



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)  
(Deemed to be University Encl. no.3 of the UGC Act, 1956)  
PALLAVARAM - CHENNAI

ACCREDITED BY **NAAC** WITH '**A**' GRADE  
*Marching Beyond 30 Years Successfully*  
INSTITUTION WITH **UGC 12B** STATUS

## **UNDERGRADUATE DEGREE PROGRAMME**

**B.Sc., Chemistry**

**(Three Years)**

/

**B.Sc., (Hons) Chemistry**

**(Four Years)**

### **CURRICULUM & SYLLABUS**

**REGULATION 2024**

**Choice Based Credit System (CBCS)**

**&**

**Learning Outcomes Based Curriculum Framework (LOCF)**

**Effective from the Academic Year**

**2024 -2025**

**Department of Chemistry**



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)  
(Deemed to be University EoL, s/s.3 of the UGC Act, 1956)  
PALLAVARAM - CHENNAI

ACCREDITED BY NAAC WITH 'A' GRADE  
*Marching Beyond 30 Years Successfully*  
INSTITUTION WITH UGC 12B STATUS

## DEPARTMENT OF CHEMISTRY

### VISION OF THE DEPARTMENT

The Vision of the Department is to enhance our reputation as a world-class teaching and research institution reputed for its innovation, excellence and discovery, and to attract best students and staff worldwide.

### MISSION OF THE DEPARTMENT

<b>M1</b>	To actively promote and preserve higher values and ethics in education and research and will pursue excellence in all these areas.
<b>M2</b>	To undertake research in emerging areas of Chemical Sciences & Nanotechnology and transform the findings for the benefit of society.

### PROGRAMME EDUCATIONAL OUTCOMES (PEO)

PEO1	To provide, knowledge based on value based education and ethical leadership in the professional and social life.
PEO2	To provide the professional consultancy and research support for the relevant organization in the domain of super specialization.
PEO3	To provide skills of observations and drawing logical inferences from the scientific experiments.
PEO4	To encourage leadership qualities in graduates with strong communication skills, mould them as good team players and managers so that they have the competence to function effectively in multi-disciplinary orientation team
PEO5	To gain knowledge of chemistry, physics and mathematics through theory and practical.

### PROGRAMME OUTCOMES (PO)

PO1	<b>Problem analyze:</b> Identify, formulate, review research literature and analyze the chemical problems reaching substantiated conclusions using basics concepts of mathematics, physics and biology.
PO2	<b>Design and development of solutions:</b> Design solutions for complex chemical problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO3	<b>Conduct investigations of complex problems:</b> Use research based knowledge and including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO4	<b>Modern Tool Usage and Communication :</b> Graduates will gain knowledge from basic concepts to advanced applications relevant to industries, effectively managing resources and time using ICT and computer-enabled devices, and demonstrating the ability to communicate scientific ideas clearly and effectively.
PO5	<b>Lifelong learning:</b> Graduates will continue to learn and adapt in a world of constantly evolving technology, applying their knowledge through elementary teaching and entrepreneurial skills in small-scale projects.

<b>PO6</b>	<b>Skilled Communicator:</b> Provides foundational and advanced training, enabling students to effectively communicate chemical concepts through technical writing and oral presentations.
<b>PO7</b>	<b>Team work:</b> Graduates to develop teamwork skills by actively contributing in laboratory settings, fieldwork, and industry-related projects.

### **PROGRAMME SPECIFIC OUTCOMES (PSO)**

<b>PSO1</b>	Ability to equipped with the knowledge and skills necessary to pursue global research opportunities and advanced studies, including Ph.D. programs, in the field of chemistry.
<b>PSO2</b>	Enormous job opportunities at all level of chemical , instrumentations , food products industries ,life oriented material industries
<b>PSO3</b>	Graduates will be prepared for specific placements in Research & Development (R&D) and allied divisions, equipping them with the necessary skills and knowledge to excel in these fields

## BOARD OF STUDIES

### List of Members

#### Department of Chemistry

S. No	Name & Designation	Address	Role
1.	<b>Dr. R.A. Kalaivani</b> Professor & Dean	Department of Chemistry, School of Basic Sciences, VISTAS, Chennai- 600 117 Tamilnadu. Email: <a href="mailto:dean.sbs@velsuniv.ac.in">dean.sbs@velsuniv.ac.in</a> Mobile: 9962506223	Chair Person (Internal Member)
2.	<b>Dr. D. Gavaskar</b> Associate Professor & Head i/c	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: <a href="mailto:hodchemistry@velsuniv.ac.in">hodchemistry@velsuniv.ac.in</a> , Mobile:6380645669	Internal Member
3.	<b>Dr. Anuja Manikandan</b> Assistant Professor	Department of Chemistry, Email: <a href="mailto:anujamanikandan@gmail.com">anujamanikandan@gmail.com</a> Loyola college, Chennai. Tamilnadu.	Academic Expert (External Member)
4.	<b>Dr. Rajkumar Samuel</b> Director Technical	Hubert Enviro Care Systems(P) Ltd, Chennai-600032. Tamilnadu Email: <a href="mailto:rajkumar@hecs.in">rajkumar@hecs.in</a> Mobile:9884391099	Industrial Expert (External Member)
5.	<b>Ms. G. Sharmila</b> Student	Department of Chemistry, Madras Christian College, Chennai-600059. Tamilnadu Email: <a href="mailto:sharmila3102@gmail.com">sharmila3102@gmail.com</a> Mobile:9087573744	Alumni Member (External Member)
6.	<b>Dr. R. Sudha</b> Associate Professor	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: <a href="mailto:sudha.sbs@velsuniv.ac.in">sudha.sbs@velsuniv.ac.in</a> Mobile: 9945708573	Internal Member

7.	<b>Dr. V. Sriraman</b> Assistant Professor	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: sriraman.sbs@velsuniv.ac.in Mobile: 9940122677	Internal Member
8.	<b>Dr. M. Revathi</b> Associate Professor	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: dr.revathi.sbs@velsuniv.ac.in Mobile: 9843246060	Internal Member
9.	<b>Dr.S. Kotteswaran</b> Assistant Professor	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: kotteswaran.sbs@velsuniv.ac.in Mobile: 98870808279	Internal Member
10.	<b>Dr. Jayalakshmi S</b> Assistant Professor	Department of Chemistry, VISTAS, Chennai- 600 117, Tamilnadu. Email: sjayalakshmi.sbs@velsuniv.ac.in Mobile: 9940063639	Internal Member

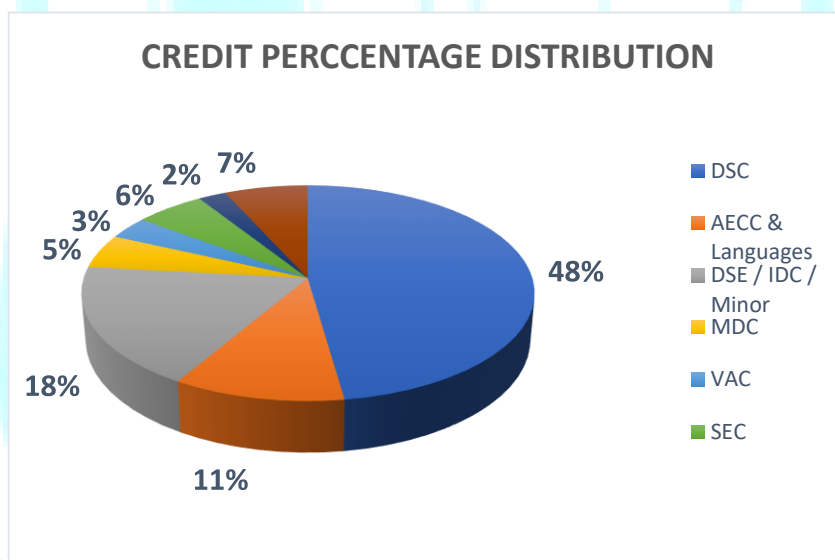
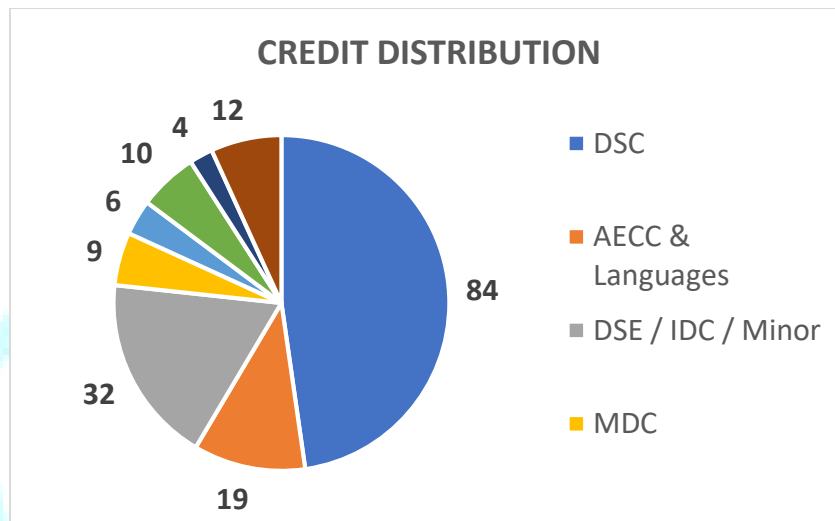


## CREDIT DISTRIBUTION

**B.Sc., (Hons) in Chemistry**  
**Minimum credits to be earned: 176**

**B.Sc., Chemistry**  
**Minimum credits to be earned: 132**

<b>Component</b>	<b>I Sem</b>	<b>II Sem</b>	<b>III Sem</b>	<b>IV Sem</b>	<b>V Sem</b>	<b>VI Sem</b>	<b>3 Yrs. Total Credits</b>	<b>VII Sem</b>	<b>VIII Sem</b>	<b>4 Yrs Total Credits</b>
<b>DSC</b>	8	8	8	8	12	16	60	12	12	84
<b>AECC &amp; Languages</b>	4	4	4	7	-	-	19	-	-	19
<b>DSE / IDC / Minor</b>	3	4	4	3	4	4	22	4	4	30
<b>MDC</b>	3	3	3	-	-	-	9	-	-	9
<b>MDE</b>	-	-	2	-	-	-	2	-	-	2
<b>VAC</b>	1	2	-	1	2	-	6	-	-	6
<b>SEC</b>	2	2	2	2	2	2	12	-	-	12
<b>SI</b>	-	-	1	-	1	-	2	-	-	2
<b>RP</b>	-	-	-	-	-	-	-	6	6	12
<b>Total Credits</b>	<b>21</b>	<b>23</b>	<b>24</b>	<b>21</b>	<b>21</b>	<b>22</b>	<b>132</b>	<b>22</b>	<b>22</b>	<b>176</b>



#### ABBREVIATIONS

<b>DSC</b>	Disciplinary Specific Core
<b>AECC</b>	Ability Enhancement Compulsory Courses
<b>DSE</b>	Disciplinary Specific Elective
<b>IDC</b>	Interdisciplinary / Minor Courses
<b>MDC</b>	Multidisciplinary Courses
<b>VAC</b>	Value Added Courses
<b>SEC</b>	Skill Enhancement Courses
<b>SI</b>	Summer Internship
<b>RP</b>	Research Project



## CURRICULUM STRUCTURE

B.Sc., Chemistry Three Years

/

B.Sc., (Hons) in Chemistry Four Years

**Total number of Credits: 176**

B.Sc., Chemistry (Hons) Minimum Credits to be earned :176										
B.Sc., Chemistry Minimum Credits to be earned: 132										
Hours/Week										
Maximum Marks										
SEMESTER 1										
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
<b>LANG 1</b>	24LTAM11/	Tamil I /								
	24LHIN11/	Hindi I/	2	0	0	1	2	40	60	100
	24LFRE11	French I								
<b>ENG 1</b>	24LENG11	English I	2	0	0	1	2	40	60	100
<b>DSC 1</b>	24CBHC11	Atomic structure and Chemical Bonding	3	0	0	2	3	40	60	100
<b>DSC 2</b>	24CBHC12	Basics of Analytical Methods	4	0	0	2	4	40	60	100
<b>MDC 1</b>	24CBMA001	Mathematics I	3	0	0	2	3	40	60	100
<b>DSE 1/ IDC 1 / Minor 1</b>	24DBHC1-	DSE 1	3	0	0	2	3	40	60	100
<b>DSC 1 (Lab)</b>	24PBHC11	Volumetric Analysis and Inorganic Preparations- Practical I	0	0	2	1	1	40	60	100
<b>VAC 1</b>	24DVAC11	Universal Human Values	1	0	0	1	1	-	100	100
<b>SEC 1</b>	24SSKU11	Soft Skills 1	2	0	0	1	2	40	60	100
<b>SEC 2</b>		Orientation programme / Industrial Visit	-	-	-	-	-	-	-	-
			<b>20</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>21</b>	<b>-</b>	<b>-</b>	<b>-</b>

**SEMESTER 2**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
<b>LANG 2</b>	24LTAM21/	Tamil II /	2	0	0	1	2	40	60	100
	24LHIN21/	Hindi II /								
	24LFRE21	French II								
<b>ENG 2</b>	24LENG21	English II	2	0	0	1	2	40	60	100
<b>DSC 3</b>	24CBHC21	Chemistry of Hydrocarbons	3	0	0	2	3	40	60	100
<b>DSC 4</b>	24CBHC22	Phase Equilibria and Chemical Kinetics	3	0	0	2	3	40	60	100
<b>MDC 2</b>	24CBMA002	Mathematics – II	3	0	0	2	3	40	60	100
<b>DSE 2 / IDC 2 / Minor 2</b>	24DBHC21	Discipline Specific Elective - II	4	0	0	2	4	40	60	100
<b>DSC 2</b>	24PBHC21 (Lab)	Organic Qualitative Analysis -Practical II	0	0	2	1	1	40	60	100
<b>DSC 3</b>	24PBHC22 (Lab)	Physical chemistry Practical-Practical III	0	0	2	1	1	40	60	100
<b>VAC 2</b>	24DVAC21	Communication Skills	2	0	0	1	2	40	60	100
<b>SEC 3</b>	24SSKU21	Soft Skills II	2	0	0	1	2	40	60	100
			<b>21</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>23</b>	<b>-</b>	<b>-</b>	<b>-</b>

### SEMESTER 3

Category	Code	Course	L	T	P	O	C	CI A	SE E	Total
<b>LANG 3</b>	24LTAM3	Tamil III /								
	1/24LHIN3	Hindi III /	2	0	0	1	2	40	60	100
	1/	French III								
	24LFRE31									
<b>ENG 3</b>	24LENG31	English III	2	0	0	1	2	40	60	100
<b>DSC 5</b>	24CBHC31	Solid State Chemistry	3	0	0	2	3	40	60	100
<b>DSC 6</b>	24CBHC32	Electrochemistry	3	0	0	2	3	40	60	100
<b>MDC 3</b>	24CBHC33	Fundamentals of Physics- I	3	0	0	2	3	40	60	100
<b>DSE 3 / IDC 3 / Minor 3</b>	24DBHC3-	Discipline Specific Elective - III	4	0	0	2	4	40	60	100
<b>DSC 4 (Lab)</b>	24PBHC31	Organic Single Stage Preparations –Practical- IV	0	0	2	2	1	40	60	100
<b>DSC 5 (Lab)</b>	24PBHC32	Physics Practical	0	0	2	2	1	40	60	100
<b>MDE 1</b>	-	Indian Knowledge System	1	1	0	0	2	40	60	100
<b>SEC 4</b>	24SSKU31	Soft Skills III	2	0	0	2	2	40	60	100
<b>SI 1</b>		Internship I	0	0	2	1	1	-	100	100
			<b>20</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>24</b>	<b>-</b>	<b>-</b>	<b>-</b>

**SEMESTER 4**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
<b>LANG 4</b>	24LTAM41/	Tamil IV /								
	24LHIN41/	Hindi IV /	2	0	0	1	2	40	60	100
	24LFRE41	French IV								
<b>ENG 4</b>	24LENG41	English IV	2	0	0	1	2	40	60	100
<b>AECC 1</b>	24EVS041	Environmental Studies	3	0	0	2	3	40	60	100
<b>DSC 7</b>	24CBHC41	Organic Reaction Mechanism	3	0	0	2	3	40	60	100
<b>DSC 8</b>	24CBHC42	Thermodynamics	3	0	0	2	3	40	60	100
<b>DSE 4 / IDC 4 / Minor 4</b>	24DBHC4-	Discipline Specific Elective -IV	3	0	0	2	3	40	60	100
<b>DSC 6 (Lab)</b>	24PBHC41	Preparation Of Inorganic Compounds And Complexes- Practical -V	0	0	2	1	1	40	60	100
<b>DSC 7 (Lab)</b>	24PBHC42	Organic Double stage Preparations -Practical -VI	0	0	2	1	1	40	60	100
<b>SEC 5</b>	24SBHC41	Industry Oriented Employability skills	1	0	2	1	2	40	60	100
<b>VAC 3</b>	24SNSS41	Yoga Education / NSS / NCC	0	0	2	1	1	-	100	100
<b>SEC 6</b>		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			<b>17</b>	<b>-</b>	<b>8</b>	<b>-</b>	<b>21</b>	<b>-</b>	<b>-</b>	<b>-</b>

**SEMESTER 5**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
<b>DSC 9</b>	24CBHC51	Stereochemistry and Molecular Rearrangement	3	0	0	2	3	40	60	100
<b>DSC 10</b>	24CBHC52	Coordination Chemistry	3	0	0	2	3	40	60	100
<b>DSC 11</b>	24CBHC53	Surface Chemistry	4	0	0	2	4	40	60	100
<b>DSE 5 / IDC 5 / Minor 5</b>	24DBHC5-	Discipline Specific Elective – V	4	0	0	2	4	40	60	100
<b>DSC 8 (Lab)</b>	24PBHC51	Gravimetric Analysis Practical- Practical VII	0	0	2	2	1	40	60	100
<b>DSC 9 (Lab)</b>	24PBHC52	Inorganic Qualitative Analysis -Practical VIII	0	0	2	2	1	40	60	100
<b>SEC 7</b>	24SBHC51	Entrepreneurial Development	2	0	0	1	2	40	60	100
<b>VAC 4</b>	24DVAC51	VAC	2	0	0	1	2	40	60	100
<b>SI 2</b>	24IBHC51	Internship II	0	0	2	1	1	-	100	100
<b>SEC 8</b>	24SBHC52	Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-	-	-	-
			<b>18</b>	<b>-</b>	<b>6</b>	<b>-</b>	<b>21</b>	<b>-</b>	<b>-</b>	<b>-</b>

**SEMESTER 6**

<b>Category</b>	<b>Code</b>	<b>Course</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
<b>DSC 12</b>	24CBHC61	Natural Products	3	0	0	2	3	40	60	100
<b>DSC 13</b>	24CBHC62	Nuclear and Radio Chemistry	4	0	0	2	4	40	60	100
<b>DSC 14</b>	24CBHC63	Quantum Mechanics	4	0	0	2	4	40	60	100
<b>DSC 15</b>	24CBHC64	Main Group Elements and Crystal study	4	0	0	2	4	40	60	100
<b>DSE 6 / IDC 6 / Minor 6</b>	24DBHC6-	Discipline Specific Elective – VI	4	0	0	2	4	40	60	100
<b>DSC 10 (Lab)</b>	24PBHC61	Analytical Chemistry Practicals- Practical IX	0	0	2	2	1	40	60	100
<b>SEC 9</b>	24RBHC61	Mini Project	2	0	0	2	2	-	100	100
<b>SEC 10</b>	24SBHC62	On Job Training / Apprenticeship / Startup	-	-	-	-	-	-	-	-
			<b>21</b>	<b>-</b>	<b>2</b>	<b>-</b>	<b>22</b>	<b>-</b>	<b>-</b>	<b>-</b>

### SEMESTER 7

Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 16	24CBHC71	Fundamentals of Spectroscopy	3	0	0	2	3	40	60	100
DSC 17	24CBHC72	Chemistry of Transition metals	4	0	0	2	4	40	60	100
DSC 18	24CBHC73	Polymer Chemistry	4	0	0	2	4	40	60	100
DSE 7 / IDC 7 / Minor 7	24DBHC7-	Discipline Specific Elective – VII	4	0	0	2	4	40	60	100
DSC 11 (Lab)	24PBHC71	Consumer Products Practicals- Practical X	0	0	2	2	1	40	60	100
RP 1	24RBHC71	Research Project I	0	0	12	2	6	40	60	100
			15	-	14	-	22	-	-	-

### SEMESTER 8

Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 19	24CBHC81	Research Methodology	3	0	0	2	3	40	60	100
DSC 20	24CBHC81	Material Chemistry	3	0	0	2	3	40	60	100
DSC 21	24CBHC81	Statistical Thermodynamics and Group Theory	4	0	0	2	4	40	60	100
DSE 8 / IDC 8 / Minor 8	24DBHC8-	Discipline Specific Elective -VIII	4	0	0	2	4	40	60	100
DSC 12 (Lab)	24PBHC81	Semi Micro Qualitative Analysis Practical - XI	0	0	2	2	1	40	60	100
DSC 13 (Lab)	24PBHC81	Industrial Chemistry Practical -XII	0	0	2	2	1	40	60	100
RP 2	24RBHC81	Research Project II	0	0	12	2	6	-	60	100
			14	-	14	-	22	-	-	-

### DISCIPLINE SPECIFIC CORE COURSES

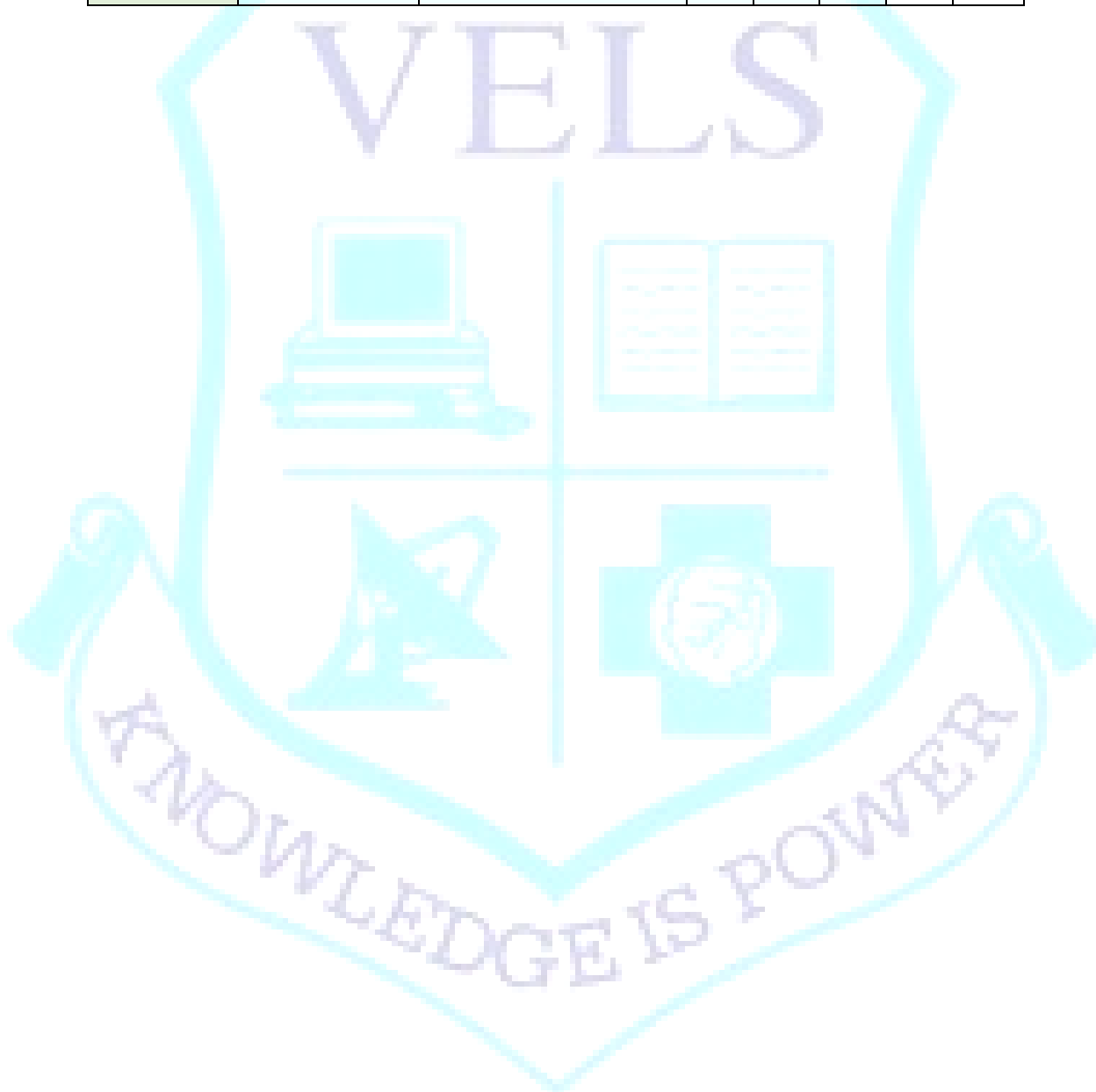
Category	Code	Course	L	T	P	O	C
DSC 1	24CBHC11	Atomic structure and Chemical Bonding	3	0	0	2	3
DSC 2	24CBHC12	Basics of Analytical Methods	4	0	0	2	4
DSC 1 (Lab)	24PBHC11	Volumetric Analysis and Inorganic Preparations- Practical I	0	0	2	1	1
DSC 3	24CBHC21	Chemistry of Hydrocarbons	3	0	0	2	3
DSC 4	24CBHC22	Phase Equilibria and Chemical Kinetics	3	0	0	2	3
DSC 2 (Lab)	24PBHC21	Organic Qualitative Analysis -Practical II	0	0	2	1	1
DSC3 (Lab)	24PBHC22	Physical chemistry Practical-Practical III	0	0	2	1	1
DSC 5	24CBHC31	Solid State Chemistry	3	0	0	2	3
DSC 6	24CBHC32	Electrochemistry	3	0	0	2	3
DSC 4 (Lab)	24PBHC31	Organic Single Stage Preparations -Practical-IV	0	0	2	2	1
DSC 5 (Lab)	24PBHC32	Physics Practical	0	0	2	2	1
DSC 7	24CBHC41	Organic Reaction Mechanism	3	0	0	2	3
DSC 8	24CBHC42	Thermodynamics	3	0	0	2	3
DSC 6 (Lab)	24PBHC41	Preparation Of Inorganic Compounds And Complexes- Practical - V	0	0	2	1	1
DSC 7 (Lab)	24PBHC42	Organic Double stage Preparations -Practical VI	0	0	2	1	1
DSC 9	24CBHC51	Stereochemistry and Molecular Rearrangement	3	0	0	2	3



<b>DSC 10</b>	24CBHC52	Coordination Chemistry	3	0	0	2	3
<b>DSC 11</b>	24CBHC53	Surface Chemistry	4	0	0	2	4
<b>DSC 8 (Lab)</b>	24PBHC51	Gravimetric Analysis Practical- Practical - VII	0	0	2	2	1
<b>DSC 9 (Lab)</b>	24PBHC52	Inorganic Qualitative Analysis -Practical VIII	0	0	2	2	1
<b>DSC 12</b>	24CBHC61	Natural Products	3	0	0	2	3
<b>DSC 13</b>	24CBHC62	Nuclear and Radio Chemistry	4	0	0	2	4
<b>DSC 14</b>	24CBHC63	Quantum Mechanics	4	0	0	2	4
<b>DSC 15</b>	24CBHC64	Main Group Elements and Crystal study	4	0	0	2	4
<b>DSC 10 (Lab)</b>	24PBHC61	Analytical Chemistry Practical - Practical IX	3	0	0	2	3
<b>DSC 16</b>	24CBHC71	Fundamentals of Spectroscopy	3	0	0	2	3
<b>DSC 17</b>	24CBHC72	Chemistry of Transition Metals	4	0	0	2	4
<b>DSC 18</b>	24CBHC73	Polymer Chemistry	4	0	0	2	4
<b>DSC 11 (Lab)</b>	24PBHC71	Consumer Products Practical- Practical X	0	0	2	2	1
<b>DSC 19</b>	24CBHC81	Research Methodology	3	0	0	2	3
<b>DSC 20</b>	24CBHC82	Material Chemistry	3	0	0	2	3
<b>DSC 21</b>	24CBHC81	Statistical Thermodynamics and Group Theory	4	0	0	2	4
<b>DSC 12 (Lab)</b>	24PBHC81	Semi Micro Qualitative Analysis Practical - XI	0	0	2	2	1
<b>DSC 13 (Lab)</b>	24PBHC82	Industrial Chemistry Practical - XII	0	0	2	2	1

### DISCIPLINE SPECIFIC ELECTIVE COURSES

Category	Code	Course	L	T	P	O	C
DSE	24DBHC11	Chemistry of Functional groups	3	0	0	2	3
DSE	24DBHC21	Chemistry in Everyday Life	4	0	0	2	4



### AECC & LANGUAGES

Category	Code	Course	L	T	P	O	C
<b>LANG 1</b>	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I / French I	2	0	0	1	2
<b>ENG 1</b>	24LENG11	English I	2	0	0	1	2
<b>LANG 2</b>	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	2	2
<b>ENG 2</b>	24LENG21	English II	2	0	0	2	2
<b>LANG 3</b>	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III / French III	2	0	0	2	2
<b>ENG 3</b>	24LENG31	English III	2	0	0	2	2
<b>AECC 1</b>	24EVS041	Environmental Studies	3	0	0	2	3

### MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	O	C
<b>MDC 1</b>	24CBMA001	Mathematics- I	3	0	0	2	3
<b>MDC 2</b>	24CBMA002	Mathematics – II	3	0	0	2	3
<b>MDC 3</b>	24CBHC33	Fundamentals of Physics	3	0	0	2	3

### MULTIDISCIPLINARY ELECTIVES

<b>MDE 1</b>	24MBCY31	Indian Knowledge System	1	1	0	0	2
--------------	----------	----------------------------	---	---	---	---	---

### VALUE ADDED COURSES

Category	Code	Course	L	T	P	O	C
VAC 1	24DVAC11	Universal Human Values	2	0	2	1	2
VAC 2	24DVAC12	Communication Skills	0	0	0	1	1
VAC 3	24SNSS41	Yoga Education / NSS / NCC	0	0	2	1	1
VAC 4	24DVAC51	VAC	2	0	0	1	2

### SKILL ENHANCEMENT COURSES

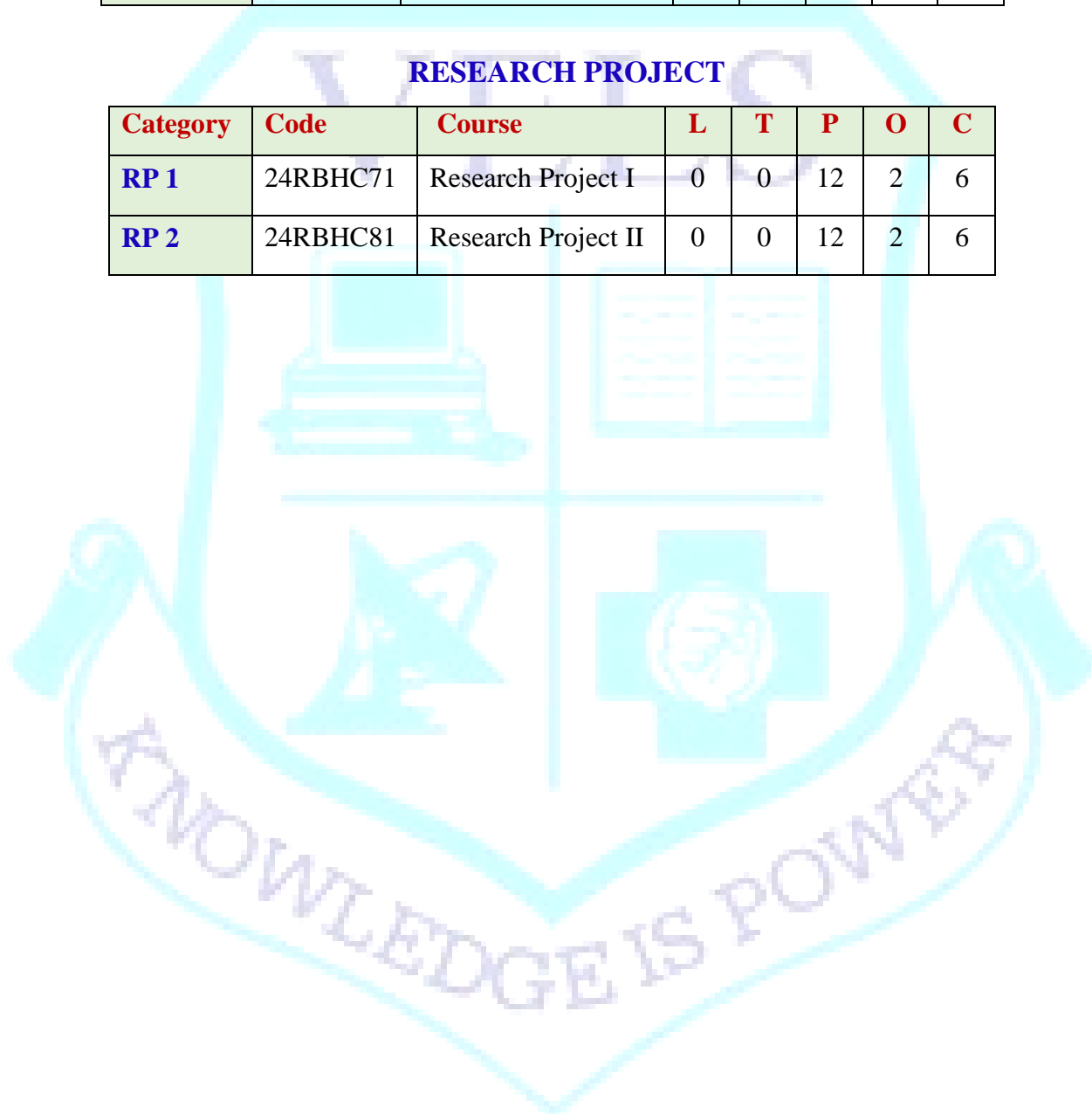
Category	Code	Course	L	T	P	O	C
SEC 1	24SSKU11	Soft Skills I	2	0	0	1	2
SEC 2	24SBHC11	Orientation Programme / Industrial Visit	-	-	-	-	-
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2
SEC 4	24SSKU31	Soft Skills III	2	0	0	2	2
SEC 5	24SBCY41	Industry Oriented Employability skills	1	0	2	1	2
SEC 6	24SBHC42	In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC 7	24SBHC51	Entrepreneurial Development	2	0	0	1	2
SEC 8	24SBHC52	Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-
SEC 9	24RBHC61	Mini Project	2	0	0	2	2
SEC 10	24SBHC62	On Job Training / Apprenticeship / Startup	-	-	-	-	-

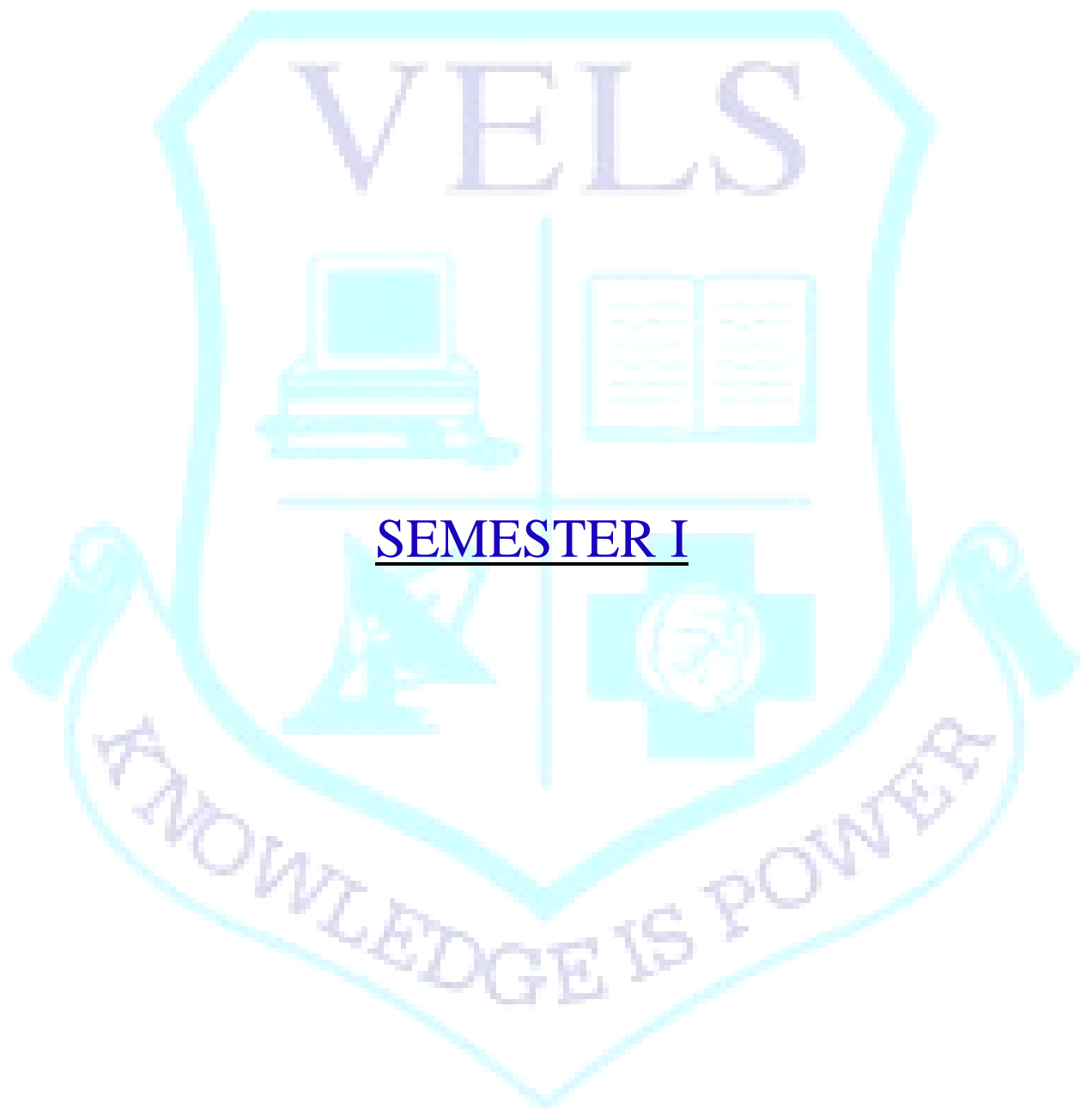
### SUMMER INTERNSHIP

Category	Code	Course	L	T	P	O	C
SI 1	24IBHC31	Internship I	0	0	2	1	1
SI 2	24IBHC31	Internship II	0	0	2	1	1

### RESEARCH PROJECT

Category	Code	Course	L	T	P	O	C
RP 1	24RBHC71	Research Project I	0	0	12	2	6
RP 2	24RBHC81	Research Project II	0	0	12	2	6





SEMESTER I

பாடக் குவியீட்டு எண்: 24LTAM11பருவம்-1, தமிழ்மொழிப்பாடம்-1, பகுதி-  
1, தகுதிப்புள்ளி: 2, வாரப் பாட கநரம்: 2. தாள்-1

L	T	P	O	C
2	0	0	1	2

**மொழிவரலாறு - ஁ங்க இலக்கியம் - ஁஁ இலக்கியம் - மொழித்தினைன் பாடத்திட்ட கநாக்கம்:**

மாணவர்களின் இலக்கிய நாட்டத்தனத கமம்படுத்துதல், தமிழர்தம் வாழ்வியல் மனைகளையும் பண்பாட்டுச் செழுமகளையும் ஁ங்கம் மற்றும் நீதி இலக்கியங்கள் மூலம் இன்னைய தனலமுனையி஁ர் ஁஁யச் செய்தல், மாணவர்களுக்குத் தமிழ்தத் தவைின்஁ ஁ழுதுவதற்குத் கதனவயா஁ பயிற்஁ ஁ளித்து ஁வர்களின் மொழித்தினை கமம்படுத்துதல், செய்யுளின் நலத்தனதப் பாராட்டும் முனைமனய ஁஁யச் செய்து ஁தன்வழி ஁ந்தனை வளத்தனதப் மபருகச் செய்தல் ஁ன்பைவும் கமற்கண்டவழி மாணவர்களை ஁ளுனம மிக்கவர்களாக ஁ருவாக்கி, கபாட்டிக்கதர்வுகளுக்குத் தயார் செய்து ஁வர்களுக்கு கவனலவாய்ப்பை ஁ருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய கநாக்கமாகும்.

**஁லகு- 1: தமிழ் மொழி வரலாறு 8஁ணி நநரம்**

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஁ட்சி மொழிகள் - திரொவிட மொழிக்குடும்பங்கள் - திரொவிட மொழிகளின் வகககள் - திரொவிட மொழிகளின் சிறப்புகள் - திரொவிட மொழிகளின் வழங்கிடங்கள் - திரொவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் மதொடர்புகள்.

**஁லகு -2 8 ஁ணி நநரம்**

புறநொ஁று- பொடல் ஁ண்: , 182, 183, - இரண்டு பொடல்கள். குறுந்மதொகக- பொடல் ஁ண்: 2, 167, - இரண்டு பொடல்கள் பெரிபொடல் - திகரயிடும் பனிப் மபளவம் நினைழில் ஁ந்நனொர்

**஁லகு - 3 ஁ற இலக்கியங்கள்**

திருக்குறள்- வொன்சிறப்பு (஁஁ம்), மபருகா (மபாருள்), பெரிவொற்றொகா (இன்பம்),. மூன்று ஁திகாரங்கள் முழுமயும்

நாலடியார் - இரண்டு பாடல்கள். (2, 3)

மூதுனர - இரண்டு பாடல்கள். (2, 8)

஁லகு 4 மொழி 07 ஁ணி நநரம் கழ நீக்கி ஁ழுதுதல் - ஁ற்றுப்பிகழ நீக்கி ஁ழுதுதல் - மதொடர்பிகழ நீக்கி ஁ழுதுதல் - ஁ற்று ஁ிகும் இடங்கள் - ஁ற்று ஁ிகொ இடங்கள் - பிற மொழிச் செ஁ற்ககள நீக்கி ஁ழுதுதல் - பயிற்சிகள்.

**மொத்தம்: 30 மணி கநரம்**

**பார்னவ நூல்கள்**

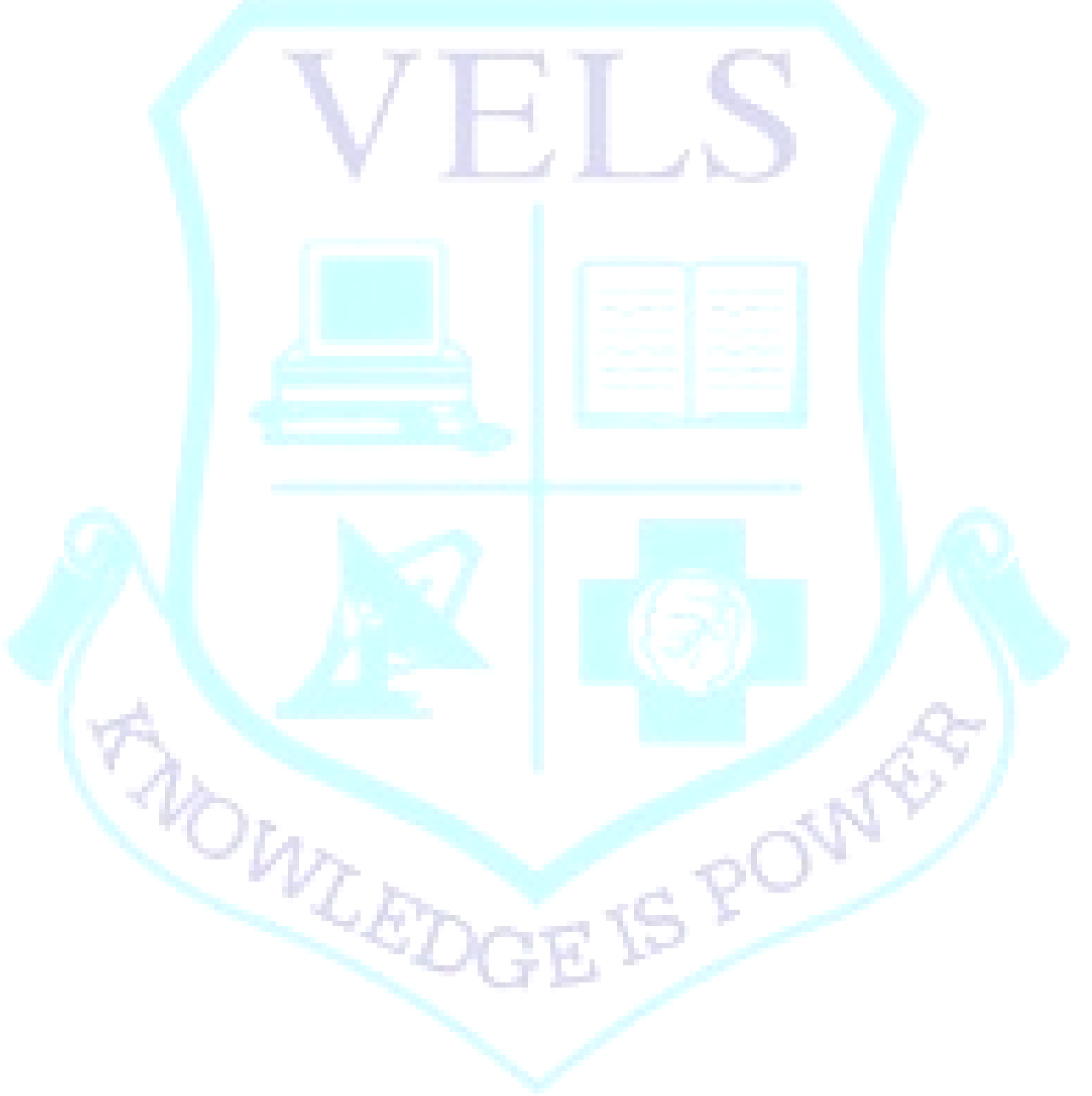
஁ங்க இலக்கிய ஁னர ஁ன் ஁஁ பி ஁ச் சென்னை 2010

தமிழ் மொழி வரலாறு, ஁க்டர் ஁.஁க்திகவல் , மணிவா஁கர் பதிப்பகம், 2018

திருக்குறள் தெளிவுரை வரதராசன் , மு., கழக மவளியீடு, 1994.

தவின்னீத் தமிழ் எழுத - மருதார் அரங்கராண், ஐந்தினணப் பதிப்பகம், 2003.

தமிழ் இலக்கிய வரலாறு, வரதராண், மு., புது தில்லி : ஁ாகித்திய அக்காமதமி, 2002.





L	T	P	O	C
2	0	0	1	2

**COURSE OBJECTIVES:**

- To enable the students to develop communication Skills
- To train students in official language
- To enrich their knowledge in Hindi Literature
- To *teach* them human values & create awareness towards importance of tourism
- To share the knowledge of their native place
- To teach them to use Azhagi, Azhagi+ fonts

**UNIT I:**

6

'Smruti' (Kahani) by Pandit Sriram Sharma.

**UNIT II:**

6

'Athiti tum kab jaaoge' (Vyangy) by Harishankar Parsayi.

**UNIT III:**

6

'Atatho Ghumakkad Jigyasa' (Yatra Vruthanth) by Rahul Sanskritayyan.

**UNIT IV:**

6

Functional Hindi-Phrases use in Letter Writing.

Skill development - Bhav Ek Bhasha Anek

**UNIT V:**

6

Letter Writing- Intro. & Types & 3 Personal Letters

Introduction to Azhagi, Azhagi + fonts

**Total hour: 30.**

### **Course Outcomes:**

At the end of this course Students will be able to

**CO-1** Gain knowledge about the olden system of communication, olden living style existed in the villages, human values, giving due respect to other living beings, thriller style of story telling

**CO-2** Understand to maintain their limits among their familiar circle and social responsibility

**CO-3** Understand importance of exposure to various culture, human values and develop good character

**CO-4** Know the Functional words in Hindi, various culture and languages of India

**CO-5** Gain knowledge in drafting personal letters, equip themselves to Hindi typing thereby creating self-employment

### **Text/Reference Book/Weblinks:**

1. Pandit Sriram Sharma ka kahani: <https://www.evidyarthi.in>
2. Harishankar parasayi ka Vyangy: <http://gadyakosh.org>
3. Rahul Sanskritayan ka yatravruttant: <https://www.hindwi.org>
4. Prayojanmoolak Hindi: <https://hi.m.wikipedia.org>
5. <https://www.azhagi.com/hnd/helphtml/Introduction.html>

L	T	P	O	C
2	0	0	1	2

**COURSE OBJECTIVES :**

The lessons are being chosen:

- 1) to greet, to express excuse and to introduce oneself
- 2) to introduce another person
- 3) to express his/her ideas, opinions and weekend projects
- 4) to request someone to do something, polite manners
- 5) to accept, refuse, enquire and indicate the time and date
- 6) to express himself / herself in positive and negative manner

**UNITS:**

- 1) Salut

les nombres, Les jours de la semaine et du mois, La nationalité

4

- 2) Enchanté

Les verbes Etre, Avoir, Aller, Regular ER verbes, Present tense.

6

- 3) J'Adore

La negation, l'adjectif possessif, le futur proche

4

- 4) Tu veux bien

Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi),  
Le passé composé

7

- 5) On se voit quand

Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que,  
L'heure et la date.

5

- 6) Bonne idée

Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms compléments  
directs le, la, les, La négation : ne... pas de.

4

**Total Hours:30****Course Outcomes:**

The students would be able to greet, to excuse and to introduce himself

- 1) The students would be able to introduce someone
- 2) The students would be able to express his ideas, opinions and weekend projects
- 3) The students would be able to ask someone to do something, polite manner
- 4) The students would be able to accept, refuse enquire and indicate the time and date
- 5) The students would be able to express himself in positive and negative manner

**Text / Reference Book:**

1. Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. Reference book: SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

L	T	P	O	C
2	0	0	1	2

### COURSE OBJECTIVES

- To enable students to develop their communication skills effectively.
- To make students familiar with usage skills in the English Language.
- To enrich their vocabulary in English.
- To develop communicative competence.

#### UNIT I Prose

Dangers of drug abuse - Hardin B.Jones

Tight corners - E.V.Lucas

6

#### UNIT II Poetry

Ecology - A.K.Ramanujan

The owl and the chimpanzee - Jo Camacho

6

#### UNIT III Short story

The Dear Departed - Stanley Houghton

The Fool's Paradise- Isaac Bashevis Singer

6

#### UNIT IV Grammar

Parts of speech, Articles

6

#### UNIT V Grammar

One-word substitution, prefix, suffix, synonym, antonym.

6

### COURSE OUTCOME

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

**CO-1** Understand the characteristic features of the language used in the text.

**CO-2** Strengthen their knowledge of basic grammar

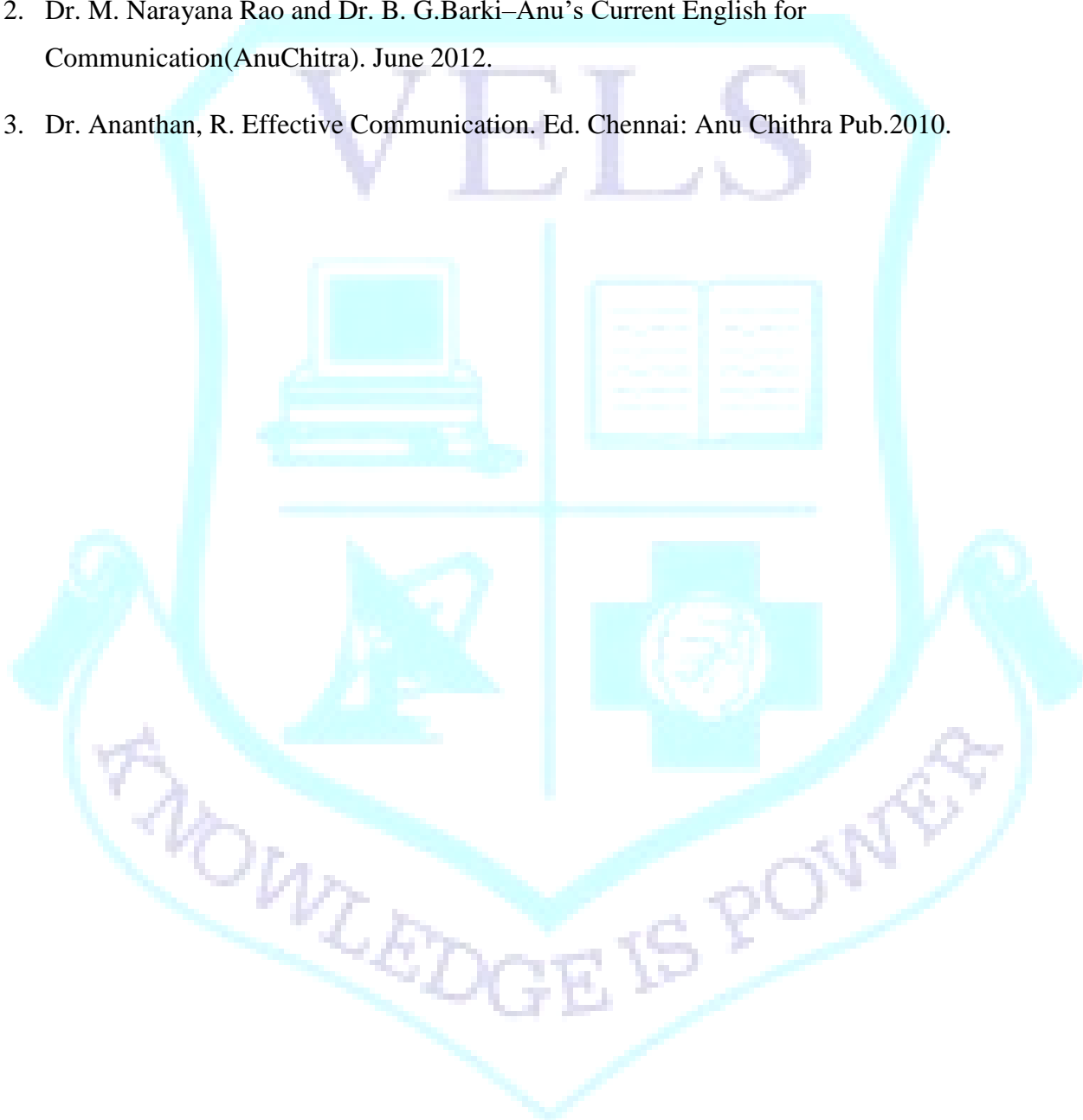
**CO-3** Improve narrative skills after studying diverse prose and play

**CO-4** Understand to classify parts of speech and articles.

**CO-5** Develop critical writing skills in the textual content of the syllabus

**BOOKS PRESCRIBED:**

1. English for Communication Enrichment: by Jeya Santhi June 2015.
2. Dr. M. Narayana Rao and Dr. B. G.Barki–Anu’s Current English for Communication(AnuChitra). June 2012.
3. Dr. Ananthan, R. Effective Communication. Ed. Chennai: Anu Chithra Pub.2010.



L	T	P	O	C
3	0	0	2	3

### COURSE OBJECTIVE

- To revive the fundamentals and basics of chemistry learned at school level with detailed explanation.
- To equip students with the ability to apply the theoretical knowledge of atomic structure, periodic properties, and chemical bonding to explain and predict chemical behavior and bonding patterns in various molecules.
- To provide a thorough understanding of different types of chemical bonds, including ionic, covalent, and metallic bonds, along with related concepts such as lattice energy, hybridization, and molecular orbital theory

### UNIT-I ATOMIC STRUCTURE

9

Introduction to Atomic Structure - Bohr's atomic theory and limitations - Line spectrum of hydrogen atom - Wave mechanics – duality of matter -de Broglie equation - Heisenberg's Uncertainty Principle and its significance. Failure of Bohr's atomic model. Significance of quantum numbers-Shapes of *s*, *p*, *d* and *f* orbitals. Pauli's exclusion principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.

### UNIT-II PERIODICITY OF ELEMENTS

9

Introduction to periodic properties - Groups and Periods in the Periodic Table - Slater rules Effective nuclear charge - shielding constant - Trend of the periodic table properties- factors affecting periodic properties: a) atomic radii, b) ionic radii, c) ionization energy, Successive ionization energy, d) electron affinity e) electronegativity. Electronegativity scales: Pauling, Mulliken's scales of electronegativity, Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity.

### UNIT-III CHEMICAL BONDING I

9

Introduction to chemical bonding - Types of chemical bonds - Definition and General characteristics of Ionic bond – Packaging of ions in crystals, Radius ratio rule and its applications, Lattice energy - Born-Lande equation, Kapustinskii Equation, Madelung constant, Born-Haber cycle and its applications, Relationship between lattice energy and solubility of ionic compounds, Covalent character in ionic compounds

### UNIT-IV CHEMICAL BONDING II

9

Introduction to Covalent Bonding - Lewis structure - Octet rule, Valence Bond theory - Postulates and limitations, Modified VB theory: Types of hybridization, VSEPR theory to predict the type of hybridization and geometry of molecule, Molecular Orbital Theory - LCAO method - formation of bonding, antibonding and nonbonding molecular orbitals. Types of overlapping, Molecular orbital diagrams of diatomic and polyatomic molecules

Introduction to metallic bond - Conductor and Insulator, Semiconductor. Band Theory - Multiple bonding and Example for  $\pi$ -back bonding. Van der Waals forces: Definition and different types of forces  
London forces - hydrogen bonding and its types, VB approach of hydrogen bonding, Effects of hydrogen bonding in density, solubility energetics of dissolution process.

**Total: 45 hrs**

**Text Books :**

1. J.D. Lee, Concise Inorganic Chemistry, Fifth Edn., Wiley India 2008.
2. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry- Principles of Structure and Reactivity, Pearson Education 2009.
3. B.E. Douglas, D. H. McDaniel, J. J. Alexander, Concepts and Models of Inorganic Chemistry, 3rd Edn., John Wiley & Sons, Inc. 1993.
4. P.W. Atkins, T.L. Overton, J.P. Rourke, M.T. Weller, and F.A. Armstrong, Shriver and Atkins' Inorganic Chemistry, 5th Edn, W. H. Freeman and Company, 41 Madison Avenue, New York, NY 10010 www.whfreeman.com. 2010.

**Reference Books:**

1. L. G. Miessler, J. P. Fischer, D. A. Tarr, Inorganic Chemistry, Fifth edition, Pearson, 2014.
2. P.L. Soni, Textbook of Inorganic Chemistry, Mohan Katyal, Sultan Chand & Sons Publishers 2006.
3. S. Prakash, G.D. Tuli, S. K. Basu, R.D. Madan, Advanced Inorganic Chemistry – I Sultan Chand & Sons Publishers 2000.

**Weblink:**

[Chemical bonding and molecular structure | Khan Academy](#)

[Atomic Structure - Chemistry LibreTexts](#)

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Utilize the knowledge of quantum mechanics to understand the atomic structure.	<b>K3</b>
<b>CO2:</b>	Interpret the periodic properties of elements with their chemical properties.	<b>K2</b>
<b>CO3:</b>	Analyze the concept of lattice energy using Born- Landé and Kapuscinski expression and Born-Haber cycle.	<b>K4</b>
<b>CO4:</b>	Perceive the importance of structures and geometries of molecules using VSEPR and MO theory.	<b>K5</b>
<b>CO5:</b>	Rationalize the properties of semiconductor using metallic bonding and gaseous behaviour using weak chemical forces.	<b>K6</b>

**Mapping of Program outcomes with course outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	2	-	2	3	3
CO2	3	3	3	2	2	-	-	2	3	2
CO3	3	3	3	3	2	-	-	2	2	3
CO4	3	2	2	3	2	-	-	3	2	3
CO5	3	2	2	2	3	-	-	2	2	2
Average	3	2.4	2.6	2.4	2.2	2	-	2.2	2.4	2.6

**Assessment Methods:**

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓





L	T	P	O	C
4	0	0	2	4

**COURSE OBJECTIVES**

- To help the student to develop the habit of accurate manipulation and an attitude of critical thinking.
- To learn the basic analytical methods and appreciate what is involved in an analysis.
- To Explain the concepts of solubility, solubility products, and their applications in separation methods like precipitation titrations and gravimetric analysis

**UNIT-I HANDLING OF CHEMICALS AND ANALYSIS****12**

Storage and handling of chemicals, Handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure. MSDS, COSHH. Accuracy and precision - Absolute and relative errors- Methods of eliminating or minimizing errors. Precision: mean, median, average deviation and coefficient of variation. Significant figure and its relevance. Normal error curve and its importance.

**UNIT II TITRIMETRIC METHODS OF ANALYSIS****12**

General Introduction General principle. Types of titrations. Requirements for titrimetric analysis. Concentration systems: Molarity, Molality, Normality, wt% ppm, Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point. Acid-base Equilibria pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers.

**UNIT III SEPARATION AND PURIFICATION TECHNIQUES****12**

General purification techniques -Purification of solid organic compounds, recrystallisation, use of miscible solvents, use of drying agents and their properties, sublimation. Purification of liquids. Experimental techniques of distillation, fractional distillation, distillation under reduced pressure. Extraction, use of immiscible solvents, solvent extraction. Chromatography-Principle of adsorption and partition chromatography. Thin Layer and paper Chromatography: choice of adsorbent, choice of solvent, preparation of chromatogram, sample, Rf value and its applications.

**UNIT IV SOLUBILITY EQUILIBRIA****12**

General Separation Techniques Solubility and solubility products, expressions for solubility products. Determination of solubility from solubility products. Precipitation titrations Argentometric titrations, indicators for precipitation titrations involving silver. Adsorption indicators. Gravimetric methods of analysis Separation by precipitation, factors affecting solubility, gravimetric factor, Co-precipitation, post precipitation.

**UNIT V POLAROGRAPHY AND THERMAL METHODS****12**

Polarography – theory, apparatus, DME, Diffusion, Current – voltage curves for reversible and irreversible system, qualitative and quantitative applications to inorganic systems. Amperometric titrations-theory, apparatus, types of titration curves, successive titrations and indicator electrodes – Applications. Principle of thermogravimetric analysis (TGA). Differential thermal analysis (DTA): Instrumentation and applications.

**Total: 60 hrs.**

### Text Books

1. D.A. Skoog, D.M. West and F.J. Holler, Analytical Chemistry: An Introduction, 5th edition, Saunders college publishing, Philadelphia, 1990.
2. R. Gopalan, Analytical Chemistry, S. Chand and Co., New Delhi

### Reference books

1. Elementary Organic Spectroscopy: Principles and Chemical Applications, S.Chand and company Ltd., Ram Nagar, New Delhi, 1990.
2. V.K. Srivastava, K.K. Srivastava, Introduction to Chromatography: Theory and Practice, S. Chand and company, New Delhi, 1987.

### Weblink

1. <https://www.lehman.edu/administration/environmental-health-safety/documents/chemical-storage.pdf>
2. <https://www.toppr.com/guides/chemistry/organic-chemistry/purification-of-organic-compounds/>
3. <https://www.scribd.com/document/408263505/Notes-on-purification-of-organic-compound>

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Gain Knowledge in handling chemicals, equipments and develop skills in accurate manipulation.	<b>K2</b>
<b>CO2:</b>	Evaluate the theoretical principles and important applications of classical analytical methods within titration and various techniques within gravimetric and coulometric methods.	<b>K5</b>
<b>CO3:</b>	Employ the theoretical principles of various separation techniques in chromatography, and typical applications of chromatographic techniques	<b>K3</b>
<b>CO4:</b>	Gain idea about the basics and Merits of electro analytical techniques.	<b>K2</b>
<b>CO5:</b>	Understand the theory and working of polarography and its application in inorganic elements can be clearly known	<b>K2</b>
<b>CO6</b>	Understand the Principles of DGA, DTA can be appreciably understood.	<b>K2</b>
<b>CO7</b>	Use an idea about the basics and Merits of electro analytical techniques.	<b>K3</b>

### **Mapping of Program outcomes with course outcomes**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO1	3	1	3	2	2	-	2	2	3	2
CO2	3	3	3	2	2	-	2	2	3	3
CO3	3	3	3	3	1	-	2	2	2	3
CO4	3	2	2	3	2	-	2	3	2	2
CO5	3	2	2	2	3	-	2	2	2	2
CO6	3	2	2	3	3	-	2	3	3	3
CO7	3	2	3	2	2	-	2	3	2	2
Average	3	2.14	2.57	2.48	2.12	-	2	2.42	2.42	2.42

**Assessment Methods:**

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓



24CBHC13

Mathematics-I

L	T	P	O	C
3	0	0	2	3

### COURSE OBJECTIVES

- To learn various concepts of Determinants and Matrices.
- To apply the concepts of sets to promote critical thinking, problem-solving techniques and interdisciplinary connections.
- To analyse the relationships and modeling complex systems.

### UNIT 1: MATRICES

9

Matrices, Operations on Matrices, Inverse, Rank of a Matrix, dependence and independence of Vectors.

### UNIT 2: DETERMINANTS

9

Determinants, Minors, Cofactors, Properties of Determinants, Cramer's Rule, Eigen Values and Eigen Vectors of a Matrix, Cayley-Hamilton Theorem.

### UNIT 3: SETS

9

Sets, Subsets, Finite and Infinite Sets, Operation on Sets, Cartesian product, Simple Applications.

### UNIT 4: DIFFERENTIATION

9

Functions, continuity, differentiation of simple function, successive differentiation, chain rule, odd and even functions.

### UNIT 5: INTEGRATION

9

Definition of an integral, Methods of Integration, Improper integrals, Integration by parts, Integration by substitution.

**Total Hours: 45 hrs**

### Textbook

1. P.Kandhasamy, K. Thilagavathy (2003), "Allied Mathematics" Vol I & II, New Delhi: Tata McGraw Hill.

### Reference Books

1. S.P.Rajagopalan and R.Sattanathan(2005), "Allied Mathematics", Vol I & II. New Delhi: Vikas Publications.
2. P. R. Vittal (2003), "Allied Mathematics", Chennai: Marghan Publications.
3. P.Duraipandian and Dr.S.Udayabaskaran. 1997,"Allied Mathematics", Vol I & II. Chennai: Muhil Publishers.

### WebLinks:

1. <https://testbook.com/maths/determinants-and-matrices>
2. <https://www.geeksforgeeks.org/set-theory/>
3. <https://www.cuemath.com/calculus/differentiation/>
4. <https://www.khanacademy.org/math/integral-calculus/ic-integration>

### **COURSE OUTCOMES**

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

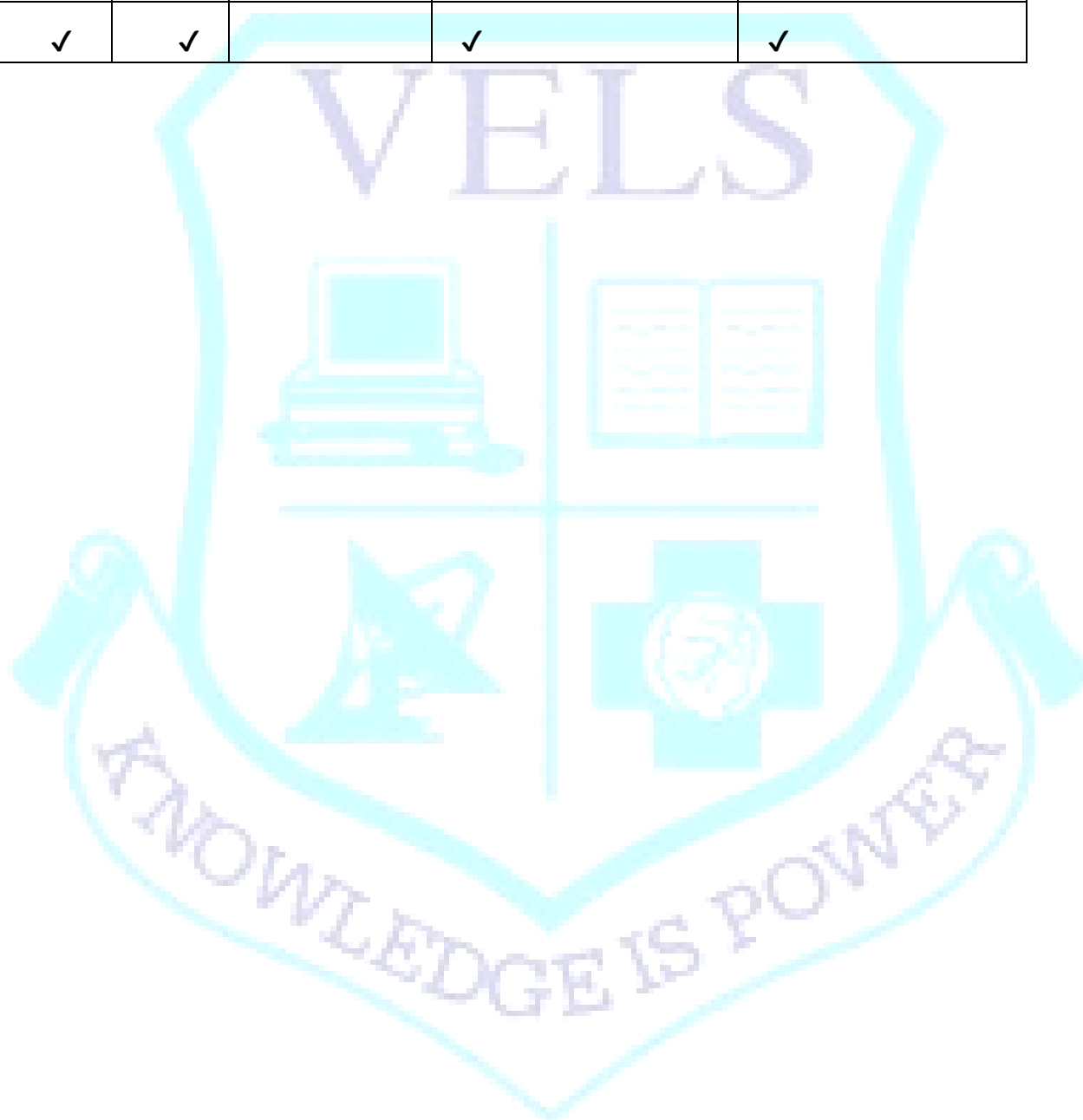
<b>CO1</b>	Apply the concept of determinants	<b>K3</b>
<b>CO2</b>	Understand the ideas of Matrix and solving simultaneous equations	<b>K4</b>
<b>CO3</b>	Identify the relations Sets and its applications.	<b>K3</b>
<b>CO4</b>	Apply the concept of Differentiation	<b>K5</b>
<b>CO5</b>	Understand the concepts of Integration	<b>K3</b>

### **MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES**

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>P O 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PSO 1</b>	<b>PSO 2</b>
CO1	2	2	2	2	2	-	-	2	2
CO2	3	2	2	3	3	-	-	2	2
CO3	2	-	2	2	2	-	-	-	-
CO4	3	2	3	3	3	-	-	2	2
CO5	2	2	3	2	2	-	-	2	2
<b>Average</b>	<b>2.40</b>	<b>2.00</b>	<b>2.40</b>	<b>2.60</b>	<b>2.40</b>	-	-	<b>2.00</b>	<b>2.00</b>

**ASSESSMENT METHODS:**

CAT 1	CAT 2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration / Presentation
✓	✓		✓	✓



L	T	P	O	C
0	0	2	2	1

24PBHC11

## VOLUMETRIC ANALYSIS AND INORGANIC PREPARATIONS PRACTICAL I

### COURSE OBJECTIVE

- Train students in performing acid-base titrations, including the estimation of hydrochloric acid, sodium hydroxide, and borax.
- To know about different types to titrations namely acid base, redox, and complexometric titration.
- To Guide students in the preparation of various inorganic compounds, such as cuprous chloride, potash alum, chrome alum, ferric alum, and soda alum.

#### Acid – Base Titrations

1. Estimation of Hydrochloric acid using oxalic acid
2. Estimation of sodium Hydroxide using sodium carbonate
3. Estimation of Borax

#### Redox Titrations

4. Estimation of oxalic acid using Mohr's salt
5. Estimation of Ferrous Sulphate using oxalic acid
6. Estimation of Ferric Iron using Potassium Dichromate Complexometric Titrations
7. Estimation of Magnesium
8. Estimation of Calcium Inorganic preparations

#### Iodo / Iodimetric Titrations

1. Estimation of Cu(II) using sodium thiosulphate solution (Iodimetrically)
2. Estimation of  $K_2Cr_2O_7$  using sodium thiosulphate solution (Iodimetrically)
3. Estimation of available chlorine in bleaching powder iodometrically.

#### Inorganic preparations

1. Preparation of Cuprous Chloride,  $Cu_2Cl_2$
2. Preparation of Aluminium potassium sulphate (Potash alum).
3. Preparation of Chrome alum
4. Preparation of Ferric Alum
5. Preparation of Soda Alum.

**Total: 30 hrs**

#### Text Books

1. Vogel's – "Textbook of quantitative Inorganic Analysis", Longmann, 12th edition, 2011.
2. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3<sup>rd</sup> edition 2011

#### Reference Books

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan. Co. 3<sup>rd</sup> edition 2011.
2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6<sup>th</sup> edition, 2010.
3. Vogel's – "Textbook of qualitative organic Analysis", Longmann, 12th edition, 2011
4. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6<sup>th</sup> edition, 2010

**Websites / Weblink**

1. <https://www.nature.com/articles/085466a0>
2. <https://pubs.acs.org/doi/10.1021/ed011p62.2>

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Understand the common experimental titration methods.	<b>K2</b>
<b>CO2:</b>	Know the estimation of various Inorganic elements.	<b>K2</b>
<b>CO3:</b>	Analyze the precipitation titration involving oxidation, reduction.	<b>K4</b>
<b>CO4:</b>	Learn the common experimental techniques of synthesis of organic molecules	<b>K2</b>
<b>CO5:</b>	Perform the preparations involving molecular rearrangement.	<b>K6</b>

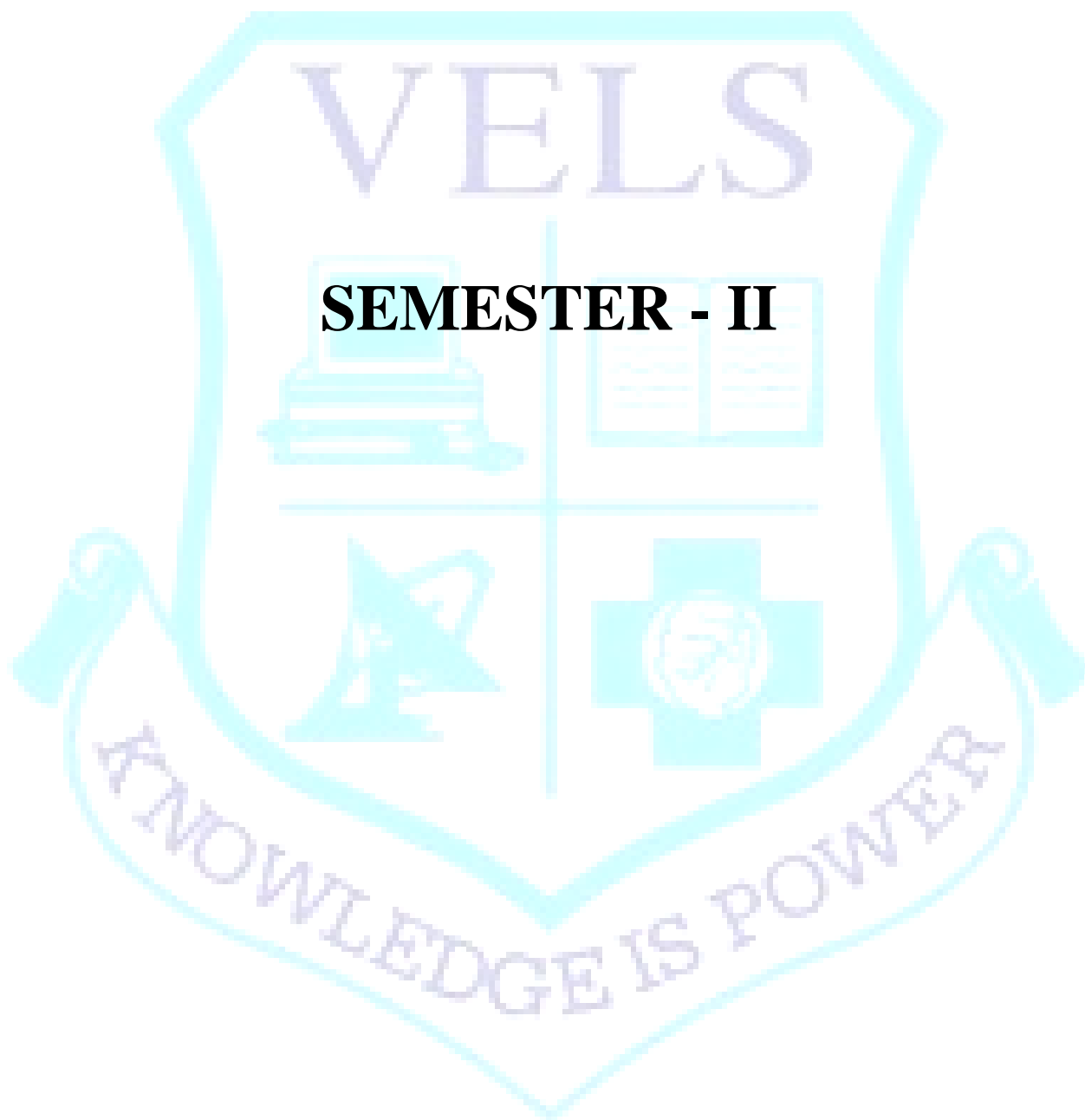
**Mapping of Program outcomes with course outcomes**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO1	2	1	3	3	1	-	2	1	2	1
CO2	3	2	1	1	3	-	2	2	2	1
CO3	2	1	2	2	2	-	2	2	2	2
CO4	2	3	2	3	3	-	2	2	2	2
CO5	2	3	2	2	3	-	2	3	3	3
Average	2.2	2	2	2.2	2.4	-	2	2	2.2	1.8

**Assessment Methods:**

<b>CAT1</b>	<b>CAT2</b>	<b>Model Exam</b>	<b>End Semester Exams</b>	<b>Assignments</b>
✓	✓	✓	✓	✓
<b>Quiz</b>	<b>MCQ</b>	<b>Projects</b>	<b>Seminars</b>	<b>Demonstration/ Presentation</b>
			✓	✓





பாடக் குறியீட்டு எண்: 24LTAM21

L	T	P	O	C
2	0	0	1	2

பருவம்-2, தமிழ்மொழிப்பாடம்-2, பகுதி-1, தகுதிப்புள்ளி: 2, வாரப் பாட கநரம்: 2. தாளம்-2

**காப்பியம், பக்தி இலக்கியம், கனலகள், நொகொிகம்-பண்பொடு பாடத்திட்ட கநாக்கம்:**

மாணவர்களின் இலக்கிய நாட்டத்த கமம்படுத்துதல், காப்பியங்கள், பக்தி இலக்கியம் ஆகியவற்றை முகப்படுத்துதல், தமிழர் தம் கனலகள், நொகொிகம் பண்பொடு ஆகியப் பாடப்பகுதிகளை அழிமுகம் மெய்து மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, கபாட்டித்ததர்வுகளுக்குத் தயார் மெய்து அவர்களுக்கு கவனலவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய கநாக்கமாகும்.

**அலகு 1 காப்பியங்கள்**

8

சிலப்பதிகொரம்- கனொத்திறம் உகரத்தக் கொகத முழுவதும் DணிநDககல-மலர்வைம் புக்க கானத முழுவதும். கம்பரொDொயணம் - குகப் படலம் (பாடல் எண்1989 முதல்1997 வனர நதர்ந்மதடுக்கப்பட்ட ஒன்பது பொடல்கள்)

**அலகு 2: பக்தி இலக்கியம்**

7

மாணிக்கவாெகர் - திருவாெகம் - மூன்று பாடல்கள், புல்லாகி பூடாகி (ெிவபுராணம்), எல்லாப் பிைப்பும் (ெிவபுராணம்), உற்ைானர யான் கவண்கடன் (திருப்புலம்பல்), ஆண்டாள் - திருப்பானவ - மூன்று பாடல்கள் (1, 3, 4), மார்கழித் திங்கள் ... (பாசரம் 1), ஒங்கி உலகளந்த... (பாசரம் 3), ஆழிமனழக் கண்ணா... (பாசரம் 4), வீரமாமுைிவர் - கதம்பாவணி - வளன் மெைித்தப் படலம், ெிைாப்புராணம்- மானுக்கு பிணை நின்ை படலம்

**அலகு 3 ககலகள்**

7

சிற்பம் - ஓவியம் - இகச - கூத்து - ஒப்பகன - ஆகட அணிகலன்கள்.

**அலகு 4 நொகொிகம், பண்பொடு**

8

சொற்றொபொருள் விளக்கம் - பண்கடத் தமிழர் தொழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தொம்பல் - உறவு முகறகள் - சடங்குகள் - நம்பிக்கககள் - மொபொமுதுநொபொக்கு - புறம் - நொபார் முகறகள் - நடுகல் வழிபொடு - மொகொகடப்பண்பு.

**மமாத்தம்: 30 மணி கநரம் பார்னவ நூல்கள்**

1. தமிழர் நொகொிகமும் பண்பொடும், டாக்டர் அ. தட்ெிணாமூர்த்தி, ஐந்தினைப் பதிப்பகம், 2001.
2. 2001.
3. திருவாெகம், அருணா பப்ளிககஷன். மென்னை 2007 திருப்பானவ வர்த்தமாண் பதிப்பகம் மென்னை 2009
4. ெிலப்பதிகொரம் ஸ்ரீ ெந்திரன் உனர, வர்த்தமாண் பதிப்பகம் மென்னை 2009
5. பாடநூல் கதலுக்காை இனணயம் - <https://archive.org/>

L	T	P	O	C
2	0	0	1	2

**COURSE OBJECTIVES:**

- To train students in translation
- To develop reading & writing skills
- To create interest towards reading different types of literature
- To understand the value of Senior citizen
- To understand the importance of hard work
- To understand the patriotism and women empowerment
- To introduce the usage of In script keyboard

**UNIT I:**

'Boodee kaki" (Kahani) by Munshi Premchand

6

**UNIT II:**

'Puraskar' (Kahani) by Prasad

6

**UNIT III:**

'Main Narak Se Bhol Raha Hun' (Vyangy) by Harishankar Parsayi,

6

**UNIT IV:**

Functional Hindi- Technical & Designation & Department Names-50., Bhav Ek Bhasha Anek

6

**UNIT V:**

Functional Hindi-Letter Writing- 3 Official Letters Inscript Keyboard knowledge

6

**Total Hour: 30**

## **COURSE OUTCOME:**

At the end of this course Students will be able to

**CO-1** Know to the value senior citizen, their love and affection towards the family members

**CO-2** Know the importance of patriotism and women empowerment in the society

**CO-3** Know the value of hard work in human life

**CO-4** Gain fair knowledge of Functional Hindi and fluency in speaking Hindi

**CO-5** Equip themselves in writing official letters in Hindi importance of translation of technical words and equip knowledge in using inscript keyboard thereby improving their employability

### **Text/reference book/weblink:**

1. Munshi Premchand, Manasarovar, 2007, <http://gadyakosh.org>
2. Jaishankar Prasad/ <http://gadyakosh.org>
3. Harishankar Parsai/ <https://hindikahani.hindi-kavita.com>
4. Prayojanmoolak Hindi: <https://hi.m.wikipedia.org>
5. <https://rajbhasha.gov.in/en/introduction>

L	T	P	O	C
2	0	0	1	2

### COURSE OBJECTIVES:

The lessons are being chosen:

- 1) to express his / her whereabouts and to ask seek direction
- 2) to express obligation and restriction
- 3) to describe a place
- 4) to narrate and to question
- 5) to describe someone
- 6) to express his desire and to speak about the future

#### Units:

1) C'est où

L'imperatif, Les articles contractés au, à la..., Le passé composé et l'accord du participe passé avec être  
5 hours

2) N'oubliez pas

Le pronom relatif Qui, que, où, Les pronoms compléments indirects (me, te, lui, leur...) 5 hours

3) Belle vue sur la mer --

Les adjectifs démonstratifs, Y- pronom complément. 4 hours

4) Quel beau voyage!

Les verbes pronominaux, En- pronom complément. 4 hours

5) Oh ! joli

L'imparfait, L'imparfait ou le passé composé. 5 hours

6) Et après ?

Le futur simple, Le subjonctif présent. 7 hours

**Total Hours:30**

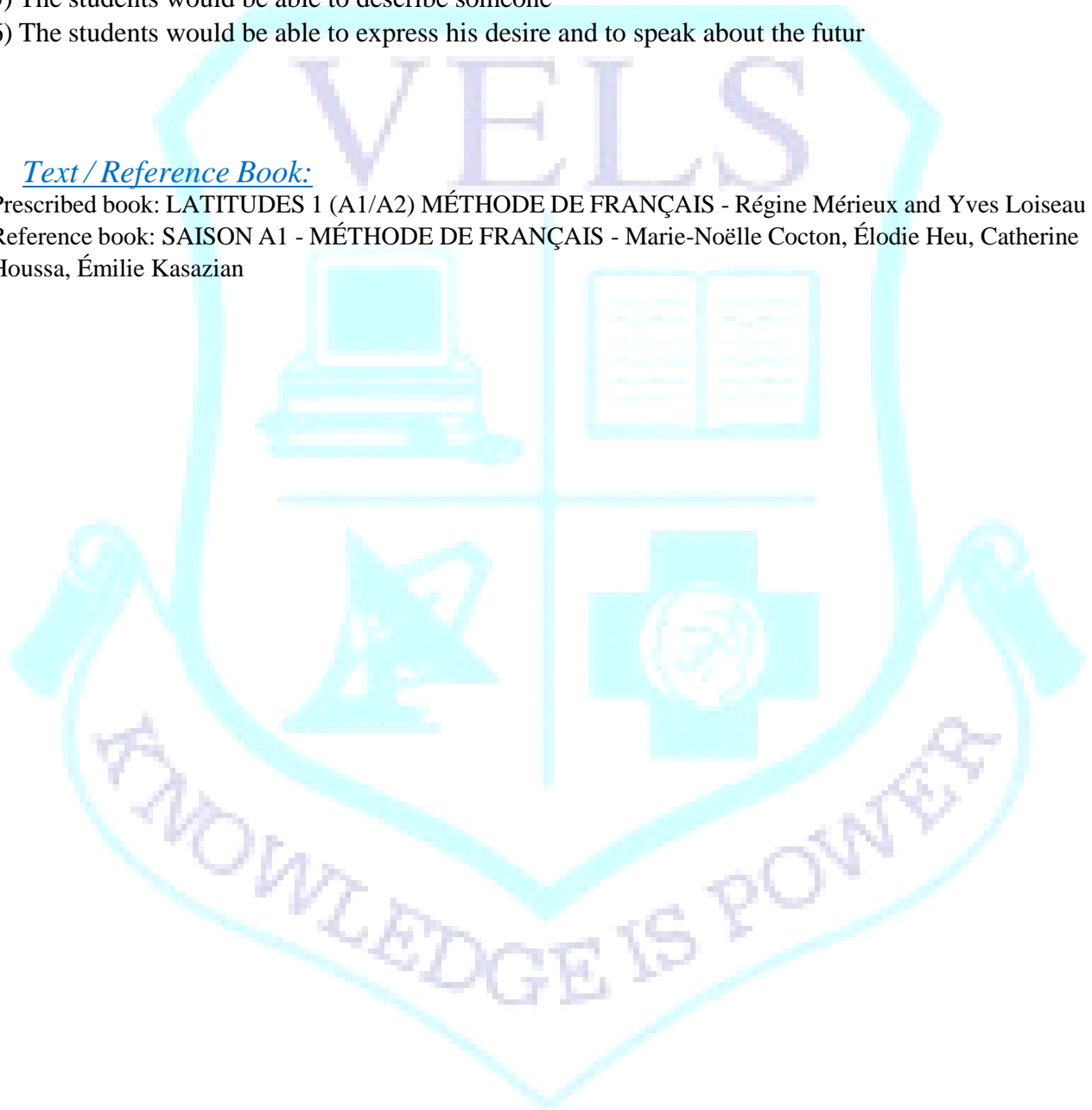
## **COURSE OUTCOMES:**

- 1) The students would be able to express his/her where about and to ask direction
- 2) The students would be able to express obligation and restriction
- 3) The students would be able to describe a place
- 4) The students would be able to narrate and to question
- 5) The students would be able to describe someone
- 6) The students would be able to express his desire and to speak about the futur

### *Text / Reference Book:*

Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

Reference book: SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian



L	T	P	O	C
3	0	0	2	3

## COURSE OBJECTIVE

- To know about what are hydrocarbons and their classification, conformations, preparations, properties and about aromaticity.
- To teach students about the conformational analysis of alkanes, particularly ethane and n-butane, and the stability of cycloalkanes from cyclopropane to cyclooctane.
- To provide knowledge on the general methods for preparing alkenes and alkynes, along with their addition reactions and mechanisms

### UNIT I CLASSIFICATIONS OF HYDROCARBONS

9

Chemistry of alkanes and cycloalkanes petroleum source of alkanes-Methods of preparing alkanes and cycloalkanes – chemical properties –mechanism of free radical substitutions in alkanes –uses. Alkyl halide and Aryl halide methods of preparation and its uses.

### UNIT II CONFORMATIONAL ANALYSIS

9

Conformational study of ethane and n-butane – Relative stability of cyclo alkanes from Cyclopropane upto cyclooctane – Bayer’s strain theory – Limitations – cyclohexane and mono- and disubstituted cyclohexanes. Application of conformational analysis. Definition and significance of conformational analysis in molecular chemistry.

### UNIT III PREPARATION METHODS OF HYDROCARBONS

9

General methods of preparation and properties of Alkenes and alkynes-electrophilic and radical addition mechanisms- addition reactions with H<sub>2</sub>,X<sub>2</sub>, HX, HOX, H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>O , hydroboration Ozonolysis and peroxide effect. Hydroxylation of alkenes with KmnO<sub>4</sub>- allylic substitution of alkenes by NBS –acidity of alkynes and formation of acetylides-test for alkenes and alkynes.

### UNIT IV TYPES OF DIENES AND REACTIONS

9

Definition and importance of dienes in organic chemistry. Dienes-types-stability-preparation of 1, 3 butadiene, isoprene and chloroprene-reactivity –1, 2 and 1, 4 additions in conjugated dienes,-Diels-Alder reaction. Types of polymerization- mechanisms of ionic and free radical addition polymerization. Importance in industrial applications, such as synthetic rubbers and polymers.

### UNIT V AROMATICITY AND PREPARATION OF AROMATIC COMPOUNDS

9

Aromaticity-Huckel’s rule-resonance in benzene –electrophilic substitution in aromatic compounds-general nitration, sulphonation, Friedelcraft’s alkylation and acylation-Orientation and reactivity in monosubstituted benzenes polynuclear hydrocarbons –naphthalene, anthracene and phenanthrene – preparation, properties and uses. Role of aromatic compounds in industrial chemistry and materials science. Use in pharmaceuticals, dyes, and other commercial products.

**Total: 45 hrs**

### Text Books

1. P. L. Soni, "Text Book of Organic Chemistry", Sultan Chand & sons. 32nd edition. 2013.
2. George A Olah and Arpad Molnar, "Hydrocarbon Chemistry", Wiley, 2<sup>nd</sup> Edition. 2003.

### Reference Books

1. Robert Thornton Morrison, Robert Neilson Boyd, "Organic Chemistry" Ashok K. Ghosh 10th edition, 2013
2. Dr. Jagadambasingh, Dr. L. D. S. Yadav, "Advanced Organic Chemistry" PragatiPrakashan, 7th Edition, 2011

### Websource / Weblink

1. <https://ncert.nic.in/textbook/pdf/kech206.pdf>
2. <https://courses.lumenlearning.com/introchem/chapter/introduction-to-hydrocarbons/>

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Classify the basic concepts in organic chemistry and its classification	<b>K2</b>
<b>CO2:</b>	Understand the chemical properties and mechanism of free radical substitutions in alkanes	<b>K2</b>
<b>CO3:</b>	Analyze the Conformational Analysis of saturated and unsaturated organic compounds	<b>K4</b>
<b>CO4:</b>	Apply the knowledge of electrophilic substitution in aromatic compounds-general nitration, sulphonation, Friedel craft's alkylation	<b>K3</b>
<b>CO5:</b>	Evaluate aromaticity in polynuclear hydrocarbons, preparation and their applications	<b>K5</b>

### **Mapping of Program outcomes with course outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	1	2	1	2	2	2	2	3	3
CO2	3	3	3	2	2	-	2	2	3	2
CO3	3	3	3	3	-	-	2	2	2	3
CO4	3	2	2	3	2	-	2	3	2	3
CO5	3	2	2	2	3	2	-	2	2	2
Average	3	2.5	2.6	2.4	2.25	2	2	2.2	2.4	2.6

### **Assessment Methods:**

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓



## 24CBHC22 PHASE EQUILIBRIA AND CHEMICAL KINETICS

L	T	P	O	C
3	0	0	2	3

### COURSE OBJECTIVES

- To provide idea about the different phases of matter and their equilibria from which the stability and sustainability can be easily predicted.
- To deals with kinetics study of different processes and surface phenomenon like adsorption, chemisorption etc.
- To introduce students to the fundamentals of chemical kinetics, including rate laws, reaction order, and methods for determining reaction rates and mechanisms.

### UNIT-I PHASE EQUILIBRIA-I

9

Definitions of phase, Concept of phases and Components, One-component system and Two components system, Degrees of freedom, Derivation of Gibbs Phase Rule for Non-reactive and reactive systems, Clausius-Clapeyron equation Applications to solid-liquid, Liquid-vapour, Solid- vapour equilibria.

### UNIT-II PHASE EQUILIBRIA-II

9

Definition of phase diagram, Phase diagram for one component systems – water Phase diagram for one component systems – CO<sub>2</sub>, with applications, Liquid-vapour equilibrium for two component systems – Zn & Cd system, Phase diagrams for systems of solid-liquid equilibria involving eutectic, congruent and incongruent melting points, solid solutions, Three component systems, water-chloroform-acetic acid system, triangular plots.

### UNIT-III PHASE EQUILIBRIA-III

9

Solutions of liquids in liquids - Phenol water system, Determination of critical solution temperature and composition at CST of the phenol water system, Vapour pressures of liquid-liquid solutions, Types of mixtures of miscible liquids, Applications to fractional distillation of binary miscible liquids (ideal and nonideal), Vapour pressure of mixture of non-miscible liquids - Determination of molecular mass from vapour pressure lowering, Elevation of boiling point - Determination of molar mass from elevation of boiling point.

### UNIT-IV CHEMICAL KINETICS I

9

Order and molecularity of a reaction, Rate laws in terms of the advancement of a reaction, rate constants, Differential and integrated form of rate expressions up to second order reactions, Pseudo first order reactions, Experimental methods of the determination of rate laws, Determination of order of a reaction by half-life and differential method, Kinetics of complex reactions (integrated rate Expressions up to first order only). Kinetics Study on the Reaction between Sodium Thiosulphate and Hydrochloric Acid

### UNIT-V CHEMICAL KINETICS II

9

Oposing reactions and parallel reactions, Consecutive reactions and their differential rate equations (steady-state approximation in reaction mechanisms), Chain reactions, Temperature dependence of reaction rates; Arrhenius equation; activation energy Unimolecular Reactions; Collision theory of reaction rates, Lindemann mechanism, qualitative treatment of the theory of absolute reaction rates. Catalysis, Types of catalyst, specificity and selectivity, mechanisms of catalyzed reactions at solid surfaces, Salt effects; effect of particle size and efficiency of nanoparticles as catalysts, Enzyme catalysis, Michaelis-Menten mechanism, Acid-base catalysis, turn-over number

**Total: 45 hrs**

### Text Books

1. Peter Atkins & Julio De Paula, Physical Chemistry 10th Ed., Oxford University Press (2014)
2. Castellan, G. W. Physical Chemistry, 4th Ed., Narosa (2004).
3. Levine, I. N. Physical Chemistry 6th Ed., Tata McGraw-Hill (2011).  
McQuarrie, D. A. & Simon, J. D., Molecular Thermodynamics, Viva Books Pvt. Ltd.: New Delhi (2004).
4. P.W. Atkins, L.L. Jones, Chemical Principles: The quest for insight. H. Freeman and Company, New York, 2010

### Reference Books

1. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, 35th edition, New Delhi ShobanLal Nagin Chand and Co, 2013.
2. Ball, D. W. *Physical Chemistry* Cengage India (2012).
3. Levine, I. N. *Physical Chemistry 6th Ed.*, Tata McGraw-Hill (2011).
4. Engel, T. & Reid, P. *Physical Chemistry 3rd Ed.*, Prentice-Hall (2012).

### Web source /Weblink

[Phase Equilibrium bsc Notes pdf Download 2023 \(tutorialsduniya.com\)](#)  
[Archived Lecture Notes #10 - Phase Equilibria and Phase Diagrams \(mit.edu\)](#)  
[lecture1425072667.pdf \(vssut.ac.in\)](#)

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Understand different phases of matter and work with phase diagrams while dealing with different phases in advanced research and industrial applications.	<b>K2</b>
<b>CO2:</b>	Understand the colligative properties of a system	<b>K2</b>
<b>CO3:</b>	Understand the solution-making and dilution	<b>K2</b>
<b>CO4:</b>	They shall also know the kinetics of chemical reaction and tune the processes as per the requirements	<b>K3</b>
<b>CO5:</b>	They will have sound knowledge regarding different surface phenomenon.	<b>K4</b>

### Mapping of Program outcomes with course outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	-	3	2	3	2
CO2	3	3	3	2	2	-	2	2	3	3
CO3	2	3	3	2	3	-	2	2	2	2
CO4	3	2	3	3	2	-	2	2	2	2
CO5	3	2	3	-	3	-	-	1	2	1
Average	2.8	2.4	3	2.2	2.2	-	2.25	1.8	2.4	2.0

### Assessment Methods:

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation

L	T	P	O	C
3	0	0	2	3

**COURSE OBJECTIVES:**

- To enable students to understand the importance of Mathematics
- To provide basic knowledge of Differential Equations, Numerical Methods and Vector differentiation.
- To help the students to read, classify and interpret the data given to them and draw conclusions. To provide knowledge on probability and Random variables.

**UNIT 1: ORDINARY DIFFERENTIAL EQUATIONS****9**

Linear first-order differential equations, Homogeneous and Non-Homogeneous linear differential equations with constant coefficients.

**UNIT 2: VECTOR DIFFERENTIATION****9**

Vector functions- Scalar and vector point functions-Derivative of a vector function- Gradient of a scalar point function- Directional derivatives, Unit vector normal to a surface, angle between the surfaces, divergence, curl.

**UNIT 3: NUMERICAL METHODS****9**

Roots of equations Newton's-Raphson Method, Regula Falsi method, Systems of linear algebraic equations-Gauss Elimination method, Gauss Jordan method.

**UNIT 4: BASICS OF PROBABILITY****9**

Basic Probability- Axioms of Probability- Addition and Multiplication theorem without proof- Conditional Probability-simple problems

**UNIT 5: RANDOM VARIABLES****9**

Random variable - Discrete random variables- Mean- Expectations- Variance- Independent random variables- simple problems, Continuous random variables- Mean- Expectations- Variance- simple problems.

**Total Hours: 45 Hours**

### Textbook

1. P.Kandhasamy, K. Thilagavathy (2003), “Allied Mathematics” Vol I & II, New Delhi:Tata McGraw Hill.

### Reference Books

1. S.P.Rajagopalan and R.Sattanathan(2005), “Allied Mathematics”, Vol I & II. New Delhi:Vikas Publications.
2. P. R. Vittal (2003), “Allied Mathematics”,Chennai: Marghan Publications.
3. P. Duraipandian and Dr. S. Udayabaskaran. 1997, “Allied Mathematics”, Vol I & II. Chennai:Muhil Publishers.

### Website and e-Learning Source:

1. <https://byjus.com/maths/ordinary-differential-equations/>
2. <https://www.slideshare.net/slideshow/btech-ii-unit4-material-vector-differentiation/45980105>
3. <https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/>
4. <https://www.toppr.com/guides/maths/probability/introduction-to-probability/>

### **COURSE OUTCOMES:**

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

<b>CO1</b>	Apply the basic concepts of Ordinary differential equations	<b>K3</b>
<b>CO2</b>	Understand the concepts of Vector differentiation	<b>K4</b>
<b>CO3</b>	Concept based on Numerical methods.	<b>K3</b>
<b>CO4</b>	Apply the concepts of Probability.	<b>K5</b>
<b>CO5</b>	Understand the concepts of Random Variables.	<b>K3</b>

## MAPPING OF COURSE OUTCOMES TO PROGRAM OUTCOMES

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>P O4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	2	2	2	2	2	2	2
CO2	3	2	2	3	3	3	2
CO3	2	-	2	2	2	2	2
CO4	3	2	3	3	3	3	3
CO5	2	2	3	2	2	2	3
<b>Average</b>	<b>2.40</b>	<b>2.00</b>	<b>2.40</b>	<b>2.60</b>	<b>2.40</b>	<b>2.4</b>	<b>2.4</b>

### ASSESSMENT METHODS:

<b>CAT 1</b>	<b>CAT 2</b>	<b>Model Exam</b>	<b>End Semester Exams</b>	<b>Assignments</b>
✓	✓	✓	✓	✓
<b>Quiz</b>	<b>MCQ</b>	<b>Projects</b>	<b>Seminars</b>	<b>Demonstration / Presentation</b>
✓	✓		✓	✓

L	T	P	O	C
0	0	2	2	1

### COURSE OBJECTIVES

- To enable the students to develop analytical skills in organic qualitative analysis and preparative skills in organic preparations.
  - To teach students how to detect the presence of special elements such as nitrogen, sulfur, and halogens in organic compounds.
  - To provide hands-on experience in preparing derivatives for specific functional groups to reinforce their understanding and application of organic chemistry concepts
1. Determination of melting and boiling points of organic substances for two sessions.
  2. Organic analysis:
    - a) Test for aliphatic and aromatic nature of substances.
    - b) Test for saturation and unsaturation.
    - c) Detection of special elements like N, S and halogens
    - d) Identification of acidic, basic, phenolic, and neutral organic substances.
    - e) Identification of functional groups
      - i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones v) Carbohydrates vi) Amines vii) Amides viii) Nitro compounds
    - f) Preparation of derivatives for the functional groups.

**Total: 30 hrs**

#### Text Book

1. N.S. Gnanaprasadam and G. Ramamurthy, Organic Chemistry – Lab manual, S. Viswanathan Co. Pvt., 1998.

#### References Books

1. J.N. Gurthu and R. Kapoor, Advanced Experimental Chemistry (Organic), S. Chand and Co., 1987.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith and A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.

#### Websource/Weblink

1. <https://rushim.ru/books/praktikum/Mann.pdf>
2. [http://www.iscnagpur.ac.in/study\\_material/dept\\_chemistry/3.1 MIS and NJS Manual for Organic Qualitative Analysis.pdf](http://www.iscnagpur.ac.in/study_material/dept_chemistry/3.1_MIS_and_NJS_Manual_for_Organic_Qualitative_Analysis.pdf)

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Understand the common experimental titration methods.	<b>K2</b>
<b>CO2:</b>	Know the estimation of various Inorganic elements.	<b>K2</b>
<b>CO3:</b>	Analyze the precipitation titration involving oxidation, reduction.	<b>K4</b>
<b>CO4:</b>	Learn the common experimental techniques of synthesis of organic molecules	<b>K2</b>
<b>CO5:</b>	Perform the preparations involving molecular rearrangement.	<b>K6</b>

**Mapping of Program outcomes with course outcomes**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2	1	3	3	1	-	2	-	-	2
CO2	3	2	1	1	3	-	2	-	2	3
CO3	2	1	2	2	2	-	2	-	3	2
CO4	2	3	2	3	3	-	2	-	2	3
CO5	2	3	2	2	3	-	2	3	2	3
Average	2.2	2	2	2.2	2.4	-	2	2.6	2.2	2

**Assessment Methods:**

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓



L	T	P	O	C
0	0	2	2	1

**COURSE OBJECTIVE:**

- To enable the students to acquire analytical (both qualitative and quantitative) and psychomotor skills.
- To able to plan the experimental projects and execute them.
- To teach the principles of transition temperature and its application in determining molecular weight, reinforcing their understanding of thermodynamics.

**Experiments**

1. Determination of partition coefficient of iodine between water and carbon tetrachloride and determination equilibrium constant for the formation of potassium triiodide from iodine and KI
2. Phase diagram of a simple eutectic system and determination of unknown composition.
3. Phenol – water system: Phase diagram, CST, and effect of impurities on CST.
4. Transition temperature of a salt hydrate – determination of molecular weight.
5. Kinetics of acid catalyzed hydrolysis of methyl acetate and comparison of rate constants.
6. Kinetics of persulphate - iodide reaction: Determination of pseudo first order rate constant.
7. Conductometry - Acid – base titration (HCl vs NaOH).
8. Conductometry – Determination of limiting molar conductance of a strong electrolyte (KCl).
9. Potentiometry – Determination of solubility product of a sparingly soluble substance.
10. Potentiometry – Redox titration of ferrous vs dichromate.
11. Verification of Beer-Lambert's law and determination of concentration of metal ions spectrophotometrically.

**Total: 30 hrs****Text Books**

1. B. Viswanaathan, P.S. Raghavan “Practical Physical Chemistry”, Viva Books private Ltd. ,2005
2. Slowiski, Wolsey-Indian, “General Chemistry A Lab Manual” Congage learning India Private Ltd.2010

**Reference Books**

1. J.N. Gurthu and R. Kapoor, Advanced Experimental Chemistry, S. Chand and Co., 1987.
2. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.
3. David P. Shoemaker, Carl W. Garland, Joseph W. Nibler, Experiments in Physical Chemistry, 5th Edi., McGraw- Hill Book company, 1989.

**Websource / Weblink**

1. [https://web.williams.edu/wp/chemistry/epeacock/LECTURE\\_NOTES/Book.PChem.pdf](https://web.williams.edu/wp/chemistry/epeacock/LECTURE_NOTES/Book.PChem.pdf)

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Expertise relevant to the professional practice of chemistry	<b>K2</b>
<b>CO2:</b>	Identify the role of physical chemistry in the chemical sciences and Engineering	<b>K1</b>
<b>CO3:</b>	Apply scientific methods employed in basic and applied physical Chemistry	<b>K3</b>
<b>CO4:</b>	Evaluate the methods employed for problem solving in physical chemistry	<b>K4</b>
<b>CO5:</b>	Explain some understanding of the professional and safety responsibilities residing in working with chemical systems	<b>K1</b>

**Mapping of Program outcomes with course outcomes**

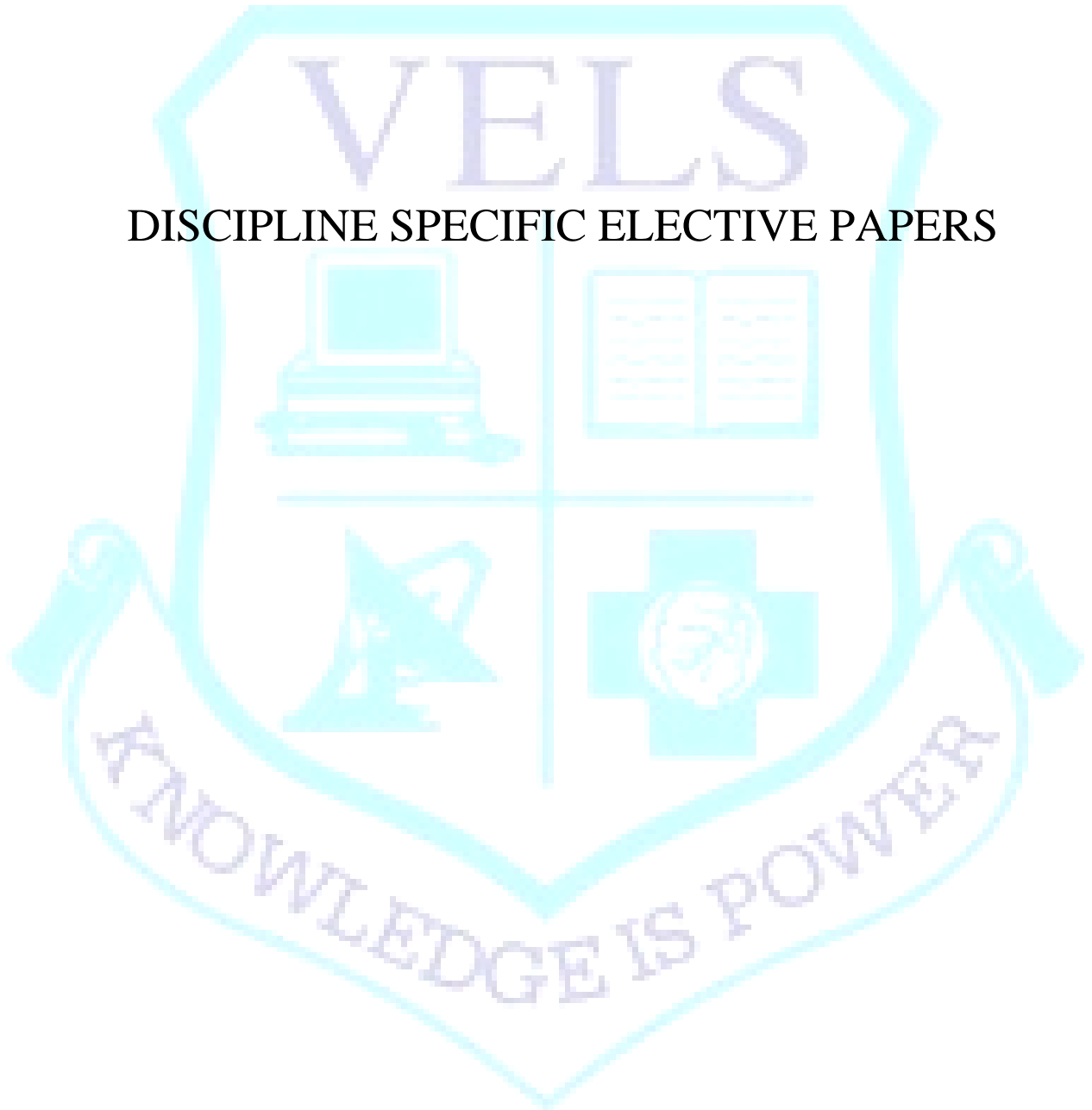
<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
CO1	2	1	3	3	1	2	2	-	-	-
CO2	3	2	1	1	3	-	2	-	-	-
CO3	2	1	2	2	2	3	2	3	-	2
CO4	2	2	2	2	3	2	2	2	2	3
CO5	2	3	2	2	3	-	2	2	3	3
Average	2.2	1.8	2	2	2.4	2.3		2.3	2.5	2.6

**Assessment Methods:**

<b>CAT1</b>	<b>CAT2</b>	<b>Model Exam</b>	<b>End Semester Exams</b>	<b>Assignments</b>
✓	✓	✓	✓	✓
<b>Quiz</b>	<b>MCQ</b>	<b>Projects</b>	<b>Seminars</b>	<b>Demonstration/ Presentation</b>
			✓	✓

VELS

DISCIPLINE SPECIFIC ELECTIVE PAPERS



L	T	P	O	C
3	0	0	2	3

21DBHC11

**CHEMISTRY OF FUNCTIONAL GROUPS**

**Course Objective**

A comprehensive understanding of the properties, reactions, and significance of various functional groups in organic chemistry.

**UNIT-I INTRODUCTION TO FUNCTIONAL GROUPS 9**

Functional groups- Classification and types- alcohols, ethers, carbonyl compounds, amines. Halides, phenolic compounds, ethers, epoxides and sulphur containing compounds- Brief account of each functional group.

**UNIT-II ALCOHOLS, PHENOLS AND ETHERS 9**

Alcohols: Nomenclature, preparation methods, properties and relative reactivity of 1°, 2°, 3° alcohols (Lucas Test and Victor Meyer Test), oxidation; Phenols: Preparation and properties; Acidity and factors effecting it, Reactions: Reimer-Tiemann and Kolbe's-Schmidt reactions with mechanism. Preparation (Williamson ether synthesis) and reactions of ethers.

**UNIT-III CARBONYL COMPOUNDS- I 9**

Nomenclature, structure, preparation, Keto-enol tautomerism and reactivity; Nucleophilic additions, Nucleophilic addition- elimination reactions with ammonia derivatives with mechanism; Mechanisms of Aldol and Benzoin condensation, Knoevenagel condensation, and Cannizzaro reaction.

**UNIT-IV CARBONYL COMPOUNDS- II 9**

Haloform reaction,  $\alpha$ -substitution reactions, reductions (Clemmensen, Wolff-Kishner,  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$  and MPV); Addition reactions of unsaturated carbonyl compounds: Michael addition. Active methylene compounds: Keto-enol tautomerism and acidity. Preparation and synthetic applications of diethyl malonate and ethyl acetoacetate.

**UNIT-V CHEMISTRY OF HALOGENATED HYDROCARBONS 9**

Alkyl halides: Nomenclature, methods of preparation, nucleophilic substitution reactions –  $\text{S}_{\text{N}}1$ ,  $\text{S}_{\text{N}}2$  and  $\text{S}_{\text{N}}\text{i}$  mechanisms with stereochemical aspects and effect of solvent etc.; Aryl halides: Preparation, including preparation from diazonium salts. Elimination reactions-  $\text{E}_1$ ,  $\text{E}_2$ ,  $\text{E}_{1\text{CB}}$  reactions. Nucleophilic substitution vs elimination.

Total: 45 hrs

### Text Books

1. Morrison, R. N. & Boyd, R. N., Organic Chemistry, Dorling Kindersley (India) Pvt.Ltd. (Pearson Education).
2. Bhal and Bhal, Advanced Organic Chemistry, 2nd Edition, S. Chand Publisher, 2012.
3. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson, 2009.

### Reference Books

1. Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
3. Graham Solomons, T.W. Organic Chemistry, John Wiley & Sons, Inc. 22

### Websource/Weblink

1. PATAI'S Chemistry of Functional Groups: (wiley.com)
2. Functional Groups Names, Properties, and Reactions – Introductory Chemistry(pressbooks.pub)
3. Functional Groups In Organic Chemistry (masterorganicchemistry.com)

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Understanding of various functional groups, including alcohols, ethers, carbonyl compounds, amines, halides, phenolic compounds, epoxides, and sulfur-containing compounds, and learn to classify and identify their types	K2
<b>CO2:</b>	Describe the nomenclature, preparation methods, properties, and reactivity of different types of alcohols, phenols, and ethers	K1
<b>CO3:</b>	Understanding Reactivity and Mechanisms of Carbonyl Compounds	K2
<b>CO4:</b>	Evaluate nucleophilic addition and addition-elimination reactions with ammonia derivatives	K4
<b>CO5:</b>	Apply $\alpha$ -substitution, reduction reactions and addition reactions (Michael addition) of carbonyl compounds, and understand the preparation	K3

**Mapping of Program outcomes with course outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	2	1	3	3	1	-	-	-
CO2	3	2	1	1	3	-	-	-
CO3	2	1	2	2	2	3	-	2
CO4	2	2	2	2	3	2	2	3
CO5	2	3	2	2	3	2	3	3
Average	2.2	1.8	2	2	2.4	2.3	2.5	2.6

**Assessment Methods:**

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓

24DBHC21

**CHEMISTRY IN EVERYDAY LIFE**

L	T	P	O	C
4	0	0	2	4

**Course objective**

To know about various compounds in nature, building materials, Food and nutrition, agriculture chemistry, color chemicals.

**UNIT-I GENERAL SURVEY OF CHEMICALS 12**

General survey of chemicals used in everyday life. Air- Components and their importance, Photosynthetic reaction, Green house effect and their impact on our life style. Water-sources of water, qualities of potable water, soft and hard water, methods of removal of hardness.

**UNIT – II BUILDING MATERIALS 12**

Building materials: - Cement, Ceramics, Glass and Refractories. Definition, composition and application only. Plastics: - Definition, Types with examples, uses, merits and demerits, environmental impact and awareness. Biodegradable polymers.

**UNIT –III FOOD AND NUTRITION 12**

Food and Nutrition: Carbohydrates, proteins, Fats Definition source and their importance as food constituents balanced diet- Calorie, minerals and vitamins. Cosmetics: General formulation and possible hazards.

**UNIT – IV AGRICULTURAL CHEMISTRY 12**

Agricultural chemistry: Fertilizers, Pesticides Classification and used Energy sources: Fuels classification –Solid, liquid and gaseous, nuclear fuel, propellants – utility and awareness.

**UNIT – V COLOUR CHEMICAL 12**

Color chemical: Pigments and Dyes: Example, uses. Explosives: Classification and examples. Chemistry in Technology: Uses, examples.

**Total hours: 60 hrs**

**Text Book**

1. K. De, Environmental Chemistry, Himalaya publishing house, 7th edition 2011

**Reference Books**

1. R. Norris Shreve “Chemical Process Industries” (4<sup>th</sup> Edition)
2. Perfumes, Cosmetics and Soaps –W.A. Poucher (Vol 3)

### Websource / Weblink

1. <https://www.askiitians.com/revision-notes/chemistry/chemistry-in-everyday-life/>
2. <https://ncert.nic.in/ncerts/l/lech207.pdf>
3. <https://www.thinkit.in/board-notes/english/class-12/chemistry/all/chemistry-in-everyday-life/>

**Course Outcomes (CO):** At the end of this course, learners will be able to:

<b>CO1:</b>	Identify and describe the various chemicals encountered in everyday life, including their sources, significance, and impact on our environment	<b>K1</b>
<b>CO2:</b>	Knowledge of the composition, uses, and environmental impacts of different building materials, including cement, ceramics	<b>K1</b>
<b>CO3:</b>	Understand the role and importance of different food constituents such as carbohydrates, proteins, fats, vitamins.	<b>K2</b>
<b>CO4:</b>	Explain the concept of food and nutrition	<b>K1</b>
<b>CO5:</b>	Understand the importance of minerals and vitamins	<b>K2</b>
<b>CO6:</b>	Explain the Fertilizers, Pesticides Classification and used Energy sources	<b>K1</b>
<b>CO7:</b>	Develop the concept of Colour of the Chemical	<b>K6</b>

### Mapping of Program outcomes with course outcomes

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	
CO1	2	2	2	2	1	-	-	-	
CO2	2	2	2	3	3	-	-	-	
CO3	3	1	2	2	2	3	-	-	
CO4	2	2	2	2	3	2	3	3	
CO5	1	3	2	2	3	2	2	2	
CO6	3	1	2	2	2	3	-	-	
CO7	2	2	2	2	3	2	3	3	
Average	2	2	2	2.2	2.4	2.3	2.5	2.5	

### Assessment Methods:

CAT1	CAT2	Model Exam	End Semester Exams	Assignments
✓	✓	✓	✓	✓
Quiz	MCQ	Projects	Seminars	Demonstration/ Presentation
			✓	✓





