation Coefficients

UNIT - II

Electro Analytical Methods: Polarography: Principle, experimental technique - dropping mercury electrode - Residual, migration and diffusion currents - Half-wave potential - Ilkovic equation - Analytical applications of polorography - Differential pulse polorography, cyclic voltametry - principle, experimental setup - application - Amperometric titration - principle and types - Titration between $Pb^{2+}$and $K_2Cr_2O_7$. electrogravimetry - theory of electrolysis, experimental set up diagram- applications - ion selective electrodes: principle and applications - DSC: Principle and applications - TMA: Principle and applications

UNIT - III

Thermalmethods Of Analysis: Thermal methods of analysis - Principle - instrumentation -methods of obtaining thermogram- TGA curves for $AgNO_3$, $CuSO_4$, CaC_2O_4,H_2O Differential thermal analysis - Principle - instrumentation - DTA curves for the above compounds. Factors influencing DTA-applications of DTA. Study of Organic reactions, Decomposition of complexes, Thermometric titration.

UNIT - IV

Optical Methods: Colorimetry - Laws of colorimetry - mono chromators, detectors, instrumentation and applications - Estimation of Cr in steel - Biochemical analysis of urea, sugar and cholesterol.

Flame photometry: Principle, Instrumentation and applications.Fluorometry and phosphometry: principle, instrumentation and applications -Refractrometry and polarimetry:principle, instrumentation and applications. AAS, ICP-ES, ICP-MS - electron microscope: SEM, TEM and AFM - principle and applications

UNIT - V

Chromatography And Some Advanced Techniques: Principles, classification (adsorption, partition, column, thin layer and paper chromatographic techniques) and applications - Ion exchange, solvent extraction, GC, HPLC techniques and applications, types of column, detectors applications - GC-MS and HPLC-MS - electrophoresis-Principle, techniques and applications. Detectors-diffrential thermal conductivity detectors.Flame ionization detector and Electron capture detector.

References:

1. F.W. Fifield and D. Kealey, "Principles and practice of Analytical Chemistry", Blackwell Publishing.Fifthh Edition, 2000.
2. J.S. Fritz and G.H. Scheink, "Quantitative Analytical Chemistry",Allyn and Bacon, Inc., Boston, Fifth Edition, 1987.
3. G.D. Christian,"Analytical Chemistry", John Wiley and Sons, Inc., Fifth Edition, 1994.
4. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, "Fundamentals of Analytical Chemistry", Thomson-Brooks.Cole, Eigth Edition, 2004.
5. H.H. Willard, L.L Merritt, J.A. Dean and F.A. Settle, Jr., CBS Publishers and Distributors, New Delhi, Sixth Edition, 1986.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	2	2	3	1	2	2	2	2.2
CO-2	3	3	2	2	2	2	3	2	2	3	2.4
CO-3	2	2	3	3	2	2	3	2	2	2	2.3
CO-4	3	2	2	3	2	2	3	3	2	2	2.4
CO-5	3	2	2	3	2	2	2	2	3	3	2.4
Mean overall Score											2.34(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/Week	Credits
I	A1PCHEL1B	DEC1	Solid State Chemistry	5	4

Course Objectives

- To learn the crystal structures of few inorganic solids.
- To learn the Metallo Organic Frameworks.
- To study the chemistry of crystallization and vapour phase transport.
- To learn the applications of magnetic materials.
- To study the chemistry of organic solids.

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Understand the crystal structure of inorganic solids.
CO2	Learn metaloorganic framework in organometalic system.
CO3	Learn various experimental method for studying solid state molecule.
CO4	Understand the magnetic and optical properties of metals and alloys.
CO5	Get a basic idea about Topochemical control of solid state organic reactions

UNIT I: Crystal Structure and Crystal Engineering of Organic Solids

Types of close packing – hcp and ccp – packing efficiency – SC, BCC, and FCC, radiusratio rule – applications – polyhedral description of solids – structure types: Na_2O,Cs_2O, rutile, perovskite (ABO_3), ReO_3, K_2NiF_4, spinels and antispinels.Hydrogen bonded supramolecular patterns involving water / carboxyl / halide motifs –concepts of different types of synthons based on non-covalent interactions – principlesof crystal engineering and non-covalent synthesis – polymorphism and pseudopolymorphism – supramolecular isomorphism, polymorphism and crystalengineering of pharmaceutical phases.

UNIT II: Metallo Organic Frameworks

M.O.Fs (Metallo Organic Frameworks) – organometallic systems – combinations ofdifferent interactions to design molecular rods, triangles, ladders, networks, etc.Design of nanoporous solids. Interligand hydrogen bonds in metal complexes – implications for drug design – crystalengineering of NLO and OLED materials.

UNIT III: Preparative Methods in Solid State Chemistry

Experimental procedure, coprecipitation as a precursor to solid state reaction, otherprecursor methods, kinetics of solid state reactions – crystallizations of solutions,melts, glasses and gels, solutions and gels: zeolite synthesis – precipitation fromsolution or melt: flux method, epitaxial growth of thin layers, verneuil flame fusionmethod.Graphite intercalation compounds, transition metal dichalcogenide and otherintercalation compounds, ion exchange reaction, synthesis of new metastable phasesby 'Chimie Douce'.Electrochemical reduction methods – preparation of thin films, chemical andelectrochemical methods, physical methods – growth of single crystals, Czochralski method, Bridgman-Stockbarger methods – zone melting.Vapour phase transport, hydrothermal methods, comparison of different methods –high pressure and hydrothermal methods and dry high pressure methods.

UNIT IV: Magnetic Materials and Optical Properties

Selected examples of magnetic materials and their properties – metals and alloys,transition metal oxides, spinels, garnets, ilmenite and perovskites.Magnetoplumbites – applications – structure/property relations – transformer,information storage, magnetic bubble memory devices, permanent magnets.Luminescence, Lasers and phosphors – definitions and general comments,

configurational coordinate model, some phosphor materials, anti-Stokes phosphors –lasers – the ruby laser, Neodymium lasers

UNIT V: Organic Solid State Chemistry

Topochemical control of solid state organic reactions – intramolecular reactions – conformational effects – intermolecular reactions – molecular packing effects –photodimerization of 2-ethoxycinnamic acid (α form, β form, γ form) –photopolymerization of 2,5-distyrylpyrazine – photopolymerizations of diacetylenes.Asymmetric syntheses – dimerization of anthracene – control of molecular packingarrangements.Organic reactions within inorganic host structures – electrically conductive organicsolids – organic metals, conjugated systems, doped polyacetylene, polyparaphenylene,polypyrrole – organic charge transfer complexes – new superconductors

REFERENCES

1. A. R. West, Solid State Chemistry and Its Applications; 2nd Ed., John Wiley ardsons, New York, 2014 (Unit III – V).
2. J. M. Lehn, Supramolecular Chemistry; VCH, Weinheim, 1995.
3. G. R. Desiraju, Crystal Engineering: The Design of Organic Solids; Elsevier,Amsterdam, 1989.
4. G. R. Desiraju, and T. Steiner, The Weak Hydrogen Bond in Structural Chemistryand Biology; Oxford University Press: Oxford, 2002.
5. G. A. Jeffrey, Introduction to Hydrogen Bonding; Oxford University Press, NewYork, 1997.
6. J. M. Lehn, Transition Metals in Supramolecular Chemistry; Vol 5, John Wiley andSons, New York, 1999.
7. C. N. R. Rao, Current Science, 2001, 81, 1030.
8. Journals:

(i) Crystal Growth andDesign.http://www.pubs.acs.org/journals/cgdefu/index.html
(ii) Crystal Engineering Communication, http://www.rsc.org /Publishing/Journals/ce/ index.asp

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	1	3	2	3	2	1	2.2
CO-2	3	3	2	2	1	3	2	3	2	2	2.3
CO-3	2	2	2	2	2	2	2	2	2	2	2.0
CO-4	3	2	3	2	1	3	2	2	2	1	2.1
CO-5	3	3	3	2	2	3	3	2	2	2	2.5
Mean overall Score											**2.22**(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCHEL1C	DEC1	Supramolecular Chemistry	5	4

Course Objectives

- To know the fundamentals of supramolecules.
- To learn the Metallo Organic Frameworks.
- To learn co-receptor molecules and multiple recognition.
- To study the supramolecular reactivity and catalysis.
- To study the Supramolecular Devices.

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Have a good overview of the core concepts in supramolecular chemistry and explain non covalent interactions, molecular recoginition and self-assembly.
CO2	Understand the organometallic systems include drug design and crystal engineering.
CO3	Understand Dinuclear and polynulclear metal ion cryptates.
CO4	Describe the applications of supramolecular chemistry including industrial applications and supramolecular catalysis.
CO5	Understand the fundamentals of supramolecular photochemistry.

UNIT I: Concepts of Supramolecular Chemistry

Concepts and languages of supramolecular chemistry – various types of noncovalent interactions – hydrogen bonds, C-H...X interactions, halogen bonds –π-π interactions, non–bonded interactions – various types of molecularrecognition.Crystal engineering of organic solids – hydrogen bonded supramolecularpatterns involving water / carboxyl / halide motifs – concepts of different typesof synthons based on non-covalent interactions – principles of crystalengineering and non-covalent synthesis – polymorphism andpseudopolymorphism – supramolecular isomorphism / polymorphism – crystalengineering of pharmaceutical phases.

UNIT II: Metallo Organic Frameworks

M.O.F (Metallo Organic Frameworks) – organometallic systems – combinations of different interactions to design molecular rods, triangles, ladders, networks,etc. – design of nanoporous solids – interligand hydrogen bonds in metalcomplexes – implications for drug design – crystal engineering of NLO materials, OLED.

UNIT III: Co-receptor Molecules and Multiple Recognition

Dinuclear and polynulclear metal ion cryptates – linear recognition ofmolecular length by ditopic co-receptors – heterotopic co-receptors –cyclophane receptors, amphiphilic receptors and large molecular cages –multiple recognition in metalloreceptors – supramolecular dynamics.

UNIT IV: Supramolecular Reactivity and Catalysis

Catalysis by reactive macrocyclic cation receptor molecules – catalysis byreactive anion receptor molecules – catalysis with cyclophane type receptors –supramolecular metallocatalysis – cocatalysis – catalysis of synthetic reactions– biomolecular and abiotic catalysis.Supramolecular chemistry in solution – cyclodextrin, micelles, dendrimers,gelators – classification and typical reactions – applications.

UNIT V: Supramolecular Devices

Supramolecular devices and sensors – various types of supramolecular devices– an overview – supramolecular photochemistry – molecular and supramolecular photonic devices – light conversion and energy transfer devices– molecular and supramolecular electronic devices – electronic conducting devices – molecular wires, modified and switchable molecular wires –molecular and supramolecular ionic devices – tubular mesophases, molecular protonics – switching devices – electro-photo switch – ion and molecule sensors– role of supramolecular chemistry in the development of nanoscience andtechnology.

REFERENCES

1. J. M. Lehn, Supramolecular Chemistry; VCH, Weinheim, Germany, 1995.
2. G. R. Desiraju, Crystal Engineering: The Design of Organic Solids; Elsevier, UnitedStates, 1989.
3. G. R. Desiraju, and T. Steiner, The Weak Hydrogen Bond in Structural Chemistryand Biology; Oxford University Press, Oxford, 1999.
4. G. A Jeffrey, Introduction to Hydrogen Bonding; Oxford University Press: UK, 1997.
5. J. M. Lehn, Transition Metals in Supramolecular Chemistry; John Wiley and Sons:New York, 1999.
6. G. R. Desiraju, Current Science; 2001, 81, 1038.
7. Web source:

(i) Crystal Growth and Design,http://www.pubs.acs.org/journals/cgdefu/index.html

(ii)CrystalengineeringCommunicationhttp://www.rsc.org/Publishing/Journals/ce/index.asp

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	3	3	2	3	2	1	2.3
CO-2	3	3	2	2	1	3	2	3	2	2	2.3
CO-3	2	2	2	2	2	2	3	2	2	2	2.1
CO-4	3	2	3	2	3	3	2	2	2	1	2.3
CO-5	3	3	3	2	2	3	3	2	2	2	2.5
Mean overall Score											**2.3**(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/Week	Credits
II	A2PCH5	CC5	Inorganic Chemistry - II	6	4

Course Objectives

- To learn the concepts of CFT and MO theory of complexes
- To interpret the stability of various complexes
- To understand the various concepts of Carbon Π donor complexes in organometallic chemistry.
- To acquire knowledge about synthesis, structure and bonding in olefins.
- To impart knowledge and applications of Bioinorganic chemistry

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Understand the splitting pattern and spectral properties of coordination complexes.
CO2	Understand the stability nature includes thermodynamic and kinetic view of Coordination compounds
CO3	Understand the bonding nature of various metal carbonyls.
CO4	Understand the synthesis, structure and bonding in Carbon pi-donor complexes.
CO5	Study the role of inorganic substances in biological acivities.

UNIT - I

Coordination chemistry: Crystal field theory -splitting of d orbitals in octahedral, trigonal, square planar, trigonal bipyramidal, square pyramidal and cubic symmetries-CFSE-strong field and weak field splitting- Jahn-Teller distortion- static and dynamic John Teller effect and chelation .Factors affecting the splitting, Spectrochemical studies, Jorgenson relation, Applications of CFT-magnetic propertie, spectral properties and kinetic properties- Limitations of CFT- evidences for CFT.

M.O.T-MO theory of octahedral complexes (sigma and pi bonding), tetrahedral and square planar complexes. Nephelauxetic effect – Comparison of CFT and MOT of bonding in octahedral complexes.

UNIT - II

Stability of coordination compounds: Stability of complexes- Factor affecting stability of complexes-thermodynamic aspects of complex formation- stepwise and overall formation constants- -stability correlation- statistical factors and chelate effects-determination of stability constants- Bjerrum's half method, polorographic,potentiometric method, photometric method and Job's method.

Kinetics aspects of complex formation-Labile and inert complexes - ligand displacement reactions- trans effect- electron transfer reactions - complementary and non complementary types - inner sphere and outer sphere processes - isomerisation and racemisation.- reactions of coordinated ligands - template effect and synthesis of macrocyclic ligands.

UNIT - III

Organometallic compounds: Types of organometallic compounds on the basis of the nature of M-C bond.EAN rule - 18 electron rule and 16electron rule-determination of Coordination number and configuration. Complexes of pi acceptor ligands-structure of carbonyls-(mono and polynuclear)-application of IR to identify the terminal and bridging CO-Hybridisation and structure of carbonyls- $Ni(CO)_4$,$Fe_3(CO)_9$, $Cr(CO)_6$, $Re_2(CO)_{10}$ and $Mn_2(CO)_{10}$-isolobal fragments-nitrosyl complexes -bridging and terminal nitrosyls-bent and linear nitrosyls,-dinitrogen complexes.

UNIT - IV

Carbon pi-donor complexes : Synthesis, structure and bonding in olefins, acetylenes and allyl complexes-metallocenes-molecular orbitals ofmetallocenes-catalysis by organometallic compounds - hydrogenation and hydroformylation of olefins-oxidation of olefins to aldehydes and ketones-polymerisation of allenes - cyclo oligomerisation of acetylene-Fischer- Tropsch synthesis.

UNIT - V

Bio-inorganic chemistry : Bio membranes- membrane transport- sodium and potassium pumps - crown ethers , cryptands , spherands , chemotherapy - Pt complexes in cancerotherapy - Cis platin and its mode of action - cytotoxic compounds of other metals - Gold containing drugs as anti Rheumatic agents and their mode of action - Lithium in psycho Pharmacological.

References:

1. Shriver, Atkins and Langford Inorganic Chemistry, ELBS, 1994
2. F.A.Cotton and G.Wilkinson, " Advanced Inorganic Chemistry", 4 th ed., A Wiley - Interscience Publication, John -Wiley & Sons, USA.
3. J.E. Huheey, "Inorganic Chemistry" 3 rd . ed., Harper & Row publisher, Singapore. 4.
4. S. Glasstone, "Source Book on Atomic Energy", D.Van Nostrand, New York 1967 (Affiliated East-West Press, New Delhi 1969)
5. Purcell and Kotz, "Inorganic Chemistry", Saunders Golden Sunburst Series, W. B. Saunders Company, Philadelphia
6. W. Kaim and B. Schewederski, Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life, John Wiley & Sons, New York, USA.
7. R. W. Hay, "Bioinorganic Chemistry".
8. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry, Panima Publishing Company, New Delhi, 1997.
9. A.W. Adamson and P. D. Fleischauer, "Concepts of Inorganic Photochemistry", Wiley, New York, 1975.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	2	1	2	3	2	2	2	2.1
CO-2	1	2	3	3	2	2	3	1	2	3	2.2
CO-3	2	3	2	2	2	3	2	2	2	2	2.2
CO-4	2	3	2	3	2	2	3	2	2	2	2.3
CO-5	2	3	2	2	3	2	2	3	3	2	2.4
Mean overall Score											**2.24**(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/Week	Credits
II	A2PCH6	CC6	Organic Chemistry - II	6	4

Course Objectives

- To learn the aspects of aliphatic electrophilic and aromatic electrophilic substitution reactions and its applications.
- To study the aspects of aliphatic nucleophilic and aromatic nucleophilic substitution reactions and its applications.
- To appreciate the principles of addition reactions.
- To understand the concept of Terpenes,Alkaloids and Vitamins
- To learn various types of rearrangement and reagents..

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No	CO-Statements
CO1	Describe the mechanism of different aliphatic nucleophillic substitution reactions.
CO2	Recognize either molecule is aromatic, non-aromatic or anti aromatic.
CO3	Have adequate knowledge about the addition reaction includes carbon- carbon multiple bonds and carbonyl group.
CO4	Understand the naming reaction and molecular rearrangement
CO5	Have the knowledge of natural products such as Terpenes, Alkaloids and Vitamins.

UNIT - I

Aliphatic nucleophilic substitution : SN_1, SN_2, and SN_i mechanisms- solvent and leaving group effects and neighboring group participation(NGP)—substitution in allylic carbons and reactivity-ambident nucleophiles.

Elimination reactions : E_1, E_2 and Ei mechanisms- Hoffman and Saytzeff rules-Chugaev reaction-cope elimination- Hoffmann degradation and pyrolysis of esters.

Aliphatic electrophilic substitution : SE^1,SE^2, and SE^i mechanism-effect of leaving groups andsolvent-Stark-Enamine reaction-decarboxilation of aliphatic acids- halogenation of aldehydes and ketones.

UNIT - II

Aromatic compounds : Elements of aromaticity-Huckel and Craig's rule-Effects of aromaticity on bond lengths- ring currents-Nonbenzanoid aromatic compounds- aromatic character in three, five,seven and eight membered rings-anti-aromaticity-system with 2,4,6,8 and10 electron system.-annulenes and avonones. Aromaticity in ferrocene.

Aromatic electrophilic substitution : Mechanism-orientation and reactivity- nitration, halogenation, friedel Craft reaction-Gattermann, Kolbe-Schmidt , Reimer-Tiemann, Hauben-Hoesch reactions.

Aromatic Nucleophilic substitution:-Aromatic Nucleophilic substitution in aryl halides by Meisenheimer complex mechanisms and benzyne mechanism- effect of substrate structure, leaving groups, attacking nucleophiles and solvents - selected reactions - Zeigler alkylation, Chichibabin reaction- reactions involving diazonium group as leaving group - cine substitution - von Richter reaction.

UNIT - III

Addition reactions : Addition to carbon -carbon multiple bonds-electrophilic addition- nucleophilic, free radical additions, orientation and reactivity- Birch reduction,hydroxylation, hydroboration,

epoxidation, Diels-Alder reaction, Michael addition, ozonolysis, carbenes and their addition to double bonds.

Addition to carbonyl groups : Mannich , crossed cannizzaro , Stobbe , Benzoin , formation of ketenes , openauer oxidation , MPV reduction , Darzen's glycidic ester condensation , wittig reactions.

UNIT - IV

Molecular rearrangements: Mechanism of the following- wagner Meerwin-Dienone phenol- Wolf-Lozson-Schmidt-Bayer Villiger-Stevens-Wittig-Favoraski and Beckmann rearrangements.

Reagents in Organic Syntheses: Complex metal hydrides - $LiAlH_4$, $NaBH_4$, tri tert-butoxyaluminium hydride, Gilman's reagents, Lithium dimethylcuprate, lithium di-isopropyl amide, dicyclohexylcarbodiimides, DDZ, SeO_3- phase transfer catalyst-Crown ethers.

UNIT - V

Natural products : Isolation and detection of natural products - a brief outline to carotenoids, flavonoids and anthocynins with one example each (structural elucidation not needed)

Terpenes: structural elucidation , Medicinal values and synthesis of α-pinene, camphor and zingiberene - biosyntheses of terpenes.

Alkaloids: Structural elucidation, medicinal values and synthesis of quinine, reserpine, morphine, cinchonine and papavarine - biosyntheses of alkaloids.

Vitamins: Physiological importance-structural elucidation of vitamins -B_1, B_2, B_6, E and K.

References:

1. J. March, "Advanced Organic Chemistry: Reactions, Mechanisms and Structure",4th ed., Wiley, 1992.
2. R.K. Bansal, "Organic Reaction Mechanisms", Tata McGraw Hill, 1975.
3. P. S. Kalsi, "Organic Reactions and their Mechanisms", New Age International Publishers. I.L. Finar, "Organic Chemistry", Vol.II, 5 th ed., ELBS 1975.
4. O.P. Agarwal, Chemistry of Organic Natural Products, Vol. I & II, Goel Publications, 1997.
5. F.A. Carey and R.J. Sunberg, "Advanced Organic Chemistry, Parts A & B, Plenum, 1984.
6. T.H. Lowry and K.S.Richardson, "Mechanism and Theory in Organic Chemistry", Harper and Row, 1976.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	3	2	2	1	3	2	3	2	1	2.2
CO-2	3	3	2	2	1	3	2	3	2	2	2.3
CO-3	2	2	2	2	2	2	2	2	2	2	2.0
CO-4	3	2	3	2	1	3	2	2	2	1	2.1
CO-5	3	3	3	2	2	3	3	2	2	2	2.5
Mean overall Score											**2.22**(High)

Question Paper Pattern

Maximum Marks: **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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HEAD OF THE DEPARTMENT OF CHEMISTRY
RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
II	A2PCH7P	CC7	Inorganic Chemistry Practical – II	6	4

Course Objectives

- To impart knowledge on Quantitative analysis of inorganic metal mixture using Titrimetry and gravimetry
- To gain the depth knowledge in c preparation of Inorganic complexes.

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Understand the crystal structure of inorganic solids.
CO2	Learn metaloorganic framework in organometalic system.
CO3	Learn various experimental method for studying solid state molecule.
CO4	Understand the magnetic and optical properties of metals and alloys.
CO5	Get a basic idea about Topo chemical control of solid state organic reactions

I.Estimations of Metal Ions in a Binary Mixture

1. Quantitative analysis of a mixture of iron (volumetry) and nickel (gravimetry)
2. Quantitative analysis of a mixture of copper (volumetry) and nickel (gravimetry)
3. Quantitative analysis of a mixture of iron (volumetry) and zinc (gravimetry)
4. Quantitative analysis of a mixture of zinc (volumetry) and copper (gravimetry)
5. Quantitative analysis of a mixture of copper (volumetric) and zinc (gravimetry)

II.Preparation of the following complexes

1. Tetrammine copper(ii) sulphate.
2. Potassium tri oxalato chromate (iii)
3. Hexa thiourea Lead (ii) nitrate
4. Potassium tri oxalato aluminate(iii)
5. Tristhiourea copper(I) chloride
6. Tris thiourea copper(ii) sulphate

Books for Reference

1. Skoog D A, West D M, Holler F J, and Crouch S R, *Fundamentals of Analytical Chemistry*, 9th Edition, Brooks/Cole Cengage Learning, Belmont, CA 94002-3098, USA, 2014 .
2. Pass G and Sutcliffe H, *Practical Inorganic Chemistry*, 2nd Edition, Chapman and Hall, London, 1974.
3.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	1	3	2	3	2	3	2	2	2.3
CO-2	2	2	2	3	1	2	2	3	3	2	2.2
CO-3	3	2	2	2	2	2	2	3	3	2	2.3
CO-4	3	3	2	3	2	3	3	3	2	2	2.5
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean overall Score											2.38(High)

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Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
II	A2PCH8P	CC8	Organic Chemistry Practical – II	5	4

Course Objectives

- To impart knowledge on Quantitative analysis of organic mixture.
- To gain the depth knowledge in Double stage preparation of different organic compounds

Course Outcomes (CO)

At the completion of this course, students will be able

CO No.	CO-Statements
CO1	To understand the crystal structure of inorganic solids.
CO2	To learn metaloorganic framework in organometalic system.
CO3	To learn various experimental method for studying solid state molecule.
CO4	To understand the magnetic and optical properties of metals and alloys.
CO5	To get a basic idea about Topochemical control of solid state organic reactions

I.Quantitative Analysis Organic Compounds

1. Determination of saponification value of edible oil.
2. Estimation of iodine value of oil.
3. Estimation of phenol
4. Estimation of aniline.
5. Estimation of glucose.

II.Double stage Preparation:

a) p- bromo acetanilide from aniline
b) acetyl salycilic acid from methyl salicylate
c) 1,3,5 tribromo benzene from aniline
d) p-nitro aniline from acetanilide
e) benzylic acid from benzoin by rearrangement
f) benzanilde from benzophenone by rearrangement
g) p- amino benzoic acid from p-nitro aniline.
h) p-bromo aniline from acetanilide
i) m- nitro aniline from nitro benzene
j) 1,2,4-triacetoxybenzenefromhydroquinone. (oxidation plus acetylation)

References

1. Ganapragasm N S and Ramamurthy C, *Organic Chemistry Lab Manual*, 2nd Edition, Vishwanathan S Printers and Publishers (P) Ltd., Chennai, 2015.
2. Furniss B S, Hannaford A J, Smith P W G, and Tatchell A R, *Vogel's Textbook of Practical Organic Chemistry*, 5th Edition, Pearson publication.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	1	2	3	3	2	3	2	3	3	2.4
CO-2	1	2	3	3	2	3	3	3	3	3	2.6
CO-3	2	3	2	3	2	2	3	2	2	2	2.3
CO-4	3	2	3	3	2	2	3	1	2	3	2.4
CO-5	2	3	2	2	3	2	2	3	3	1	2.3
Mean overall Score											2.4(High)

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Semester	Code	Course	Title of the Paper	Hours/Week	Credits
II	A2PCHEL2A	DEC2	Physical Chemistry - I	5	4

Course Objectives

- To study about the quantum concept and atomic and molecular structures.
- To study the principle, selection rules and applications of molecular spectroscopy includes Microwave, IR and Raman.
- To get acquainted with classical thermodynamics.
- To impart the knowledge on Chemical kinetics.
- To get the deep knowledge of photochemistry

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Understand the mathematics associated with quantum statistics including certain aspects of linear algebra.
CO2	Understand the detailed information about microwave, IR and Raman spectroscopy.
CO3	Attain the depth knowledge about quantum chemistry and to Know the Eigen function, Eigen value, operator and postulates of quantum mechanics.
CO4	Learn two and three dimensional box, mechanics of particle.
CO5	Use the simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics.

UNIT - I

Quantum chemistry I: Black body radiation-Planck's quantum theory-uncertainity principle.Time independent Schrödinger's wave equation (SWE) from classical wave equation and de Broglie relationship - elementary ideas about time dependent SWE - Postulates of Quantum Mechanics - Operator Algebra - linear, non-linear and ladder operators - Hermitian operators(definition and theorems) and their properties - proof of Hermitian nature of linear, angular, position and Hamiltonian operators – eigen functions and eigen values - normalization and orthogonality - principle of superposition - commutation relations of linear and angular momentum operators - average/expectation values.

Application of SWE to model systems- particle in one and three dimensional boxes - quantum numbers, distortion of the box, zeropoint energy and uncertainty principle - orthogonality and normalization - finite potential barrier and tunneling.

UNIT - II

Molecular Spectroscopy - I: Microwave spectroscopy : Theory of linear, symmetric and asymmetric top molecules.

Infrared spectroscopy : vibrational spectra - selection rules-harmonic and un-harmonic oscillators - (fundamental absorption, first and second overtones, hot bands etc) - rotation-vibration spectra of diatomic molecules (P,Q,R branches; breakdown of Born-Oppenheimer approximation), selection rules and transitions for rigid-rotor-harmonic oscillator model - relative intensities - coupling of rotation and vibration - linear and symmetric top molecules (parallel and perpendicular bands) - influence of rotation on the rotation of polyatomic molecules Fourier Transform IR spectrometry.

Raman spectroscopy: Raman effect-elastic and inelastic scattering- selection rules-pure rotational Raman Spectra (linear, spherical top, symmetric top and asymmetric top molecules) - vibrational Raman spectra - polarization of light and Raman effect - comparison of IR and Raman spectra - simple molecules - mutual exclusion principle - Fermi resonance - laser Raman spectroscopy.

UNIT – III

Classical thermodynamics: thermodynamics of systems of variable composition - partial molar quantities and additive rules - chemical potential -relationship between partial molar

quantities - Gibbs-Duhem equation- calculation of partial molar quantities from experimental data - thermodynamic properties of real gases - fugacity - definition, calculation (real gases) - and variation of fugacity with temperature, pressure and composition (Duhem-Margules equation) - activity and activity coefficient definition - standard states - colligative properties and the activity of the solute - experimental determination of activity and activity coefficients of non-electrolytes - activities in electrolytic solutions - determination of activity coefficient of electrolytes by freezing point method.

UNIT - IV

Chemical kinetics I : Theories of reaction rates -Bimolecular collision theory, absolute reaction rate theory ARRT- significance of reaction coordinate - potential energy surfaces - kinetic isotopic effect - opposing, parallel and consecutive reactions - the Hinshelwood theory - Kassel, Rice and Ramsperger (KRR) theory - KRRM method - the Slater treatment - Principle of microscopic reversibility - Steady state approximation - chain reactions - thermal and photochemical reactions between hydrogen and halogens. Gas phase auto-oxidation, explosions and hydrogen-oxygen reaction.

Factors influencing reaction rates in solutions -Enzyme kinetics-Michale's Menton equation and application-LFER-Hammett and Taft equations-application.

UNIT - V

Fast reaction techniques : Flow methods (continuous and stopped flow methods) - relaxation methods (T and P jump methods) - pulse techniques (flash photolysis, shock tube method) - molecular beam method - half life time method.

Photochemistry: Photophysical processes in electronically excited molecules - Jablonski diagram -Stern-Volmer Equation and its applications - experimental techniques in photochemistry - chemical actinometers - lasers and their applications. Fluorescence,Quenching- static and dynamic quenching Stern-Volmer Plot - linear and non-linear plots - Reasons fordeviation in stern-volmer plot. Excited state life time - definition of life time estimation of life time by time - correlated single photon counting technique.

References:

1. R.K. Prasad, Quantum Chemistry, New Age International Ltd,
2. A.K. Chandra, " Introductory Quantum Chemistry", 4 th ed,. Tata MCGraw Hill (1994)
3. D.A. Mcquarrie, "Quantum Chemistry", University Science Books (1998)
4. F.L.Pillar."Elementary Quantum Chemistry", McGraw Hill (1968)
5. J.P.Lowe, "Quantum Chemistry", Academic Press (1978).
6. I.N.Levine, "Quantum Chemistry", Allyn and Bacon (1983).
7. P.W.Atkins, "Molecular Quantum mechanics", Clarendon Press New York(1973).
8. K.J. Laidler, "Chemical Kinetics",2 nd ed., Tata McGraw Hill (1975).
9. A.A. Frost and R.G.Pearson, "Kinetics and Mechanisms", John Wiley & Sons, New York, 1953.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	1	3	2	2	3	3	1	**2.2**
CO-2	2	3	2	3	2	1	2	3	2	3	**2.3**
CO-3	1	3	2	3	2	2	3	2	1	2	**2.1**
CO-4	2	1	3	3	2	2	3	2	2	3	**2.3**
CO-5	2	3	2	3	2	2	3	2	3	3	**2.5**
Mean overall Score											**2.28**(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)

Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)

Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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RAJAH SERFOJI GOVT. COLLEGE
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A2PCHEL2B	DEC2	Pharmaceutical Chemistry	5	4

Course Objectives

- To understand the basics of pharmaceutical chemistry.
- To study the antibiotics and their activity.
- To learn the analgesic and antipyretic activities.
- To know the activities of anaesthetics and local anaesthetics.
- To understand concept of clinical chemistry

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No.	CO-Statements
CO1	Learn about the structure and synthesis of antibiotics
CO2	Know the classification of enzymes.
CO3	Know the Structural Activity Relationship of different class of drugs
CO4	Study the chemical synthesis of selected drugs.
CO5	Learn standardization and quality control of different raw materials

UNIT I: Basics of Pharmaceutical Chemistry

Definitions – the terms – drugs, pharmacology, pharmacy, chemotherapy,therapeutics – pharmacologically active principles in plants – first aid –important rules of first aids, cuts, fractures, bleeding for blood, maintainingbreathing burns and first aid box – tuberculosis (T.B.), jaundice, piles, typhoid,malaria, cholera – causes – symptoms, diagnosis – prevention and treatment –medicinally important compounds of iron – ferrous gluconate, ferrous sulphateand ferric ammonium citrate.

UNIT II: Antibiotics

Definition – introduction – classification and biological actions – penicillin,chloramphenicol, streptomycin and tetracycline – structure, properties andtherapeutic uses – chemical structure and pharmacological activity – effect ofunsaturation, chain length, isomerism, halogens, amino groups, hydroxylgroups and acid groups.

UNIT III: Analgesic and Antipyretics

Narcotic analgesic – analgesic action of morphine – derivatives of morphine –heroin and apomorphine – synthetic analgesics – pethidine, methadone – nonnarcoticanalgesic – aspirin, paracetamol and phenacetin – analgin –preparation, properties and uses – ibuprofen and ketoprofen – structure anduses.

UNIT IV: Anaesthetics and Local Anaesthetics

Characteristics of anaesthetics – classification of anaesthetics – generalanaesthetics – volatile anaesthetics – ether, chloroform and halothane –advantages and disadvantages – non-volatile anaesthetics (intravenousanaesthetics) – methohexitone and propanidid – structure and uses – cocaineand amethocaine – structure and uses – benzocaine and procaine – structure, synthesis and uses.

UNIT V: Clinical Chemistry

Determination of sugar (glucose) in serum – *o*-toluidine method – diagnostictest for sugar in urine – Benedict's test – detection of diabetes – detection ofcholesterol in urine – detection of anaemia – estimation of haemoglobin (Hbconcentration) – red cell count.

REFERENCES

1. Jayashree Ghosh, A Text Book of Pharmaceutical Chemistry; 5th Ed., S.Chand and Company Ltd., New Delhi, 2014.
2. S. Lakshmi; Pharmaceutical Chemistry; 1st Ed., S. Chand and Company Ltd., New Delhi, 1995.
3. Bhagavathi Sundari; Applied Chemistry; 1st Ed., MJP Publishers, Chennai,2006.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	1	2	2	3	3	3	2.3
CO-2	2	2	3	3	1	2	2	3	2	2	2.1
CO-3	3	2	2	2	2	2	3	3	3	2	2.3
CO-4	3	3	2	3	2	3	3	3	2	2	2.3
CO-5	2	3	3	2	3	2	3	2	3	3	2.6
Mean overall Score											2.32(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25 Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
II	A2PCHEL2C	DEC2	Bio-organic Chemistry	5	4

Course Objectives

- To learn the preparation, properties of amino acids and proteins.
- To study the activity of enzymes and cofactors.
- To know basics of lipids and nucleic acids.
- To learn the concept of bioenergetics.
- To learn the principles of lead and analogue synthesis

Course Outcomes (CO)

At the completion of this course, students will be able to

CO No	CO-Statements
CO1	Learn about the structure and synthesis of amino acids.
CO2	Know the classification of enzymes and cofactors.
CO3	Know the Structural Activity nucleosides and nucleotides
CO4	Study the Standard free energy values of chemical reactions.
CO5	Learn the Designing organic synthesis.

UNIT I: Amino Acids and Proteins

Structure, classification, synthesis and properties of amino acids –biosynthesis of amino acids – peptides – N-terminal and C-terminal residueanalysis – solid phase peptide synthesis.
Proteins – classification and properties (denaturation, isoelectric point andelectrophoresis), primary, secondary, tertiary and quaternary structures ofproteins – biological roles of proteins.

UNIT II: Enzymes and Cofactors

Chemical nature of enzymes – characteristics of enzymes – colloidal nature,catalytic nature. Mechanism of enzymes – Michaelis-Menten hypothesis – Fischer's lock and keymodel – regulation of enzyme activity.Structure and biological functions of coenzyme A, NAD+, FAD and vitamin B12.

UNIT III: Lipids and Nucleic Acids

Lipids – definition – simple lipids – fats and oils – compound lipids –phospholipids. glycolipids – physical properties – solubility, melting point,surface tension, emulsification and geometric isomerism – chemical properties– reaction involving -COOH group, -OH group and double bonds.Nucleic Acid – definition – nucleosides and nucleotides – deoxyribonucleic acid(DNA) – internucleotides linkages – base composition – double helical structure.

UNIT IV: Bioenergetics

Concept of energy – thermodynamic principles – first law, second law,combining the two laws – relationship between standard free energy changeand equilibrium constant.Standard free energy values of chemical reactions – Adenosine triphosphate(ATP) as universal currency of free energy in biological systems – ATPhydrolysis and equilibria of coupled reactions – inter conversion of adeninenucleotides.

UNIT V: Lead and Analogue Synthesis

Designing organic synthesis – disconnection approach – synthons and synthetic equivalents – one group disconnections: alcohol, acid and ketone –functional group interconversions.Asymmetric synthesis – basic principles – stereoselective and stereospecificreactions – reagents, catalysts and their applications (wherever applicable) in alkylation and hydrogenation – Jacobsen's catalyst – Evan's catalyst.

REFERENCES

1. J. L. Jain, Fundamentals of Biochemistry; S. Chand and Co., New Delhi, 2007[Unit- I, II, III, IV].
2. N. C. Price and L. Stevens, Fundamental of Enzymology; Oxford UniversityPress, UK, 1999 [Unit-II].
3. F. A. Carey and R. J. Sundberg, Advanced Organic Chemistry: Part-A and Part-B;5th Ed., Springer, Germany, 2008 [Unit-I, II, III].
4. S. Warren, Designing Organic Synthesis: The Disconnection Approach; 2nd Ed.,Wiley, New York, 2008 [Unit-V].
5. H. B. Kagan, Asymmetric Synthesis; Thieme Medical Publishers, Germany, 2009 [Unit – V].

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	3	2	3	2	3	2	2	2.4
CO-2	2	1	3	3	1	2	2	3	3	2	2.2
CO-3	3	3	3	2	2	2	2	3	3	2	2.5
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean overall Score											2.5(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: 3 Hours**

Part A – 10 X 2 = 20 Answer All Questions (Two questions from each unit)
Part B – 5 X 5 = 25Answer All Questions (Either 0r type -Two questions from each unit)
Part C – 3 X 10 = 30 Answer Any THREE (One question from each unit)

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Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCHGE1	GEC1	Chemistry In Every Day Life	2	2

Course Objectives

To learn about cleaning agents
To acquire the knowledge of Cosmetics
To study the various concepts of Paints and varnishes.
To understand the various Fertilizers

Course Outcomes (CO)

At the completion of this course, students will

CO No	CO-Statements
CO1	Have knowledge of the composition and preparation of cleansing agents at different scales
CO2	Have knowledge of the composition and preparation of cosmetics at different scales.
CO3	Have knowledge of chemical compounds used as medicines for common curatives and deterrents.
CO4	Have knowledge of the constituents and manufacturing paints and varnishes
CO5	Have knowledge of preparation and properties of Nitrogen based fertilizers.

UNIT – 1

Cleaning agents – soaps- detergents- types–composition-manufacture –foaming, colouring and building agents . shampoo, washing powder and bleaching powder.

UNIT – II

Cosmetics- Face powder-constituents uses-side effects. Nail polish, hairdye- composition and side effects . Tooth powder- composition and manufacturing .

UNIT – III

Medicines in day- to-day life - analgesics, anti pyretics, anti inflammatory, antibiotics, antiseptic and disinfectants- definition, examples and uses.

UNIT – IV

Paints and varnishes-constituents, manufacturing-medium -binder –pigments- types of paints - requirements of good paints,

UNIT – V

Fertilizers- fertilizer industries in India .Manufacture of ammonium salts, urea, and ammonium super phosphates.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	2	3	2	3	2	3	2	2	2.4
CO-2	2	1	3	3	1	2	2	3	3	2	2.2
CO-3	3	3	3	2	2	2	2	3	3	2	2.5
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.4
Mean overall Score											2.4(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: Three Hours**

Part A – 5 X 15 = 75 Answer Any FIVE out of Eight Questions

Semester	Code	Course	Title of the Paper	Hours/ Week	Credits
I	A1PCHGE2	GEC2	FOOD AND ADULTERANTS	2	2

Course Objectives

To learn about Food Adulteration
To acquire the knowledge of Commonly Adulterated Food
To study the Food Laws and Standards.
To understand the Harmful Effects of Adulterants.
To study the Methods for Detection of Adulterants

Course Outcomes (CO)

At the completion of this course, students will

CO No	CO-Statements
CO1	Have acquired knowledge of the different types of adulteration and adulterants.
CO2	Have knowledge of types of adulteration in common food items
CO3	Have knowledge of various laws and regulations which deal with offences of food adulteration
CO4	Have knowledge of harmful effects of adulterants on human health.
CO5	Have knowledge of analysis ,identification and understanding the effects of food adulterants.

UNIT I

Food Adulteration:

Definition, reasons. Characteristics of Adulteration. Classification and types of Adulterants-Intentional Adultterants,Incidental adulterants, Packaging Hazard and Metallic Contaminants.

UNIT II

Foods Commonly Adulterated

Food grains like wheat, rice, pulses and their products like wheat flour, semolina (*suji*) and gram flour.
Edible oils and fats like groundnut oil, sunflower oil, mustard oil and vanaspati.
Sweetening agents like sugar, honey and Jaggery.
Non-alcoholic beverages like aerated drinks, squashes and juices.

UNIT III

Food Laws and Standards:

Codex Alimentations , Prevention of Food Adulteration (PFA) Act, Agmark, Fruit Products Order (FPO), Meat Products Order (MPO), Bureau of Indian Standards (BIS) and Food Standards and Safety Authority of India(FSSAI)

UNIT IV

Harmful Effects of Adulterants:

Toxic adulterants in milk and their ill-effects, Toxic adulterants in oil and their ill-effects, Toxicity of food colours.

UNIT V

Methods for Detection of Some Adulterants:

Milk, milk product, Ghee, butter Oils and fats, Black pepper ,Mustard seeds, Coffee ,Chilly or Turmeric powder

Reference Books and Websites:

1. A first course in Food Analysis –A.Y.Sathe, New Age International(P)Ltd.,1999
2. Food Safety, casestudies–Ramesh.V.Bhat, NIN, 1992 3.
3. Shakuntala Manay N and Shadaksharaswamy M. Foods-facts and principles. 3rd edition New age International
4. https://www.fssai.gov.in/
5. Principles & Techniques of Practical biochemistry by Wilson N . Walker
6. Mohini Sethi and Eram S Rao. Food science experiments and applications. CBS publishers.

Relationship matrix for Course outcomes,Programme outcomes/Programme specific outcomes

Course outcomes	Programme outcomes(PO)					Programme specific outcomes(PSO)					Mean Scores
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	3	2	3	3	2	2	3	2	2.4
CO-2	3	2	2	3	2	2	2	2	3	2	2.3
CO-3	2	2	2	3	1	3	1	2	2	3	2.1
CO-4	3	2	2	3	2	2	3	2	2	3	2.4
CO-5	3	2	2	2	2	1	2	3	3	2	2.2
Mean overall Score											2.28(High)

Question Paper Pattern

Maximum Marks: 75 **Exam duration: Three Hours**

Part A – 5 X 15 = 75 Answer Any FIVE out of Eight Questions

Signature of the HOD

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