

**RAJAH SERFOJI GOVERNMENT COLLEGE  
(AUTONOMOUS)  
THANJAVUR – 613 005**



**PG & RESEARCH DEPARTMENT OF CHEMISTRY**

**SYLLABUS FOR  
B.Sc. Degree Programme in Chemistry**

**Semester Pattern (THREE-YEAR DEGREE PROGRAMME)**

**LOCF WITH CHOICE BASED CREDIT SYSTEM**

**Effective from the Academic Year 2022-2023**

RAJAH SERFOJI G.O.T. 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-CBGS 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-CBGS 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 curriculum structure and syllabus to the PG programme (Food and Additives) as per the UGC-CBGS 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

ASSOCIATE PROFESSOR & HEAD

DEPT. OF CHEMISTRY, RSGT-TNI-05

CHAIRMAN

S. P. Elangovan  
18/8/22

2. DR. A. ILLANGOVAN

PROFESSOR,

DEPARTMENT OF CHEMISTRY

BHARATHIDASAN UNIVERSITY,

TRICHIRAPPALLI - 24

UNIVERSITY 1987

NOMINEE

A. Illangovan

18/8/22

3. DR. K. KRISHNASAMY

PROFESSOR OF CHEMISTRY

DEPT. OF CHEMISTRY, ANNAMALAI UNIVERSITY

CHIDAMBARAM.

SUBJECT 1987

EXPERT-I

K. Krishnasamy

18/8/22

4. DR. R. THIRUNEELAKANDAN

PROFESSOR OF CHEMISTRY

DEPT. OF CHEMISTRY

ANNA UNIVERSITY, BIT CAMPUS

TRICHY - 24.

SUBJECT

EXPERT-II

R. Thiruneelakandan

18/8/22

5. MR. SEKAR GANESAN

HEAD - SOUTH INDIA OPERATIONS

BASF INDIA LTD - CHENNAI - 04

INDUSTRIALIST

6. DR. M. PUGAZHENTHI

ASSISTANT PROFESSOR

ANUHARSHI PUSHPAM COLLEGE (A)

POONDI - 05, THANJAVUR

ALUMNUS

M. Pugazhenth

18/8/22

7. DR. T. V. NANASUNDARAM

ASSIST. PROFESSOR OF CHEMISTRY

MEMBER

18/8/22

DEPT. OF CHEMISTRY

RSGT-TNI.

8. DR. K. RAJARAJAN

ASSIST. PROFESSOR OF CHEMISTRY

MEMBER

18/8/22

9. DR. N. INGARSAN MEMBER  
 DEPT. OF CHEMISTRY  
 ASST. PROFESSOR OF CHEMISTRY RGC-TNJ N. *[Signature]*  
*[Signature] 18/8/22*
10. Prof. N. PUNITHA ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
11. Prof. M. ANITHA ASST. PROFESSOR OF CHEMISTRY M. *[Signature]*  
*[Signature] 18/8/22*
12. DR. P. SANDEETHA ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
13. Prof. M. MANGALAM ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
14. Prof. N. VIDHYA RATHA ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
15. Prof. K. VIJAYALAKSHMI ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
16. DR. R. CHITHIRAVEL ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
17. DR. G. MANIMEGALAI ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
18. DR. C. KATHIRAVAN ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
19. Prof. R. RADHAKRISHNAN ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
20. DR. D. T. LAGESWARAN ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*
21. DR. S. SELVAKUMAR ASST. PROFESSOR OF CHEMISTRY " *[Signature]*  
*[Signature] 18/8/22*

- 22 Prof. R. BALAJI  
ASST. PROFESSOR OF CHEMISTRY
- MEMBER  
DEPT. OF CHEMISTRY  
REGC-TNT  
18/8/22
- 23 Prof. A. SIVAKUMAR  
ASST. PROFESSOR OF CHEMISTRY
- " Tomy  
18/8/22
- 24 Dr. T. RAJKUMAR  
ASST. PROFESSOR OF CHEMISTRY
- " Tomy  
18/8/22
- 25 Dr. S. LAWRENCE  
ASST. PROFESSOR OF CHEMISTRY
- " S. Lawrence  
18/8/22
- 26 Dr. J. ELANGOVAN  
ASST. PROFESSOR OF CHEMISTRY
- " 2  
18/8/22
- 27 Dr. M. ELAMARAN  
ASST. PROFESSOR OF CHEMISTRY
- " Lees  
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 Dated 16.02.2021 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  
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
- 2 Two Subject experts from outside  
of the college
- 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

*H. Ilangovan*  
18/8/2022

*K. Krishnasamy*  
18/8/2022

*D. R. Thiruneelakandan*  
18/8/2022

*S. Sekar Ganesan*

*M. Pugazhenthi*  
18/8/2022

*S. Eswari*  
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 be well prepared for successful careers in the research and innovation at an industry.
2	Graduates will be engaged in professional activities to enhance their own achievement and will contribute in social activities
3	Graduates will be successful leaders with quality to handle all kind of circumstances through nurturing them in interdisciplinary and multidisciplinary learning environment.
4	Graduates will be successful in higher educational in management

## PROGRAMME OUTCOMES (POs)

Upon completion of the UG 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 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	Create an awareness of the impact of chemistry on the environment, society and development outside the scientific community.
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 B.Sc. chemistry Degree programme, students will be able to

PSO1	Get systematic and coherent understanding of the fundamental concepts in Organic chemistry, Inorganic chemistry, Physical chemistry, Analytical chemistry and other related allied chemistry subjects .
PSO2	Use the evidence based comparative chemistry approach to explain the chemical synthesis and analysis.
PSO3	Understand the characterization of materials.
PSO4	Understand the basic principles of equipment, instruments used in the chemistry laboratory.
PSO5	Become aware of the employment areas for the B. Sc. Chemistry graduates which include pharmaceutical industries, chemical manufactures, cement and leather industries, plastic industries, agro industries etc.

## **Undergraduate Programme:**

### **Programme Pattern:**

The Under Graduate degree programme consists of FOUR vital components. They are as follows:

Part -I : Languages (Tamil)

Part-II : General English (Theory, Practicals)

Part-III : Core Course (Theory, Practicals, Discipline Specific Electives, Compulsory and Optional Allied courses, Project, Self-paced courses, Internship , Comprehensive Examinations and field visit /industrial visit/Case Study)

Part-IV: Value Education, Ability Enhancement Courses, Skill Enhancement Courses/ Soft Skills , Generic Electives/ National Cadet Corps etc.

### **Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcome**

The Programme Outcomes (POs)/Programme Specific Outcomes (PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme. At the end of each programme the PO/PSO assessment is done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs UG programme and five POs for PG programme framed by the college. PSOs are framed by the departments and they are five in numbers.

For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is

1. This relation is defined by using the following table

Mapping	<40%	$\geq 40\%$ and $< 70\%$	$\geq 70$
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scores of COs = Sum of values _____ Total No.of POs & PSO		Mean Overall Score = Sum of Mean Scores _____ Total No.of COs	
Result	Mean Overall Score	< 1.2	# Low
		$\geq 1.2$ and $< 2.2$	# Medium
		$\geq 2.2$	# $\geq 2.2$

If the mean overall score is low then the course in charge has to redesign the particular course content so as to achieve high level mean overall score



**Rajah Serfoji Govt. College (Autonomous), Thanjavur – 613 005**  
**B.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	I	LT	A1T1	Tamil – I	6	3	3	25	75	100
	II	LE	A1E1	Communication Skills in English – I	4	3	2	15	45	60
			A1E1P	Communication Skills in English – I	2	1	3	10	30	40
	III	CC1	A1CH1	General Chemistry – I	6	4	3	25	75	100
	III	CC2	A2CHP1	Running Paper - Volumetric Analysis Practical - I	3	-	-	-	-	-
	III	Allied 1	A1AMA1/ A1AZO1	Allied Mathematics - I / Allied Zoology – I	4	4	3	25	75	100
	III	Allied 2	A2AMA2/ A2AZOP	Running Paper – Allied Zoology Practical-I Allied Mathematics - III	3	-	-	-	-	-
	IV	VE	A1VE	Value Education	2	2	3	25	75	100
				Total	30	16				500
II	I	LT	A2T2	Tamil – II	6	3	3	25	75	100
	II	LE	A2E2	Communication Skills in English – II	4	3	2	15	45	60
			A2E2P	Communication Skills in English – II	2	1	3	10	30	40
	III	CC2	A2CHP1	Volumetric Analysis Practical –I ( 3 Hrs )	3	4	3	40	60	100
	III	CC3	A2CH2	General Chemistry – II	4	4	3	25	75	100
	III	Allied 2	A2AMA2 / A2AZOP	Allied Mathematics - III Allied Zoology Practical – I(3Hrs)	3	4	3	40	60	100
	III	Allied 3	A2AMA3 / A2AZO2	Allied Mathematics –II Allied Zoology – II /	4	4	3	25	75	100
	IV	ES	A2ES	Environmental Studies	2	2	3	25	75	100
				Total	30	24				700

III	I	LT	A3T3	Tamil – III	6	3	3	25	75	100
	II	LE	A3E3	Communication Skills in English – III	4	3	2	15	45	60
			A3E3P	Communication Skills in English – III	2	1	3	10	30	40
	III	CC4	A3CH3	General Chemistry – III	6	4	3	25	75	100
	III	CC5	A4CHP2	Running Paper - Inorganic Qualitative Analysis Practical-II	3	-	-	-	-	-
	III	Allied 4	A3APH1	Allied Physics – I	4	4	3	25	75	100
	III	Allied 5	A4APHP	Running Paper - Allied Physics Practical	3	-	-	-	-	-
	IV	SEC1	A3SB1	Food and Nutrition	2	2	3	25	75	100
	IV	GEC1	A3CHGE1		2	2	3	25	75	100
	<b>Total</b>				<b>30</b>	<b>18</b>				<b>600</b>
IV	I	LT	A4T4	Tamil – IV	6	3	3	25	75	100
	II	LE	A4E4	English for Communication – IV	6	3	3	25	75	100
	III	CC5	A4CHP2	Running Paper - Inorganic Qualitative Analysis Practical-II	3	4	3	40	60	100
	III	CC6	A4CH4	General Chemistry – IV	6	4	3	25	75	100
	III	Allied 5	A4APHP	Running Paper - Allied Physics Practical	3	4	3	40	60	100
	III	Allied 6	A4APH2	Allied Physics – II	4	4	3	25	75	100
	IV	SEC2	A4SB2	Dying Techniques and Water Treatment	2	2	3	25	75	100
	IV	GEC2	A3CHGE2		2	2	3	25	75	100
	<b>Total</b>				<b>30</b>	<b>26</b>				<b>800</b>
V	III	CC7	A5CH5	Inorganic Chemistry – I	5	5	3	25	75	100
	III	CC8	A5CHP3	Organic Chemistry Practical – III ( 3 Hrs )	3	3	3	40	60	100
	III	CC9	A5CH6	Organic Chemistry – I	5	5	3	25	75	100
	III	CC10	A6CHP4	Running Paper - Physical Chemistry Practical - V	3	-	-	-	-	-
	III	DSE1	A5CHEL1A	Physical Chemistry - I	5	5	3	25	75	100
			A5CHEL1B	Forensic Chemistry						
			A5CHEL1C	Bio Chemistry						
	III	DSE2	A5CHEL2A	Analytical Chemistry	5	5	3	25	75	100

			A5CHEL2B	Pharmaceutical Chemistry											
			A5CHEL2C	Polymer Chemistry											
	IV	SSD	A5SSD	Soft Skill Development		2	2	3	25	75	100				
	IV	SEC3	A5SB3	Agricultural Chemistry		2	2	3	25	75	100				
	IV	ECC1	A5CHEC1	Pharmaceutical Chemistry		-	4	3	-	100	100				
	III			Intenship		-	2	-	-	-	-				
	Total				30	27				700					
	III	CC10	A6CHP4	Physical Chemistry Practical – V ( 3 Hrs )		5	5	3	40	60	100				
	III	CC11	A6CH7	Inorganic Chemistry – II		6	5	3	25	75	100				
VI	III	CC12	A6CH8	Organic Chemistry – II		6	5	3	25	75	100				
	III	CC13	A6CHPS	Gravimetric Analysis Practical - IV ( 3 Hrs )		6	5	3	40	60	100				
	III	DSE3	A6CHEL3A	Physical Chemistry – II		5	5	3	25	75	100				
			A6CHEL3B	Materials & Nano Chemistry											
			A6CHEL3C	Chemistry in Everyday Life											
	IV	GS	A6GS	Gender Studies		2	2	3	25	75	100				
	IV	ECC2	A6CHEC2	Chemistry in Everyday Life		-	4	3	-	100	100				
	V	Extra Activities		NCC/NSS/SPORTS/RCC/YRC/CCC		-	2	-	-	-	-				
	Total				30	29				600					
Grand Total						140				3900					

#### ALLIED COURSES OFFERED TO OTHER DEPARTMENTS

(I B.Sc. -Mathematics, Zoology, Bio-Chemistry and II B.Sc. Physics)

PART	CODE	COURSE	TITLE	LECTURE	TUTORIAL	PRACTICAL	HRS	MARKS		TOTAL
								IE	WE	
III	A1ACHI	AC-1	Allied Chemistry-I	4	0	0	4	25	75	100
III	A3ACHI	AC-1	Allied Chemistry -I	4	0	0	4	25	75	100
III	A2ACH2	AC-2	Allied Chemistry -II	4	0	0	4	25	75	100
III	A4ACH2	AC-2	Allied Chemistry -II	4	0	0	4	25	75	100
III	A2ACHP	Allied	Volumetric and Organic Analysis	0	0	3	3	40	60	100
III	A4ACHP	Allied	Volumetric and Organic Analysis	0	0	3	3	40	60	100

**GENERIC ELECTIVE COURSES (NON- MAJOR ELECTIVE)**  
**(Offered to III B.Sc. Zoology and Physics)**

PART	CODE	COURSE	TITLE	LECTURE	TUTORIAL	PRACTICAL	HRS	MARKS	TOTAL
								IE	WE
III	A5CHEL01	GE-1	Soil Science	2	0	0	2	25	75
III	A6CHEL02	GE-2	Industrial Chemistry	2	0	0	2	25	75

**U.G. PROGRAMMES – CHEMISTRY**

(Applicable to the Candidates admitted from the Academic Year 2022 – 2023 onwards)

**Course Structure**

PART	COURSE TITLE	NO. OF PAPERS	TOTAL CREDITS
PART – I	TAMIL	4X3	12
PART – II	ENGLISH	4X3	12
PART – III	CORE	6X5 = 30	57
		6X4 = 24	
		1X3 = 03	
PART – IV	ELECTIVES	3X5	15
	ALLIED	6X4	24
	NON MAJOR	2X2	4
PART – V	ES,VE	2X2	4
	SKILL BASED	3X2	6
PART – V	GS	1X2	2
	EXT.ACTIVITIES	-	2
<b>TOTAL PAPERS – 39</b>		<b>TOTAL CREDIT – 140</b>	

Semester	Code	Course	Title of the Paper	Hours/Week	Credits	Medium
I	AICIII	CC-I	General Chemistry - I	6	4	Tamil/English

### Course Objectives

- To understand the basic concepts of Gaseous state in Physical Chemistry
- To learn about chemical bonding.
- To acquire the knowledge of Boron and carbon families.
- To understand the hybridization and geometry of organic molecules, electronic effects, bonding and its influences on organic molecules
- To study about Alkanes, Alkenes and Alkynes compounds

### Course Outcomes (CO)

At the completion of this course, students will

CO No.	CO-Statements
CO1	be able to understand and identify the structure of atoms and apply periodic laws to predict the chemical Properties and Physical properties of the elements.
CO2	have acquired knowledge about the P-block elements includes boron and carbon family.
CO3	have acquired knowledge about naming of organic compounds.
CO4	will have gained knowledge on the mechanism of free radical substitution in alkanes, properties and reaction mechanism of alkenes and alkynes.
CO5	have a good knowledge about the behaviour of gases.

### UNIT – I

#### Chemical bonding:

Ionic bond-Properties of ionic compounds,factors favouring the formation of ionic bond-Lattice energy and Born – Haber Cycle-Electronegativity-determination of electronegativity using Pauling and Mulliken's methods- Polarising power and Polarizability– Partial ionic character from electronegativity – Transition from ionic to covalent character and vice-versa – Fajan's rules .VSEPR Theory: Shapes of simple inorganic molecules ( $\text{BeCl}_2$ ,  $\text{BF}_3$ ,  $\text{SiC}_4$ ,  $\text{PCl}_5$ ,  $\text{SF}_6$ ,  $\text{IF}_7$ ,  $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ,  $\text{XeF}_6$ ) containing lone pair and bond pairs of electrons – Lewis structures. Hydrogenbonding – Its nature and types. Intermolecular forces – London forces and vander Waals forces.

### UNIT – II

#### Boron Family:

Comparative study of boron family elements: Compounds of boron – diborane structure discussion – borax, boron nitride, boron carbide and borazole.

#### Carbon Family:

Comparative study of carbon family elements and their compounds (hydrides, halides and oxides). Chemistry of cyanogens, hydrocyanic acid, cyanic acid, thiocyanic acid, ammonium thiocyanate and carbon disulphide.Structures of graphite, diamond and fullerene.

### UNIT – III

#### Bonding in Organic Molecules:

Hybridization and geometry of molecules – methane, ethane, ethylene and acetylene (sigma and pi bonds, bond lengths, bond angles, bond energy)Electronic effects – Inductive effect, resonance effect drawing of resonance structures-conditions for resonance-stability of resonance structures, hyperconjugation,electromeric effect and steric effects. Dissociation of bonds – homolysis and heterolysis. Reaction intermediates – free radicals, carbocations and carbanions, carbenes, nitrenes and arynes – their stability.

#### Nomenclature of organic compounds :

IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds. Priorities of functional group suffixes in polyfunctional groups.

## **UNIT –IV**

### **Alkanes:**

Mechanism of free radical substitution in alkanes.-Conformation of ethane and n-butane with energy diagrams – dihedral angle – torsional strain.

### **Alkenes:**

Properties of alkenes – electrophilic and free radical addition, addition reactions with hydrogen bromide (peroxide effect), sulphuric acid, water, hydroboration, ozonolysis, hydroxylation with  $\text{KMnO}_4$ –allylic substitution by NBS (with mechanisms of all the above reactions)

### **Alkynes:**

Acidity of alkynes, formation of acetylide, addition of water with  $\text{HgSO}_4$  catalyst, addition of hydrogen halides and halogens, oxidation, ozonolysis and hydroboration. (with mechanisms of above reactions ) Problems and conversions

## **UNIT –V**

### **The Gaseous State:**

Derivation of Gas Laws – Boyle's, Charles', Avogadro's laws and ideal gas equation. Numerical value of "R" in different units. Graham's law of diffusion and Dalton's law of partial pressures. Maxwell's law of distribution of molecular velocities – most probable velocity, average velocity and root mean square velocity. Collision diameter, collision number and mean free path. Deviation of Real gases from ideal behaviour – Compressibility factor, van der Waals gas equation. The critical phenomena – critical constants, derivation of critical constants from van der Waals equation. Principle of corresponding states. Liquefaction of gases – Joule-Thomson effect, Linde's and Claude's apparatus

### **References:**

1. R.D. Madan, "Modern Inorganic Chemistry", 2<sup>nd</sup> edition, S. Chand & Company 2Ltd., 2000.
2. G.S.Manku – Theoretical Principles of Inorganic Chemistry Tata McGraw Hill, New Delhi.
3. Paula Yurkanis Bruice- Organic Chemistry, Prentice Hall
4. J.D.Lee , Concise Inorganic Chemistry . 5 th Edition., Blackwell Science Ltd, Oxford, 2002
5. Bahl, B.S. and Bahl, A.; Advanced Organic Chemistry, (12<sup>th</sup> edition), New Delhi, Sultan Chand & Co., (2010).
6. Puri B.R., Sharma L.R. and Pathania M.S. Principles of Physical Chemistry, (35<sup>th</sup> edition), New Delhi: Shoban Lal Nagin chand and Co. (2013)

### **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	
<b>CO1</b>	2	2	2	2	2	2	2	2	2	2	2.2
<b>CO2</b>	2	2	3	3	2	2	2	3	3	2	2.2
<b>CO3</b>	3	2	2	2	2	3	2	2	2	2	2.3
<b>CO4</b>	3	3	2	3	2	3	3	2	3	2	2.3
<b>CO5</b>	2	2	3	2	3	2	2	3	2	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 Or type -Two questions from each unit)

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

*[Signature]*  
**Signature of the HOD**  
 HEAD OF THE DEPARTMENT OF CHEMISTRY  
 RAJAH SERFOJI GOVT. COLLEGE  
 THANjavur - 613 004

Semester	Code	Course	Title of the Paper	Hours/Week	Credits	Medium
I	A1VE	VE	Value Education	2	2	Tamil/English

Credits : 2

Hours/Week : 2

Medium of Instruction : English/Tamil

Code: S1VE

### ஒள்ளை பட்ட வருப்பு - பகுதி IV

(2018-2019 ஆம் கல்வியாண்டு முதல் சேர்க்கப்பட்ட மாணவர்களுக்குமிழது)

முதல் பருவம்

வாழ்வியல் கல்வி (Value Education)

அலகு - 1

வாழ்வியல் கல்வி ஓர் அறிமுகம், தனி மனித நெறிமுறைகள், சமுதாய நெறிமுறைகள், ஆன்மீக நெறிமுறைகள், வாழ்வியல் நெறிகளின் மூலங்கள், வாழ்வியல் நெறிகளின் அவசியம், நன்னடத்தையும் நற்செயல்களும், நற்பண்புகள் உருவாக்கம்.

அலகு - 2

சமூக நற்பணி, சமூக நலப்பணித் திட்டங்கள், சமுதாயத் தீமைகள் குறித்த விழிப்புணர்வு, போதை மருந்துகளுக்கு அடிமையாதல், மதுப்பழக்கம், புசைப்பிடித்தல், தற்கொலை.

அலகு - 3

இந்து சமயத்தின் போதனைகள், இஸ்லாம் போதிக்கும் நெறிகள், கிறித்துவம் போதிக்கும் நெறிகள், சமயச் சார்பின்மை, சமய நல்லினைக்கம்.

அலகு - 4

சாந்தியடிகளின் அகிம்சை கொள்கை, அன்னை தெரசாவின் தொண்டுகள், துண்ணலமின்மையின் வடிவம் பெருந்தலைவர் காமராசர்.

அலகு - 5

சமூக நிதி, மனித உரிமைகளும் அவற்றின் பாதுகாப்பும், மகளிர்க்கு எதிரான வங்முறைகள், நாட்டின் ஓருமைப்பாடு.

### 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 Or 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	Medium
I & II	A2CHP1	CC-2	Practical-I Volumetric Analysis	3	4	Tamil/English

(Examination at the End of Semester – II)

### Course Objectives

- To impart knowledge on Quantitative analysis especially volumetric analysis.
- To gain the depth knowledge in different types of volumetric analysis.

### Course Outcomes (CO)

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

CO No.	CO-Statements
CO1	Understand Calibration and use of apparatus
CO2	Understand the principle of volumetric analysis such as acidimetric & alkalimetry, permanganometry, dichrometry, iodo & iodimetry, argentometry & complexometry.
CO3	Estimate the strength of unknown solution by titrimetric method
CO4	Prepare the solutions of different molarity/normality of titrants
CO5	Know the various types of indicators

## VOLUMETRIC ANALYSIS

- I. Acidimetry And Alkalimetry
- II. Permanganometry.
  1. Estimation of Ferrous iron in Mohr's salt.
  2. Estimation of Ferrous and Ferric iron in a mixture.
  3. Estimation of Oxalic acid.
  4. Estimation of Calcium.
- III. Dichrometry
  5. Estimation of Ferrous Iron.
  6. Estimation of Ferric Iron – by using both internal and external indicators.
- IV. Iodo and Iodimetry.
  7. Estimation of Copper.
  8. Estimation of Potassium Dichromate.
  9. Estimation of Arsenious Oxide.
- V. Argentometry.
  10. Estimation of Chloride (in neutral and acid media)
- VI. Complexometric Titrations.
  11. Estimation of Zn, Mg and Ca ions using EDTA.

**Note:** EDTA and acidimetry - alkalimetry experiments to be included in the END Semester Examinations.

Procedure writing at the beginning along with the principles of calculations and equations : 05 Marks  
 Record : 05 Marks  
 Practical : 50 Marks  
 CIA : 25 Marks  
 Total : 100 Marks

Error Based Marks for the Practical (55 Marks)

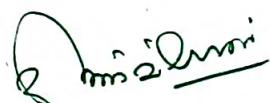
Up to 1%	: 55 Marks
1 to 2%	: 45 Marks (deduce 1 mark for 0.1%)
2 to 3%	: 30 Marks (deduce 1.5 marks for 0.1%)
3 to 4%	: 10 Marks (deduce 2 marks for 0.1%)
Above 4%	: 02 Marks

For wrong Calculation deduce 5 Marks from the total marks awarded

For Shabby presentation deduce 3 marks from the total marks awarded

**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	
CO1	3	2	2	3	2	3	2	3	2	2	2.4
CO2	2	2	2	3	1	2	2	3	3	2	2.2
CO3	3	2	2	2	2	2	2	3	3	2	2.3
CO4	3	2	2	3	2	3	3	3	3	2	2.4
CO5	3	1	3	2	3	2	2	3	3	3	2.5
Mean overall Score											2.36(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	Medium
II	A2CHI2	CC-3	General Chemistry – II	4	4	Tamil/English

### Course Objectives

- To acquire the knowledge of halogen families.
- To provide the detailed knowledge about oxygen family
- To learn about Dienes and cycloalkanes of organic compounds.
- To study the various concepts and applications of solid state in physical chemistry.
- To understand the basic knowledge of Liquid state, Colloidal state and Macromolecules in physical chemistry.

### Course Outcomes (CO)

At the completion of this course, students will

CO No.	CO-Statements
CO1	Have knowledge of the p block elements of halogen family.
CO2	Have acquired knowledge of the p block elements of oxygen family
CO3	Have gain knowledge about the types and synthesis of dienes and Preparation and properties of cyclo alkanes.
CO4	Understand the structure, chemical and physical properties of the elements
CO5	Have knowledge of Liquid state, Colloidal state and Macromolecules in physical chemistry

### UNIT – I

#### Oxidation and reduction reactions –

Oxidation number concept, balancing redox equations by oxidation number method and ion-electron method – equivalent weight of oxidizing and reducing agents.

#### Halogen family –

comparative study of halogens and their compounds. Oxides and oxy acids of halogens (structure only) – estimation of available chlorine in bleaching powder.

Interhalogen compounds – preparation, properties and uses. Pseudo-halogens – Preparation, properties and uses of cyanogens and thiocyanogen comparison with halogens. Basic properties of halogens– Anomalous properties of fluorine.

### UNIT – II

#### Oxygen family –

Comparative study. Oxygen fluorides.Ozone – Preparation, properties, structural elucidation and uses. Green-house effect, ozone hole and protection of ozone layer. Hydrogen peroxide – Preparation, properties, estimation, structure and uses.Peracids of sulphur – their preparation, properties, uses and structures.Thionic acids – their preparation, properties, uses and structures.Sodium hyposulphite and sodium thiosulphate – Preparation, properties, uses and structures.

### UNIT – III

#### Dienes :

Types of dienes – conjugated, isolated and cumulated.Stability and chemical reactivity – 1,2 and 1, 4 additions, kinetic and thermodynamic controls of a reaction. Diels-Alder reaction. Synthesis of dienes – 1, 3 Butadiene, isoprene and chloroprene.

#### Cycloalkanes

Preparation using Wurtz's reaction, Dieckmann's ring closure and reductions of aromatic hydrocarbons.Substitution and ring opening reactions.Bayer's strain theory and theory of strainless rings.Problems and conversions involving the reactions of alkynes and dienes.

## **UNIT -IV**

### **Solid state:**

Isotropic and anisotropic solids. Nature of the solid state – seven crystal systems – Bravais lattice, unit cell, law of rational indices (Weiss indices) Miller indices, symmetry elements in crystals (for cubic system only in detail). X-Ray diffraction by crystals – derivation of Bragg's equation — Bragg method- powder method crystal structure of NaCl, KC1, ZnS and CsCl – radius ratio and packing in crystals – determination of Avogadro's number. Vitreous state – Brief studies.

## **UNIT -V**

### **Liquid state:**

Liquid crystals – classification, structure, properties and applications.

### **Colloidal state:**

Size of colloidal particles – Peptization, stability of colloids, coagulation and protection. Reverse Osmosis and desalination of sea water. Donnan – Membrane equilibrium. Electrophoresis and separation of proteins. Gels and emulsions.

### **Macromolecules:**

Number average and weight average molecular weight of macromolecules – determination of molecular weight by osmometry (number average), ultra centrifuge (weight average), Viscometry and light scattering.

### **References:**

1. S.S.Dara -A text book of environmental chemistry & pollution control – S.Chand and Co.
2. D.N.Bajpai – Advanced physical chemistry – S.Chand and Co. Bruce H.Mahan , “ University Chemistry ,” Narosa Publishers , New Delhi. 1989.
3. R.T Morrison and R.N.Boyd , “ Organic Chemistry ,” 6 th Edition
4. R.D. Madan, “Modern Inorganic Chemistry”, 2<sup>nd</sup> edition, S. Chand & Company 2Ltd., 2000.
5. G.S.Manku – Theoretical Principles of Inorganic Chemistry Tata McGraw Hill, New Delhi.
6. Paula Yurkanis Bruice- Organic Chemistry, Prentice Hall
7. J.D.Lee , Concise Inorganic Chemistry . 5 th Edition., Blackwell Science Ltd, Oxford, 2002
8. Bahl, B.S. and Bahl, A., Advanced Organic Chemistry, (12<sup>th</sup> edition), New Delhi, Sultan Chand & Co., (2010).
9. Elements of Physical Chemistry, B.R. Puri, L.R. Sharma, Madan S. Pathania, Vishal Publishing Co., Jalandhar Delhi. ISBN: 81-88646-66-0

### **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	
CO1	3	1	1	3	2	3	1	1	3	2	2.2
CO2	2	2	3	3	1	2	2	3	3	1	2.3
CO3	3	2	2	2	2	3	2	2	2	2	2.3
CO4	3	2	2	3	2	3	2	2	3	2	2.3
CO5	3	2	3	2	3	3	2	3	2	3	2.6
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 Or type -Two questions from each unit)

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

Qm 20

Semester	Code	Course	Title of the Paper	Hours/Week	Credits	Medium
II	A2E2	ES	Environmental Studies	2	2	Tamil/English

Credits : 2  
 Hours/Week : 2  
 Medium of Instruction : English/Tamil

Code: S2ES

**கூர்ண்ணல் பட்ட வருப்பு - பாரதி IV**  
 (2018-2019 ஆம் கல்வியாண்டு முதல் சேர்க்கப்பட்ட மாணவர்களுக்குரியது)  
**அறண்பாம் பருவம்**  
**கற்றுச்சூழல் அறிவியல்**

**அலகு - 1**

கற்றுச்சூழல் அறிவியலின் பல்துறை ஆய்வு அனுகுழுமை - சுற்றுச்சூழல் வகைஞரும், காறுகளாரும் - சுற்றுச்சூழல் அறிவியலின் வாய்ப்புகள் - சுற்றுச்சூழல் அறிவியலின் முக்கியத்துவம் - சுற்றுச்சூழல் கல்வியில் பல்துறை அனுகுழுறையின் பங்கு - பொதுமக்களிடையே சுற்றுச்சூழல் விழிப்புணர்வின் தேவை - சுற்றுச்சூழல் குறித்து பொதுமக்களின் விழிப்புணர்வு - இயற்கை வளங்கள் - புதுப்பிக்கக்கூடிய மற்றும் புதுப்பிக்க இயலாத வளங்கள் - இயற்கை வளங்களாரும் அதன் பிரச்சனைகளாரும் - வன வளாம், நீர் வளாம், கனிம வளாம் - உணவு வளாம், சுக்கி வளாம், நில வளாம் - இயற்கை வளங்களைப் பாதுகாப்பதில் ஒவ்வொருவரின் பங்கு - நீடித்த வாழ்க்கை முறைக்கு வளங்களின் சமமான பயண்பாடு.

**அலகு - 2**

குழல் தொகுப்பு - குழல் தொகுப்பின் அடிப்படைக் கொள்கைகள் - குழல் தொகுப்பின் அமைப்பு மற்றும் செயல்கள் - உயிர் புவி வேதியியல் சூழ்சி - ஆற்றலும் அது குழல் தொகுப்பில் பாய்தலும் - குழியல் வழிமுறை தொடர் வளர்ச்சி - உணவுச் சங்கிலி மற்றும் உணவு வலை - குழல் தொகுப்பின் முப்பட்டை கோபுரம் - குழல் தொகுப்புகளின் வகைகள், பண்புகள், அமைப்பு, செயல்கள் - நிலச்சூழல் தொகுப்பு, நீர்ச்சூழல் தொகுப்பு.

**அலகு - 3**

உயிரின வளாம் மற்றும் அதன் பாதுகாப்பு - உயிரின வளாம் - வரையறை - இந்தியாவின் உயிர்புவியியல் வகைப்பாடு - உயிரின வளத்தின் மதிப்புகள் - உலகளாவிய, தேசிய மற்றும் மாநில அளவிலான உயிரின வளாம் - இந்தியா ஓர் உயிரின வளமிக்க தேசம் - உயிரின வள செழுமை இடங்கள் - உயிரின வளத்தின் அச்சுறுத்தல்கள் - இந்தியாவில் உள்ள அபாயத்திற்குள்ளாகிய சிற்றினங்கள் மற்றும் இடச்சூழல் சிற்றினங்கள் - உயிரின வளப்பாதுகாப்பு - சுற்றுச்சூழல் மாசுபாடு - வரையறை, மூலங்கள், விளைவுகள் மற்றும் கட்டுப்படுத்தும் வழிமுறைகள் - காற்று மாசுபாடு, நீர் மூலங்கள் - மண் மாசுபாடு - கடல்நீர் மாசுபாடு - இரைச்சல் மாசுபாடு - வெப்ப மாசுபாடு - கதிரியக்க ஆபத்து - நிடக்கழிவு : மூலங்கள், விளைவுகள், கட்டுப்படுத்தும் முறைகள், நகர மற்றும் தொழிற்சாலைக் கழிவுகள் - மாகக்கட்டுப்பாட்டில் தலை மனிறனின் பங்கு - உதாரண சாட்சியங்கள் - இயற்கைச் சிற்றங்களும் அவற்றைத் தடுக்கும் வழிமுறைகளும் வெள்ளாம், நிலநடுக்கம், புயல் மற்றும் நிலச்சாரி.

அலகு -4

சமூகச் சிக்கல்களும், சுற்றுச்சூழலும் - வளம் குன்றிய மேம்பாட்டி.விருந்து வளம் குன்றா மேம்பாடு - சக்தி மூலங்களுடன் சம்மந்தப்பட்ட நகரப் பிரச்சனைகள் - நீர் பாதுகாப்பு, மழை நீர் சேகரிப்பு, நீர் பிடிப்பு மேலாண்மை - மக்கள் குடிப்பெயர்வு - குடியமர்த்தல் - மறுவாழ்வுப் பணிகள் இவற்றின் பிரச்சனைகளும், தீர்வுகளும் - சுற்றுச்சூழல் நன்னெறிகள் - பசுமையக விளைவு - அமில மழை - ஒசோன் (கமழி) அடுக்கு செறிவுகுறைதல் - களர் நிலம் பண்படுத்துதல் - நுகர்தலும், கழிவுகளும் - சுற்றுச்சூழல் சட்டம் - காற்று (மாசுக்கட்டுப்பாடு மற்றும் பாதுகாப்பு) சட்டம் - நீர் (மாசுக் கட்டுப்பாடு மற்றும் பாதுகாப்பு) சட்டம் - வனவிலங்கு (பாதுகாப்பு) சட்டம் - வனப்பாதுகாப்புச் சட்டம் - சுற்றுச்சூழல் சட்டங்களை அழுவாக்குவதில் ஏற்படும் சிக்கல்கள் - சமுதாய விழிப்புணர்வு.

அலகு - 5

மக்கள் தொகையும் சுற்றுச்சூழலும் - மக்கள் தொகை வளர்ச்சியும், உலக நாடுகளிடையே உள்ள வேறுபாடுகளும் - மக்கள் தொகை விரைவுப் பெருக்கம் - குடும்பநலத் திட்டம் - சுற்றுச்சூழல் மனித நலவாழ்வும் - மனித உரிமைகள் - பயன் மதிப்புக் கல்வி - எச்.ஐ.வி / எய்ட்ஸ் - பெண்கள் மற்றும் குழந்தைகள் நலன் - சுற்றுச்சூழல் மற்றும் மனித நலவாழ்வில் தகவல் தொழில் நுட்பத்தின் பங்கு - சமூக அமைப்பில் பெண்களின் நிலை - ஓர் எடுத்துக்காட்டு.

#### பார்வை நூல்:

1. அபாசி, எஸ்.ஏ. 1998இ) சுற்றுச்சூழல் வேதியியல், சிபிஎஸ் பதிப்பகம், புதுடில்வி.

#### Question Paper Pattern

Maximum Marks: 75

Exam duration: Three Hours

Part A – 5 X 6 = 30. Answer All Questions (Either Or type -Two questions from each unit)

Part B – 3 X 15 = 45 Answer Any THREE (One question from each unit)

Signature of the HOD  
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RAJAH SERFOJI GOVT. COLLEGE  
THANJAVUR - 613 005

Semester	Code	Course	Title of the Paper	Hours/Week	Credits	Medium
I	A1ACH1/ A3ACH1	AC -1	Allied Chemistry-I	4	4	Tamil/English

### Course Objectives

- To acquire the knowledge of Acids and bases, buffer action.
- To learn about Polar Effects, Halogen Containing Compounds and Types of Solvents.
- To study the various concepts of Aromatic Compounds, Organic Reactions and Chemotherapy.
- To get knowledge about Solid State, Energetic and Phase Rule,
- To learn about the Chemical Equilibrium, Chemical Kinetics and Catalysis

### Course Outcomes (CO)

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

CO No.	CO-Statements
CO1	Apply the principles of kinetics in calculating reaction rates, activation energies, and order of reactions.
CO2	Understand and appreciate the importance of phase rule and its applications and energetic.
CO3	Understand the utility of organic reactions and appreciate the structure-activity relationship of certain drugs.
CO4	Determine the rate law of chemical change based on experimental data.
CO5	Understand the concept of kinetics and catalysts.

## UNIT – I

**Acids and Bases :** Arrhenius concept and limitations-Bronsted- lowry concept-conjugate acid and conjugate base -limitations- Lewis concept-examples of lewis acids and bases. Strength of acids and bases – strength of aliphatic acids-solvent that influence the strength of acids and bases -Definition of pH pOH and Pka – ionic product of water – buffer solutions - buffer action - Henderson- Hasselbauch equations - Determination of pH by Colorimetric method.

## UNIT – II

**Polar Effects:** Inductive effect- Relative strength of aliphatic monocarboxylic acid and aliphatic amines - Resonance- conditions for resonance, consequences of resonance- resonance energy. Basic property of aniline and acidic property of phenol - Hyper conjugation - consequences of hyperconjugation- Heat of hydrogenation, bond length and dipolemoment. Steric effect – steric accelerated reaction and steric inhibited reaction.

**Halogen Containing Compounds:** Important chlorohydro carbon used as solvents and pesticides(Dichloromethane, chloroform, carbontetrachloride, DDT, BHC) Fluorocarbons ( freons )- preparation , properties and uses

**Types Of Solvents** – polar , nonpolar- dissolving nature .

## Unit – III

**Aromatic Compounds:** Structure , stability , resonance and aromaticity of benzene -Typical substitution reaction- i) Nitration ii) Halogenation iii ) alkylation. (iv) acylation,(v)sulphonation.

**Chemotherapy:** Explanations with two examples each for i) Analgesics ii) Antibacterial iii)Anti-inflammatory, iv) Antipyretic , v ) Antibiotic, vi)Antitubercular vii)Antiviral viii) Antitussive ix) Antiallergic x ) Antidiabetics xi) antihypertensive xii) Antiepileptics xiii) Tranquillizers, xiv) Antiseptic and disinfectant xv)Antimalarial xvi) Anaesthetics ( local and general ). Structures not necessary.

## **Unit – IV**

**Solid State:** Typical crystal lattices – unit cell. Elements of symmetry. Bragg's equation, Weiss indices, Miller indices, simple, body centered and face centered cubes – Crystal defects–point–line– planar–edge dislocation.

**Phase Rule:** Phase, component, degrees of freedom, and phase rule definition. One component – water system. Reduced phase rule - two components – Pb-Ag system.

## **UNIT – V**

**Chemical Equilibrium:** Criteria of homogeneous and heterogeneous equilibria. Decomposition of HI, N<sub>2</sub>O<sub>4</sub> and PCl<sub>5</sub>

**Chemical Kinetics:** Definitions-Order and molecularity of reactions. Activation energy, Effect of temperature on reaction rate.

**Catalysis :** Definition and examples: Positive and negative catalyst, homo and heterogeneous catalysis, autocatalysis and enzyme catalysis.

### **References:**

1. R.D.Madan, J.S.Tiwari and G.L.Mudhara – A text book of First Year B.Sc.Chemistry – S.Chand & Co.
2. G.S.Manku – Theoretical Principles of Inorganic Chemistry Tata McGraw Hill, New Delhi.
3. Paula Yurkanis Bruice- Organic Chemistry, Prentice Hall
4. D.N.Bajpai – Advanced physical chemistry – S.Chand and Co.

### **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	
CO1	3	2	1	3	2	3	2	3	2	2	2.3
CO2	2	2	2	3	1	2	2	3	3	2	2.2
CO3	3	2	2	2	2	2	2	3	3	2	2.3
CO4	3	3	2	3	2	3	3	3	2	2	2.5
CO5	3	2	3	2	3	2	2	3	3	3	2.6
Mean overall Score											2.38(High)

### **Question Paper Pattern**

**Maximum Marks: 75**

**Exam duration: Three 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 Or 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	Medium
I	A2ACH2/ A4ACH2	AC -II	Allied Chemistry-II	4	4	Tamil/English

### Course Objectives

- To learn about Coordination Chemistry, Metallic Bond, Compounds of Sulphur in inorganic compounds.
- To acquire the knowledge of Carbohydrates, Amino Acids and Proteins,
- To study the various concepts and applications of Synthetic Polymers, Heterocyclic Compounds and Stereoisomerism.
- To understand the various ideas of colloids and photochemistry.
- To learn about the Electrochemistry.

### Course Outcomes (CO)

At the end of the course, students will

CO No.	CO-Statements
CO1	Have knowledge of Nomenclature of mononuclear complexes.
CO2	Be able to preparation and properties of glucose.
CO3	Have acquired knowledge of Synthetic Polymers, preparation and properties of Heterocyclic Compounds and stereoisomerism.
CO4	Have acquired knowledge of photochemistry and colloids.
CO5	Have knowledge of Electrochemistry.

### UNIT – I

**Coordination Chemistry:** Nomenclature of mononuclear complexes – Werner, Sidgwick, and Pauling's theories. Chelation and its industrial importance to EDTA. Biological role of haemoglobin and chlorophyll.

**Metallic Bond:** Electron gas, Pauling and band theories. Semiconductors- intrinsic, n –type and p-type.

**Compounds of Sulphur :** Peracids of sulphur and sodium thiosulphate

### UNIT – II

**Carbohydrates:** Classification- glucose and fructose- preparation and properties of glucose- configuration of glucose – Fischer and Haworth cyclic structures. Sucrose, starch and cellulose – structure, properties and uses.

**Amino Acids and Proteins:** Amino acids- classification based on structure and essential and non-essential amino acids- preparation and properties – peptides (elementary treatment) - proteins- classification based on physical properties and biological functions. Structures of proteins-primary and secondary (elementary treatment)

### UNIT III

**Synthetic Polymers:** Teflon, alky and epoxy resins, poly esters-general treatment only.

**Heterocyclic Compounds:** Furan, thiophene, pyrrole and pyridine – preparation and properties- basic properties of pyridine and Pyrrole.

**Stereoisomerism:** Optical isomerism- lactic and tartaric acid-racemic mixture and resolution. Geometrical isomerism – maleic and fumaric acids. Meaning of E, Z, R,S,D, L, and meso in stereochemistry.

## **UNIT IV**

**Colloids:** Emulsions, gels- preparation, properties and applications. Electrophoresis, chromatography-column, paper and thin layer chromatography

**Photochemistry:** Laws of photochemistry - lambert's law, lambert-beer law, Grothus-Drapper law, Einstein law of photochemical equivalence- photo synthesis- photoelectric effect.

## **UNIT - V**

**Electrochemistry:** Specific conductance, equivalent conductance and their determination using kohlraush bridge – effect of dilution on conductivity. An elementary idea about ionic theory- Ostwald's dilution law, Kohlrausch law, conductometric titrations-weak acid vs strong base only. Construction of standard hydrogen electrode – calomel electrode – Glass electrode – pH determination.

### **References:**

1. R.D.Madan, J.S.Tiwari and G.L.Mudhara – A text book of First Year B.Sc.Chemistry – S.Chand & Co.
2. G.S.Manku – Theoretical Principles of Inorganic Chemistry Tata McGraw Hill, New Delhi.
3. B.R.Puri, L.R.Sharma and Madan S.Pathania, "Principles of Physical Chemistry" Shoban Lal Nagin Chand and Co., Delhi.
4. R.D.Madan, "Modern Inorganic Chemistry", 1987, S.Chand and Company (Private) Ltd.,
5. P.L.Soni, "Text book of Organic Chemistry, Sultan Chand & Co., New Delhi

### **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	
<b>CO1</b>	3	2	2	3	2	3	2	3	2	2	2.4
<b>CO2</b>	2	1	3	3	1	2	2	3	3	2	2.2
<b>CO3</b>	3	3	3	2	2	2	2	3	3	2	2.5
<b>CO4</b>	3	2	2	3	2	3	3	3	2	2	2.3
<b>CO5</b>	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: Three 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 Or 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	Medium
I & II	A2AChP/ A4AChP	Allied Practical-III	Volumetric & Organic Analysis	3	4	Tamil/Englis h

**(Examination at the End of Semester - II)**

## Course Objectives

- To impart the knowledge on Quantitative analysis especially volumetric analysis.
  - To gain the depth knowledge in different types of volumetric analysis.
  - To understand the knowledge on Qualitative analysis of organic compounds

### **Course Outcomes (CO)**

At the end of the course, students will be able to

CO No.	CO-Statements
CO1	Understand the principle of volumetric analysis such as acidimetry, alkalimetry, permangnometry and iodometry.
CO2	Understand the various terms in volumetric analysis
CO3	Calculate the hardness of water
CO4	Identify and analyse organic compounds.
CO5	Know the various types of functional groups

## I. Volumetric Analysis

1. Acidimetry and alkalimetry
    - a) Strong acid vs strong base
    - b) Weak acid vs strong base
    - c) Determination of hardness of water
  2. Permanganimetry
    - a) Estimation of ferrous sulphate
    - b) Estimation of oxalic acid
  3. Iodometry
    - a) Estimation of copper
    - b) Estimation of potassium dichromate
    - c) Estimation of potassium permanganate

## II.Organic Analysis

## A study of the reactions of the following organic compounds

1. Carbohydrate
  2. Amide
  3. Aldehyde
  4. Ketone
  5. Acid
  6. Amine
  7. Phenol

The students may be trained to perform the specific reactions like tests for elements (nitrogen only), aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

### **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	
CO1	2	1	2	2	1	2	2	3	3	3	2.1
CO2	2	2	3	3	1	2	2	3	2	2	2.1
CO3	3	2	2	2	2	2	3	3	3	2	2.3
CO4	3	3	2	3	2	3	3	3	2	2	2.3
CO5	2	3	3	2	3	2	3	2	3	3	2.6
Mean overall Score										2.28(High)	

**Note:**

Org – Qual – Practical	:	30 marks
Volumetric Procedure writing	:	05 marks
Volumetric	:	25 marks
Record (Vol. & Org. Qual.)	:	10 marks*
CIA	:	30 marks
<b>Total</b>	:	<b>100 marks</b>

\*Minimum of 5 marks may be given



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