

VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

[AUTONOMOUS]

An ISO 9001:2015 Certified Institution,
Affiliated to Periyar University, Salem,
(Approved by AICTE and Re-Accredited with 'A' Grade by NAAC,
Recognized Under 2(f) and 12(b) of UGC Act, 1956).
Elayampalayam, Tiruchengode - 637 205, Namakkal Dt., Tamilnadu, INDIA.

DEPARTMENT OF CHEMISTRY

BACHELOR OF SCIENCE (B.Sc.)

B.Sc., CHEMISTRY

REGULATIONS AND SYLLABUS

(Modified)

[FOR CANDIDATES ADMITTED FROM 2022-25 ONWARDS UNDER
AUTONOMOUS – CHOICE BASED CREDIT SYSTEM (CBCS) & OUTCOME
BASED EDUCATION (OBE) PATTERN]



SPONSORED BY

ANGAMMAL EDUCATIONAL TRUST

Elayampalayam – 637 205, Tiruchengode Tk., Namakkal Dt., Tamil Nadu.

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About the College

Vivekanandha College of Arts and Sciences for Women (Autonomous) was established and hailed into Women's Educational Service in the Year 1995. Angammal Educational Trust Chaired by the great Educationalist 'Vidhya Rathna' Prof. Dr. M. KARUNANITHI, B.Pharm., M.S., Ph.D., D.Litt., sponsors this college and other institutions under the name of the great Saint Vivekanandha. Our institutions are situated on either side of Tiruchengode-Namakal Main Road at Elayampalayam, 6 kms away from Tiruchengode. This is biggest women's college in India with more than 5500 girl students and more than 19 departments. The strength of the college was just 65 at the time of its establishment. With the dedication, work, sacrifice and long vision of the chairman, this institution has grown into a Himalaya stage. As a result of which UGC, New Delhi, awarded 2f and 12b, extended Autonomous status for second cycle. The National Assessment and Accreditation Council reaccredited with grade 'A+' for its successful performance.

As an Autonomous Institution, academic professionals of the college framed Curriculum and Syllabi in consultation with all its stakeholders to cater the needs of the young women to fulfill the women empowerment and present Industrial needs to the local benefits. The students are empowering with confidence and required skills to face the society.

Quality Policy

To provide professional training by establishing a high level center of learning that provides quality education at par with the international standards and Provide excellence education with well equipped infrastructure to all the rural women.

Our Vision

To be an academic institution exclusively for women, in dynamic equilibrium with the social and economic environment, strive continuously for excellence in education, research and technological service to the nation.

Our Mission

The mission of our institution is to discover, teach and apply knowledge for the intellectual, cultural, ethical, social and economic growth of women students.

REGULATIONS

I. SCOPE OF THE COURSE

The uniqueness of the B.Sc. (Chemistry) program is its content and topic coverage, the teaching methodology and the faculty. The program expects a serious commitment of the students to take up challenging study schedules and assignments. The course involves a blend of theoretical education and practical training which run concurrently for a period of three years and equips a student with knowledge, ability, skills and other qualities.

The teaching methodologies include classroom lectures, industrial visits, orientation and internship. The new syllabus may help the students to understand the newer aspects of chemistry and apply the same to the real life situations. Thus the students turn more relevant and resourceful to the society. It may enable the young minds think differently and forms a link between old ideas and new ideas in chemistry and gives comprehensive approaches to the very learning process and the learners. To have academic flexibility we have chosen and implemented Choice Based Credit System (CBCS) in our syllabus. To enhance the quality of students from 2018-2019, we have implemented Outcome Based Education (OBE) education system for I UG students. The OBE pattern will be extended for the II UG and III UG students.

II. SALIENT FEATURES

- ✓ Course is specially designed for a higher level career placement.
- ✓ Special guest lectures from industrialists will be arranged.
- ✓ Exclusively caters to students interested in pursuing higher studies.
- ✓ Special industry orientations and training are parts of the degree course.

III. OBJECTIVES

The new syllabus throws light on the recent and emerging areas of chemistry.

- ✓ Enable the students to understand chemistry and make them more relevant to the society.
- ✓ Develop the analytical ability in students so that they themselves prepared in solving problems.
- ✓ Help the students to learn practical skills in a better way.
- ✓ Inculcate research aptitude among the students.
- ✓ Enable the students to go to higher levels of learning chemistry.
- ✓ Improve the employability of the students.
- ✓ Inspire the students to apply their knowledge gained for the development of society in general and individuals in particular.

IV. ELIGIBILITY FOR ADMISSION

A candidate who has passed Higher secondary examination of Tamil nadu Higher secondary board or an examination of some other board accepted by the syndicate as equivalent there to with Chemistry and Physics and any one of the subjects namely Maths, Botany, Zoology or Biology, Home science shall be eligible for admission into B.Sc., course in chemistry.

V. DURATION OF THE COURSE

- The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The first semester will consist of the period from July to November and the second semester from December to April.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women (Autonomous), Tiruchengode with the approval of Periyar University, Salem.

- Each subject will have required hours of lecture per week apart from practical training.

VI. ASSESSMENT

Assessment of the students would be made through Continuous Internal Assessment (CIA) and External Assessment (EA) for passing each subject both theory and practical papers.

A candidate would be permitted to appear for the External Examination only on earning 75 % of attendance and only when her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously by the teacher concern and the Internal Assessment Marks will be as follows:

Distribution of Continuous Assessment Marks (Theory-25/Practical-40)

Activity (Theory)	Period (WD)	Marks (25)	Activity (Practicals)	Marks (40)
Attendance	90	5	Attendance	5
CA Test I	30 to 35	2.5	Review I	5
CA Test II	60 to 65	2.5	Review II	5
Model	After 90	10	Model practical Examination	10
Assignment	15 to 20	1	Observation note	10
Poster	30 to 35	1	Results in lab/Work	5
PowerPoint	45 to 50	1		
Skit	60 to 65	1		
Groupdiscussion	65 to 70	1		
Total		25		40

Distribution of attendance mark

S. No.	Percentage	Marks	
		Theory	Practical
1	76-80	1	2
2	81-85	2	4
3	86-90	3	6
4	91-95	4	8
5	96-100	5	10

A. EXTERNAL ASSESSMENT (EA)

The performance of the students would be assessed by examination at the end of each semester with a written test for theory for three hours and practical examination at the end of even semesters for three/six hours. Question papers would be set by the selected external examiners in the prescribed format and valued by the external examiners with the help of the teacher concern.

The pattern of assessment is as follows:

Distribution Of Final Assessment Marks (75/60)

Section	Activity	Marks (75)	Activity	Marks (60)
A	One mark (20)	20	Record work	05
B	Five marks (Either or)	25	Viva Voce	05
C	Ten marks (3/5)	30	Spotter	20
			Major (Performance)	05
			Major (Result)	05
			Major (Writeup)	10
			Minor (Performance)	02
			Minor (Result)	03
			Minor (Writeup)	05
Total		75	Total	60

VII. PASSING MINIMUM

INTERNAL

There is no passing minimum for CIA

EXTERNAL

In the End Semester Examinations, the passing minimum shall be 30 out of 75 Marks for theory (40 %) and 24 out of 60 marks for practical (40 %).

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

1. Successful candidates passing the examination of core and allied papers and securing
 - a) 75 % and above shall be declared to have passed the examination in first class with distinction provided they pass all the examinations prescribed for the course at first appearance itself.
 - b) 60% and above shall be declared to have passed the examinations in first class.
 - c) 50% and above but below 60% shall be declared to have passed the examinations in second class.
2. All the remaining successful candidates shall be declared to have passed the examinations in third class.
3. Candidates who pass all the examinations prescribed for the course at the first appearance itself and within a period of three consecutive academic years from the year of admission only will be eligible for ranking purpose.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the degree only if she has undergone the above degree for a period of not less than three academic years comprising of six semesters and passed the examinations prescribed and fulfilled the conditions prescribed.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the End Semester Examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2018-19.

XII. COURSE PATTERN
VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)
SYLLABUS FRAME WORK

Subjects	Inst. Hour/Week	Credit	Exam Hours	Internal	External	Total Marks	Subjects	Inst. Hour/Week	Credit	Exam Hours	Internal	External	Total Marks
YEAR I													
Semester I							Semester II						
Language I & 22U1LT01	4	3	3	25	75	100	Language II & 22U2LT02	4	3	3	25	75	100
English I & 21U1CE01	4	3	3	25	75	100	English II & 21U2CE02	4	3	3	25	75	100
Core I & 21U1CHC01	5	5	3	25	75	100	Core II & 21U2CHC02	5	4	3	25	75	100
Core I Practical & 21U2CHCP01	3	0	-	-	-	-	Core I Practical & 21U2CHCP01	3	2	3	40	60	100
Allied I & 21U1PHA01	4	4	3	25	75	100	Allied II & 21U2PHA02	4	4	3	25	75	100
Allied I Practical & 21U2PHAP01	3	0	-	-	-	-	Allied I Practical & 21U2PHAP01	3	2	3	40	60	100
Valued added course & 18U1VE01	2	2	3	25	75	100	Valued added course & 21U2ES01	2	2	3	25	75	100
Professional English & 21U1PSPE01	4	4	3	25	75	100	Professional English & 21U2PSPE02	4	4	3	25	75	100
Library	1	0	0	0	0	0	Library	1	0	0	0	0	0
Total	30	21	18	150	450	600	Total	30	24	24	230	570	800
I YEAR TOTAL									45	42	380	1020	1400
YEAR II													
Semester III							Semester IV						
Language III & 21U3LT03	5	3	3	25	75	100	Language IV & 21U4LT04	6	3	3	25	75	100
English III & 21U3CE03	5	3	3	25	75	100	English IV & 21U4CE04	6	3	3	25	75	100
Core III & 21U3CHC03	6	5	3	25	75	100	Core IV & 21U4CHC04	6	5	3	25	75	100
Core II Practical & 21U4CHCP02	3	0	-	-	-	-	Core II Practical & 21U4CHCP02	3	3	3	40	60	100
Allied III & 21U3MAA01	5	4	3	25	75	100	Allied IV & 21U4MAA02	4	4	3	25	75	100
Allied II Practical & 21U4MAAP01	3	0	-	-	-	-	Allied II Practical & 21U4MAAP01	3	3	3	40	60	100
NMEC I & 21U3CHN01	2	2	3	25	75	100	NMEC II & 21U4CHN02	2	2	3	25	75	100
Library	1	0	0	0	0	0	Library	0	0	0	0	0	0
Total	30	17	15	125	375	500	Total	30	23	21	205	495	700
II YEAR TOTAL									40	36	330	870	1200

YEAR III													
Semester V							Semester VI						
Core V & 21U5CHC05	5	5	3	25	75	100	Core VIII & 21U6CHC08	5	5	3	25	75	100
Core VI & 21U5CHC06	5	5	3	25	75	100	Core IX & 21U6CHC09	5	5	3	25	75	100
Core III Practical & 24U5CHCP03	3	3	3	40	60	100	Core III Practical & 24U6CHCP04	3	3	3	40	60	100
Core IV Practical & 24U6CHCP04	3	0	3	-	-	-	Core IV Practical & 24U6CHCP05	6	4	6	40	60	100
Core VII & 21U5CHC07	5	5	3	25	75	100	Core X & 21U6CHC10	5	5	3	25	75	100
Elective I & 21U5CHE01	4	4	3	25	75	100	Elective II & 21U6CHE02	4	4	3	25	75	100
SBEC I & 21U5CHS01	2	2	3	25	75	100	SBEC II & 21U6CHS02	2	2	3	25	75	100
Mini Project 24U5CHPR01	3	2	3	40	60	100	Extension work	0	1	0	0	0	-
Total	30	26	24	205	495	700	Total	30	29	24	205	495	700
III YEAR TOTAL									55	48	410	990	1400
TOTAL CREDIT FOR THE COURSE									140	126	1120	2880	4000

XII. BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate

1. Theory: 75 Marks

(i) Test - I & II and ESE

Knowledge Level	Section	Marks	Description	Total
K1	A (Answer all)	20 x 01=20	MCQ/Define	75
K2	B (Either or pattern)	05 x 05=25	Short Answers	
K3& K4	C (Answer 3 out of 5)	03 x 10=30	Descriptive/ Detailed	

Programme Outcomes

P01: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.

P02: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and

present complex information in a clear and concise manner to different groups.

P03:Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

P04: Problem solving: Capacity to extrapolate from what one has learned and applies their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

P05:Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesise data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

P06:Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

P07: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

P08: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

PO10:Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO11: Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO12:Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13:Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO14:Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15:Lifelong learning: Ability to acquire knowledge and skills, including "learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning

aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/re-skilling.

Programme Specific Outcomes

PS01: To foster a theoretical and practical knowledge on chemistry and its applications and to make responsible citizenships.

PS02: To deliver core and advanced courses on the applied chemistry.

PS03: To deepen learner-capacity for productive scientific thinking both within and beyond the classroom through extensive programmes.

PS04: To cultivate problem solving skills through chemical knowledge to address environmental problems, and to complement and reflect on social needs.

PS05: To develop innovative thinking, generate creative ideas towards scientific knowledge through well-structured seminars and assignments.



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205



Programme	B. Sc.	Programme Code	UCH			Regulations	2021-2024		
Department	Chemistry		Semester			1			
Course Code	Course Name	Hours per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21U1CHC01	Core paper - I: General Chemistry - I	5	0	0	5	25	75	100	
COURSE OBJECTIVES	1 To learn about the fundamentals of chemistry and principles of various topics. 2 To learn about the outline of basic concepts of organic chemistry. 3 To critique errors and titrimetry.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,								
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.								
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,								

COs	COURSE OUTCOME
CO 1	Students understand the periodic properties and electronic configurations of s p d and f block elements
CO 2	Students gain an insight into basic chemical concepts in organic chemistry
CO 3	Students apply the different chemical concepts to different gaseous system and real time problems
CO 4	Students analyze the various atom models
CO 5	Students evaluate the magnitude of various Possible errors in volumetric analysis
Pre-requisites	NIL

Knowledge Levels																				
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing																				
CO / PO / KL Mapping																				
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																				
Cos	KLs		POs		KLs		POs		KLs		POs		KLs		POs					
CO 1	2		PO 1		2		PO 2		1		PO 3		5		PO 4		5			
			PO 5		4		PO 6		6		PO 7		2		PO 8		4			
CO 2	2		PO 9		1		PO 10		3		PO 11		3		PO 12		2			
CO 3	3		PO 13		1		PO 14		6		PO 15		3		PSOs		KLs			
CO 4	4		PSO 1		3		PSO 2		4		PSO 3		1		CO / PO Mapping		(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
CO 5	5		COs		PROGRAMME OUTCOME (POs)															
PSOs	KLs		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15			
PSO 1	3		3	2	1	1	1	1	1	2	2	2	3	2	1	2				
PSO 2	4		3	2	1	1	1	1	1	2	2	2	3	2	1	2				
PSO 3	1		2	1	1	2	1	2	2	1	3	3	2	1	1	3				
CO / PO Mapping		(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)		1	1	2	2	3	1	1	2	2	1	1	1	1	2			
CO / PSO Mapping		(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)		1	1	3	3	2	2	1	2	1	1	1	1	2	1			

COs	Programme Specific Outcome (POs)					
	CO1	CO2	CO3	CO4	CO5	
PSO1	2	2	3	2	1	
PSO2	1	1	2	3	2	
PSO3	2	2	1	1	1	
Course Assessment Methods						
Direct						
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations						
Indirect						
1. Course End Delivery						
Content of the Syllabus						
Unit - I	Atomic structure				Hours	12
	1.1 Rutherford's nuclear model of the atom. Planck's quantum theory of radiation. Photoelectric effect. Bohr's theory, its limitations and atomic spectrum of hydrogen atom. 1.2 de Broglie equation, Heisenberg's principle of uncertainty, Postulates of Quantum mechanics, Black body Radiation, Schrodinger wave equation (derivation not required), significance of ψ and ψ^2 .					
Unit - II	Introduction to Chemical bonding				Hours	12
	2.1 Types of Bonds - Ionic, Covalent, Metallic, Coordinate Bonds and their Properties. 2.2 Hydrogen bonding: Nature, types and consequences. Intermolecular forces–London forces, van der Waals forces. 2.3 Lattice Energy - Born-Lande Equation (derivation not required) - Factors affecting Lattice Energy, Born Haber Cycle and its Applications.					
Unit - III	Covalent Bond				Hours	12
	3.1 Covalent Bond – Lewis Structures of Simple Molecules and Ions, Valence Shell Electron Pair Repulsion Theory {NH ₃ , H ₂ O, PCl ₅ }. 3.2 Valence Bond Theory (VBT) – Hybridization of orbitals (BeF ₂ , BF ₃ , CH ₄) 3.3 Molecular Orbital Theory (MOT) – Bonding, Antibonding and Nonbonding Orbitals. Application of MOT to He, N ₂ , O ₂ , Comparison between VBT and MOT.					
Unit - IV	Theories of Acids and Bases and Principles of Volumetric Analysis				Hours	12
	4.1 Acids and bases : Arrhenius theory, Bronsted–Lowry concept and Lewis concept acids and bases, Factors that influence the strength of acids and bases, common ion effect, pH and pKa, pKb and buffers. 4.2 Volumetric Analysis: Mole concept, Atomic Mass, Molecular Mass, Equivalent Mass, concentration terms - mole fraction, normality, molarity, molality. Principle of titrimetry - neutralisation point and end point – standard solution – primary and secondary standards, Indicators.					

	Introductory Organic Chemistry	Hours	12
Unit - V	5.1 Electron Displacement Effects - Inductive, Electromeric, Mesomeric, Resonance, Hyper-Conjugation and Steric Effects. 5.2 Nature of Bond Fission – Homolytic and Heterolytic. Reactive Intermediates – Carbocations, Carbanions and Free Radicals – Conditions Favouring their Formation, Stability and Structure. 5.3 Types of Reagents – Electrophiles and Nucleophiles. Types of Reactions - Substitution, Addition, Elimination and Rearrangement Reactions (Definition with an example).		
Total Hours			60
Text Books			
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33 rd edition), Vishal publishing co (2017).		
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, (47 th edition), Vishal publishing co., (2017).		
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (22 nd edition), New Delhi, S Chand & Co (2016).		
References			
1	Morrison R.T. and Boyd R.N., Organic Chemistry (7 th Edition), Pearson Education, India (2010)		
2	Madan. R. D., Inorganic Chemistry (3 rd edition), New Delhi, S. Chand and Co (2012)		
3	Mukherji. S. M, Singh. S. P, Kapoor. R.P, Organic Chemistry volume I (4 th edition) New age International (p) limited (1998).		
E-References			
1	https://chem.libretexts.org/Core/InorganicChemistry/DescriptiveChemistry/Periodic Trends of Elemental_Properties/Periodic_Properties_of_the_Elements		
2	unicorn.ps.uci.edu/M3LC/lectures/LectureWeek1.pdf		

Signature of BOS Chairman



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Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			1				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U1CHA01	Allied Chemistry – I (BIOCHEMISTRY)		5	0	0	4	25	75	100	
COURSE OBJECTIVES	To impart knowledge in formation of molecule from atoms and various organic reaction mechanism, Toprepare students for a carrier in chemical industries and To acquire basic knowledge in fundamental aspects of practical chemistry.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writingand orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge;analyse and evaluate evidence,arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students learn about bonding, anti bonding, non bonding and Interhalogen compounds.
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	5	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	2	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2

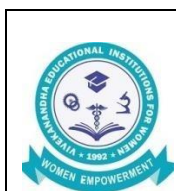
CO / PSO Mapping				
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)				
COs	Programme Specific Outcome (POs)			
	CO1	CO2	CO3	CO4
PSO1	1	2	3	2
PSO2	2	1	2	3
PSO3	1	2	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chemical bonding and Aromaticity	Hours	12
	Chemical Bonding Definition types Ionic bond and covalent bond, hydrogen bond -formation and characteristics properties -bond order- magnetic properties. Structure of NaCl, CaF ₂ . MO theory-bonding in H ₂ , O ₂ , N ₂ using MO theory -bonding -bond order- magnetic properties. Aromaticity -Huckel's rule-types - Examples.		
Unit - II	Acid and Base theory	Hours	12
	Arrhenius concept - Lowry-bronsted theory -Lewis acid and base theory - Conjugated Acid and base- Strength of an Acid and base. Principle and Classification of Hard acid and Base -Soft Acid and base- HSAB. Acidity of water - Alkalinity-PH -hardness of water- types of hardness - methods RO and Zeolite process.		
Unit - III	Volumetric analysis	Hours	12
	Law of Volumetric analysis-Definitions of molarity, molality, normality and mole fraction. Titration-Back titration-Equivalence point-Indicator - Standard solution - Primary and secondary standards- Types of titrations- Acid-base and redox.		
Unit - IV	Pharmaceutical Chemistry-I	Hours	12
	Definition of the terms - Drug, Pharmacy, Pharmacophore, Pharmacodynamics and Pharmacopoeia. Antibiotics - Definition, classification - broad and narrow spectrum antibiotics. penicillin, chloramphenicol and erythromycin - structure and uses -structure elucidation not needed. Sulpha drugs-preparation of sulphaguanine and sulphathiazole. Mechanism and mode of action of sulpha drugs.		
Unit - V	Agricultural Chemistry	Hours	12
	Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Manures and their importance. Chemical fertilizers- Natural and synthetic fertilizers: Classification of NPK fertilizer- Preparation of Urea, Ammonium sulphate, Triple super phosphate potassium nitrate; role of macronutrients and micronutrients. Pesticides- classification-insecticides, herbicides and fungicides- Structure of important pesticides: DDT, BHC.		
Total Hours			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16th), Meerut, Krishnaprakasham media., (2011).
4	Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (22nd edition), New Delhi, S. Chand & Co., (2016).
5	Dr.R.D.Madan, Modern inorganic chemistry,(3rd edition), New Delhi,S. Chand & Co., (2014).
References	
1	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry , 47th edition, Vishal publishing co., 2017.
2	Jayashree Ghosh, Text Book of Pharmaceutical Chemistry, S. Chand, New Delhi,1999.
3	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry , 50th edition, New Delhi, S. Chand &Co., 2011.
E-References	
1	www.sparknotes.com/chemistry/bonding/molecularorbital/section1.rhtm
2	www.organic-chemistry.org/namedreactions/nucleophilic-substitution-sn1-sn2.shtm
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	chem.libretexts.org/

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024		
Department	Chemistry		Semester			1			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
20U1CHA01	Allied Chemistry – I (Nutrition and dietetics)		5	0	0	4	25	75	100
COURSE OBJECTIVES	To impart knowledge in formation of molecule from atoms and various organic reaction mechanism. To prepare students for a carrier in chemical industries. To acquire basic knowledge in fundamental aspects of practical chemistry.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,								
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.								
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,								

COs	COURSE OUTCOME
CO 1	Students learn about bonding, anti bonding, non bonding and Interhalogen compounds.
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	5	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	2	PO 9	1
		PO 10	3
PSOs	KLs		
PSO 1	3	PO 11	3
		PO 12	2
PSO 2	4	PO 13	1
		PO 14	6
PSO 3	1	PO 15	3

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2

CO / PSO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)



COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	1	2	3	2	2
PSO2	2	1	2	3	1
PSO3	1	2	1	1	2

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chemical bonding	Hours	12
	Types of Bonding- Ionic Bond, covalent Bond and coordinate bond Molecular Orbital Theory-bonding, antibonding and nonbonding orbitals. M.O. diagrams of Hydrogen, Helium, Nitrogen, discussion of bond order and magnetic properties. Hydrides-classification and characteristics - preparation, properties and uses of Borazole, NaBH ₄ and LiAlH ₄ .		
Unit - II	Nuclear Chemistry	Hours	12
	Natural radioactivity-radioactive series including Neptunium series-Group displacement law. Nuclear Binding energy, mass defect-Calculations. Nuclear Fission and Nuclear Fusion-differences – Stellar energy. Nuclear reactors, Applications of radioisotopes-C-14 dating, rock dating		
Unit - III	Hybridisation, Electron displacement Effects & Stereoisomerism	Hours	12
	Covalent Bond-Orbital Overlap-Hybridisation – Geometry of Organic molecules-Methane, Ethylene and Acetylene Electron displacement Effects: Inductive, Resonance, Hyper conjugative & steric effects. Their effect on the properties of compounds. Stereoisomerism: Symmetry-elements of symmetry- cause of optical activity, Tartaric acid. Racemisation. Resolution. Geometrical isomerism of Maleic and Fumaric acids.		
Unit - IV	Aromatic compounds	Hours	12
	Aromatic compounds-Aromaticity-Huckel's rule. Electrophilic substitution in Benzene-Mechanism of Nitration, Halogenation-Alkylation, Acylation. Isolation, preparation, properties and structure of Naphthalene Haworth's synthesis. Heterocyclic compounds:- Preparation, properties and uses of Furan, Thiophene and Pyrrole		
Unit - V	Solutions & Chromatography	Hours	12
	Solutions: Liquid in liquid type-Raoult's law for ideal solutions. positive and negative deviation from Raoult's law-Reasons and examples, Fractional distillation and Azeotropic distillation. Chromatography: principle and application of column, paper and thin layer chromatography.		
Total Hours			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16th), Meerut, Krishna prakasam media., (2011).
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2	www.organic-chemistry.org/namedreactions/nucleophilic-substitution-sn1-sn2.shtm
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	chem.libretexts.org/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B. Sc.	Programme Code	UCH			Regulations	2021-2024		
Department	Chemistry		Semester			2			
Course Code	Course Name	Hours per Week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21U2CHC02	Core paper - II: General Chemistry - II	5	0	0	4	25	75	100	
COURSE OBJECTIVES	1. To gain knowledge about shapes of inorganic molecules and metallurgy. 2. Acquire the knowledge about hydrocarbons. 3. To study about liquids and liquid crystals.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
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PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
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PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,								

COs	COURSE OUTCOME														
CO 1	Students evaluate the shapes of simple covalent molecules.														
CO 2	Students design the methods of extraction, separation and purification of metals from its corresponding ore.														
CO 3	Students identify the methods of preparation and properties of alkanes and alkenes.														
CO 4	Students assess the classification and reaction of dienes and alkynes.														
CO 5	Students identify the various properties of liquids and liquid crystals.														
Pre-requisites															
Knowledge Levels															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	KLs		POs		KLs										
CO 1	5		PO 1		2										
			PO 2		1										
CO 2	2		PO 3		5										
			PO 4		5										
CO 3	4		PO 5		4										
			PO 6		6										
CO 4	3		PO 7		2										
			PO 8		4										
CO 5	2		PO 9		1										
			PO 10		3										
PSOs	3		PO 11		3										
PSO 1			PO 12		2										
			PO 13		1										
PSO 2			4		PO 14		6								
PSO 3	1		PO 15		3										
CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO4	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO / PSO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	1	2	2	3	2
PSO2	2	1	3	2	1
PSO3	1	2	1	1	2



Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chemistry of Hydrocarbons	Hours	12
	1.1 Alkanes - Physical properties of Alkanes – Structure and reactions of C-C bonds – Oxidation, Aromatization, Pyrolysis and free radical substitution. Petroleum and petrochemicals - cracking, synthetic petrol, refining of gasoline, reforming, knocking, diesel engine fuel, Octane number and Cetane number. 1.2 Cycloalkanes - Preparation using Wurtz reaction, Dieckmann's ring closure and reduction of aromatic hydrocarbons – Substitution and ring opening reactions – Baeyer's strain theory.		
Unit - II	Chemistry of Unsaturated Hydrocarbons	Hours	12
	2.1 Alkenes: Physical Properties of alkenes – electrophilic and free radical addition reactions (mechanism not required) of hydrogen, hydrogen halides (Markownikoff's rule), hydrogen bromide (peroxide effect) and Water. allylic substitution by NBS. 2.2 Dienes: Classification – isolated, conjugated and cumulated dienes. 1,3-Butadiene – preparation, chemical reactions – 1,2- and 1,4 -additions 2.3 Alkynes: Preparation using-CaC ₂ , properties – addition of H ₂ O, HCN and HX, reduction using Lindlar's catalyst		
Unit - III	Chemistry of Group III ,V & VI Elements	Hours	12
	3.1 Boron family: Comparative study of boron family, inert pair effect, preparation, properties, structure and uses of borax, diborane and borazole 3.2 Nitrogen family: Comparative study of halides and oxides of nitrogen group elements, preparation, properties of Oxy acids of nitrogen (HNO ₂ and HNO ₃), preparation, properties and structure of hydrazine. 3.3 Oxygen family: Anomalous behavior of oxygen- preparation, properties, structure, Preparation, oxidizing and reducing character of H ₂ O ₂		

Unit - IV	Reactivity of Aliphatic, Aromatic and Unsaturated Carbonyl Compounds and Aromaticity	Hours	12
	<p>4.1 Structure of Carbonyl Group, acidity of alpha hydrogen, Keto-Enol tautomerism – evidence for the two forms. Relative reactivity of Aldehydes and Ketones.</p> <p>4.2 Nucleophilic addition reactions: Aldol Condensation, Cannizzaro and Knoevenagel reactions</p> <p>4.3 Oxidation and reduction of Carbonyl Compounds- Meerwein-Ponndorf-Verley, Clemmensen, Baeyer-Villiger and Wolff- Kishner reactions</p> <p>4.4 Concept of Aromaticity – definition, Huckel’s rule, aromatic, non-aromatic and non-aromatic. Application of Huckel’s rule to benzene, naphthalene, cyclopropenyl cation, cyclopentadienyl anion.</p>		
Unit - V	States of Matter	Hours	12
	<p>5.1 Gaseous state: Laws of gases– Avagadro’s law –Ideal gas equation. Kinetic theory of gases. van der Waals equation of state -law of corresponding states.</p> <p>5.2 Liquid state: Vapour pressure– Trouton’s rule- Colloidal state: Classifications of colloids – Methods of preparation of colloids -peptization, coagulation- Gold Number Rule – Bredict’s Arc Method. Micelle formation of soaps and detergents. Cleansing action of soap.</p>		
Total Periods			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry 33 rd edition, Vishal publishing co.,2017.
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, 47 th edition, Vishal publishing co., 2017.
3	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22 nd edition, New Delhi, S. Chand & Co., 2016.
References	
1	Morrison R.T. and Boyd R.N., Organic Chemistry 7 th Edition, Pearson Education, India 2010.
2	Madan. R. D., Inorganic Chemistry 3rd edition, New Delhi, S. Chand and Co., 2012.
3	Mukherji. S. M, Singh. S. P, Kapoor. R.P, Organic Chemistry volume I 4 th edition New age International pvt limited 1998.
E-References	
1	https://www.khanacademy.org/science/biology/chemistry--of-life/chemical-bonds-and-reactions/v/ionic-covalent-and-metallic-bonds
2	https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-i/structure-and-properties-of-alkanes/alkanes-physical-properties
3	https://chem.libretexts.org/
4	http://www.chem.tamu.edu/class/fyp/mcquest/mcquest.html
5	http://nptel.ac.in/courses/104103069/15

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			2				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U2CHCP01	Core Practical - I				3	2	40	60	100	
COURSE OBJECTIVES	To understand the principles of volumetric analysis. To know about different types of volumetric titrations. To enable the students to have hands-on training on preparation of simple.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students will learn how to make solutions and do the titrations with different kinds
CO 2	Students will understand reactions taking place during the experiment
CO 3	The students will be able to apply the knowledge about nature, significance, and influence of errors and to be avoided or minimized during quantitative examination of experiment
CO 4	Students will analyze the given samples volumetrically
CO 5	To evaluate the known techniques to prepare, recrystallize and finding melting point of simple inorganic compound
Pre-requisites	

Knowledge Levels																
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing																
CO / PO / KL Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	KLs		POs		KLs											
CO 1	2		PO 1		2											
			PO 2		1											
CO 2	2		PO 3		5											
			PO 4		5											
CO 3	3		PO 5		4											
			PO 6		6											
CO 4	4		PO 7		2											
			PO 8		4											
CO 5	5		PO 9		1											
			PO 10		3											
PSOs	KLs		PO 11		3											
PSO 1	3		PO 12		2											
			PO 13		1											
PSO 2	4		PO 14		6											
			PO 15		3											
PSO 3	2															
CO / PO Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	PROGRAMME OUTCOME (POs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3	
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2	
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1	
CO / PSO Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	Programme Specific Outcome (POs)															
	CO1			CO2			CO3			CO4			CO5			
PSO1	2			2			3			2			1			
PSO2	1			1			2			3			2			
PSO3	3			3			2			1			1			

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Acidimetry	Hours	9
	1. Estimation of sodium hydroxide-standard sodium carbonate. 2. Estimation of hydrochloric acid- standard oxalic acid. 3. Estimation of Oxalic acid -standard-oxalic acid		
Unit - II	Permanganometry	Hours	9
	1. Estimation of oxalic acid-std-Mohr s salt or ferrous sulphate. 2. Estimation of sodium nitrite-standard oxalic acid. 3. Estimation of ferrous ion.		
Unit - III	Iodometry	Hours	6
	1. Estimation of copper-standard Potassium dichromate. 2. Estimation of Potassium dichromate-standard potassium dichromate		
Unit - IV	Dichrometry	Hours	3
	1. Estimation of ferric ion using diphenyl amine/N-Phenylanthranilic acid as indicator		
Unit - V	INORGANIC PREPARATIONS	Hours	15
	1. Micro-Cosmic salt. 2. Potassium trioxalatochromate(III) 3. Ferrous Ammonium sulphate. 4. Tetramminecopper sulphate(II) 5. Tris thiourea copper chloride(I)		
Total Hours			42

Text Books	
1	V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S.Chand& Co, (1995).
References	
1	Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand& Co, (2012)
E-References	
1	https //byjus.com/chemistry/volumetric-analysis/
2	https //chem.libretexts.org

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			2			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21U2CHA02	Allied Chemistry – II (Biochemistry)			5	0	0	3	25	75	100
COURSE OBJECTIVES	To compile students with various chromatography techniques and its applications towards industries and research laboratories. To educate about the chemistry of bio-organic and bio-inorganic compounds and various kinds of drugs and its uses.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, value, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students predict the concept of various chromatographic techniques.
CO 2	Students identify the details of bio organic compounds and bio inorganic compounds.
CO 3	Students utilize knowledge of antipyretics, analgesic, antiseptics, disinfectants and anesthetics
CO 4	Students analyze the structure of different haem proteins.
CO 5	Students evaluate the different pharmaceutically important compounds and their uses in real life.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2	
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3	
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2	
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1	

CO / PSO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	1
PSO2	3	1	2	3	2
PSO3	1	2	1	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chromatography	Hours	12
	Chromatography -definition-types- column, paper, thin layer -method of separationapplication-Difference between paper chromatography and thin layer chromatography. High pressure liquid chromatography- HPLC-principle-experimental techniques - instrumentation and advantages.		
Unit - II	Amino acids and Carbohydrates	Hours	12
	Aminoacids- Preparation- Gabriel method, Strecker synthesis- Isoelectric point, Reactions of glycine. Polypeptide- Proteins- Classification- primary structure and its functions. Carbohydrates-definition, Classification, Preparation and Reactions of glucose and fructose- Inter conversion of glucose to fructoseand vice versa- sucrose and starch		
Unit - III	Bio-inorganic Chemistry	Hours	12
	Structure of chlorophyll, porphyrin unit and photosynthesis. Nitrogen fixation, carbon cycle. structure of haem proteins: haemoglobin, myoglobin. Oxygen transport and respiration. Metallo enzymes, vitaminscontaining metals.		
Unit - IV	Pharmaceutical Chemistry-II	Hours	12
	Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenol derivatives- paracetamol and ibuprofen. Antiseptic and disinfectants-definition and distinction, crystal violet, acridine. Anaesthetics-definition, classification- local and general, preparation,properties and usesof cocaine and benzo cocaine.		
Unit - V	Organic Analysis	Hours	12
	Qualitative analysis of organic substances: test for saturation and unsaturation; aliphatic & aromatic; acidic and basic nature of organic compound; elements test for N, S and halogens: functional groups like acid,phenol, aldehyde, ketone, carbohydrate, amine, ester, amide and diamide.		
Total Hours			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, 50th edition, New Delhi, S. Chand & Co., (2011). R., Sharma L.R., Kalia K.K., Principles of
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry 23rd edition. New Delhi, S. Chand & Co., 2004. Applied Chemistry, New Delhi, S. Chand & Co., 2008.
3	V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, 1995.
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S. Chand & Co., 2016.
5	Pandey. O.P, Bajpai. D.N., Giri. S., Practical Chemistry, New Delhi, S. Chand & Co, 2012.
References	
1	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., 2008.
2	Sharma. B.K., Industrial chemistry including chemical engineering -16th- Meerut, Krishnaprakasham media. 2011.
E-References	
1	https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-of-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate .
3	https://chem.libretexts.org/

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			2			
Course Code	Course Name			Hours per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
20U2CHA02	Allied Chemistry – II (Nutrition & dietetics)			5	0	0	4	25	75	100
COURSE OBJECTIVES	To compile students with basic knowledge in co-ordination chemistry.									
	To educate about the chemistry of pharmaceutical and photochemical phenomenon.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, value, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students predict the concept of various co-ordination compounds.
CO 2	Students identify the details of bio organic compounds.
CO 3	Students utilize knowledge of antipyretics, analgesic, antiseptics, disinfectants and anesthetics
CO 4	Students analyze the terms in phase rule.
CO 5	Students evaluate the different electrochemical phenomenon.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	1
PSO2	3	1	2	3	2
PSO3	1	2	1	1	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & Model
2. Assignment
3. End Semester Examinations

Indirect



1. Course End Delivery

Content of the Syllabus

Unit - I	Co-ordination chemistry	Hours	12
	Co-ordination chemistry-definition of terms- classification of ligands-NomenclatureChelation-Examples. Chelate effect- explanation. Werner's theory-conductivity and precipitation studies. Sidgwick's theory-Effective AtomicNumber concept. Pauling's theory-postulates-Application to octahedral, square planar and tetrahedralcomplexes. Pauling's theory and magnetic properties of complexes. Merits and demerits ofPauling's theory. Biological role of Haemoglobin and Chlorophyll (Elementary idea of structure andfunctions).		
Unit - II	Carbohydrates &Aminoacids	Hours	12
	Carbohydrates: Classification, preparation and properties of Glucose and Fructose- Propertiesof Starch, Cellulose and derivatives of Cellulose. Inter conversion of Glucose to Fructose andvice versa.Amino Acids-classification, preparation and properties of Glycine and Alanine.		
Unit - III	Pharmaceutical chemistry	Hours	12
	Chemotherapy: Preparation, uses and mode of action of sulpha drugs-prontosil,sulphadiazine and sulphafurazole. Uses of penicillin, chloramphenicol and streptomycin,Definition and one example each for-analgesics, antipyretics, tranquilizers, sedatives, hypnotics,local anaesthetics and general anaesthetics. Cause and treatment of diabetes, cancer and AIDS.		
Unit - IV	Photochemistry	Hours	12
	Grothius-Draper law and Stark-Einstien's law of photochemicalequivalence. Quantum yield. Example for photochemical reactions- Hydrogen-Chlorine reaction(elementary idea only) Photosynthesis. Phosphorescence and Fluorescence.Phase Rule: Phase rule and the definition of terms in it. Application of phase rule to watersystem. Reduced phase rule and its application to a simple eutetic system (Pb-Ag) Freezingmixtures.		
Unit - V	Electro Chemistry	Hours	12
	Kohlrausch law -measurement of conductance, pH determination.Conductometric titrations.Galvanic cells-EMF-standard electrode potentials, reference electrodes.Corrosion: Methods of prevention.		
Total Hours			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, 50th edition, New Delhi, S. Chand & Co., (2011). R., Sharma L.R., Kalia K.K., Principles of
2	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry 23rd edition. New Delhi, S. Chand & Co., 2004. Applied Chemistry, New Delhi, S. Chand & Co., 2008.
3	V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, 1995.
4	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, 22nd edition, New Delhi, S. Chand & Co., 2016.
5	Pandey O.P, Bajpai D.N., Giri S., Practical Chemistry, New Delhi, S. Chand & Co, 2012.
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1	Jayashree Ghosh S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., 2008.
2	Sharma B.K., Industrial chemistry including chemical engineering -16th- Meerut, Krishnaprakasham media. 2011.
E-References	
1	https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-of-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate .
3	https://chem.libretexts.org/

Signature of BoS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			2				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U2CHAP01	Allied Chemistry Practical (Biochemistry)		0	0	3	2	40	60	100	
COURSE OBJECTIVES	To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
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PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students will learn how to conduct a volumetric estimation process precisely. .
CO 2	Students will understand reactions taking place during the experiment.
CO 3	Students will plan, conduct, review and report the experiment
CO 4	The students will learn the nature, significance, and influence of errors and how they may best be avoided or minimized during quantitative examination of a chemical compound. Students will gain knowledge about analysis of organic compounds.
CO 5	Students will evaluate the reactivity of various functional groups.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	5	PO 5	4
		PO 6	6
CO 4	2	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	PROGRAMME OUTCOME (POs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1	
CO4	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2	
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1	



CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	2	1
PSO2	1	1	2	1	2
PSO3	2	2	1	2	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Volumetric Estimations-Acidimetry	Hours	9
	1. Estimation of sodium hydroxide-standard sodium carbonate 2. Estimation of Oxalic acid -standard-oxalic acid. 3. Estimation of Hydrochloric acid - standard oxalic acid		
Unit - II	Permanganometry	Hours	9
	1. Estimation of oxalic acid-std-Mohrs salt or ferrous sulphate. 2. Estimation of sodium nitrite-standard oxalic acid. 3. Estimation of ferrous ion.		
Unit - III	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Aldehydes, Ketones, carboxylic acids.		
Unit - IV	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: aromatic primary amines, phenol, amide, diamide.		
Unit - V	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Nitro compounds and monosaccharides.		
Total Hours			45

Text Books	
1	1. V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, (1995).
References	
1	.Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand& Co, (2012).
E-References	
1	1. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2	2. http://vlab.amrita.edu/?sub=2&brch=191&sim=345&cnt=1
3	3. http://amrita.olabs.edu.in/?sub=73&brch=8&sim=116&cnt=1

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			2				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
20U2CHAP01	Allied Chemistry Practical (Nutrition & Dietetics)		0	0	3	2	40	60	100	
COURSE OBJECTIVES	To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic compounds.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students will learn how to conduct a volumetric estimation process precisely. .
CO 2	Students will understand reactions taking place during the experiment.
CO 3	Students will plan, conduct, review and report the experiment
CO 4	The students will learn the nature, significance, and influence of errors and how they may best be avoided or minimized during quantitative examination of a chemical compound. Students will gain knowledge about analysis of organic compounds.
CO 5	Students will evaluate the reactivity of various functional groups.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	5	PO 5	4
		PO 6	6
CO 4	2	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)



COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	2	1
PSO2	1	1	2	1	2
PSO3	2	2	1	2	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Volumetric Estimations-Acidimetry	Hours	9
	1. Estimation of sodium hydroxide-standard sodium carbonate 2. Estimation of Oxalic acid -standard-oxalic acid. 3. Estimation of Hydrochloric acid - standard oxalic acid		
Unit - II	Permanganometry	Hours	9
	1.Estimation of oxalic acid-std-Mohrs salt or ferrous sulphate. 2.Estimation of sodium nitrite-standard oxalic acid. 3.Estimation of ferrous ion.		
Unit - III	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Aldehydes, Ketones, carboxylic acids.		
Unit - IV	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: aromatic primary amines, phenol, amide, diamide.		
Unit - V	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Nitro compounds and monosaccharides.		
Total Hours			45

Text Books	
1	1. V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, (1995).
References	
1	.Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand& Co, (2012).
E-References	
1	1. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2	2. http://vlab.amrita.edu/?sub=2&brch=191&sim=345&cnt=1
3	3. http://amrita.olabs.edu.in/?sub=73&brch=8&sim=116&cnt=1

Signature of BOS Chairman

		VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.						
Programme	B.Sc.	Programme Code	UCH		Regulations	2021-2024		
Department	Chemistry		Semester			3		
Course Code	Course Name	Hours per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3CHC03	GENERAL CHEMISTRY-III	6	0	0	5	25	75	100
COURSE OBJECTIVES	1.To acquire knowledge about the fundamentals and principles of chemistry. 2.To educate the students about the functional groups of organic compounds. 3.To understand the concept of thermodynamic terms.							
POs	PROGRAMME OUTCOME							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.							
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge; analyze and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identifies appropriate resources required for a project, and manages a project through to completion.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,							
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,							
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,							
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,							

COs	COURSE OUTCOME
CO 1	Students gain the knowledge of preparation, properties and uses of some important d-block metal compounds
CO 2	Students know different types of hydrides, preparation, properties and its uses.
CO 3	Students study about preparation, properties and uses of alcohols, phenols and aromatic hydrocarbons
CO 4	Students learn about preparation, properties of aldehydes, ketones and some naming reactions
CO 5	Students able to study about the thermodynamic terms and laws.
Pre-requisites	

Knowledge Levels															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	KLs		POs		KLs										
CO 1	2		PO 1		2										
			PO 2		1										
CO 2	1		PO 3		5										
			PO 4		5										
CO 3	3		PO 5		4										
			PO 6		6										
CO 4	6		PO 7		2										
			PO 8		4										
CO 5	5		PO 9		1										
			PO 10		3										
PSOs	KLs		PO 11		3										
			PO 12		2										
PSO 1	3		PO 13		1										
			PO 14		6										
PSO 2	4		PO 15		3										
PSO 3	1														
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	2	3	1	1	1	1	2	1	3	1	1	2	3	1	1
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	1	3	1	1
PSO2	1	1	2	1	2
PSO3	2	3	1	1	1



Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	d- Block elements	Hours	12
	1.1. d-block elements - Introduction – general characteristics: metallic character, atomic and ionic radii, oxidation states, color, complex formation and magnetic properties. 1.2. Preparation, properties and uses of some important compounds: Zeigler Natta catalyst, Prussian blue, sodium nitroprusside, Turnbull's blue, Wilkinson's catalyst, potassium permanganate, potassium dichromate.		
Unit - II	Hydrides and carbides	Hours	12
	2.1. Hydrides - classification of hydrides: ionic, covalent, interstitial, polymeric and complex hydrides - preparation, properties and structure of lithium hydride, sodium hydride and lithium aluminium hydride. 2.2. Carbides: classification, preparation, properties and uses of calcium carbide, boron carbide, aluminium carbide and silicon carbide.		
Unit - III	Chemistry of alcohols and ethers	Hours	12
	3.1. Alcohols - distinction of primary, secondary and tertiary alcohols: Lucas reagent, oxidation and Victor Mayer's methods – preparation by the reduction of aldehydes, ketones, carboxylic acids and hydrolysis of esters 3.2. Polyhydric alcohols: cleavage reactions of polyhydric alcohols with periodic acid, lead tetra acetate, osmium tetroxide - unsaturated alcohols: preparation and reactions of allyl alcohol. 3.3. Ethers: Methods of preparation of aliphatic and aromatic ethers – chemical reactions: cleavage reaction and autooxidation, Ziesel's method.		
Unit - IV	Chemistry of phenols and organohalogens	Hours	12
	4.1. Phenol: preparation and properties of phenol - reactions of phenol: acidic character, formation of ethers, formation of esters – reactions involving benzene rings: nitration, sulphonation, halogenation, Reimer-Tiemann reaction, coupling reaction (mechanism not necessary) – difference between phenol and ethyl alcohol 4.2. Acidity of phenol, effect of substituents on acidity (electro withdrawing and releasing substituents) – preparation and reactions of resorcinol, catechol and quinol 4.3. Organohalogens: preparation, properties and uses of CH ₂ Cl ₂ , CHCl ₃ and vinyl chloride.		

	Thermodynamics and Thermochemistry	Hours	12
Unit – V	5.1. Thermodynamic terms - system, surrounding and boundary - homogenous and heterogeneous system - First law of thermodynamics - internal energy- enthalpy of a system - heat capacity of a system - relationship between Cp and Cv.		
	5.2. Enthalpy change in a chemical reaction - exothermic and endothermic reactions - relation between heats of reaction at constant volume and pressure.		
	5.3. Determination of enthalpies – Kirchoff’s equation, Hess’s law and its applications (derivation not necessary) - Joule –Thompson experiment - Nernst heat theorem - flame temperature and explosion temperature.		
Total Hours			60

Text Books	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry (33 rd edition), Vishal publishing co., (2017).
2	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry, (47 th edition), Vishal publishingco., (2017).
3	Bahl. B.S. and Arun Bahl, Advanced Organic Chemistry, (22 nd edition), New Delhi, S. Chand & Co., (2016).
References	
1	Morrison. R.T. and Boyd R.N., Organic Chemistry (6 th edition), New York, Allyn &Bacon Ltd., (1992).
2	Madan.R.D., Inorganic Chemistry (3 rd edition), New Delhi, S. Chand and Co., (2012).
3	Mukherji.S.M, Singh.S.P, Kapoor.R.P, Organic Chemistry volume I (4 th edition) New Age International (P) limited (1998).
Website and e-learning source	
1	https://www.askiitians.com/iit-jee-chemistry/inorganic-chemistry/hydrogen/hydrides.html
2	nsdl.niscair.res.in/jspui/bitstream/123456789/778/1/Revised%20 thermodynamics.pdf
3	https://www.askiitians.com/iit-jee-chemistry/organic-chemistry/carbonyl-compounds/aldehydes-and-ketones/chemical-properties-of-aldehydes-and-ketones.html

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024		
Department	Chemistry		Semester			3			
Course Code	Course Name	Hours per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21U3CHA01	Allied Chemistry – I (Botany/Zoology)		5	0	0	4/3	25	75	100
COURSE OBJECTIVES	1. To impart knowledge in formation of molecule from atoms and various organic reaction mechanism 2. To prepare students for a carrier in chemical industries. 3. To acquire basic knowledge in fundamental aspects of practical chemistry.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,								
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.								
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,								

COs	COURSE OUTCOME
CO 1	Students learn about bonding, anti-bonding, non-bonding and Interhalogen compounds.
CO 2	Students acquire knowledge about the fundamental concepts of acid and base and to determine the hardness of water.
CO 3	Students able to apply the knowledge to prepare various concentration of solution.
CO 4	Students understand about the various antibiotics and drugs.
CO 5	Students evaluate the characteristics of soil, fertilizers and pesticides.
Pre-requisites	

Knowledge Levels															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	KLs					POs					KLs				
CO 1	5					PO 1					2				
						PO 2					1				
CO 2	2					PO 3					5				
						PO 4					5				
CO 3	3					PO 5					4				
						PO 6					6				
CO 4	4					PO 7					2				
						PO 8					4				
CO 5	2					PO 9					1				
						PO 10					3				
PSOs	KLs					PO 11					3				
						PO 12					2				
PSO 1	3					PO 13					1				
						PO 14					6				
PSO 2	4					PO 15					3				
PSO 3	1														
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2



CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	1	2	3	2	2
PSO2	2	1	2	3	1
PSO3	1	2	1	1	2

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chemical bonding	Hours	12
	Lewis approach to chemical bond formation, the concept of ionic and covalent bonds. Ionic Bonding: Formation of ionic bonds, factors affecting the formation of ionic bonds; calculation of lattice enthalpy. Covalent Bonding: Concept of electronegativity, Fajan's rule, dipole moment; Valence Shell Electron Pair Repulsion (VSEPR) theory		
Unit - II	Acid and Base theory	Hours	12
	Arrhenius concept - Lowry-Bronsted theory -Lewis's acid and base theory - Conjugated Acid and base- Strength of an Acid and base. Principle and Classification of Hard acid and Base -Soft Acid and base- HSAB. Acidity of water - Alkalinity-PH -hardness of water- types of hardness - methods RO and Zeolite process.		
Unit - III	Volumetric analysis	Hours	12
	Law of Volumetric Analysis-Definitions of molarity, molality, normality and mole fraction. Titration-Back Titration-Equivalence Point-Indicator - Standard solution - Primary and secondary standards- Types of titrations- Acid-base and redox.		
Unit - IV	Pharmaceutical Chemistry-I	Hours	12
	Definition of the terms - Drug, Pharmacy, Pharmacophore, Pharmacodynamics and Pharmacopoeia. Antibiotics - Definition, classification - broad and narrow spectrum antibiotics. penicillin, chloramphenicol and erythromycin - structure and uses -structure elucidation not needed. Sulpha drugs-preparation of sulphaguanine and sulphathiazole. Mechanism and mode of action of sulpha drugs.		
Unit - V	Agricultural Chemistry	Hours	12
	Soil types-red soil, black soil, alluvial soil, desert soil, red soil; role of humus: Chemical fertilizers- Natural and synthetic fertilizers: Classification of NPK fertilizer- Preparation of Urea, Ammonium sulphate, Triple super phosphate potassium nitrate; role of macronutrients and micronutrients. Pesticides- classification- insecticides, herbicides and fungicides- Structure of important pesticides: DDT, BHC.		
Total Hours			60

Text Books	
1	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry (33 rd edition), Vishal publishing co., (2017).
2	Jayashree Ghosh. S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
3	Sharma B.K., Industrial chemistry including chemical engineering (16 th), Meerut, Krishnaprakashamedia., (2011).
4	Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (22 nd edition), New Delhi, S. Chand & Co., (2016).
5	Madan.R. D., Modern Inorganic Chemistry,(3 rd edition), New Delhi,S. Chand & Co., (2014).
References	
1	Puri B.R., Sharma L.R., Pathania M.S., Principles of Physical Chemistry, 47 th edition, Vishal publishing co., (2017).
2	Jayashree Ghosh, Text Book of Pharmaceutical Chemistry, S. Chand, New Delhi, (1999).
3	Puri B.R., Sharma L.R., Kalia K.K., Principles of Inorganic Chemistry, 50 th edition, New Delhi, S. Chand &Co., (2011).
E-References	
1	www.sparknotes.com/chemistry/bonding/molecularorbital/section1.rhtm
2	www.organic-chemistry.org/namedreactions/nucleophilic-substitution-sn1-sn2.shtm
3	www.soest.hawaii.edu/oceanography/courses/OCN633/Fall%202013/Titrimetry.pdf
4	chem.libretexts.org/

Signature of BOS Chairman

		VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2022			
Department	Chemistry		Semester			3				
Course Code	Course Name		Hours per week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U3CHA03	Allied Chemistry – I (Physics)		5	0	0	3	25	75	100	
COURSE OBJECTIVES	1. To provide a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective. 2. To expose the students to a breadth of experimental techniques using instrumentation.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, value, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students will be known molecular orbital theory and types of inter-halogens.
CO 2	Students can understand organic reactions and types of hybridization
CO 3	Students will be enhanced their knowledge towards electrolysis, conductance and buffer solutions.
CO 4	Students will learn the basics of Pharmaceutical Chemistry.
CO 5	Students will gain knowledge about corrosion and its preventive methods.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	5	PO 5	4
		PO 6	6
CO 4	6	PO 7	2
		PO 8	4
CO 5	3	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO5	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3

CO / PSO Mapping				
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)				
COs	Programme Specific Outcome (POs)			
	CO1	CO2	CO3	CO4
PSO1	2	2	1	1
PSO2	3	1	2	1
PSO3	1	2	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Covalent bonding	Hours	12
	Covalent bond-Hybridization-Definition -Salient features-VSEPR theory - Shapes of inorganic molecules such as BF ₃ , H ₂ O, NH ₃ ,ClF ₃ and XeF ₂ . Molecular orbital theory - Postulates-bonding,anti bonding and Hybridization in methane,ethylene, acetylene. non-bonding molecular orbital-Bond order-MO diagram for H ₂ , He ₂ ,N ₂ ,O ₂ ,F ₂ ,NO and CO.		
Unit - II	Organic Reactions	Hours	12
	Classification of reactions-substitution,addition,elimination reactions-explanation.Isomerization, polymerization and condensation definition with examples. Aromaticity,Huckel's rule. Electrophilic substitution reactions in benzene - Mechanism of nitration,sulphonation,halogenation and alkylation.		
Unit - III	Electrochemistry-I	Hours	12
	Electrolytic conduction-Faradays law of electrolysis-Conductance of electrolytes-Specific conductance, equivalent conductance, molar conductance-variation of molar conductance with dilution - Kohlrausch law and its application-Conductometric titrations-Ostwald dilution law-pH definition Common ion Effect-Buffer solutions.		
Unit - IV	Pharmaceutical Chemistry-I	Hours	12
	Antibiotic-Definition and classification -A study of Chloramphenicol, Penicillin – semi-synthetic Penicillin-gross structural features Streptomycin-Cephalasporin and Tetracycline. Sulpha drugs – preparationof sulphaguanidine, sulphapyridine and sulphathiazole. Mechanism and mode of action ofsulpha drugs.		
Unit - V	Applied Chemistry-I	Hours	12
	Corrosion-Types of corrosion - Dry and Wet corrosion definition only-Prevention of corrosion by electroplating. Paints - Requirements of good paint- constituents of paints and their functions- manufacture of paints -special paints: luminescent fire retardant and heat resistant paints. Varnishes -Constituents, characteristics of good varnish, types and uses.		
Total Hours			60

Text Books	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry 33 rd edition, Vishal publishing co., (2017).
2	Bahl. B.S. and Arun Bahl, Advanced Organic Chemistry, 22 nd edition, New Delhi, S. Chand & Co., (2016).
3	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry, 47 th edition, Vishal publishing co., (2017).
References	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry 50 th edition, New Delhi, S. Chand & Co., (2011).
2	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry 23 rd edition, New Delhi, S. Chand & Co., (2004).
E-References	
1	https://chem.libretexts.org/Core/Physical_and_Theoretical_Chemistry/Chemical_Bonding/Molecular_Orbital_Theory/MO_bonding_in_F2_and_O2 .
2	https://www.cliffsnotes.com/study-guides/chemistry/organic-chemistry-ii/reactions-of-aromatic-compounds/electrophilic-aromatic-substitution-reactions

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			3			
Course Code	Course Name	Hours per week			Credit	Maximum Marks				
		L	T	P	C	CA	ESE	Total		
21U3CHN01	Industrial Chemistry			2	0	0	2	25	75	100
COURSE OBJECTIVES	<ul style="list-style-type: none"> ❖ To learn the importance of Cement Chemistry. ❖ To understand the manufacturing of soaps, detergents and glass of different types. ❖ To enable the students to learn about the preparation and importance of various industrial products. 									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students will be known the various methods involved in Cement Preparation.
CO 2	Students can understand the manufacture of soap and detergents.
CO 3	Students will be enhanced their knowledge towards manufacture of glass.
CO 4	Students will learn the basic concepts involved in lubricants and petroleum products.
CO 5	Students will learn how to conduct a volumetric estimation process precisely.
Pre-requisites	

Knowledge Levels															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	KLs					POs					KLs				
CO 1	2					PO 1					2				
CO 2	2					PO 2					1				
CO 3	3					PO 3					5				
CO 4	4					PO 4					5				
CO 5	4					PO 5					4				
PSOs	KLs					PO 6					6				
PSO 1	3					PO 7					2				
PSO 2	4					PO 8					4				
PSO 3	1					PO 9					1				
						PO 10					3				
						PO 11					3				
						PO 12					2				
						PO 13					1				
						PO 14					6				
						PO 15					3				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2



CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	2
PSO2	1	1	2	3	3
PSO3	2	2	1	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Cement Chemistry	Hours	6
	Manufacture of cement, Dry and Wet process, Important parameters for manufacturing a good cement clinker. Characteristics of the constitutional compounds of cement. Additives for cement, Properties, General composition, Testing of cement, Chemical & physical requirement.		
Unit - II	Soaps and detergents	Hours	6
	Soaps: manufacture-toilet and transparent soap -metal soaps, cleansing action of soap. Detergents: Manufacture of synthetic detergents-anionic detergents-cationic detergents and amphoteric detergents.		
Unit - III	Glass industry	Hours	6
	Glass-physical and chemical properties of glass-characteristics-manufacture: formation of batch material-melting-shaping-annealing-finishing-special glass: optical, borosilicate and coloured glass.		
Unit - IV	Lubricants	Hours	6
	Definition-functions - properties - viscosity index-pour point - cloud point - classification - additives for lubricants- grease-solid lubrication-emulsions.		
Unit - V	Petroleum and Petrochemicals	Hours	6
	Cracking - mechanism, changes occurring during cracking - types - applications - synthetic petrol - Hydrogenation of coal Bergius process - Fischer tropch process - knocking and anti knocking agents - octane number.		
Total Hours			30

Text Books	
1	Structure and Performance of Cements, 2 nd Edition, Edited by J. Bensted and P. Barnes, Spon Press, London, 2002, ISBN 0-419-23330-X
2	Industrial chemistry by B.K.Sharma, Goel Publishing House, Meerut.
3	Industrial chemistry by B.N.Chakrabarty, Oxford and IBH publishing Co, New Delhi, 1981.
References	
1	College Industrial chemistry by P.P.Singhn, T.M.Joseph, R.G.Dhanvale, Himalaya Publishing house, Bombay 4th edition, 1983.
2	Applied chemistry by Jayashree Ghosh, S.Chand Publication Reprint, 2013.
E-References	
1	https://www.scribd.com/document/274281762/Water-Technology-Ppt
2	nptel.ac.in/courses/103107082/module6/lecture5/lecture5.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			4				
Course Code	Course Name		Hours per week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U4CHC04	General Chemistry – IV		6	0	0	5	25	75	100	
COURSE OBJECTIVES	1.To study about the fundamentals and applications of nuclear chemistry. 2.To acquire the knowledge about carboxylic acids, its derivatives, Aliphatic and Aromatic amines. 3.To understand the principle and significance of electrical and magnetic properties.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence;identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group,and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations,demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students identify the fundamentals and applications of nuclear chemistry.
CO 2	Students demonstrate the preparations and properties of mono and dicarboxylic acids.
CO 3	Students understand about the Nomenclature, preparations and properties of some aliphatic and aromatic amines.
CO 4	Students learn about the concepts and significance of various nitro compounds
CO 5	Students analyze about the electrical and magnetic properties.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	1
CO 2	6	PO 3	5
		PO 4	5
CO 3	2	PO 5	4
		PO 6	6
CO 4	1	PO 7	2
		PO 8	4
CO 5	4	PO 9	1
		PO 10	3
PSOs	3	PO 11	3
		PO 12	2
PSO 1	4	PO 13	1
		PO 14	6
PSO 2	1	PO 15	3
PSO 3			

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	1	1	2	2	1	3	1	1	1	1	1	1	1	3	1
CO3	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO4	2	3	1	1	1	1	2	1	3	1	1	2	3	1	1
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	1	2	1	2
PSO2	3	1	1	1	3
PSO3	1	1	2	3	1



Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Nuclear chemistry	Hours	12
	1.1. Introduction–composition of nucleus, nuclear forces- nuclear stability – n/p ratio, mass defect, binding energy, packing fraction and magic numbers, Harkin’s rule, shell and liquid drop models 1.2. Definition of isotopes, isobars, isotones and isomers with examples - detection of isotopes: Aston and Dempster methods – detection and measurement of radioactivity: Ionization chamber and Geiger-Muller counter – nuclear fusion and fission reactions		
Unit - II	Halogens and interhalogens	Hours	12
	2.1. Halogens and interhalogens - diatomic nature –oxidizing property – Electron affinity - electronegativity - size effect - comparison of halogens with O, N and C groups - Anamolous behavior of fluorine – chemical properties of haloacids and oxyhalides 2.2. Interhalogens – preparation, structure and bonding of AX, AX ₃ , and AX ₅ type interhalogens and their uses - pseudohalogens: comparison with halogens - preparation, properties and uses of cyanogen and thio-cyanogen - oxyacids of halogens: preparation and uses of HClO ₄ , HClO ₃ , HClO ₂ and HClO		
Unit - III	Carboxylic acids and its derivatives	Hours	12
	3.1. Monocarboxylic acids – methods of preparation by oxidation of primary alcohol, aldehydes and hydrolysis of esters – chemical properties: salt formation, formation of acid halides, amides and esters – acidity constant – acid strength of substituted benzoic acid - Hammett equation (derivation not required) - dicarboxylic acids – preparation and properties of oxalic acid, malonic acid and succinic acid 3.2. Malonic and acetoacetic esters – characteristics of reactive methylene group – synthetic uses of malonic and acetoacetic esters		
Unit - IV	Chemistry of nitrogen compounds	Hours	12
	4.1. Nitro compounds: reactions of nitroalkanes – difference between nitroalkanes and alkyl nitriles – aromatic nitro compounds: preparation and reactions of nitrobenzene – preparation, properties and uses of picric acid 4.2. Amino compounds – classification of aliphatic and aromatic amines – distinction of primary, secondary and tertiary amines – reactions of aliphatic and aromatic amines - effect of substituents on basicity - comparison of aliphatic and aromatic amines – separation of amines by Hinsberg and Hofmann method		

Unit - V	Electrical and magnetic properties of atoms and molecules	Hours	12
	5.1. Electrical properties of matter: polarization of molecules in an electric field: electronic polarization, atomic polarization and orientation polarization - Clausius-Mossotti equation (no derivation), Debye equation (no derivation), dipole moment: methods of determining dipole moment temperature method and dilute solution method 5.2. Magnetic properties: magnetic permeability, magnetic susceptibility, paramagnetism, diamagnetism and ferro and anti-ferro magnetism – comparison of paramagnetism and diamagnetism – comparison of paramagnetism and ferromagnetism – determination of magnetic susceptibility by Guoy's balance method		
Total Hours		60	

Text Books	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry (33 rd edition), Vishal publishing co., (2017).
2	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry, (47 th edition), Vishal publishing co., (2017).
3	Bahl. B.S. and Arun Bahl, Advanced Organic Chemistry, (22 nd edition), New Delhi, S. Chand & Co., (2016).
References	
1	Morrison. R.T. and Boyd R.N., Organic Chemistry (6 th edition), New York, Allyn & Bacon Ltd., (1992).
2	Madan.R.D., Inorganic Chemistry (3 rd edition), New Delhi, S. Chand and Co., (2012).
3	Mukherji.S.M, Singh.S.P, Kapoor.R.P, Organic Chemistry volume I (4 th edition) New Age International (P) limited (1998).
Website and e-learning source	
1	http://www.ltcconline.net/stevenson/2008CHM101Fall/CHM101Lecture Notes20081201a. html
2	https://www.askiitians.com/iit-jee-amines-and-nitrogen-containing-compounds/amines-and-its-preparation-methods/
3	nptel.ac.in/courses/101104063/25

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.					 ISO 9001:2008 www.bvc.com ID: 9105078407			
Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024		
Department	Chemistry		Semester			4			
Course Code	Course Name	Hours per week			Credit	Maximum Marks			
		L	T	P	C	CA	ESE	Total	
21U4CHA02	Allied Chemistry – II (Botany/Zoology)	5	0	0	4/3	25	75	100	
COURSE OBJECTIVES	1. To compile students with various chromatography techniques and its applications towards industries and research laboratories 2. To educate about the chemistry of bio-organic and bio-inorganic compounds and various kinds of drugs and its uses.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,								
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, value, and use a variety of relevant information sources; and use appropriate software for analysis of data.								
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting one's life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.								

COs	COURSE OUTCOME
CO 1	Students predict the concept of various chromatographic techniques.
CO 2	Students identify the details of bio-organic compounds and bio inorganic compounds.
CO 3	Students utilize knowledge of antipyretics, analgesic, antiseptics, disinfectants and anesthetics
CO 4	Students analyze the structure of different proteins.
CO 5	Students evaluate the different pharmaceutically important compounds and their uses in real life.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	4	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	1
PSO2	3	1	2	3	2
PSO3	1	2	1	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Chromatography	Hours	12
	Chromatography-definition-types-paper, column, thin layer -method of separation application- Difference between paper chromatography and thin layer chromatography. High pressure liquid chromatography-HPLC-principle-experimental techniques - instrumentation and advantages.		
Unit - II	Amino acids and Carbohydrates	Hours	12
	Carbohydrates - Definition and Examples - Classification – Oxidation and Reduction Reactions of Glucose - Structure of Glucose (Structural elucidation not necessary) - Uses of Starch - Uses of Cellulose Nitrate and Cellulose Acetate. Amino Acids – Definition and Examples - Classification of Amino Acids - Preparation - Gabriel Phthalimide Synthesis – Properties – zwitterion and Isoelectric point - Structure of Glycine.		
Unit - III	Bio-inorganic Chemistry	Hours	12
	Structure of chlorophyll, porphyrin unit and photosynthesis. Nitrogen fixation, carbon cycle. structure of haem proteins: haemoglobin, myoglobin. Oxygen transport and respiration. Metallo-enzymes, vitamins containing metals.		
Unit - IV	Pharmaceutical Chemistry-II	Hours	12
	Anesthetics - General and Local Anesthetics - Antiseptics - Examples and their Applications - Definition and One Example each for Analgesics, Antipyretics, Tranquilizers, Sedatives - Causes, Symptoms and Treatment of Diabetes, Cancer and AIDS.		
Unit - V	Organic Analysis	Hours	12
	Qualitative analysis of organic substances: test for saturation and unsaturation; aliphatic & aromatic; acidic and basic nature of organic compound; elements test for N, S and halogens: functional groups like acid, phenol, aldehyde, ketone, carbohydrate, amine, ester, amide and diamide.		
Total Hours			60

Text Books	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry, 50 th edition, New Delhi, S. Chand & Co., (2011).
2	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry 23 rd edition. New Delhi, S. Chand & Co., (2004).
3	Venkateswaran. V, Veeraswamy. R., Kulandaivelu. A.R., Basic Principles of Practical Chemistry, New Delhi, S.Chand & Co, (1995).
4	Bahl. B.S. and Arun Bahl, Advanced Organic Chemistry, 22 nd edition, New Delhi, S. Chand & Co., (2016).
5	Pandey.O.P, Bajpai.D.N., Giri.S., Practical Chemistry, New Delhi, S.Chand & Co, (2012).
References	
1	Jayashree Ghosh. S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
2	Sharma.B.K., Industrial chemistry including chemical engineering -16 th - Meerut, Krishnaprakasham media, (2011).
E-References	
1	https://www.khanacademy.org/test-prep/mcat/chemical-processes/separations-purifications/a/principles-of-chromatography
2	https://en.wikipedia.org/wiki/Carbohydrate .
3	https://chem.libretexts.org/

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024	
Department	Chemistry			Semester			4	
Course Code	Course Name	Hours per week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4CHA04	Allied Chemistry – II (Physics)	5	0	0	3	25	75	100
COURSE OBJECTIVES	1. To gain knowledge about thermodynamics and electrochemistry. 2. Acquire the knowledge about medicinal drugs and dyes.							
POs	PROGRAMME OUTCOME							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.							
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,							
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.							
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,							
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.							
PO 11	Ability to work independently, identifies appropriate resources required for a project, and manages a project through to completion.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,							
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,							
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,							
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,							

COs	COURSE OUTCOME
CO 1	Students will learn the basic concepts of thermodynamics.
CO 2	Students will know about the theory and applications of transport number.
CO 3	Students will gain knowledge regarding electrode potential and batteries.
CO 4	Students will enhance their knowledge towards Pharmaceutical and industrial chemistry.
CO 5	Students will learn about dyes and its importance.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	3	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	4	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
PSO 1	3	PO 12	2
		PO 13	1
PSO 2	4	PO 14	6
		PO 15	3
PSO 3	1		

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	3	2	2
PSO2	1	1	2	3	3
PSO3	2	2	1	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Thermodynamics	Hours	12
	Systems and surroundings- isolated, closed and open systems – Homogenous & heterogeneous systems, state of the system intensive and extensive variables. Thermodynamics process – cyclic processes, reversible and irreversible, isothermal and adiabatic processes – state and path functions, exact and inexact differentials, concepts of heat and work.		
Unit - II	Electrochemistry-II	Hours	12
	Arrhenius theory of electrolyte dissociation and its limitations - Migration of ions. Definition of transport number, determination by Hittorf's method and Moving boundary method. DebyeHuckel-Onsagar's equation for strong electrolytes (elementary treatment only). Degree of dissociation-factors influencing the degree of dissociation. Solubility product-application of solubility product.		
Unit - III	Electrochemistry-III	Hours	12
	Cells-Galvanic cell with examples.Electrode potential-single electrode potential- Standard electrode potential-Nernst equation-derivation-electrochemical series and its applications- EMF-Applications of EMF measurements:Determination of pH by using hydrogen electrode- Reference electrodes:hydrogen electrode and calomel electrode-Reversible and irreversible cell-Batteries-definition - lead acid battery		
Unit - IV	Pharmaceutical Chemistry-II	Hours	12
	Structure and mode of action: Analgesics and Antipyretics-salicylic acid derivatives-aspirin, p-aminophenol derivatives- paracetamol and ibuprofen. Antiseptic and disinfectants-definition and distinction, crystal violet, acridine. Anesthetics - definition, classification-local and general, preparation,properties and uses of cocaine and benzococaine.		
Unit - V	Applied Chemistry-II	Hours	12
	Dyes-definition-requisites of a true dye, classification of dyes-based on structure and mode of application, colours and chemical constitution-Witt's theory, Bayer theory. Dyeing forces-ionic interactions, hydrogen bonds, van der-Waals interaction, covalent bonds with examples, cross dyeing - principle only. Basic operations in dyeing process-preparation of fiber and dye bath, applications of dye and finishing.		
Total Hours			60

Text Books	
1	Puri. B.R., Sharma. L.R., Kalia. K.K., Principles of Inorganic Chemistry 33 rd edition, Vishal publishing co., (2017).
2	Bahl. B.S. and ArunBahl, Advanced Organic Chemistry, (19 th edition), New Delhi, S. Chand & Co., (2010).
3	Puri. B.R., Sharma. L.R., Pathania. M.S., Principles of Physical Chemistry (23 rd edition). New Delhi, S. Chand & Co., (2004).
References	
1	Jayashree Ghosh .S, Fundamental concepts of Applied Chemistry, New Delhi, S. Chand & Co., (2008).
2	Sharma.B.K., Industrial chemistry including chemical engineering (16 th) Meerut, Krishnaprakash media. (2011).
E-References	
1	https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/carbhyd.htm
2	http://dyes-pigments.standardcon.com/what-is-dye.html

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B. Sc.	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			4			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21U4CHN02	Water Quality Analysis			2	0	0	2	25	75	100
COURSE OBJECTIVES	1. To study the characteristics of water 2. To learn the importance of water purification 3. To analyze the quality measurement about water									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, value, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students knew the various sources of water.
CO 2	Students able to understand the importance of various water quality parameters.
CO 3	Students able to determine the hardness of water.
CO 4	Students knowledge on sources, analysis and control methods of industrial waste water.
CO 5	Students learn how to treat polluted water.
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	5	PO 5	4
		PO 6	6
CO 4	3	PO 7	2
		PO 8	4
CO 5	4	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	2	1	1	1	2	1	2	2	1	3	3	2	1	1	3
CO5	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2

CO / PSO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	3	2
PSO2	1	1	2	2	3
PSO3	2	2	1	1	1

Course Assessment Methods

Direct

1. Continuous Assessment Test I, II & Model
2. Assignment
3. End Semester Examinations

Indirect



1. Course End Delivery

Content of the Syllabus

Unit - I	Introduction to Hydrology	Hours	6
	World water resource; water resources of India- Different ecosystem of hydrology- Riverine, Estuarine and marine-Status of water quality in India.		
Unit - II	Characteristics of Water	Hours	6
	Water quality parameters and their interaction-physical and chemical characteristics- colour, odour, taste, turbidity, temperature-chemical constituents- electrical conductivity - suspended solids - dissolved solids - acidity - total acidity - alkalinity - pH - free CO ₂ - dissolved O ₂ - free chlorine - chlorine demand.		
Unit - III	Water Treatment	Hours	6
	Water composition analysis - Hardness of water- Type of Hardness-Determination of hardness by EDTA method, Removal of hardness-Zeolite process, demineralization and Reverse osmosis - Salinity - ionic composition - Minerals-pollutants- BOD, COD- Water quality standard - ISI, EPA, WHO.		
Unit - IV	Industrial Water Pollution, Its Control & Analysis	Hours	6
	Sources of water pollution - domestic - industrial - agricultural - soil and radioactive wastes as sources of pollution. Water pollutants and their effects. Heavy metal pollution-public health significance of Cadmium -Chromium - Copper - Lead - Zinc - Manganese. Prevention and control its measures.		
Unit - V	Industrial Waste Water Treatment	Hours	6
	Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors; Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal.		
Total Hours			30

Text Books	
1	B. K. Sharma, Industrial Chemistry; 8 th Ed., Goel Publishing House, New Delhi, 1997.
2	B.K. Sharma and H. Kaur, "Environmental chemistry", Goel Publishing House, Meerut, 2008.
3	Industrial chemistry by B. N. Chakrabarty, Oxford and IBH publishing Co, NewDelhi, 1981.
4	Industrial chemistry by B. K. Sharma, Goel Publishing House, Meerut.
References	
1	Chemical Process Industries Norrish Shreve, R. and Joseph A. Brink Jr. McGraw Hill, Industrial Book Company, London.
2	Production and Properties of Industrial Chemicals "Brain A.C.S. Reinhold" New York.
3	Outlines of Chemical Technology "For the 21 st Century, M. Gopala Rao & Matshall Sittig (3 rd Edition).
4	College Industrial chemistry by P. P. Singh, T. M. Joseph, R. G. Dhanvale, Himalaya Publishing house, Bombay 4 th edition, 1983.
5	Applied chemistry by Jayashree Ghosh, S. Chand Publication Reprint 2013
E-References	
1	https://www.cdc.gov/healthywater/drinking/public/water_treatment.html
2	https://www.hunterwater.com.au

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry		Semester			4				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U4CHCP02	Core Practical II		0	0	3	3	40	60	100	
COURSE OBJECTIVES	1.To understand the principles of qualitative analysis. 2.To expose the students to separate anions and cations. 3.To enable the students to understand the techniques to remove interfering from non-interfering radicals.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.									
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,									
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.									
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,									
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.									
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,									
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,									
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,									
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,									

COs	COURSE OUTCOME
CO 1	Students learn how to separate the cations and anions systematically.
CO 2	Students gain the knowledge about group separation of various cations.
CO 3	Students enable to acquire knowledge about interfering and non interfering ions.
CO 4	Students learn how to analyze the cations and anions using preliminary tests.
CO 5	Students find some cations using flame test.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	4	PO 3	5
		PO 4	5
CO 3	1	PO 5	4
		PO 6	6
CO 4	4	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO3	2	3	1	1	1	1	2	1	3	1	1	2	3	1	1
CO4	1	1	2	2	3	1	1	3	1	2	2	1	1	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

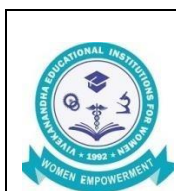
CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					
COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	2	1
PSO2	1	3	1	3	2
PSO3	2	1	3	1	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Semimicro Qualitative Analysis of Inorganic Mixtures	Hours	45
	ANIONS TO BE ANALYSED: Carbonate, Sulphate, Nitrate, Chloride, Fluoride, Borate, Oxalate, Phosphate radicals. CATIONS TO BE ANALYSED: Lead, Bismuth, Copper, Cadmium, Aluminium, Cobalt, Nickel, Zinc, Barium, Strontium, Calcium, Magnesium, Ammonium radicals.		
Total Hours			45

Text Books	
1	1.V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S.Chand& Co, (1995).
References	
1	1. Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand& Co, (2012)
E-References	
1	1. http://amrita.olabs.edu.in/?sub=73&brch=7&sim=180&cnt=1
2	2. http://www.federica.unina.it/agraria/analytical-chemistry/inorganic-qualitative-analysis/

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc.	Programme Code	UCH			Regulations	2021-2021		
Department	Chemistry		Semester			4			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
21U4CHAP01	Allied Chemistry Practical (Botany/Zoology/Physics)		0	0	3	2	40	60	100
COURSE OBJECTIVES	To understand the principles of volumetric analysis. To enable the students to have hands-on training on qualitative analysis of organic								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.								
PO 2	Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share ones views and express herself/himself etc.,								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications etc.,								
PO 4	Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply ones learning to real life situations.								
PO 5	Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesis data from a variety of sources; draw valid conclusions etc.,								
PO 6	A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses etc.,								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, valuate, and use a variety of relevant information sources; and use appropriate software for analysis of data.								
PO 11	Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective etc.,								
PO 13	Ability to embrace moral/ethical values in conducting ones life, formulate a Position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work etc.,								
PO 14	Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating etc.,								
PO 15	Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced etc.,								

COs	COURSE OUTCOME
CO 1	Students will learn how to conduct a volumetric estimation process precisely. .
CO 2	Students will understand reactions taking place during the experiment.
CO 3	Students will plan, conduct, review and report the experiment
CO4	The students will learn the nature, significance, and influence of errors and how they may best be avoided or minimized during quantitative examination of a chemical compound. Students will gain knowledge about analysis of organic compounds.
CO 5	Students will evaluate the reactivity of various functional groups.
Pre-requisites	

Knowledge Levels
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping			
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)			
COs	KLs	POs	KLs
CO 1	2	PO 1	2
		PO 2	1
CO 2	2	PO 3	5
		PO 4	5
CO 3	5	PO 5	4
		PO 6	6
CO 4	2	PO 7	2
		PO 8	4
CO 5	5	PO 9	1
		PO 10	3
PSOs	KLs	PO 11	3
		PO 12	2
PSO 1	3	PO 13	1
		PO 14	6
PSO 2	4	PO 15	3
PSO 3	1		

CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															

COs	PROGRAMME OUTCOME (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO2	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO3	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1
CO4	3	2	1	1	1	1	1	1	2	2	2	3	2	1	2
CO5	1	1	3	3	2	2	1	2	1	1	1	1	1	2	1

CO / PSO Mapping					
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)					

COs	Programme Specific Outcome (POs)				
	CO1	CO2	CO3	CO4	CO5
PSO1	2	2	1	2	1
PSO2	1	1	2	1	2
PSO3	2	2	1	2	1

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	Volumetric Estimations-Acidimetry	Hours	9
	1. Estimation of sodium hydroxide-standard sodium carbonate 2. Estimation of Oxalic acid -standard-oxalic acid. 3. Estimation of Hydrochloric acid - standard oxalic acid		
Unit - II	Permanganometry	Hours	9
	1.Estimation of oxalic acid-std-Mohrs salt or ferrous sulphate. 2.Estimation of sodium nitrite-standard oxalic acid. 3.Estimation of ferrous ion.		
Unit - III	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Aldehydes, Ketones, carboxylic acids.		
Unit - IV	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative .Functional groups that may be studied: aromatic primary amines, phenol, amide, diamide.		
Unit - V	Qualitative Organic Analysis	Hours	9
	Systematic analysis of organic compounds: Characterization of Organic compounds by their functional groups and confirmation by preparation of derivative. Functional groups that may be studied: Nitro compounds and monosaccharides.		
Total Hours			45

Text Books	
1	1. V. Venkateswaran, R. Veeraswamy and A.R.Kulandaivelu, Basic Principles of Practical Chemistry, New Delhi, S. Chand & Co, (1995).
References	
1	.Pandey O. P, Bajpai D. N., Giri S., Practical Chemistry, New Delhi, S.Chand& Co, (2012).
E-References	
1	1. http://wwwchem.uwimona.edu.jm/lab_manuals/c10expt25.html
2	2. http://vlab.amrita.edu/?sub=2&brch=191&sim=345&cnt=1
3	3. http://amrita.olabs.edu.in/?sub=73&brch=8&sim=116&cnt=1

Signature of BOS Chairman

Course Code	Course Name	Hours per Week			Credit	Maximum Marks		
		L	T	P		C	CA	ESE
21U5CHC05	CORE PAPER-V: ORGANIC CHEMISTRY-I	6			5	25	75	100
Course Objectives	1. To gain knowledge about stereoisomerism. 2. Acquire the knowledge about heterocycles. 3. To understand the reaction mechanism and reagents in organic synthesis.							
POs	PROGRAMME OUTCOME							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesize data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Student will be able to get an insight into basic concept of stereoisomerism.
CO 2	Students will be skilled in solving the problems related to isomerism.
CO 3	Students will have a firm foundation in the fundamentals of heterocyclic chemistry, methods of synthesis and application of those methods for the preparation of specific groups of heterocyclic systems.

CO 4	Students will have a clear understanding of mechanisms in organic reactions.
CO 5	Students will be skilled enough to choose a reagent to carry out organic reactions.
Pre-requisites	

KNOWLEDGE LEVELS

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

Cos	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	3
		PO 3	5
CO 2	3	PO 4	2
		PO 5	4
		PO 6	2
CO 3	2	PO 7	6
		PO 8	4
		PO 9	2
CO 4	4	PO 10	3
		PO 11	1
		PO 12	5
CO 5	3	PO 13	4
		PO 14	2
		PO 15	1

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	1	2	1	2	1	1	2	1	3	1	1	2	3
CO2	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1
CO3	2	2	1	3	1	3	1	1	3	2	2	1	1	3	2
CO4	1	2	2	1	3	1	1	3	1	2	1	2	3	1	1
CO5	1	3	1	2	2	2	1	2	2	3	1	1	2	2	1

Course Assessment Methods

Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Stereochemistry-I	Hours	12
	Stereoisomerism - definition - classification into optical and geometrical isomerism – optical isomerism - optical activity - conditions for optical activity - asymmetric centre - achiral molecule - elements of symmetry - meaning of + and - , d and l notations - Racemization - methods of racemization - Resolution - methods of resolution -Walden inversion - Notations for optical isomers: Cahn-Ingold-Prelog rules - R-S notation - Erythro and threo representations.		
Unit - II	Stereochemistry-II	Hours	12
	Optical activity in compounds containing no asymmetric carbon: biphenyls, allenes and spiranes - Optical activity of lactic and tartaric acid - Geometrical isomerism: cis-trans, syn-anti, E-Z notations - Geometrical isomerism in maleic and fumaric acids - Methods of distinguishing geometrical isomers: dipole moment, dehydration and heat of hydrogenation.		
Unit - III	Heterocyclic compounds	Hours	12
	Heterocyclic compounds: five membered and six membered heterocyclic rings: pyrrole, furan, thiophene and pyridine - structure, preparation and properties - aromaticity-relative reactivity of pyrrole, furan and thiophene towards electrophilic substitution reaction- preparation of fused heterocyclic compounds: indole, quinoline, isoquinoline		
Unit - IV	Molecular rearrangements	Hours	12
	Pinacol-Pinacolone, Wolff, Beckmann, Cope, Hofmann, Curtius, Lossen, Schmidt and Fries rearrangements.		
Unit - V	Reagents of synthetic importance	Hours	12
	Sodium borohydride, Lithium aluminium hydride, Manganese dioxide, N-bromosuccinimide, Osmium tetroxide, Swern oxidation, Gilman's reagent, and Grignard reagent.		
Total Hours			60

Text Books	
1	I.L. Finar, Organic chemistry Vol I sixth edition, ELBS, Pearson Education Ltd.,2004
2	I.L. Finar, Organic chemistry Vol II fifth edition, ELBS, Pearson Education Ltd.,2012
3	O.P. Agarwal, Reactions and Reagents, Krishna prakashan media (p) Ltd., 1975
4	P.S. Kalsi, Stereochemistry, Conformation and Mechanism, New Age International (p) Ltd, VIIth, 2008.
5	B.S. Bhal and Arun Bhal, A text book of organic chemistry, S.Chand & company ltd, 1948.
References Books	
1	K.S.Tewari, and N.K.Vishoni, Organic Chemistry, Vikas Publishing House.
2	P.L. Soni and H.M. Chawla Text book of organic chemistry, 26th revised edition, Sultan chand and sons, 1995.

3	R.T.Morrison and Boyd, Organic Chemistry, VIth edition, PHI Learning Pvt Ltd., 2008.
4	M. K. Jain and S. C. Sharma, Modern Organic Chemistry, Vishal Publishing Co. 2018.
5	B. Mehta and M. Mehta, Organic Chemistry, PHI learning Publishers.
Website and e-learning source	
1	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Fundamentals/Isomerism_
2	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Supplemental_Modules_(Organic_Chemistry)/Fundamentals/Isomerism_
3	http://www.3rd1000.com/chem301/chem302a.htm
4	https://www.scribd.com/doc/97295442/Molecular-Rearrangements
5	https://www.wiley.com/en-us/Molecular+Rearrangements+in+Organic+Synthesis-p-9781118347966

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024				
Department	Chemistry			Semester			5				
Course Code	Course Name			Hours per Week			Credit		Maximum Marks		
				L	T	P	C	CA	ESE	Total	
21U5CHC06	CORE PAPER-VI: INORGANIC CHEMISTRY-I			5			5	25	75	100	
Course Objectives	<p>1. To help the student to understand the basic concepts in inorganic chemistry and to develop their critical thinking.</p> <p>2. To learn the basics and applications of the inorganic compounds.</p> <p>3. To learn the coordination complexes and limitation.</p>										
POs	PROGRAMME OUTCOME										
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.										
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.										
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.										
PO 4	Apply one's learning to real life situations.										
PO 5	Analyse and synthesise data from a variety of sources.										
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.										
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.										
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.										
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.										
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.										
PO 11	Ability to work independently, identify appropriate resources required for a project.										
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.										
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.										
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.										
PO 15	Ability to acquire knowledge and skills.										
COs	COURSE OUTCOME										
CO 1	Students known basics in acid and bases										
CO 2	Students able to understand the solvents										
CO 3	Students enhanced their knowledge of coordination complexes										
CO 4	Students learn the importance of f- block elements										
CO 5	Students will be able to interpret the applications of inorganic compounds in day to day life.										
Pre-requisites											



KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	1					PO 1					2				
						PO 2					3				
						PO 3					5				
CO 2	3					PO 4					1				
						PO 5					4				
						PO 6					3				
CO 3	2					PO 7					6				
						PO 8					3				
						PO 9					1				
CO 4	4					PO 10					2				
						PO 11					4				
						PO 12					4				
CO 5	5					PO 13					2				
						PO 14					2				
						PO 15					5				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3
Course Assessment Methods															
Direct															
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations															
Indirect															
1. Course End Delivery															

Content of the Syllabus

Unit - I	Modern Concepts of Acids and Bases	Hours	12
	Acids and Bases - Arrhenius concept - Bronsted - Lowry concept - Luxflood concept - Lewis concepts of acids and bases - Usanovich concept - Conjugate acid - base pairs –Dual behavior of water, Basicity and acidity of an Acid & base.Hydracids &Oxyacids - Levelling& Differentiating solvents - Solvent system concept. Hard and Soft Acids and Bases - Classification of acids and bases as hard and soft – examples - Pearson’s HSABPrinciple and its applications.		
Unit - II	Non-Aqueous Solvents	Hours	12
	Classification of solvents - General Characteristics of a solvent, Reaction in non aqueous solvents with reference to liq NH ₃ , Solutions of alkali metals in ammonia, liqN ₂ O ₄ ,anhydrous H ₂ SO ₄ , liq.HF,and molten salts.		
Unit - III	Chemistry of f-Block Elements	Hours	12
	Position in the periodic table - general characteristics of Lanthanides -Lanthanide contraction and its consequences - Isolation of Lanthanides from monazite including the Ion exchange resin methods - General characteristics of Actinides - occurrence and preparation ofthorium and uraniumcompounds.		

Unit - IV	Coordination Chemistry-I	Hours	12
	Definition and classification of ligands - Nomenclature of mononuclear and poly nuclear complexes - chelating ligands - chelate effect - coordination number and stereochemistry of complexes - Isomerism in complexes - structural isomerism - stereo isomerism - geometrical isomerism and optical isomerism in 4 and 6 coordinated complexes – Werner’s theory & its evidences - Sidgwick theory - EAN rule and its applications.		
Unit - V	Coordination Chemistry-II	Hours	12
	Theories of bonding in complexes: VB theory - postulates - Hybridization and Geometry of complexes - Outer orbital and inner orbital octahedral complexes - Square planar - tetrahedral complexes - Magnetic properties of complexes - limitations of VB theory. Crystal Field Theory - postulates - d orbital splitting in octahedral, tetrahedral and square planar complexes - strong and weak field ligands - Spectro chemical series - High spin and Low spin complexes -Applications of crystal field theory - CFSE and its uses - Limitations of CFT-Comparison between VBT and CFT.		
Total Hours			60
Text Books			
1	Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Distributor, New Delhi, Wahid. U. Malik, G. D. Tuli,		
2	R. D. Madan, Selected topics in Inorganic Chemistry, S.Chand & company, New Delhi.		
References Books			
1	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol - I (2006), S. Chand Publishing, New Delhi.		
2	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol - II (2006), S. Chand Publishing, New Delhi.		
Website and e-learning source			
1	https://en.wikibooks.org/wiki/Introduction_to_Inorganic_Chemistry		

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.							
Programme	B.Sc	Programme Code	UCH		Regulations	2021-2024		
Department	Chemistry		Semester			5		
Course Code	Course Name	Hours per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5CHCO7	CORE PAPER-VII: PHYSICAL CHEMISTRY-I	5			5	25	75	100
Course Objectives	1. To facilitate the students to study about the nature of solutions, kinetics of reactions. 2. To learn the concepts of chemical equilibrium. 3. To acquaint the knowledge for derivation of reaction rates, rate constants of various chemical reactions.							
POs	PROGRAMME OUTCOME							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Students will learn the laws of solutions and deviations of solution w.r.t. pressure, temperature and volume
CO 2	Students can understand fundamental concepts of chemical equilibrium.
CO 3	Students will have enhanced knowledge towards advanced conception of chemical equilibrium.
CO 4	Students will able to understand and explain the theories of chemical kinetics.
CO 5	Students will be skilled in solving the problems of Kinetics.
Pre-requisites	



KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					2				
						PO 2					1				
						PO 3					4				
CO 2	5					PO 4					2				
						PO 5					3				
						PO 6					5				
CO 3	3					PO 7					3				
						PO 8					6				
						PO 9					2				
CO 4	6					PO 10					3				
						PO 11					1				
						PO 12					4				
CO 5	4					PO 13					2				
						PO 14					3				
						PO 15					5				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	3	2	1	2	1	3	2	2	1	3	2	1
CO2	1	1	2	1	1	3	1	2	1	1	1	2	1	1	3
CO3	2	1	2	2	3	1	1	1	2	3	1	2	2	3	1
CO4	1	1	1	1	1	2	1	3	1	1	1	1	1	1	2
CO5	1	1	3	1	2	2	2	1	1	2	1	3	1	2	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment

3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	Solutions	Hours	12
	Definition- different types of solutions. Solutions of gases in liquids – Henry’s law - solutions of liquids in liquids – Raoult’s law. Ideal solution - Binary liquid mixture - deviation from ideal behavior -Thermodynamics of ideal solutions - V-P-composition curves, V-P-temperature curves - Azeotropic distillation. Theory of fractional distillation, Steam distillation, Nernst’s distribution law- Colligative properties-Introduction, Thermodynamic derivations, applications and limitations. Thermodynamic derivation of elevation of boiling point and depression of freezing point.		
Unit - II	Chemical Equilibrium- I	Hours	12
	Reversible reactions - nature of chemical equilibrium - definition, characteristics of chemical equilibrium - Law of mass action. Thermodynamic derivation of law of chemical equilibrium in terms of general concentration, partial pressure and mole fraction (K_p , K_c and K_x)- Relations between K_p , K_c and K_x - Problems related to K_p and K_c Derivation.		
Unit – III	Chemical Equilibrium- II	Hours	12
	Equilibrium law for ideal gases - Effect of inert gas on reaction equilibrium. Le Chatelier’s principle - effect of change in concentration, pressure and temperature. de-Donder’s treatment of chemical equilibria -Donnan Equilibrium membrane- concept of chemical affinities. Temperature dependence of equilibrium constant – Van’t Hoff equation.. Pressure dependence of equilibrium constant- Temperature dependence of equilibrium constant.		
Unit – IV	Chemical Kinetics-I	Hours	12
	Chemical kinetics and its scope - rate of a reaction, factors influencing the rate of the reaction. Order and molecularity of a reaction: Definition, types - difference between order and molecularity - Derivation of rate constant and half life period for zero, first order reactions - second order (same and different initial concentrations) and third order reactions (same initial concentrations only). Methods to determine the order of the reaction - Isolation and half life methods. Kinetics of complex reactions. Parallel and consecutive reactions only.		
Unit – V	Chemical Kinetics-II	Hours	12
	Theories of chemical kinetics: Arrhenius equation, effect of temperature on rate of reaction, concept of activation energy. Collision theory of reaction rates- introduction, Derivation of rate constant for bimolecular reaction from collision theory, Failures of CT. Lindemann theory - Introduction, Derivation of rate constant for unimolecular reaction. Theory of absolute reaction rates- Introduction, Thermodynamic derivation of rate constant for bimolecular reaction based on ARRT.		
Total Hours			60
Text Books			
1	A. Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, Revised multicolor edition, S. Chand publication Ltd, New Delhi, 2010.		
2	B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, (47th edition) Vishal Publishing Co., New Delhi, 2017.		
3	N. Kundu and S.K. Jain, Physical Chemistry, S. Chand & Company Ltd, New Delhi, 1990.		
Reference Books			
1	P. Atkins and J.D. Paula, Physical Chemistry, 7th Edn, Oxford University Press, New York, 2002.		

2	J.Rajaram and J.C.Kuriacose, Kinetics and mechanisms of chemical transformations, First edition, Macmillan Publishers India Ltd, New Delhi, 2011.
3	R.P.Rastogi and R.R.Misra, An introduction to chemical thermodynamics, 6th revised edition, Vikas Publishing House Pvt. Ltd, New Delhi, 2005.
Website and e-learning source	
1	https://www.britannica.com/science
2	https://www.chemqueries.com
3	https://socratic.org/Chemistry
4	https://chem.libretexts.org
5	https://www.askiitians.com/Physical Chemistry/Chemical Kinetics

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc	Programme Code	UCH		Regulations	2021-2024			
Department	Chemistry		Semester			5			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
21U5CHE01	ELECTIVE COURSE - I: ANALYTICAL CHEMISTRY		4			4	25	75	100
Course Objectives	1. To help the student to develop the habit of accurate manipulation and an attitude of critical thinking. 2. To learn the basic analytical methods and appreciate what is involved in an analysis. 3. To develop the student knowledge to handle the chemicals in proper and hygiene manner.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.								
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.								
PO 4	Apply one's learning to real life situations.								
PO 5	Analyse and synthesise data from a variety of sources.								
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.								
PO 11	Ability to work independently, identify appropriate resources required for a project.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.								
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.								
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.								
PO 15	Ability to acquire knowledge and skills.								

COs	COURSE OUTCOME
CO 1	Students will utilize the learned analytical skills in handling various chemical and biochemical instruments.
CO 2	Students will be able to learn basic understanding on precipitation and gravimetric techniques.
CO 3	Students will have basic understanding on purification and separation techniques.
CO 4	Students will be able to interpret the results of quantitative experiments and interpret the data in meaningful way.

CO 5	Students will have a thorough understanding of thermal and electro analytical techniques.
Pre-requisites	

KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2	PO 1					3								
		PO 2					5								
		PO 3					3								
CO 2	1	PO 4					1								
		PO 5					2								
		PO 6					4								
CO 3	4	PO 7					6								
		PO 8					2								
		PO 9					3								
CO 4	3	PO 10					5								
		PO 11					4								
		PO 12					4								
CO 5	5	PO 13					3								
		PO 14					2								
		PO 15					3								
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	2	2	3	1	1	3	2	1	1	1	2	3	2
CO2	1	1	1	3	2	1	1	2	1	1	1	1	1	2	1
CO3	2	2	2	1	1	3	1	1	2	2	3	3	2	1	2
CO4	3	1	3	1	2	2	1	2	3	1	2	2	3	2	3
CO5	1	3	1	1	1	2	2	1	1	3	2	2	1	1	1

Course Assessment Methods	
Direct	
	1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect	
	1. Course End Delivery

Content of the Syllabus			
Unit - I	Handling of Chemicals and Analysis	Hours	12
	Laboratory Hygiene and safety Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous chemicals. Simple first aid procedures for accidents involving acids, alkalis, bromine, burns and cut by glass. Threshold vapour concentration - safe limits. Waste disposal. Heating methods, stirring methods, filtration techniques. Error in chemical analysis Accuracy, precision, Types of error-absolute and relative error, methods of eliminating or minimizing errors. Methods of expressing precision: mean, median, deviation, average deviation and coefficient of variation. Significant figures and its application with respect to the glassware used. Normal error curve and its importance.		
Unit - II	Solubility Equilibria	Hours	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. Determination of chloride by Volhard's method. Adsorption indicators. Gravimetric methods of analysis Separation by precipitation, factors affecting solubility, gravimetric factor. Purity of precipitates, von Weiman ratio. Co-precipitation, post precipitation.		
Unit - III	General purification techniques	Hours	12
	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. Chemical methods of purification and test of purity.		
Unit - IV	Chromatographic Techniques	Hours	12
	Principle of adsorption and partition chromatography. Column chromatography: adsorbents, classification of adsorbents, solvents, preparation of column, adsorption and applications. Thin Layer Chromatography: choice of adsorbent, choice of solvent, preparation of chromatogram, sample, Rf value and its applications. Paper chromatography, solvent used, Rf value, factors which affect Rf value. Ion exchange chromatography, resins used, experimental techniques, applications. HPLC and Gas Chromatography, principle, detector (FID, TCD, ECD), Applications.		
Unit - V	Thermal and electroanalytical techniques	Hours	12
	Principle - Thermogravimetric analysis and Differential Thermal Analysis - discussion of various components with block diagram- TGA & DTA curves of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ and $\text{CaC}_2\text{O}_4 \cdot \text{H}_2\text{O}$ in air and in CO_2 - factors affecting TGA & DTA curves. Polarography- principle, concentration polarization, dropping mercury electrode (DME)- advantages and disadvantages- migration, residual, limiting and diffusion currents- Use of supporting electrolytes- Ilkovic equation (derivation not required) and significance-current voltage curve- oxygen wave. Half wave potential ($E_{1/2}$)- Polarography as an analytical tool in quantitative and qualitative analysis.		
Total Hours			60

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	U.N. Dash, Analytical Chemistry: Theory and Practice, Sultan Chand and sons Educational Publishers, New Delhi, 1995.

3	R.A. Day Jr. A.L. Underwood, Quantitative Analysis, 5th edition, Prentice Hall of India Private Ltd., New Delhi, 1988
4	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
3	R.M. Roberts, J.C. Gilbert, L.B. Rodewald, A.S. Wingrove, Modern Experimental Organic Chemistry, 4th edition, Holt Saunders international editions
4	A.K. Srivastava, P.C. Jain, Chemical Analysis: An Instrumental Approach for B.Sc. Hons. and M.Sc. Classes, S. Chand and company Ltd., Ram Nagar, New Delhi
Website and e-learning source	
1	https://www.news-medical.net/life-sciences/Analytical-Chemistry-Techniques.aspx .
2	https://www.toppr.com/guides/chemistry/organic-chemistry/purification-of-organic-compounds
3	https://www.hitachihightech.com/global/products/science/tech/ana/thermal/descriptions/ta.html

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH	Regulations	2021-2024			
Department	Chemistry		Semester		5			
Course Code	Course Name	Hours per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5CHS01	SKILL BASED ELECTIVE COURSE – I SPECTROSCOPY	2			2	25	75	100
Course Objectives	<p>Students acquire the knowledge about the fundamentals and different types of spectroscopy. Students can able to interpret unknown compounds through UV, FT-IR, Raman, NMR, Mass spectroscopy. Students can able to identify the structure of unknown compounds and application of spectroscopy.</p>							
POs	PROGRAMME OUTCOME							
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.							
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.							
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.							
PO 4	Apply one's learning to real life situations.							
PO 5	Analyse and synthesise data from a variety of sources.							
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.							
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.							
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.							
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.							
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.							
PO 11	Ability to work independently, identify appropriate resources required for a project.							
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.							
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.							
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.							
PO 15	Ability to acquire knowledge and skills.							

COs	COURSE OUTCOME
CO 1	Student will be able to understand the principle, instrumentation and applications of Rotational Spectroscopy.
CO 2	Students will be skilled in UV spectroscopy and it's applications.
CO 3	Students can able to learn theory, laws, and types of band and applications of IR Spectroscopy. Knowledge of students will be developed in the field of Raman spectroscopy by the learning of Scattering, stokes and anti-stokes line etc.
CO 4	Students can able to understand the concept of NMR spectrum and its applications.
CO 5	Students will be skilled in different types of peak, Nitrogen rule and fragmentation of Mass spectroscopy.
Pre-requisites	



KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					3				
						PO 2					2				
						PO 3					4				
CO 2	1					PO 4					5				
						PO 5					1				
						PO 6					4				
CO 3	3					PO 7					3				
						PO 8					5				
						PO 9					2				
CO 4	4					PO 10					3				
						PO 11					5				
						PO 12					4				
CO 5	3					PO 13					3				
						PO 14					2				
						PO 15					5				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	2	1	3	2	1	1	2	3	1
CO2	1	2	1	1	3	1	1	1	2	1	1	1	1	2	1
CO3	3	2	2	1	1	2	1	1	2	3	1	2	3	2	1
CO4	2	1	3	2	1	3	2	2	1	2	2	3	2	1	2
CO5	3	2	2	1	1	2	1	1	2	3	1	2	3	2	1

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Rotational Spectroscopy	Hours	6
	Fundamental concepts electromagnetic spectrum, Interaction of Electromagnetic Radiation with Matter, Regions of Spectrum. Rotational Spectroscopy - Principle-Instrumentation-Selection rules for rotational spectroscopy - Molecular rotation-diatomic molecule as rigid rotor-diatomic molecule as non-rigid rotor. Applications of rotation spectra: bond length-isotopic substitution.		
Unit - II	UV-VIS spectroscopy	Hours	6
	Theory-Instrumentation-Beer-Lamberts Law - bands in UV-VIS spectrum - possible electronic transitions - types of electronic transitions based on selection rules - characteristic absorption (λ_{max} and ϵ_{max}) of carbonyl, isolated double bond, conjugated double bond systems and aryl groups - factors influencing the absorption. Spectroscopic terms: Chromophore, Auxochrome, Bathochromic shift, Hypsochromic shift, Hypochromic shift and Hyperchromic shift.		
Unit - III	IR & Raman Spectroscopy	Hours	6
	Theory-Instrumentation- Hooke's Law - bands in IR spectrum - Units- Number and types of fundamental vibrations-Modes of vibrations and their energies- Factor affecting the frequency of absorption-Conjugation, inductive effect and hydrogen bonding. Applications of IR - Identification of Functional groups. Raman effect -Rayleigh scattering and Raman scattering - Stokes and anti-stokes lines in Raman spectra - Raman frequency - condition for a molecule to be Raman active - Comparison of Raman and IR spectra. Applications of Raman spectroscopy in organic molecules.		
Unit - IV	NMR spectroscopy	Hours	6
	The principle of NMR, NMR spectrometer, Types of NMR-Nuclear spin and conditions for a molecule to give rise to NMR spectrum- chemical shift, Number of NMR signals - shielding, deshielding,Factors influencing chemical shift. TMS & its applications, peak area and number of protons -splitting of signals-spin-spin coupling- Applications of NMR spectroscopy in organic molecules.		
Unit - V	Mass spectroscopy	Hours	6
	Basic Principles - Instrumentation - Molecular ion peak, metastable peak, base peak and isotopic peak - their uses- Nitrogen rule-Ring rule-Fragmentation of alkanes, alkenes, cycloalkane and alcohol - McLafferty rearrangement- Applications of Mass spectroscopy in biomolecule.		
Total Hours			30

Text Books	
1	C. Anand, Instrumental methods of chemical analysis, Himalaya Publishing, 1980.
2	Y.R.Sharma, Elementary Organic Absorption Spectroscopy-principles and chemical applications, S.Chand and Co., 2006.
3	K.V. Raman, R. Gopalan and P.S. Ragavan, Molecular spectroscopy, K.V. Raman, R. Gopalan and P.S. Ragavan Thomson Publications, 2004.
Reference Books	
1	C.N. Banwell, Mc Cash and M. Elaine, Fundamentals of Molecular Spectroscopy, Tata Mc.Graw Hill Publishing, New Delhi, 1994.
2	J. Mohan, Organic Analytical Chemistry, Narosa Publishers, 2003.
3	W. Kemp, Organic Spectroscopy, 3rd Edition, Palgrave publishers, 2007.
4	R.M.Silverstein, F.X.Webster, D.J. Kiemle, D.L. Bryce, SpectrometricIdentification of Organic compounds, 8th Edition, 2015.
5	G. Aruldhas, Molecular Structure and Spectroscopy, PHI Learning Pvt. Ltd., 2004.
Website and e-learning source	
1	https://nptel.ac.in/courses/122101001/downloads/lec-13.pdf
2	https://en.wikipedia.org/wiki/Rotational_spectroscopy
3	https://nptel.ac.in/courses/102103044/pdf/mod2.pdf
4	www.mssl.ucl.ac.uk/~gbr/workshop3/papers/Paerels_school_Mar17.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc	Programme Code	UCH		Regulations	2021-2024			
Department	Chemistry		Semester			5			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
24U5CHPR01	MINI PROJECT				3	2	40	60	100
Course Objectives	This course aims at giving an overall view to 1. inculcate the habit of literature survey among the students. 2. offer skill based knowledge to the students. 3. facilitate the students towards basic research and development.								

Signature of BOS Chairman

Programme	B.Sc	Programme Code	UCH	Regulations	2021-2024				
					5				
Department	Chemistry		Semester		5				
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P		C	CA	ESE
24U5CHCP03	CORE PRACTICAL- IV QUALITATIVE ORGANIC ANALYSIS				3	3	40	60	100
Course Objectives	1. The students will get training for systematic qualitative analysis and 2. Preparation of derivative for simple organic compounds.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.								
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.								
PO 4	Apply one's learning to real life situations.								
PO 5	Analyse and synthesise data from a variety of sources.								
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.								
PO 11	Ability to work independently, identify appropriate resources required for a project.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.								
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.								
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.								
PO 15	Ability to acquire knowledge and skills.								

COs	COURSE OUTCOME
CO 1	Students will learn to predict the outcome of organic reactions.
CO 2	To understanding of the general reactivity of functional groups and mechanism.
CO 3	Enable the students to work effectively as a member of a team.
CO 4	To communicate productively with lab mates, teaching assistant and instructor.
CO 5	Students will learn to maintain a detailed scientific notebook.
Pre-requisites	

KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					3				
						PO 2					1				
						PO 3					4				
CO 2	1					PO 4					2				
						PO 5					6				
						PO 6					2				
CO 3	3					PO 7					3				
						PO 8					4				
						PO 9					2				
CO 4	5					PO 10					4				
						PO 11					2				
						PO 12					4				
CO 5	4					PO 13					3				
						PO 14					4				
						PO 15					2				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit – I	Organic Qualitative analysis-I	Hours	20
	Analysis of Organic Compounds Characterization of organic compounds by their functional group and confirmation by preparation of derivatives. The following functional groups may be studied: Carboxylic Acids (mono and di), Phenols, Aromatic Esters, and Aldehydes.		
Unit – II	Organic Qualitative analysis-II	Hours	25
	Analysis of Organic Compounds Characterization of organic compounds by their functional group and confirmation by preparation of derivatives. Ketones, Monosaccharides, Amides, Diamides, Aromatic primary amines and Nitro compounds.		
Total Hours			45

Text Books	
1	Dr. N.S Gnanapragasam, Organic chemistry Lab manual.
2	V. Venkateswaran, R.Veerawamy and A.R. Kulandaivelu, Basic Principle of Practical chemistry, S. Chand and Sons, New Delhi, 2004.
References	
1	R.K. Bansal, Laboratory Manual of Organic chemistry, 3rd Edition, New Age Internal Publication.
2	B.S. Furniss, A.J. Hannaford, P.W.D Smith and A.R. Tatchell, Vogel's Practical Organic chemistry, 5th Edition, ELBS (1989).
E-References	
1	https://www.toppr.com/guides/chemistry/organic-chemistry/qualitative-analysisof-organic-compounds/
2	https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3	https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_/07%3A_Gravimetric_Analysis_(Experiment)

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			6			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21U6CHC08	CORE PAPER-VIII: ORGANIC CHEMISTRY-II			5			5	25	75	100
Course Objectives	1. To gain knowledge about fats, oils and waxes. 2. To understand the properties and structure of alkaloids and terpenoids. 3. Acquire the knowledge about steroids, amino acids, proteins and carbohydrates.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.									
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.									
PO 4	Apply one's learning to real life situations.									
PO 5	Analyse and synthesise data from a variety of sources.									
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.									
PO 11	Ability to work independently, identify appropriate resources required for a project.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.									
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.									
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.									
PO 15	Ability to acquire knowledge and skills.									

COs	COURSE OUTCOME
CO 1	To gain an insight into fats, oils, wax and detergents.
CO 2	To gain knowledge about the properties and structure of organic compounds like terpenoids, alkaloids derived from plant materials.
CO 3	To understand the structure of some steroidal hormones and vitamins.
CO 4	To gain an insight into amino acids and its preparation, proteins structure and nucleic acids.
CO 5	To acquire basic knowledge of monosaccharides and disaccharides.
Pre-requisites	

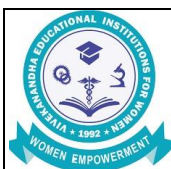
KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					3				
						PO 2					4				
						PO 3					6				
CO 2	3					PO 4					1				
						PO 5					3				
						PO 6					2				
CO 3	1					PO 7					4				
						PO 8					5				
						PO 9					3				
CO 4	4					PO 10					1				
						PO 11					4				
						PO 12					2				
CO 5	5					PO 13					6				
						PO 14					2				
						PO 15					4				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	2	2	3	1	1	2	2	1	3	1	3	1
CO2	3	2	1	1	3	2	2	1	3	1	2	2	1	2	2
CO3	1	1	1	3	1	2	1	1	1	3	1	2	1	2	1
CO4	2	3	1	1	2	1	1	2	2	1	3	1	1	1	3
CO5	1	2	2	1	1	1	2	3	1	1	2	1	2	1	2

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Fats, Oils and Wax	Hours	12
	Occurrence, properties: hydrogenation, drying of oils, hydrogenolysis, rancidity - analysis of oils and fats: saponification value and iodine number - synthetic detergents: cationic, anionic and non-ionic detergents - occurrence of wax - difference between wax and lipids - compound lipids: phospholipids, Sphingolipids and glycolipids.		
Unit - II	Terpenoids and Alkaloids	Hours	12
	Terpenoids and alkaloids- Occurrence - Terpenes: General methods of determination of structure of alkaloids are added. Definition - general properties- classification and isolation - isoprene rule - structural elucidation of citral, geraniol and menthol. Alkaloids: Definition - general properties - classification - isolation - structure determination of conine, piperine, nicotine.		
Unit - III	Steroids, Hormones and Vitamins	Hours	12
	Steroids: Definition- Cholesterol and Ergosterol (structure only) - Steroidal hormones: Androsterones, Testosterone, Progesterone and Oestrone (structure only) - Vitamins: Water and Fat soluble vitamins - Occurrence and biological importance of thiamine, riboflavin, pyridoxine and ascorbic acid – structural elucidation of pyridoxine and ascorbic acid.		
Unit - IV	Amino acids, proteins and nucleic acids	Hours	12
	Amino acids: - classification - essential and non-essential amino acids - preparation of α -amino acids-strecker's synthesis, Gabriel phthalimide synthesis, zwitter ion, isoelectric point - Peptides- synthesis of peptide: Bergmann method, Sheehan method – Proteins - primary and secondary structure of proteins - Nucleic acids: Types of nucleic acids and constituents.		
Unit - V	Carbohydrates	Hours	12
	Classification - Monosaccharide: Constitution of glucose and fructose - Reactions of glucose and fructose – Mutarotation and its mechanism - Cyclic structure - pyranose and furanose forms - Fischer and Haworth projection of glucose and fructose - Disaccharides: Structure and reactions of maltose and sucrose (Structural elucidation not necessary).		
Total Hours			60

Text Books	
1	I.L.Finar Organic chemistry vol I & II- ELBS, Pearson Education Ltd., 2008
2	O.P. Agarwal- Reactions and Reagents- Krishna prakashan media (p) Ltd., 1975
3	B.S.Bhal and ArunBhal- A text book of organic chemistry, S. Chand & company Ltd, 1948.
Reference book	
1	K.S. Tewari, and N.K. Vishoni, Organic Chemistry, Vikas Publishing House. I & II- ELBS, Pearson Education Ltd., 2008
2	P.L.Soni and H.M.Chawla. Text book of organic chemistry, 26th revised edition, Sultan chand and sons, 1995
3	R.T. Morrison and Boyd, Organic Chemistry, VIth edition., PHI Learning Pvt Ltd., 2008.
4	Modern Organic Chemistry, M. K. Jain and S. C. Sharma, Vishal Publishing Co. 2018
5	Organic Chemistry, Bhupinder Mehta and Manju Mehta, PHI learning Publishers.
Website and e-learning source	
1	https://chem.libretexts.org/Bookshelves/Organic_Chemistry/Map%3A_Organic_Chemistry_(McMurry)/27%3A_Biomolecules Lipids/27.03%3A_Waxes%2C_Fats%2C_and_Oils.
2	https://www.britannica.com/science/alkaloid
3	https://chem.libretexts.org/Bookshelves/Biological_Chemistry/Supplemental_Modules_(Biological_Chemistry)/Lipids/Steroids
4	https://www.thoughtco.com/amino-acid-373556
5	https://microbenotes.com/carbohydrates-structure-properties-classification-and-functions

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			6			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
21U6CHC09	CORE PAPER-IX: INORGANIC CHEMISTRY-II			5			5	25	75	100
Course Objectives	1. To study the structure of some crystals. 2. To gain knowledge of some important electron deficient compounds. 3. Acquire the knowledge about organo-metallic compounds and bioinorganic chemistry.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.									
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.									
PO 4	Apply one's learning to real life situations.									
PO 5	Analyse and synthesise data from a variety of sources.									
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.									
PO 11	Ability to work independently, identify appropriate resources required for a project.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.									
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.									
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.									
PO 15	Ability to acquire knowledge and skills.									

COs	COURSE OUTCOME
CO 1	Students gain knowledge about the geometry of crystals and its significance
CO 2	Students capable to recognize the inter halogens and pseudo halogens.
CO 3	Students improved their understanding towards preparation of some electron deficient compounds.
CO 4	Students become skilled at the importance of coordination chemistry.
CO 5	Students can identify and understanding the structures of some organo-metallic compounds
Pre-requisites	

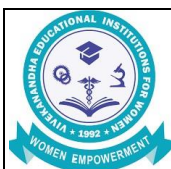
KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	1					PO 1					1				
						PO 2					3				
						PO 3					2				
CO 2	2					PO 4					4				
						PO 5					6				
						PO 6					2				
CO 3	2					PO 7					4				
						PO 8					3				
						PO 9					4				
CO 4	3					PO 10					5				
						PO 11					3				
						PO 12					2				
CO 5	4					PO 13					1				
						PO 14					4				
						PO 15					5				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	1	1	2	1	1	1	1	1	2	3	1	1
CO2	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO3	2	2	3	1	1	3	1	2	1	1	2	3	2	1	1
CO4	1	3	2	2	1	2	2	3	2	1	3	2	1	2	1
CO5	1	2	1	3	1	1	1	2	3	2	2	1	1	3	2

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Solid State Chemistry	Hours	12
	Crystalline and Amorphous solids - Differences - Symmetry in crystals - Basic crystal systems - Space lattice and unit cell - Bravais lattices-CCP, FCP, BCP, Packing efficiency - Miller indices - Types of crystals - Radius ratio rule and its applications - Structure of Sodium Chloride, Cesium Chloride, Zinc blende and Diamond. Defects in ionic crystals: Schottky, Frenkel, Metal excess and metal deficiency defects.		
Unit - II	Inter Halogens and Pseudohalogen	Hours	12
	Definition - similarities and dissimilarities between halogen and pseudohalogen - preparation, properties, structure and uses of cyanogen and thiocyanogen - Naming of the interhalogens - types, preparation, properties, structure and uses of ICl, ClF ₃ , IF ₅ , and IF ₇ . Preparation, properties and uses of oxy acids of chlorine – Bleaching powder.		
Unit - III	Electron Deficient Compounds and metallic carbonyls	Hours	12
	Definition - Borides: structure, properties and uses - Boranes: Diborane - preparation, properties and uses - bonding in boranes - B ₂ H ₆ , B ₄ H ₁₀ - Carboranes – Wade's rule - Types of carboranes. - Borazine- preparation, properties and uses. Structure and bonding in Ni(CO) ₄ , Fe(CO) ₅ & Co ₂ (CO) ₈		
Unit - IV	Organometallic Compounds	Hours	12
	Organometallic compounds: Definition - Classification based on nature of C-M bond: Ionic, σ bonded and non-classically bonded. Organometallic compounds of Lithium, Magnesium and Boron - preparation, properties, structure and uses. Olefin complexes – Zeise's salt - synthesis and structure Cyclopentadienyl complexes - Ferrocene- preparation, properties, bonding and uses.		
Unit - V	Bioinorganic Chemistry	Hours	12
	Essential and trace elements in biological processes, metalloporphyrin with special reference to haemoglobin and myoglobin. Some important metalloenzymes and their functions. Biological functions and toxicity of alkali and alkaline earth metal ions, Role of metal ions in biological process: Oxidation (haemoglobin), Nitrogen fixation and photosynthesis.		
Total Hours			60
Text Books			
1	Puri, Sharma, Kalia, Principles of Inorganic Chemistry 32nd Edition (2014), Milestone Publishers and Distributor, New Delhi.		
2	W.U. Malik, G. D. Tuli, R. D. Madan, Selected topics in Inorganic Chemistry, S.Chand&company, New Delhi.		
3	R.D. Madan, Satyaprakash's Modern Inorganic Chemistry, S. Chand Publishing, New Delhi.		

Reference Books	
1	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry - Vol – I (2006), S. Chand Publishing, New Delhi.
2	S. Prakash, G.D. Tuli, S.K. Basu and R.D. Madan, Advanced Inorganic Chemistry-Vol – II (2006), S. Chand Publishing, New Delhi.
Website and e-learning source	
1	https://chem.libretexts.org/
2	https://www.toppr.com/guides/chemistry/the-p-block-elements/interhalogen-compounds/
3	http://chem.yonsei.ac.kr/chem/upload/CHE3103-01/119484463779670.pdf

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			6			
Course Code	Course Name			Hours per Week			Credit		Maximum Marks	
				L	T	P	C	CA	ESE	Total
21U6CHC10	CORE PAPER-X: PHYSICAL CHEMISTRY-II			5			5	25	75	100
Course Objectives	1. To encourage the students to study about the different phases of compounds. 2. To acquire the knowledge on the fundamental concepts of electrochemistry. 3. To understand the principle of radiative and non-radiative transitions in photochemistry.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.									
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.									
PO 4	Apply one's learning to real life situations.									
PO 5	Analyse and synthesise data from a variety of sources.									
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.									
PO 11	Ability to work independently, identify appropriate resources required for a project.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.									
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.									
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.									
PO 15	Ability to acquire knowledge and skills.									



COs	COURSE OUTCOME
CO 1	Students will identify the formation of metal alloy systems.
CO 2	Students can demonstrate the processes in electrochemistry and method of determinations in conductometric titrations.
CO 3	Students understand the formation and dissociation of acids, bases and salts.
CO 4	Students learn about the various types of cells and electrodes.
CO 5	Students analyze and apply the different laws of photochemical reactions.
Pre-requisites	

KNOWLEDGE LEVELS																
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing																
CO / PO / KL Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
Cos	KLs					POs					KLs					
CO 1	2						PO 1					2				
							PO 2					4				
							PO 3					1				
CO 2	1						PO 4					3				
							PO 5					5				
							PO 6					2				
CO 3	4						PO 7					4				
							PO 8					5				
							PO 9					3				
CO 4	5						PO 10					1				
							PO 11					2				
							PO 12					4				
CO 5	3						PO 13					3				
							PO 14					5				
							PO 15					4				
CO / PO Mapping																
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	Programme Outcome (POs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	
CO1	3	1	2	2	1	3	1	1	2	2	3	1	2	1	1	
CO2	2	1	3	1	1	2	1	1	1	3	2	1	1	1	1	
CO3	1	3	1	2	2	1	1	2	2	1	1	3	2	2	3	
CO4	1	2	1	1	3	1	2	3	1	1	1	2	1	3	2	
CO5	2	2	1	3	1	2	2	1	3	1	2	2	3	1	2	

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	Phase Rule	Hours	12
	Statement, explanation of terms involved in phase rule, derivation of phase rule. One component system – water, sulphur and CO ₂ systems - two component system - solid - liquid equilibria - CST Lower and upper systems - simple eutectic system - Ag- Pb and KI-H ₂ O systems. Compound formation with congruent melting points - FeCl ₃ -H ₂ O and Zn-Mg and compound formation with incongruent melting points - K-Na alloy system.-three component system-chloroform-acetic acid-water.		
Unit - II	Electrochemistry – I	Hours	12
	Faraday's laws, Ohm's law, Conductance: Electrolytic and Electrical conductance - specific conductance - equivalent conductance - molar conductance - variation of molar conductance and equivalent conductance with dilution. Transport number - Determination of transport number by Hittorf's method and moving boundary method. Ionic mobilities - definition and determination – Walden's rule. Kohlrausch's law - applications. Conductometric titrations - Principle, types - strong acid vs strong base, weak acid vs strong base. Advantages of conductometric titrations.		
Unit - III	Electrochemistry – II	Hours	12
	Arrhenius theory of electrolytic dissociation-limitations of Arrhenius Theory-Oswald dilution Law-Debye - Huckel Theory - Ionic atmosphere, pH and its determination - Hydrolysis of different types of salts - degree of hydrolysis determination methods- electrical conductance method and Bredig's method. Buffer solution - pH of Buffer solution - Henderson - Hasselbalch equation. Solubility product - relation between solubility product and molar solubility - Applications of solubility product.		
Unit - IV	Electrochemistry – III	Hours	12
	Cell reaction and half cell reaction - cell representation. Reversible and Irreversible cells- Electrochemical cells - Galvanic cell. Standard cell - single electrode potential - Types of electrode - Standard Hydrogen electrode and calomel electrode - Quinhydrone electrode and glass electrode - EMF and its measurements- - Standard emf - emf series – calculation of $\Delta G, \Delta H$ and ΔS from EMF data- Chemical cells with and without transference. Polarization and overvoltage. Potentiometric titration - principle, acid-base and redox titrations.		
Unit - V	Photochemistry	Hours	12
	Electromagnetic radiation - difference between thermal and photochemical processes. Laws of photochemistry - Beer-Lambert's Law, Grothus - Draper law, Stark-Einstein law. The Jablonski diagram depicting various photo physical processes occurring in the excited state - Radiative (Fluorescence and Phosphorescence) and non-radiative (Internal Conversion and Inter system crossing) processes. Quantum yield - Definition, Photochemical reactions - Kinetics of hydrogen - bromine reaction - decomposition of HI.		
Total Periods			60
Text Books			

1	A. Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, Revised multicolor edition, S. Chand publication Ltd, New Delhi, 2010.
2	B.R . Puri , L.R.Sharma., M.S.Pathania., Principles of Physical Chemistry, (47th edition) Vishal Publishing Co., New Delhi, 2017.
3	D.R. Crow, Principles and Applications of Electrochemistry, 4th Edition, CRC Taylor and Francis Group, 1994.
4	K.K. Rohatgi-Mukherjee, Fundamentals of Photochemistry, Revised edition, New Age International Pvt. Ltd, New Delhi, 2003.
Reference Books	
1	G. Raj, Advanced Physical Chemistry, Krishna Prakashan Media Pvt. Ltd, 35th edition, 2009.
2	P. Atkins and J. D. Paula, Physical Chemistry, 7th Edn, Oxford University Press, New York,2002.
3	M.S. Yadhav, Electrochemistry, Anmol Publications Pvt Ltd, Revised Edition, 2001.
Website and e-learning source	
1	soft-matter.seas.harvard.edu/index.php
2	https://latestcontents.com/chemistry
3	https://hemantmore.org.in/science/chemistry
4	https://www.edinst.com
5	https://chem.libretexts.org/Jablonski_diagram

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc	Programme Code	UCH		Regulations	2021-2024			
Department	Chemistry		Semester			6			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
21U6CHE02	ELECTIVE COURSE - II MEDICINAL CHEMISTRY		4			4	25	75	100
Course Objectives	1. To help the student to understand the basic concepts in medicinal chemistry and to develop their critical thinking. 2. To learn the basics and applications of the chemical compounds as drugs in pharmaceutical industry. 3. To understand the importance of the constituents of blood and anti-convulsant agent..								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.								
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.								
PO 4	Apply one's learning to real life situations.								
PO 5	Analyse and synthesise data from a variety of sources.								
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.								
PO 11	Ability to work independently, identify appropriate resources required for a project.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.								
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.								
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.								
PO 15	Ability to acquire knowledge and skills.								
COs	COURSE OUTCOME								
CO 1	Students will learn the basic principles of chemistry involved in life sciences.								
CO 2	Students will have basic understanding on blood and anti-convulsant agent..								
CO 3	Students will be able to incorporate the causes of various diseases and proper usage of medicines.								

CO 4	Students will be able to know the different types of drugs being used in drug industry.
CO 5	Students will be able to know the different types of drugs being used in drug industry.
Pre-requisites	



KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2	PO 1					2								
		PO 2					1								
		PO 3					4								
CO 2	1	PO 4					3								
		PO 5					5								
		PO 6					2								
CO 3	4	PO 7					4								
		PO 8					6								
		PO 9					4								
CO 4	5	PO 10					2								
		PO 11					3								
		PO 12					4								
CO 5	3	PO 13					5								
		PO 14					1								
		PO 15					3								
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	2	1	3	1	1	1	3	2	1	1	2	2
CO2	2	3	1	1	1	2	1	1	1	2	1	1	1	3	1
CO3	1	1	3	2	2	1	1	1	3	1	2	3	2	1	2
CO4	1	1	2	1	3	1	2	2	2	1	1	2	3	1	1
CO5	2	1	2	3	1	2	2	1	2	2	3	2	1	1	3

Course Assessment Methods	
Direct	
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations	
Indirect	
1. Course End Delivery	

Content of the Syllabus			
Unit - I	Study of Drugs	Hours	12
	Definition of the terms - Drug, Pharmacophore, Pharmacodynamics, Pharmacopoeia, pharmacology, pharmacokinetics, Bacteria, Virus, Fungus, Actinomycetes, Chemotherapy, Metabolites, Metabolism of drug, Antimetabolites, LD ₅₀ , ED ₅₀ . Classification of drugs, Assay of drugs .		
Unit - II	Antibiotics	Hours	12
	Antibiotics - definition - classification as broad and narrow spectrum antibiotics. Structure, properties, mode of action and uses of penicillin, chloramphenicol, streptomycin, erythromycin and puromycin.		
Unit - III	Sulphonamides	Hours	12
	Sulphonamides - preparation, properties and uses of sulphanilamides - mechanism and action of sulpha drugs - preparation, properties and uses of sulphadiazine, sulphapyridine, prontosil and sulphathiazole.		
Unit - IV	Diabetes and Hypoglycemic Agents	Hours	12
	Diabetes-Definition- types- control of diabetes. Insulin- chemical structure of insulin – preparations and dosage –uses. Hypoglycemic agents- Structure, properties and uses of sulphonylureas : Tolbutamide, chlorpropamide, glibenclamide – Biguanides : Phenformin, Metformin.		
Unit - V	Anti-Convulsant agents	Hours	12
	Anti-convulsant –introduction, classification, mechanism of action- synthesis of diazepam, carbamazepine, sodium valproate. Organic diagnostic agents- classification-Iopanoic acid- sulphobromophthalein sodium- evens blue.		
Total Hours			60

Text Books	
1	S. Lakshmi, Pharmaceutical Chemistry, S.Chand& Sons, New Delhi,2004.
2	V.K. Ahluwalia and Madhu Chopra, Medicinal Chemistry ,AneBooks,New Delhi, Reprint 2009.
References	
1	G. Patrick, Medicinal Chemistry, VIVA Books Private Ltd, New Delhi, 2002
2	R.R. Nadendla , Principles of Organic Medicinal Chemistry New Age International Private Ltd Publishers, New Delhi Reprint 2007.
3	P. Parimoo, A Text Book of Medicinal Chemistry, CBS Publishers, New Delhi,2006.
Website and e-learning source	
1	https://pharmafactz.com/introduction-to-medicinal-chemistry/
2	https://en.wikipedia.org/wiki/Medicinal_chemistry
3	http://library.umac.mo/ebooks/b28050332.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.								
Programme	B.Sc	Programme Code	UCH		Regulations	2021-2024			
Department	Chemistry		Semester			6			
Course Code	Course Name		Hours per Week			Credit	Maximum Marks		
			L	T	P	C	CA	ESE	Total
21U6CHS02	SKILL BASED ELECTIVE COURSE - II POLYMER CHEMISTRY		2			2	25	75	100
Course Objectives	1. To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses. 2. To learn basic concepts of polymer chain architecture, structure and morphology, with particular emphasis on the relationship between chemical structure (chain architecture). 3. To impart the students the understanding of biological applications of polymer materials.								
POs	PROGRAMME OUTCOME								
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.								
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.								
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.								
PO 4	Apply one's learning to real life situations.								
PO 5	Analyse and synthesise data from a variety of sources.								
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.								
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.								
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.								
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.								
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.								
PO 11	Ability to work independently, identify appropriate resources required for a project.								
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.								
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.								
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.								
PO 15	Ability to acquire knowledge and skills.								
COs	COURSE OUTCOME								
CO 1	Students will be able to gain knowledge about the properties and classification of polymers.								
CO 2	Students will be able to prepare of polymer through different techniques of polymerization.								
CO 3	Students will be able to estimate the number- and weight-average molecular masses of polymers given the degree of polymerization and mass fraction of chains present.								
CO 4	Students will develop their knowledge towards degradation of polymerization.								

CO 5	Students will enhance their knowledge towards the commercially important polymers, their preparation and applications.															
Pre-requisites																
KNOWLEDGE LEVELS																
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing																
CO / PO / KL Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
Cos	KLs					POs					KLs					
CO 1	3					PO 1					4					
						PO 2					2					
						PO 3					1					
CO 2	2					PO 4					3					
						PO 5					6					
						PO 6					4					
CO 3	4					PO 7					2					
						PO 8					5					
						PO 9					2					
CO 4	1					PO 10					4					
						PO 11					1					
						PO 12					3					
CO 5	3					PO 13					4					
						PO 14					2					
						PO 15					4					
CO / PO Mapping (3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)																
COs	Programme Outcome (POs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	
CO1	2	2	1	3	1	2	2	1	2	2	1	3	2	2	2	
CO2	1	3	2	2	1	1	1	1	3	1	2	2	1	3	1	
CO3	3	1	1	2	1	3	1	2	1	3	1	2	3	1	3	
CO4	1	2	3	1	1	1	2	1	2	1	3	1	1	2	1	
CO5	2	2	1	3	1	2	2	1	2	2	1	3	2	2	2	
Course Assessment Methods																
Direct																
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations																
Indirect																
1. Course End Delivery																
Content of the Syllabus																
Unit - I	Polymers Classification and properties											Hours	6			
	Monomers, Oligomers and Polymers - Degree of polymerization and its significance- Functionality - Tacticity of Polymers (Isotactic, Syndiotactic and Atactic). Nomenclature of polymers- Homopolymers and Co-polymers. Classification of polymers - Natural, Synthetic, Organic and Inorganic Polymers - linear, cross linked and network. Physical properties of polymers - Elasticity, Tensile strength, Glass Transition Temperature.															

Unit - II	Techniques, Mechanism of Polymerization and Processing	Hours	6
	General methods of preparation of polymer-bulk, Solution, Suspension and Emulsion polymerization. Mechanism of polymerization- Cationic, anionic, free radical and Coordination polymerization. Types of Polymerization - Condensation and Addition Polymerization. Plastics-Thermoplastic and Thermosetting Plastics. Polymer Processing: Calendering, rotational moulding, compression, injection moulding, blow moulding and thermoforming.		
Unit - III	Molecular weight and its Determination	Hours	6
	Molecular weight and its determination: concept of Molecular weight-Number average Molecular weight-Weight average molecular weight. Methods of determining molecular weight- Osmometry, Viscometry, End Group Analysis. Light scattering and sedimentation, Gel permeation Chromatography.		
Unit - IV	Polymer degradation and Compounding materials of polymers	Hours	6
	Polymer degradation-Definition- Types of degradation- Thermal degradation -Mechanical degradation, Hydrolytic degradation, Photodegradation and Biodegradation. Compounding Materials of Polymers – Plastics – Fillers – Plasticizers – Colorants –Antioxidants - Stabilizers and Lubricants and Differences.		
Unit - V	Industrially important polymers	Hours	6
	Individual Polymers-Polyacrylates, Polystyrene, Polyethylene, Polyvinylchloride, Polyester, Polyamides- (Nylon-6, Nylon 6,6), Kevlar-Preparation and Uses. Types of Rubber - Natural Rubber and synthetic process - Vulcanization. Fibre Reinforced Plastic (FRP) - Foamed Plastics-Conducting Polymers, polymers in biological application.		
Total Hours			30
Text Books			
1	V.R. Gowarikar., N.V. Viswanathan: Polymer Science-Wiley Eastemlimited,New Delhi.1986.		
2	F.W. Billmeyer,Wiley, Textbook of Polymer Science, 1984.		
3	M.S.Bhatnagar, A Text Book Polymers, S.Chand& Company Ltd, Ram Nagar, New Delhi. Volume-II-2004.		
Reference Books			
1	Billmeyer, F.W. Polymer Science. India: Wiley-Interscience, 2007.		
2	Seymour, R. B.; CarraherJr.C.E. Polymer Chemistry: AnIntroduction, Marcel DckkerInc : New York, 1981.		
3	Sinha, R. Outlines of Polymer Technology, Prentice Hall of India: New Delhi, 2000.		
Website and e-learning source			
1	https://byjus.com/jee/polymers/		
2	https://www.intechopen.com/books/fiber-reinforced-polymers-the-technology-applied-for-concrete-repair/introduction-of-fibre-reinforced-polymers-polymers-and-composites-concepts-properties-and-processes		

Signature of BOS Chairman



**VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)**

Elayampalayam, Tiruchengode-637 205.



Programme	B.Sc	Programme Code	UCH			Regulations	2021-2024			
Department	Chemistry			Semester			6			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
24U6CHCP04	CORE PRACTICAL - III: PHYSICAL CHEMISTRY PRACTICAL					3	3	40	60	100
Course Objectives	1. To verify some important principles in physical chemistry. 2. To determine various physical properties using simple instruments like conductivity meter, potentiometer, etc.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.									
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.									
PO 4	Apply one's learning to real life situations.									
PO 5	Analyse and synthesise data from a variety of sources.									
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.									
PO 11	Ability to work independently, identify appropriate resources required for a project.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.									
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.									
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.									
PO 15	Ability to acquire knowledge and skills.									



COs	COURSE OUTCOME
CO 1	To develop skills in doing experiments in kinetics, Potentiometry and phase rule.
CO 2	Students will gain an understanding of how to keep records of instruments, parameters.
CO 3	Students will gain experimental observations.
CO 4	Students will get various physical properties using simple instruments.
CO 5	Enable the students to work effectively as a member of a team and to Communicate productively with lab mates, teaching assistant and instructor.
Pre-requisites	

KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					2				
						PO 2					3				
						PO 3					4				
CO 2	4					PO 4					5				
						PO 5					1				
						PO 6					6				
CO 3	1					PO 7					2				
						PO 8					3				
						PO 9					3				
CO 4	1					PO 10					2				
						PO 11					4				
						PO 12					3				
CO 5	3					PO 13					2				
						PO 14					4				
						PO 15					1				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	2	1	1	2	2	3	1	2	3	1	2
CO2	1	2	3	2	1	1	1	2	2	1	3	2	1	3	1
CO3	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO4	2	1	1	1	3	1	2	1	1	2	1	1	2	1	3
CO5	2	3	2	1	1	1	2	3	3	2	2	3	2	2	1

Course Assessment Methods			
Direct			
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations			
Indirect			
1. Course End Delivery			
Content of the Syllabus			
Unit - I	Kinetics	Hours	12
	1. Rate constant determination for first order reaction-Hydrolysis of an ester in acidic medium (Ethyl acetate or Methyl acetate). 2. Rate constant determination for second order reaction-Reaction between Potassium persulphate and Potassium iodide.		
Unit - II	Conductivity Experiments -I	Hours	12
	1. Determination of cell constant. 2. Determination of dissociation constant for weak acid (Acetic acid). 3. Determination of Equivalent conductance at infinite dilution for strong electrolyte (KCl).		
Unit - III	Conductivity Experiments-II	Hours	12
	1. Conductometric titration-Strong acid vs Strong base 2. Weak acid vs Strong base. 3. Precipitation titration – KCl vs AgNO ₃		
Unit - IV	Potentiometry	Hours	12
	1. Potentiometric titration- Strong acid vs Strong base 2. Weak acid vs Strong base. 3. Precipitation titration – KCl vs AgNO ₃		
Unit - V	Heterogeneous Equilibrium	Hours	12
	1. Binary system-naphthalene/biphenyl 2. Phenol/water system-determination of CST and study of effect of impurity (NaCl) on CST. 3. Determination of transition temperature for hydrated salts-sodium thiosulphate, sodium acetate, strontium chloride, manganous chloride. 4. Determination of K _f of a solvent by Rast method.		
Total Hours			60

Text Books	
1	Basic Principle of Practical chemistry - V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, S. Chand and Sons, New Delhi, 2004.
References	
1	Experimental Physical Chemistry, V.D. Athawale, Parulmathur, New age International publishers, 2001.
E-References	
1	https://pubs.acs.org/doi/abs/10.1021/ed013p250.2
2	https://www.elsevier.com/books/experiments-in-physical-chemistry/wilson/978-0-08-023798-5

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) Elayampalayam, Tiruchengode-637 205.									
Programme	B.Sc	Programme Code			UCH	Regulations		2021-2024		
Department	Chemistry			Semester			6			
Course Code	Course Name			Hours per Week			Credit	Maximum Marks		
				L	T	P	C	CA	ESE	Total
24U6CHCP05	CORE PRACTICAL- IV GRAVIMETRIC ANALYSIS AND ORGANIC PREPARATION					6	4	40	60	100
Course Objectives	1. The students will get training in the quantitative analysis of metal ions using gravimetric method. 2. The students will get training for systematic qualitative analysis and preparation of simple organic compounds.									
POs	PROGRAMME OUTCOME									
PO 1	Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines.									
PO 2	Demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.									
PO 3	Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence.									
PO 4	Apply one's learning to real life situations.									
PO 5	Analyse and synthesise data from a variety of sources.									
PO 6	Establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.									
PO 7	Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group.									
PO 8	Ability to analyse, interpret and draw conclusions from quantitative/qualitative data.									
PO 9	Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.									
PO 10	Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information source.									
PO 11	Ability to work independently, identify appropriate resources required for a project.									
PO 12	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.									
PO 13	Appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.									
PO 14	Building a team who can help achieve the vision, motivating and inspiring team members.									
PO 15	Ability to acquire knowledge and skills.									

COs	COURSE OUTCOME
CO 1	Students will learn to predict the outcome of organic reactions.
CO 2	To understanding of the general reactivity of functional groups and mechanism.
CO 3	Enable the students to work effectively as a member of a team.
CO 4	To Communicate productively with lab mates, teaching assistant and instructor.
CO 5	Students will learn to maintain a detailed scientific notebook.
Pre-requisites	

KNOWLEDGE LEVELS															
1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing															
CO / PO / KL Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
Cos	KLs					POs					KLs				
CO 1	2					PO 1					3				
						PO 2					1				
						PO 3					4				
CO 2	1					PO 4					2				
						PO 5					6				
						PO 6					2				
CO 3	3					PO 7					3				
						PO 8					4				
						PO 9					2				
CO 4	5					PO 10					4				
						PO 11					2				
						PO 12					4				
CO 5	4					PO 13					3				
						PO 14					4				
						PO 15					2				
CO / PO Mapping															
(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)															
COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	1	1	3	1	1	1	1	3	2	1	1	2	2	1
CO2	2	3	1	1	2	3	1	3	1	2	2	2	2	2	1
CO3	3	2	1	2	1	2	1	2	2	3	1	1	3	3	1
CO4	1	2	2	1	3	2	1	2	1	1	3	3	1	1	2
CO5	1	1	3	1	2	1	2	1	1	1	2	2	1	1	3

Course Assessment Methods				
Direct				
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations				
Indirect				
1. Course End Delivery				
Content of the Syllabus				
Unit – III	Organic Preparations - I		Hours	30
	Preparations involve the following reactions: 1. Oxidation - Preparation of Benzoic acid from Benzaldehyde 2. Hydrolysis - Preparation of Methyl salicylate from Salicylic acid 3. Nitration- Preparation of p - Nitroacetanilide from Acetanilide. 4.			
Unit – IV	Organic Preparations - II		Hours	30

	4. Bromination - Preparation of p - Bromoacetanilide from Acetanilide 5. Bromination - Preparation of sym -Tribromophenol from Phenol 6. Benzoylation - Preparation of Benzanilide from aniline.		
Unit – V	Gravimetric Estimations	Hours	30
	1. Estimation of Nickel as Nickel DMG Complex 2. Estimation Barium as Barium Chromate 3. Estimation of Lead as Lead Chromate 4. Estimation of Calcium as Calcium oxalate 5. Estimation of Barium as Barium sulfate		
Total Hours			90

Text Books	
1	Dr. N.S Gnanapragasam, Organic chemistry Lab manual.
2	V. Venkateswaran, R.Veerawamy and A.R. Kulandaivelu, Basic Principle of Practical chemistry, S. Chand and Sons, New Delhi, 2004.
References	
1	R.K. Bansal, Laboratory Manual of Organic chemistry, 3rd Edition, New Age Internal Publication.
2	B.S. Furniss, A.J. Hannaford, P.W.D Smith and A.R. Tatchell, Vogel's Practical Organic chemistry, 5th Edition, ELBS (1989).
E-References	
1	https://www.toppr.com/guides/chemistry/organic-chemistry/qualitative-analysisof-organic-compounds/
2	https://www.csub.edu/chemistry/organic/manual/Lab14_QualitativeAnalysis.pdf
3	https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_/07%3A_Gravimetric_Analysis_(Experiment)

Signature of BOS Chairman