

**SRI SARADA COLLEGE FOR WOMEN(AUTONOMOUS)**

**SALEM -16**

**Reaccredited with 'B++' Grade by NAAC**

**Affiliated to Periyar University**



**PG & RESEARCH DEPARTMENT OF CHEMISTRY**

**OUTCOME BASED SYLLABUS**

**B.Sc. CHEMISTRY**

**(For the students admitted in 2023 – 24)**

<b>PROGRAMME OUTCOMES (PO) OF B.Sc. DEGREE PROGRAMME IN CHEMISTRY</b>	
<b>Programme</b>	<b>B.Sc.</b>
<b>Programme Code</b>	
<b>Duration</b>	<b>3 Years for UG</b>
<b>Program (Pos)</b>	<p><b>PO1 : Disciplinary Knowledge</b> have firm subject knowledge required for higher studies, professional and applied courses.</p> <p><b>PO2 : Problem Solving Skill</b> apply basic practical skills &amp; technical knowledge along with domain knowledge of different subjects in the science &amp; humanities stream.</p> <p><b>PO3 : Critical Thinking/ Analytical Reasoning</b> develop scientific aptitude Integrate skills of analysis, critiquing, application and creativity.</p> <p><b>PO4 : Digital literacy</b> employ appropriate digital tools and techniques in analysing data and creative design.</p> <p><b>PO5 : Employment/ Entrepreneurship Skill</b> gain competence to pursue higher learning, research and to opt for job opportunities or entrepreneurship.</p> <p><b>PO6 : Leadership Quality</b> interact effectively with others displaying leadership and team spirit.</p> <p><b>PO7 : Contribution to Society</b> demonstrate responsibility as citizens for national development through community outreach, wellness of self and a sustainable environment.</p> <p><b>PO8 : Research and Development</b> inculcate creativity in academics and research</p> <p><b>PO9 : Self directed learning</b> apply digital tools to collect, analyse and interpret data and present scientific findings.</p> <p><b>PO10: Life long Learning</b> Exhibit competence in educational, industrial and research pursuits that contribute towards the holistic development of self and community.</p>
<b>Programme Specific Outcome (PSOs)</b>	<p><b>PSO1- Disciplinary Knowledge</b> Gain in-depth knowledge of the fundamental concepts in all disciplines of chemistry.</p> <p><b>PSO2 – Scientific Reasoning</b> Capability to integrate the basics of chemistry and advanced topics and analytical. Skills in organic, inorganic and physical chemistry.</p> <p><b>PSO3 – Multicultural Competence</b> Imbibe leadership qualities to work individually and within a team in organizing curricular, co-curricular and extracurricular activities.</p> <p><b>PSO4 – Professional Ethics/ Entrepreneurship Skill</b> Apply the concepts of chemistry to solve problems in the community, entrepreneurial and research pursuits.</p> <p><b>PSO5 – Self Directed Learning</b> Gain competence to pursue higher education and career opportunities in chemistry and allied fields.</p>

**SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS) SALEM-16**  
**PG & RESEARCH DEPARTMENT OF CHEMISTRY**  
**B.Sc. CHEMISTRY**  
**PROGRAMME STRUCTURE UNDER CBCS**  
**(From the academic year 2023-24 onwards)**  
**Total Credits: 140 + Extra Credits (Maximum 28)**

**FIRST YEAR**

**SEMESTER - I**

Part	Course	Course Title	Code	No. of Hours	Credit
I	Language	Tamil -I / Hindi-I / Sanskrit-I	23ULTC1 / 23ULHC1 / 23ULSC1	6	3
II	English	General English-I	23ULEC1	6	3
III	Core Course -I	General Chemistry-I	23UCHCC1	5	5
	Core Course -II	Core Practical- I: Quantitative Inorganic Estimation (titrimetry) and Inorganic Preparations	23UCHCCQ1	4	3
	Elective – I (GE)	Theory of Equations and Differential Calculus	23UCHGEC1	5	5
IV	Skill Enhancement Course-I(NME)	Food Chemistry	23UCHSEC1	2	2
	Skill Enhancement Foundation Course	Foundation Chemistry	23UCHSEFC	2	2
<b>Total</b>				<b>30</b>	<b>23</b>
V	<ul style="list-style-type: none"> <li>• Articulation and Idea Fixation Skills</li> <li>• Physical Fitness Practice – 35 hours per semester</li> </ul>				
	<ul style="list-style-type: none"> <li>• Advanced Diploma Course in Applied Chemistry Level- 1: Certificate Course 100 hours per year</li> </ul>				

**SEMESTER - II**

Part	Course	Course Title	Code	No. of Hours	Credit
I	Language	Tamil -II/ Hindi-II/ Sanskrit-II	23ULTC2 / 23ULHC2 / 23ULSC2	6	3
II	English	General English-II	23ULEC2	6	3
III	Core Course -III	General Chemistry-II	23UCHCC2	5	5
	Core Course -IV	Core Practical- II: Qualitative Organic Analysis and Preparation of Organic Compounds	23UCHCCQ2	4	3
	Elective – II (GE)	Integral Calculus and Laplace Transform	23UCHGEC2	3	3
		Theory of Equations and laplace Transform using sage Math-Practical	23UCHGECQ	2	2
IV	Skill Enhancement Course-II (NME)	Dairy Chemistry	23UCHSEC2	2	2
	Skill Enhancement Course-III (Indian Knowledge System)	Inherited Knowledge in Cosmetic Chemistry	23UCHSEC3	2	2
	<b>Total</b>			<b>30</b>	<b>23</b>
V	<ul style="list-style-type: none"> <li>• Articulation and Idea Fixation Skills</li> <li>• Physical Fitness Practice – 35 hours per semester</li> <li>• Certificate Course in Yoga – 30 hours – 1 Extra Credit</li> </ul>				
	<ul style="list-style-type: none"> <li>• Advanced Diploma in Applied Chemistry Level -1: Certificate Course 100 hours per year– 2 Extra Credits</li> <li>• Extra credits are given for extra skills and courses qualified in MOOC/NPTEL</li> </ul>				

<b>Title of the Course</b>	<b>GENERAL CHEMISTRY-I</b>						
<b>Course No.</b>	<b>Core Course – I</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>5</b>	<b>Course Code</b>	<b>23UCHCC1</b>
		<b>Semester</b>	<b>I</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>		<b>Lab Practice</b>		<b>Total</b>	
	<b>4</b>	<b>1</b>		<b>-</b>		<b>5</b>	
<b>Prerequisites</b>	<b>Higher secondary chemistry</b>						
<b>Objectives of the course</b>	<p>The course aims at giving an overall view of the</p> <ul style="list-style-type: none"> <li>• various atomic models and atomic structure</li> <li>• wave particle duality of matter</li> <li>• periodic table, periodicity in properties and its application in explaining the chemical behaviour</li> <li>• nature of chemical bonding, and fundamental concepts of organic chemistry.</li> </ul>						
<b>Course Outline</b>	<p><b>UNIT-I</b> <span style="float: right;"><b>15 Hours</b></span>  <b>Atomic structure and Periodic trends</b>  History of atom (J.J.Thomson, Rutherford); Moseley’s Experiment and Atomic number, Atomic Spectra; Black-Body Radiation and Planck’s quantum theory - Bohr's model of atom; The Franck-Hertz Experiment; Interpretation of H spectrum; Photoelectric effect, Compton effect; Dual nature of Matter- de Broglie wavelength-Davisson and Germer experiment Heisenberg’s Uncertainty Principle; Electronic Configuration of Atoms and ions- Hund’s rule, Pauli’s exclusion principle and Aufbau principle; Numerical problems involving the core concepts.</p> <p><b>UNIT-II</b> <span style="float: right;"><b>15 Hours</b></span>  <b>Introduction to Quantum mechanics</b>  Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wavefunctions, Formulation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of <math>\Psi</math> and <math>\Psi^2</math>.</p> <p><b>Modern Periodic Table</b>  Cause of periodicity; Features of the periodic table; classification of elements - Periodic trends for atomic size- Atomic radii, Ionic, crystal and Covalent radii; ionization energy, electron affinity, electronegativity-electronegativity scales, applications of electronegativity. Problems involving the core concepts</p>						

	<p><b>UNIT-III</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Structure and bonding - I</b></p> <p><b>Ionic bond</b> Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in ionic compounds; Born Haber cycle – lattice energies, Madelung constant; relative effect of lattice energy and solvation energy; Ion polarisation – polarising power and polarizability; Fajan’s rules - effects of polarisation on properties of compounds; problems involving the core concepts.</p> <p><b>Covalent bond</b> Shapes of orbitals, overlap of orbitals – <math>\sigma</math> and <math>\Pi</math> bonds; directed valency - hybridization; VSEPR theory - shapes of molecules of the type <math>AB_2</math>, <math>AB_3</math>, <math>AB_4</math>, <math>AB_5</math>, <math>AB_6</math> and <math>AB_7</math></p> <p>Partial ionic character of covalent bond-dipole moment, application to molecules of the type <math>A_2</math>, <math>AB</math>, <math>AB_2</math>, <math>AB_3</math>, <math>AB_4</math>; percentage ionic character numerical problems based on calculation of percentage ionic character.</p> <p><b>UNIT-IV</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Structure and bonding - II</b></p> <p>VB theory – application to hydrogen molecule; concept of resonance - resonance structures of some inorganic species – <math>CO_2</math>, <math>NO_2</math>, <math>CO_3^{2-}</math>, <math>NO_3^-</math>; limitations of VBT; MO theory - bonding, antibonding and nonbonding orbitals, bond order; MO diagrams of <math>H_2</math>, <math>C_2</math>, <math>O_2</math>, <math>O_2^+</math>, <math>O_2^-</math>, <math>O_2^{2-}</math>, <math>N_2</math>, <math>NO</math>, <math>HF</math>, <math>CO</math>; magnetic characteristics, comparison of VB and MO theories. Coordinate bond: Definition, Formation of <math>BF_3</math>, <math>NH_3</math>, <math>NH_4^+</math>, <math>H_3O^+</math> properties Metallic bond-electron sea model, VB model; Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor – types, applications of semiconductors Weak Chemical Forces - Vander Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces; Hydrogen bonding – Types, special properties of water, ice, stability of DNA; Effects of chemical force, melting and boiling points.</p> <p><b>UNIT-V</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Basic concepts in Organic Chemistry and Electronic effects</b></p> <p>Types of bond cleavage – heterolytic and homolytic; arrow pushing in organic reactions; reagents and substrates; types of reagents - electrophiles, nucleophiles, free radicals; reaction intermediates – carbanions, carbocations, carbenes, arynes and nitrenes. Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects.</p> <p>Resonance – resonance energy, conditions for resonance - acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance. Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group, dipole moment of aldehydes and nitromethane</p> <p>Types of organic reactions- addition, substitution, elimination and rearrangements</p>
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<p>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET/ UGC-CSIR / GATE /TNPSC others to be solved. (To be discussed during the Tutorial hours)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<p><b>Recommended Text</b></p>	<ol style="list-style-type: none"> <li>1. Madan, R. D. and Sathya Prakash, <i>Modern Inorganic Chemistry</i>, S. Chand and Company: New Delhi, 2<sup>nd</sup> Ed., 2003.</li> <li>2. Rao, C.N. R. <i>University General Chemistry</i>, Macmillan Publication: New Delhi, 2000.</li> <li>3. Puri, B. R. and Sharma, L. R. <i>Principles of Physical Chemistry</i>, Vishal Publishing Company: Jalandhar, 38<sup>th</sup> Ed., 2002.</li> <li>4. Bruce, P. Y. and Prasad K. J. R. <i>Essential Organic Chemistry</i>, Pearson Education: New Delhi, 2008.</li> <li>5. Dash U.N, Dharmarha OP, Soni P.L. Textbook of Physical Chemistry, Sultan Chand &amp; Sons: New Delhi,2016</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Maron, S. H. and Prutton C. P. <i>Principles of Physical Chemistry</i>, The Macmillan Company: Newyork, 4<sup>th</sup>Ed.,1972.</li> <li>2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, ELBS William Heinemann: London, 4<sup>th</sup> Ed.,1991.</li> <li>3. Gurudeep Raj, <i>Advanced Inorganic Chemistry</i>, Goel Publishing House: Meerut, 26<sup>th</sup>Ed., 2001.</li> <li>4. Atkins, P.W. &amp; Paula, J. <i>Physical Chemistry</i>, Oxford University Press:New York, 10<sup>th</sup> Ed., 2014.</li> <li>5. Huheey, J. E. <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, Addison, Wesley Publishing Company: India, 4<sup>th</sup> Ed., 1993..</li> </ol>
<p><b>Website and e-learning source</b></p>	<ol style="list-style-type: none"> <li>1) <a href="https://onlinecourses.nptel.ac.in">https://onlinecourses.nptel.ac.in</a></li> <li>2) <a href="http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm">http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm</a></li> <li>3) <a href="http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html">http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html</a></li> <li>4) <a href="https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding">https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding</a></li> <li>5) <a href="https://www.chemtube3d.com/">https://www.chemtube3d.com/</a></li> </ol>

**Course Outcomes (for Mapping with POs and PSOs)****On completion of the course the students should be able to****CO1:** explain the atomic structure, wave particle duality of matter, periodic properties, bonding, and properties of compounds.**CO2:** classify the elements in the periodic table, types of bonds, reaction intermediates, electronic effects in organic compounds and types of reagents.**CO3:** apply the theories of atomic structure, bonding, to calculate energy of a spectral transition, electronegativity, percentage ionic character and bond order.**CO4:** evaluate the relationship existing between electronic configuration, bonding, geometry of molecules and reactions, structure, reactivity and electronic effects**CO5:** construct MO diagrams, predict trends in periodic properties, assess the properties of elements, and explain hybridization in molecules, nature of H – bonding and organic reaction mechanisms.**CO-PO mapping (Course Articulation matrix)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO 1	S	S	S	M	M	M	L	S	L	S
CO 2	S	S	S	M	M	S	M	M	M	S
CO 3	S	S	S	M	S	S	M	S	M	S
CO 4	S	S	S	M	S	S	M	S	S	S
CO 5	S	S	S	M	S	S	S	S	S	S

**3 – Strong, 2 – Medium, 1 – Low****Level of Correlation between PSO's and CO's**

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	13	15	15
Weighted percentage of Course Contribution to PSO	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 – Low****Board of Studies Date : 02.05.2023**



<b>Title of the Course</b>	<b>QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS</b>						
<b>Course No.</b>	Core Course-II: Core Practical-I						
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>3</b>	<b>Course Code</b>	<b>23UCHCCQ1</b>
		<b>Semester</b>	<b>I</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>		<b>Lab Practice</b>		<b>Total</b>	
	-	1		3		4	
<b>Prerequisites</b>	Higher Secondary Chemistry						
<b>Objectives of the course</b>	<p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> <li>● laboratory safety</li> <li>● handling glasswares</li> <li>● Quantitative estimation</li> <li>● preparation of inorganic compounds</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b> <b>Chemical Laboratory Safety in Academic Institutions</b> Introduction - importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers-types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal. <b>Common Apparatus Used in Quantitative Estimation (Volumetric)</b> Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauge and tripod stand. <b>Principle of Quantitative Estimation (Volumetric)</b> Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid-base, redox, complexometric, iodimetric and iodometric titrations; indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.						<b>10 Hours</b>

	<p><b>UNIT II</b> <span style="float: right;"><b>25 Hours</b></span></p> <p><b>Quantitative Estimation (Volumetric)</b> Preparation of standard solution, dilution from stock solution</p> <p><b>Permanganometry</b> Estimation of sodium oxalate using standard ferrous ammonium sulphate</p> <p><b>Dichrometry</b> Estimation of ferric alum using standard dichromate (external indicator) Estimation of ferric alum using standard dichromate (internal indicator)</p> <p><b>Iodometry</b> Estimation of copper in copper sulphate using standard dichromate</p> <p><b>Argentometry (Demonstration Experiment)</b> Estimation of chloride in barium chloride using standard sodium chloride/ Estimation of chloride in sodium chloride (Volhard's method)</p>
	<p><b>UNIT III</b> <span style="float: right;"><b>25 Hours</b></span></p> <p><b>Complexometry</b> Estimation of hardness of water using EDTA</p> <p><b>Estimations</b> Estimation of iron in iron tablets Estimation of ascorbic acid.</p> <p><b>Preparation of Inorganic compounds</b> Potash alum Tetraammine copper (II) sulphate Hexamminecobalt (III) chloride Mohr's Salt</p>
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<p>1. Venkateswaran, V, Veeraswamy, R. &amp; Kulandivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, Sultan Chand &amp; Sons: New Delhi, 2<sup>nd</sup> Ed., 1997.</p> <p>2. Nad, A. K, Mahapatra, B. &amp; Ghoshal, A, <i>An advanced course in Practical Chemistry</i>, New Central Book Agency: Kolkata, 3<sup>rd</sup> Ed., 2007.</p>
Reference Books	1. Mendham, J, Denney, R. C, Barnes, J. D, Thomas, M, Sivasankar, B, <i>Vogel's Textbook of Quantitative Chemical Analysis</i> , 6 <sup>th</sup> Ed., Pearson Education Ltd: New Delhi, 2000.
Website and e-learning source	<p>1) <a href="http://www.federica.unina.it/agraria/analytical-chemistry/volumetricanalysis">http://www.federica.unina.it/agraria/analytical-chemistry/volumetricanalysis</a></p> <p>2) <a href="https://chemdictionary.org/titration-indicator/">https://chemdictionary.org/titration-indicator/</a></p>
<p><b>Course outcomes ( For mapping with POs and PSOs)</b>  <b>On successful completion of the course the students should be able to</b>  <b>CO1:</b> explain the basic principles involved in titrimetric analysis and inorganic preparations.  <b>CO2:</b> compare the methodologies of different titrimetric analysis.  <b>CO3:</b> calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution.  <b>CO4:</b> assess the yield of different inorganic preparations and identify the end point of various titrations.</p>	

**CO-PO Mapping (Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO 1</b>	S	M	M	S	S	M	L	M	S	M
<b>CO 2</b>	M	S	S	S	M	S	S	M	M	M
<b>CO 3</b>	S	S	S	M	S	S	S	M	S	M
<b>CO 4</b>	S	S	S	S	S	S	S	M	M	M

**Level of Correlation between PSO's and CO's**

<b>CO /PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>Weightage</b>	12	12	12	12	12
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**3 – Strong, 2 – Medium, 1 – Low**

**Board of Studies Date : 02.05.2023**

<b>Title of the Course</b>		Theory of Equations and Differential Calculus					
<b>Course No.</b>		Elective – I (GE)					
<b>Category</b>	<b>ELECTIVE COURSE</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>5</b>	<b>Course Code</b>	<b>23UCHGEC1</b>
		<b>Semester</b>	<b>I</b>				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>	
		<b>5</b>	<b>-</b>	<b>-</b>		<b>5</b>	
<b>Pre-requisite</b>		12 <sup>th</sup> Standard Mathematics					
<b>Objectives of the Course</b>		1. To acquire knowledge in a theory of equations, Differential calculus, and Differential equations. 2. To understand the method of solving algebraic equations using the transformation of equations. 3. To promote problem-solving ability in differential equations.					
<b>Course Outcomes:</b>							
Students will be able to							
<b>CO1:</b> Learn the concepts of matrices, theory of equations, differential calculus, ordinary and partial differential equations							
<b>CO2:</b> Analyze various methods to find roots of polynomial equations and inspect Horner's method and Newton's method to find approximate real roots							
<b>CO3:</b> Understand the concept of the angle between the radius vector and the tangent, radius of curvature, pedal equation, and Descartes rule of signs and solve related problems							
<b>CO4:</b> Solve specific types of ordinary and partial differential equations.							
<b>CO5:</b> Analyze the method of Variation of parameters to solve ordinary differential equations, Lagrange's method to solve partial differential equations							
<b>Course Outline</b>		<b>Unit - I</b> <span style="float: right;"><b>15 Hours</b></span> <b>Theory of Equations</b> Relation between the roots and coefficients of an equation, Imaginary and irrational roots, Symmetric functions of the roots of an equation in terms of its coefficients (up to cubic equations), and Reciprocal equation. <b>Chapter 6 (Page No : 6.2 - 6.37)</b>					
		<b>Unit - II</b> <span style="float: right;"><b>15 Hours</b></span> Transformation of equation (Definition only), Multiplication of roots by m (Definition only), Diminishing the roots of an equation, Removal of a term, Descartes' rule of sign, Descartes's rule of signs for negative roots of an equation, Horner's method, Newton's method of evaluating a real root correct to given decimal places. <b>Chapter 6 (PageNo: 6.38 - 6.67)</b>					
		<b>Unit - III</b> <span style="float: right;"><b>15 Hours</b></span> <b>Differential Calculus</b> The angle between the radius vector and the tangent, Angle of the intersection of two curves, the Length of a perpendicular from the pole to the Tangent, Pedal equation, The Cartesian formula for the radius of curvature, and the Parametric formula for the radius of curvature. <b>Chapter 10 &amp; 11(Page No.: 10.1 - 10.23, 11.1 - 11.22)</b>					

	<p><b>Unit – IV</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Ordinary Differential Equations</b></p> <p>Second order differential equations with constant coefficients, finding particular integral for the function <math>f(x)e^{ax}</math>, <math>\cos ax</math>, <math>\sin ax</math>, <math>\sinh ax</math>, <math>\cosh ax</math>, <math>x^m</math>, <math>e^{ax}v</math> where <math>v</math> is any function of <math>x</math>, Linear homogeneous equation and Variation of parameter.</p> <p><b>Chapter 23 &amp; 24 (Page No: 23.1 - 23.32, 24.1 - 24.23)</b></p>
	<p><b>Unit – V</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Partial Differential Equations</b></p> <p>Elimination of arbitrary constants, Elimination of arbitrary functions, Definitions - complete solution, singular solutions, General solutions, Standard types, Lagrange's linear partial differential equations (Charpit's method to be excluded).</p> <p><b>Chapter 26 (Page No: 26.1 - 26.40, 26.44 - 26.58)</b></p>
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
<b>Recommended Text</b>	P.R. Vittal - Allied Mathematics, Margham Publications, Chennai-17
<b>Reference Books</b>	T.K.Manicavachagam Pillai, Natarajan & K.S. Ganapathy - Algebra Volume-I, Viswanathan Publishers, Pvt. Ltd, 2004.
<b>Web resources</b>	<p>1.<a href="http://www.universityofcalicut.info/SDE/VI%20Sem.%20B.Sc%20Maths%20-%20Additional%20Course%20in%20lie%20of%20Project%20Theory%20of%20equations%20&amp;%20fuzzy%20set.pdf">http://www.universityofcalicut.info/SDE/VI%20Sem.%20B.Sc%20Maths%20-%20Additional%20Course%20in%20lie%20of%20Project%20Theory%20of%20equations%20&amp;%20fuzzy%20set.pdf</a></p> <p>2.<a href="https://sol.du.ac.in/pluginfile.php/4111/mod_resource/content/1/B.A.%20st%20m%204_1-7_.pdf">https://sol.du.ac.in/pluginfile.php/4111/mod_resource/content/1/B.A.%20st%20m%204_1-7_.pdf</a></p>

<b>Title of the Course</b>	<b>FOOD CHEMISTRY</b>						
<b>Course No.</b>	<b>Skill Enhancement Course-I</b>						
<b>Category</b>	<b>NME</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>2</b>	<b>Course Code</b>	<b>23UCHSEC1</b>
		<b>Semester</b>	<b>I</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>		<b>Lab Practice</b>		<b>Total</b>	
	<b>2</b>	<b>-</b>		<b>-</b>		<b>2</b>	
<b>Prerequisites</b>	Higher secondary chemistry						
<b>Objectives of the course</b>	<p>This course aims at giving an overall view of the</p> <ul style="list-style-type: none"> <li>• Types of food</li> <li>• Food adulteration and poisons</li> <li>• Food additives and preservation</li> <li>• Beverages</li> <li>• Vitamins and Minerals</li> </ul>						
<b>Course Outline</b>	<p><b>UNIT-I</b> <span style="float: right;"><b>6 Hours</b></span>  <b>Food Adulteration</b>  Sources of food, types, advantages and disadvantages- Food Adulteration-contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals- common adulterants, ghee adulteration and their detection; Detection of adulterated foods by simple analytical techniques.</p> <p><b>UNIT-II</b> <span style="float: right;"><b>6 Hours</b></span>  <b>Food Poison</b>  Food Poisons- natural poisons (alkaloids-nephrotoxin)- pesticides, (DDT, BHC, Malathion, Monocrotophos)- Chemical poisons- First aid for poison consumed victims.</p> <p><b>UNIT III</b> <span style="float: right;"><b>6 Hours</b></span>  <b>Food additives</b>  Food additives- artificial sweeteners- Saccharin- Cyclamate, and Aspartate. Food flavours- esters, aldehydes and heterocyclic compounds – food colours- emulsifying agents- preservatives- leavening agents; Baking powder- yeast- tastemakers- MSG- vinegar.</p> <p style="text-align: center;"><b>UNIT-IV</b></p> <p><b>Beverages</b> <span style="float: right;"><b>6 Hours</b></span>  Beverages- soft drinks- soda- fruit juices - alcoholic beverages- examples. Carbonation- addiction to alcohol- diseases of liver and social problems.</p> <p style="text-align: center;"><b>UNIT-V</b></p> <p><b>Vitamins and Minerals</b> <span style="float: right;"><b>6 Hours</b></span>  Vitamins- A, C, K, E, B<sub>1</sub>, B<sub>2</sub> and B<sub>6</sub>, sources, requirements, deficiency diseases; Minerals- important minerals- Na, K, Mg, Fe, S and P, sources, functions, requirements and deficiency diseases.</p>						

<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Jayashree Ghosh. A, <i>Text Book of Pharmaceutical Chemistry</i>, S. Chand, &amp; Co 3<sup>rd</sup>Ed., 2003.</li> <li>2. Jayashree Ghosh, <i>Fundamental Concepts of Applied Chemistry</i>, S.Chand &amp; Co 1<sup>st</sup> Ed., 2006.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Belitz, H. D, Werner Grosch, <i>Food Chemistry Springer Science and Buisness Media</i>, 4<sup>th</sup> Ed, 2009.</li> <li>2. Swaminathan M, <i>Food Science and Experimental Foods</i>, Ganesh and Company, 1979.</li> <li>3. Hasenhuettl, Gerard. L, &amp; Hartel, Richard. W., <i>Food Emulsifiers and their Applications Springer New York</i> 2<sup>nd</sup> Ed. 2008.</li> <li>4. Belitz, H. D, Grosch, W, Schieberle, P, <i>Food chemistry</i>, Springer, 4<sup>th</sup> revised and Extended Ed, 2009.</li> <li>5. John, M, deMan John W, Finley, W. Jefferey Hurst, ChangYong Lee, <i>Principles of Food Chemistry</i>, Springer, 4<sup>th</sup> Ed, 2018.</li> </ol>
<b>Website and e-learning source</b>	<ol style="list-style-type: none"> <li>1) <a href="https://gcwgandhinagar.com/econtent/document/1589361321Unit%20V%20Food%20adulteration.pdf">https://gcwgandhinagar.com/econtent/document/1589361321Unit%20V%20Food%20adulteration.pdf</a></li> <li>2) <a href="https://ccsuniversity.ac.in/bridge-library/pdf/Toxicology-2704-Health-&amp;-hygiene-open-elec-Unit-III-Food-Poisoning-types-symptoms-treatments.pdf">https://ccsuniversity.ac.in/bridge-library/pdf/Toxicology-2704-Health-&amp;-hygiene-open-elec-Unit-III-Food-Poisoning-types-symptoms-treatments.pdf</a></li> <li>3) <a href="https://egyankosh.ac.in/bitstream/123456789/73121/1/Unit-7.pdf">https://egyankosh.ac.in/bitstream/123456789/73121/1/Unit-7.pdf</a></li> <li>4) <a href="https://ccsuniversity.ac.in/bridge-library/pdf/FST-Paper%20II%20Food%20Beverages-%20IV-Semester.pdf">https://ccsuniversity.ac.in/bridge-library/pdf/FST-Paper%20II%20Food%20Beverages-%20IV-Semester.pdf</a></li> <li>5) <a href="https://egyankosh.ac.in/bitstream/123456789/12390/1/Unit-9.pdf">https://egyankosh.ac.in/bitstream/123456789/12390/1/Unit-9.pdf</a></li> </ol>
<p><b>Course Outcomes (for Mapping with POs and PSOs)</b>  <b>On completion of the course the students should be able to</b>  <b>CO1:</b> explain about food adulteration- contamination of wheat, rice, milk, butter.  <b>CO2:</b> identify food poisons like natural poisons (alkaloids-nephrotoxin), pesticides, DDT, BHC, Malathion, Monocrotophos  <b>CO3:</b> describe food additives, artificial sweeteners, saccharin, cyclamate and aspartate in the food industries  <b>CO4:</b> classify beverages and illustrate their importance  <b>CO5:</b> outline the sources of vitamins and minerals and its significance</p>	

**Board of Studies Date : 02.05.2023**

<b>Title of the Course</b>	<b>FOUNDATION CHEMISTRY</b>						
<b>Course No.</b>	<b>Foundation Course</b>						
<b>Category</b>	<b>SEFC</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>2</b>	<b>Course Code</b>	<b>23UCHSEFC</b>
		<b>Semester</b>	<b>I</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>		<b>Lab Practice</b>		<b>Total</b>	
	<b>2</b>	<b>-</b>		<b>-</b>		<b>2</b>	
<b>Prerequisites</b>	Higher secondary chemistry						
<b>Objectives of the course</b>	This course aims at providing basic knowledge on <ul style="list-style-type: none"> <li>• principles of volumetric and inorganic semi-micro analysis</li> <li>• fundamental concepts of inorganic, organic and physical chemistry</li> </ul>						
<b>Course Outline</b>	<p><b>UNIT I</b> <span style="float: right;"><b>6 Hours</b></span>  <b>Basic concepts in volumetric and inorganic semi micro analysis</b>          Principles of volumetric analysis – Equivalent weight, concentration terms - molarity, molality, formality, normality, volume/volume and weight/volume percentage, ppm, normal, decinormal solutions – simple problems. Basic principles of inorganic semi micro analysis – common anions, interfering anions, separation of cations into various groups. Common ion effect, ionic product, solubility product and their applications in qualitative analysis.</p> <p><b>UNIT II</b> <span style="float: right;"><b>6 Hours</b></span>  <b>Introduction to atomic structure and chemical bonding</b>          Charges and masses of fundamental particles like proton, neutron, electron, meson and positron. Atomic structure - atomic orbitals and concept of atomic orbitals, shapes of s, p and d orbitals, difference between orbit and orbitals, sigma and pi bonds, oxidation state, acidity, basicity of simple molecules, definition and examples of reducing, oxidising agents, oxides, oxo acids, metallic and non-metallic elements, chemical bonding – types, ionic bond, covalent bond, co-ordinate bond, hydrogen bonding, vander Waal’s bond, metallic bond, definition of ions, atoms, molecules, compound, mixture, co-ordination complex- neutral, cationic, anionic, co-ordination number, ligands, types.</p> <p><b>UNIT III</b> <span style="float: right;"><b>6 Hours</b></span>  <b>IUPAC nomenclature of organic compounds</b>          Introduction to organic chemistry - general classification of organic compounds- cyclic, acyclic, open chain and closed chain with examples- homologous series, functional groups, IUPAC nomenclature of organic compounds (Alkanes, alkenes, alkynes, alcohols, aldehydes, ketones, ethers, acids, esters, amines).</p>						



	<p><b>UNIT IV</b> <span style="float: right;"><b>6 Hours</b></span></p> <p><b>Gaseous and liquid state</b></p> <p>Mathematical concepts applied to chemistry- some useful physical constants, important conversion factor, Greek alphabets, States of Matter - colloidal state, gaseous state- statements of gas laws- Boyle's law, Charles law, Avogadro law, ideal gas equation, liquid state- vapour pressure, surface tension, viscosity, solutions- pH range, simple calculations involving pH and pOH.</p> <p><b>UNIT V</b> <span style="float: right;"><b>6 Hours</b></span></p> <p><b>Chemical equilibria and chemical kinetics</b></p> <p>Chemical equilibria- law of mass action, homogeneous and heterogeneous equilibria with examples, chemical kinetics - rate of reaction, order and molecularity of reaction, first and second order reaction with examples, Arrhenius equation and its terms, energy barrier diagram for exothermic and endothermic reactions.</p>
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<ol style="list-style-type: none"> <li>1. Venkateswaran, V.; Veeraswamy, R.; Kulandivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, Sultan Chand &amp; Sons: New Delhi, 2<sup>nd</sup> Ed., 1997.</li> <li>2. Madan, R. D. and Sathya Prakash, <i>Modern Inorganic Chemistry</i>, S.Chand and Company: New Delhi, 2<sup>nd</sup> Ed., 2003.</li> <li>3. Jain, M.K &amp; Sharma, S.C, <i>Modern Organic Chemistry</i>, Vishal Publishing, 4<sup>th</sup> reprint, 2003.</li> <li>4. Puri, B. R. &amp; Sharma, L. R. <i>Principles of Physical Chemistry</i>, Vishal Publishing Company: Jalandhar, 38<sup>th</sup> Ed., 2002.</li> </ol>
Reference Books	<ol style="list-style-type: none"> <li>1. Morrison R.T, &amp; Boyd, R.N, <i>Organic Chemistry</i>, Pearson Education, Asia, 6<sup>th</sup> Ed, 2012.</li> <li>2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, 4<sup>th</sup> Ed.; ELBS William Heinemann: London, 1991.</li> <li>3. Atkins, P.W. &amp; Paula, J. <i>Physical Chemistry</i>, Oxford University Press: New York, 10<sup>th</sup> Ed., 2014.</li> </ol>
Website and e-learning source	<ol style="list-style-type: none"> <li>1) <a href="https://onlinecourses.nptel.ac.in">https://onlinecourses.nptel.ac.in</a></li> <li>2) <a href="http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm">http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm</a></li> <li>3) <a href="http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html">http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html</a></li> <li>4) <a href="https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding">https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding</a></li> <li>5) <a href="https://www.chemtube3d.com/">https://www.chemtube3d.com/</a></li> </ol>
<p><b>Course Outcomes (for Mapping with POs and PSOs)</b></p> <p><b>On completion of the course the students should be able to</b></p> <p><b>CO1:</b> explain basic principles of inorganic semi micro analysis and titrimetry</p> <p><b>CO2:</b> classify different types of bonds in compounds and explain the atomic structure</p> <p><b>CO3:</b> assign the nomenclature of organic compounds based on IUPAC</p> <p><b>CO4:</b> solve problems related to concentration terms and pH of solutions</p> <p><b>CO5:</b> apply the mathematical concepts and physical constants in solving problems</p>	

**CO-PO Mapping ( Course Articulation Matrix)**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	M	M	M	M	S	S	S
<b>CO3</b>	S	S	S	M	M	M	M	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	S

**Level of Correlation Between PSO's and CO**

	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**Board of Studies Date : 02.05.2023**

## SECOND SEMESTER

<b>Title of the Course</b>	<b>GENERAL CHEMISTRY-II</b>						
<b>Course No.</b>	<b>Core Course -III</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>5</b>	<b>Course Code</b>	<b>23UCHCC2</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>		<b>Tutorial</b>		<b>Lab Practice</b>		<b>Total</b>
	<b>4</b>		<b>1</b>		<b>-</b>		<b>5</b>
<b>prerequisites</b>	General Chemistry I						
<b>Objectives of the course</b>	<p>This course aims at providing an overall view of the</p> <ul style="list-style-type: none"> <li>● chemistry of acids, bases and ionic equilibrium</li> <li>● applications of acids and bases</li> <li>● properties of s and p-block elements</li> <li>● chemistry of hydrocarbons</li> <li>● compounds of main block elements and hydrocarbons</li> </ul>						
<b>Course Outline</b>	<p><b>UNIT-I</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Acids, bases and Ionic equilibria</b></p> <p>Concepts of Acids and Bases - Arrhenius concept, Bronsted-Lowry concept, Lewis concept, Relative strengths of acids, bases and dissociation constant; dissociation of poly basic acids, ionic product of water, pH scale, pH of solutions; Degree of dissociation, common ion effect, factors affecting degree of dissociation; acid-base indicators, theory of acid -base indicators – action of phenolphthalein and methyl orange, titration curves - use of acid -base indicators.</p> <p>Buffer solutions – types, mechanism of buffer, action in acid and basic buffer, Henderson-Hasselbalch equation.</p> <p>Salt hydrolysis - salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases - hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis.</p> <p>Solubility product - determination and applications, numerical problems involving the core concepts.</p> <p><b>UNIT-II</b> <span style="float: right;"><b>15 Hours</b></span></p> <p><b>Chemistry of s - Block Elements</b></p> <p>Hydrogen: Position of hydrogen in the periodic table. Alkali metals: Comparative study of the elements with respect to oxides, hydroxides, halides, carbonates and bicarbonates. Diagonal relationship of Li with Mg. Properties and uses of NaOH, Na<sub>2</sub>CO<sub>3</sub>, KBr, KClO<sub>3</sub>, alkaline earth metals. Anomalous behaviour of Be.</p> <p><b>Chemistry of p- Block Elements (Group 13 &amp; 14)</b></p> <p>Preparation and structure of diborane and borazine. Chemistry of borax.</p>						

Extraction of Al and its uses. Alloys of Al.  
Comparison of carbon with silicon. Percarbonates- per monocarbonates and per dicarbonates.

### UNIT-III

15 Hours

#### Chemistry of p- Block Elements (Group 15-18)

General characteristics of elements of Group 15; chemistry of  $\text{H}_2\text{N-NH}_2$ ,  $\text{NH}_2\text{OH}$ ,  $\text{HN}_3$  and  $\text{HNO}_3$ . Hybridisation and structure of  $\text{PH}_3$ ,  $\text{PCl}_5$ ,  $\text{POCl}_3$ ,  $\text{P}_2\text{O}_5$  and oxy acids of phosphorous ( $\text{H}_3\text{PO}_3$  and  $\text{H}_3\text{PO}_4$ ).

General properties of elements of group 16 - Structure and allotropy of elements - Classification and properties of oxides - oxides of sulphur and selenium - Oxo acids of sulphur (Caro's and Marshall's acids).

Chemistry of Halogens: General characteristics of halogen with reference to electronegativity, electron affinity, oxidation states and oxidizing power. Peculiarities of fluorine. Halogen acids ( $\text{HF}$ ,  $\text{HCl}$ ,  $\text{HBr}$  and  $\text{HI}$ ), oxides and oxo acids ( $\text{HClO}_4$ ). Inter-halogen compounds ( $\text{ICl}$ ,  $\text{ClF}_3$ ,  $\text{BrF}_5$  and  $\text{IF}_7$ ), pseudo halogens [ $(\text{CN})_2$  and  $(\text{SCN})_2$ ] and basic nature of Iodine.

Noble gases: Position in the periodic table. Hybridisation and structure of  $\text{XeF}_2$ ,  $\text{XeF}_4$ ,  $\text{XeF}_6$  and  $\text{XeOF}_4$ ; uses of noble gases - clathrate compounds.

### UNIT-IV

15 Hours

#### Hydrocarbon Chemistry-I

**Petroproducts:** Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses

**Alkenes**-Nomenclature, general methods of preparation - Mechanism of  $\beta$ - elimination reactions -  $\text{E}_1$  and  $\text{E}_2$  mechanism - factors influencing - stereochemistry - orientation - Hofmann and Saytzeff rules. Reactions of alkenes - addition reactions - mechanisms - Markownikoff's rule, Kharasch effect, oxidation reactions - hydroxylation, ozonolysis; polymerization.

#### Alkadienes

Nomenclature - classification - isolated, conjugated and cumulated dienes; stability of conjugated dienes; mechanism of electrophilic addition to conjugated dienes - 1, 2- and 1, 4 -additions; free radical addition to conjugated dienes- Diels-Alder reactions - polymerisation - polybutadiene, polyisoprene (natural rubber), vulcanization.

#### Alkynes

Nomenclature; general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene, polymerisation and isomerisation.

**Cycloalkanes:** Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations. Conformational analysis of cyclohexane, mono and di substituted cyclohexanes.

### UNIT-V

15 Hours

#### Hydrocarbon Chemistry - II

	<p><b>Benzene:</b> Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions - General mechanism of aromatic electrophilic substitution - nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and disubstituted benzene - Effect of substituent – orientation and reactivity.</p> <p><b>Polynuclear Aromatic hydrocarbons:</b> Naphthalene – nomenclature, Haworth synthesis; physical properties, reactions – electrophilic substitution reaction, nitration, sulphonation, halogenation, Friedel – Crafts acylation &amp; alkylation, preferential substitution at alpha - position – reduction, oxidation – uses.</p> <p>Anthracene – synthesis by Elbs reaction, Diels – Alder reaction and Haworth synthesis; physical properties; reactions - Diels-Alder reaction, preferential substitution at C-9 and C-10; uses.</p>
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	<p>Questions related to the above topics, from various competitive examinations UPSC/JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)</p>
Skills acquired from this course	<p>Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.</p>
<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Puri B. R., Sharma L. R., <i>Principles of Physical Chemistry</i>, Vishal Publishing Company, Jalandhar. 38<sup>th</sup> Ed., 2002.</li> <li>2. Puri B. R., Sharma L. R., Kalia K. C., <i>Principles of Inorganic Chemistry</i>, Milestone Publishers &amp; Distributors, 31<sup>st</sup> Ed., 2013.</li> <li>3. Madan R. D., Sathya Prakash, <i>Modern Inorganic Chemistry</i>, S.Chand and Company, New Delhi., 2<sup>nd</sup> Ed., 2003.</li> <li>4. Sathya Prakash, Tuli G. D., Basu S. K. &amp; Madan R. D., <i>Advanced Inorganic Chemistry</i>, S.Chand and Company, New Delhi., 17<sup>th</sup> Ed., 2003.</li> <li>5. Bahl B. S. &amp; Arul Bhal, <i>Advanced Organic Chemistry</i>, S.Chand and Company, New Delhi., 3<sup>rd</sup> Ed., 2003.</li> <li>6. Tewari K. S., Mehrothra S. N. &amp; Vishnoi N. K., <i>Text book of Organic Chemistry</i>, Vikas Publishing House, New Delhi, 2<sup>nd</sup> Ed., 1998.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Maron S. H. Prutton C. P., <i>Principles of Physical Chemistry</i>, The Macmillan Company, New York. 4<sup>th</sup> Ed., 1972.</li> <li>2. Barrow G. M., <i>Physical Chemistry</i>, Tata McGraw Hill, New Delhi. 5<sup>th</sup> Ed., 1992.</li> <li>3. Lee J .D, <i>Concise Inorganic Chemistry</i>, ELBS William Heinemann,</li> </ol>

	<p>London. 4<sup>th</sup>Ed., 1991.</p> <p>4. Huheey J. E., <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, Addison Wesley Publishing Company, India. 4<sup>th</sup> Ed., 1993.</p> <p>5. Gurudeep Raj, <i>Advanced Inorganic Chemistry Vol – I</i>, Goel Publishing House, Meerut. 26<sup>th</sup> Ed., 2001.</p> <p>Agarwal O. P., <i>Reactions and Reagents in Organic Chemistry</i>, Goel Publishing House, Meerut. 8<sup>th</sup>Ed., 1995.</p>
<b>Website and e-learning source</b>	<p><a href="https://onlinecourses.nptel.ac.in/http://cactus.dixie.edu/sblack/chem1010/lecture_notes/4B.html">https://onlinecourses.nptel.ac.in/http://cactus.dixie.edu/sblack/chem1010/lecture_notes/4B.html</a></p> <p><a href="http://www.auburn.edu/~deruija/pdareson.pdf">http://www.auburn.edu/~deruija/pdareson.pdf</a><a href="https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding">https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding</a></p> <p><b>MOOC components</b></p> <p><a href="http://nptel.ac.in/courses/104101090/">http://nptel.ac.in/courses/104101090/</a></p> <p>Lecture 1: Classification of elements and periodic properties</p> <p><a href="http://nptel.ac.in/courses/104101090/">http://nptel.ac.in/courses/104101090/</a></p>
<p><b>Course Learning Outcomes (for Mapping with POs and PSOs)On completion of the course the students should be able to</b></p> <p><b>CO1:</b> explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements.</p> <p><b>CO2:</b> identify the concept of acids, bases and ionic equilibria; periodic properties of s and p-block elements, preparation and properties of aliphatic and aromatic hydrocarbons.</p> <p><b>CO3:</b> compare the periodic properties of s and p- block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids.</p> <p><b>CO4:</b> interpret hydrocarbon classification, types of reactions, acids and bases, determine the properties s and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons.</p> <p><b>CO5:</b> predict the applications of acid-base indicators, buffers, compounds of s and p-block elements and hydrocarbons.</p>	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
<b>CO1</b>	S	S	S	S	S	M	S	S	S	S
<b>CO2</b>	S	S	S	S	S	M	S	S	S	S
<b>CO3</b>	S	S	S	S	S	S	M	S	S	S
<b>CO4</b>	S	S	S	M	M	M	M	S	S	S
<b>CO5</b>	S	S	S	M	S	S	S	M	S	S

**CO-PO Mapping (Course Articulation Matrix)**

<b>CO /PO</b>	<b>PS O1</b>	<b>PS O2</b>	<b>PS O3</b>	<b>PS O4</b>	<b>PS O5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	2	2	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	14	14	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**Level of Correlation between PSO's and CO's**

**Board of Studies Date : 02.11.2023**

<b>Title of the Course</b>	<b>QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS</b>						
<b>Course No.</b>	<b>Core Course – IV: Core Practical -II</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>3</b>	<b>Course Code</b>	<b>23UCHCCQ2</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	-	1	3		4		
<b>Prerequisites</b>	General Chemistry II						
<b>Objectives of the course</b>	<p>This course aims at providing knowledge on</p> <ul style="list-style-type: none"> <li>laboratory safety</li> <li>handling glass wares</li> <li>analysis of organic compounds</li> <li>preparation of organic compounds</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b>			<b>10 Hours</b>			
	<p>Safety rules, symbols and first-aid in chemistry laboratory.  Basic ideas about Bunsen burner, its operation and parts of the flame.  Chemistry laboratory glassware –basic information and uses</p>						
<b>Course Outline</b>	<b>UNIT II</b>			<b>25 Hours</b>			
	<p><b>Qualitative Organic Analysis</b>  Preliminary examination, detection of special elements - nitrogen, sulphur and halogens  Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests  Confirmation of functional groups</p> <ul style="list-style-type: none"> <li>monocarboxylic acid, dicarboxylic acid</li> <li>monohydric phenol, polyhydric phenol</li> <li>aldehyde, ketone, ester</li> <li>carbohydrate (reducing and non-reducing sugars)</li> <li>primary, secondary, tertiary amine</li> <li>monoamide, diamide, thioamide</li> <li>anilide, nitro compound</li> <li>Preparation of derivatives for functional groups</li> </ul>						



	<p style="text-align: center;"><b>UNIT III</b> <span style="float: right;"><b>25 Hours</b></span></p> <p><b>Preparation of Organic Compounds</b></p> <ol style="list-style-type: none"> <li>i. Nitration - picric acid from Phenol</li> <li>ii. Halogenation - p-bromo acetanilide from acetanilide</li> <li>iii. Oxidation - benzoic acid from Benzaldehyde</li> <li>iv. Microwave assisted reactions in water:             <ol style="list-style-type: none"> <li>v. Methyl benzoate to Benzoic acid</li> <li>vi. Salicylic acid from Methyl Salicylate</li> <li>vii. Rearrangement - Benzil to Benzilic Acid</li> <li>viii. Hydrolysis of benzamide to Benzoic Acid</li> </ol> </li> </ol>
	<p style="text-align: center;"><b>Separation and Purification Techniques (Not for Examination)</b></p> <ol style="list-style-type: none"> <li>1. Purification of organic compounds by crystallization (from water / alcohol) and distillation</li> <li>2. Determination of melting and boiling points of organic compounds.</li> <li>3. <b>Steam distillation</b> - Extraction of essential oil from citrus fruits/eucalyptus leaves.</li> <li>4. <b>Chromatography (any one) (Group experiment)</b> <ol style="list-style-type: none"> <li>(i) Separation of amino acids by Paper Chromatography</li> <li>(ii) Thin Layer Chromatography - mixture of sugars / plant pigments dichromate/permanganate</li> <li>(iii) Column Chromatography - extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene - anthracene picrate.</li> </ol> </li> <li>5. <b>Electrophoresis</b> – Separation of amino acids and proteins. <b>(Demonstration)</b></li> <li>6. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5 &amp; 6 – not for ESE)</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, Sultan Chand: New Delhi, 2<sup>nd</sup> Ed., 2012.</li> <li>2. Manna, A.K. <i>Practical Organic Chemistry</i>, Arunabha Sen, Books and Allied (P) LTD: Kolkata, 2018.</li> <li>3. Gurtu, J. N.; Kapoor, R. <i>Advanced Experimental Chemistry (Organic)</i>, Sultan Chand: New Delhi, 1987.</li> <li>4. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. <i>Vogel's Textbook of Practical Organic Chemistry</i>, Pearson: India, 5<sup>th</sup> Ed., 1989.</li> </ol>

<b>Website and e-learning source</b>	<a href="https://www.vlab.co.in/broad-area-chemical-sciences">https://www.vlab.co.in/broad-area-chemical-sciences</a>
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**Course Learning Outcomes (for Mapping with POs and PSOs)On**

**completion of the course the students should be able to**

**CO1:** observe the physical state, odour, colour and solubility of the given organic compound.

**CO2:** identify the presence of special elements and functional group in an unknown organic compound performing a systematic analysis.

**CO3:** compare mono and dicarboxylic acids, primary, secondary and tertiary amines, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing and non-reducing sugars and explain the reactions behind it.

**CO4:** exhibit a solid derivative with respect to the identified functional group.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	S	S	S	S	S	S	S	M	S	M
<b>CO2</b>	M	S	S	S	M	S	S	M	M	M
<b>CO3</b>	S	S	S	M	S	S	S	M	S	M
<b>CO4</b>	S	S	S	S	S	S	S	M	M	M

**CO-PO Mapping (Course Articulation Matrix)**

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>Weightage</b>	12	12	12	12	12
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3.0	3.0	3.0	3.0

**Level of Correlation between PSO's and CO's**

**Board of Studies Date : 02.11.2023**

<b>Title of the Course</b>		<b>INTEGRAL CALCULUS AND LAPLACE TRANSFORM (FOR I B.Sc. CHEMISTRY)</b>					
<b>Paper Number</b>		<b>EC II (GENERIC)</b>					
<b>Category</b>	<b>ELECTIVE</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>3</b>	<b>Course Code</b>	<b>23UCHGEC2</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>	
		<b>3</b>	<b>-</b>	<b>-</b>		<b>3</b>	
<b>Pre-requisite</b>		12 <sup>th</sup> Standard Mathematics					
<b>Objectives of the Course</b>		<p>1. To acquire the knowledge in integral calculus, Fourier series and Laplace transform</p> <p>2. To understand the method of doing problems using the above concepts.</p> <p>3. To analyse is the different methods of solving differential equations using the Laplace transform</p>					
<p><b>Course Outcomes:</b> Students will be able to</p> <p><b>CO1:</b> learn the notions of multiple integrals and Laplace transforms</p> <p><b>CO2:</b> Understand the change of order of integration, Fourier coefficients, odd and even functions and solved related problems.</p> <p><b>CO3:</b> analyse the properties of integration to evaluate double and triple integrals and Fourier series.</p> <p><b>CO4:</b> interpret the properties of Laplace transform, inverse Laplace transform and solve the related problems.</p> <p><b>CO5:</b> apply Laplace transform and inverse Laplace transform to solve the differential equations</p>							
<b>Course Outline</b>		<p><b>Unit – I (Hours: 9)</b> <b>Integral Calculus</b> Multiple Integrals, Evaluation of double integrals, Double integral in polar co- ordinates. <b>Chapter 20 (sections 20.1-20.17)</b></p>					
		<p><b>Unit – II (Hours: 9)</b> Triple integrals, Change of order of integration. applications of double and triple integrals to area volume and centroid. <b>Chapter 20 (sections 20.18 -20.44)</b></p>					
		<p><b>Unit – III (Hours: 9)</b> <b>Fourier Series</b> Definition, Finding Fourier series for a given periodic function with period <math>2\pi</math>, Fourier series for odd and even functions. <b>Chapter 21 (sections 21.1-21.40)</b></p>					
		<p><b>Unit – IV (Hours: 9)</b> <b>Laplace Transform</b> Definition, Laplace transform of elementary functions, Linearity property,</p>					

	shifting property, Change of Scale property, Laplace transform of derivatives. <b>Chapter 27 (sections 27.1-27.20)</b>
	<b>Unit – V (Hours: 9)</b> Inverse Laplace transform, solving differential equations using Laplace transform. (Simultaneous equations are to be excluded). <b>Chapter 27 (sections 27.23-27.57)</b> <b>(Section 5: Examples1-10 only, Exercise 4:1-26only)</b>
Skills acquired from the course	Knowledge, Problem-Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
<b>Recommended Text</b>	P.R.Vittal, Allied Mathematics, Margham Publications, Chennai-1
<b>Reference Books</b>	S. Narayanan and T. K. Manicavachagam Pillay, Calculus - Volume III, S. Viswanathan (Printers and Publishers), Pvt., Ltd,2011.
<b>Web resources</b>	1. <a href="https://nptel.ac.in">https://nptel.ac.in</a>

<b>Title of the Course</b>		<b>THEORY OF EQUATIONS AND LAPLACE TRANSFORM USING SAGE MATH- PRACTICAL</b>  <b>(FOR I B.Sc CHEMISTRY)</b>					
<b>Paper Number</b>		<b>EC – PRACTICAL</b>					
<b>Category</b>	<b>ELECTIVE</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>2</b>	<b>Course Code</b>	<b>23UCHGECQ</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>	
		-	-	2		2	
<b>Pre-requisite</b>		Basic knowledge in data and representations					
<b>Objectives of the Course</b>		The main objectives of this course are: <ol style="list-style-type: none"> <li>1. To work with interpolation and approximation methods in finding roots using SageMath.</li> <li>2. To utilize SageMath to perform symbolic and numerical integration. and Laplace Transforms</li> </ol>					
<b>Course Outcomes:</b> Students will be able to <b>CO1:</b> learn the notions of approximation of solutions, Laplace transforms, inverse Laplace transform and basic operations, commands within SageMath <b>CO2:</b> understand the fundamental principles of ordinary differential equations and numerical integrations using SageMath to solve them accurately  <b>CO3:</b> apply the Laplace, Inverse Laplace Transforms to solve linear differential equations in SageMath. <b>CO4:</b> analyze the application of SageMath in solving differential equations in simplifying and solving complex problems. <b>CO5:</b> evaluate multiple integrals, and non-linear equations with accuracy using SageMath while demonstrating critical thinking skills							
<b>Course Outline</b>		<b>Unit I: Theory of Equations</b>  Problems on Finding the roots of the equations using the SageMath. <b>(Page No: 139-140)</b>					
		<b>Unit II: Non-Linear Equations</b>  Numerical Solution: Location of solutions of Algebraic equations and Iterative Approximation Methods using SageMath. <b>(Page No: 263-278)</b>					
		<b>Unit III: Multiple integral</b>  Available Integration Functions, Multiple Integrals using SageMath <b>(Page No: 305-317)</b>					
		<b>Unit IV: Laplace Equations</b>					

	<p>Solving problems on Laplace transforms using SageMath <b>(Page No: 225)</b></p>
	<p><b>Unit V: Inverse Laplace Transforms</b></p> <p>Solving problems on Inverse Laplace transformations using SageMath <b>(Page No: 226)</b></p>
Skills acquired from the course	Computational Mathematics with SageMath
<b>Web resources</b>	<a href="https://archive.nptel.ac.in/courses/111/106/111106149/">https://archive.nptel.ac.in/courses/111/106/111106149/</a>

<b>Title of the Course</b>	<b>Dairy Chemistry</b>						
<b>Course No.</b>	<b>Skill Enhancement Course-II</b>						
<b>Category</b>	<b>NME</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>2</b>	<b>Course Code</b>	<b>23UCHSEC2</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	<b>2</b>	<b>-</b>	<b>-</b>		<b>2</b>		
<b>Prerequisites</b>	Higher secondary chemistry						
<b>Objectives of the course</b>	<p>This course aims at providing an overall view of the</p> <ul style="list-style-type: none"> <li>• chemistry of milk and milk products</li> <li>• processing of milk</li> <li>• preservation and formation of milk products.</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b>						<b>6 Hours</b>
	<p><b>Composition of Milk</b>  Milk-definition-general composition of milk- constituents of milk - lipids, proteins, carbohydrates, vitamins and minerals - physical properties of milk - colour, odour, acidity, specific gravity, viscosity and conductivity -Factors affecting the composition of milk - adulterants, preservatives with neutralizer-examples and their detection- estimation of fat, acidity and total solids in milk. Comparison of A1 and A2 milk</p>						
	<b>UNIT II</b>						<b>6 Hours</b>
	<p><b>Processing of Milk</b>  Microbiology of milk - destruction of micro - organisms in milk, physico – chemical changes taking place in milk due to processing - boiling, pasteurization – types of pasteurization -Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization.</p>						
	<b>UNIT III</b>						<b>6 Hours</b>
	<p><b>Major Milk Products</b>  Cream - definition - composition - chemistry of creaming process - gravitational and centrifugal methods of separation of cream -. Butter - definition -composition - theory of churning – desi butter - salted butter, estimation of acidity and moisture content in butter. Ghee - major constituents - common adulterants added to ghee and their detection - rancidity- definition - prevention - antioxidants and synergists - natural and synthetic.  Perspectives for food technology and health benefits of A2 milk and milk products.</p>						

	<b>UNIT IV</b> <span style="float: right;"><b>6 Hours</b></span> <b>Special Milk</b> Standardised milk - definition - merits - reconstituted milk - definition - flow diagram of manufacture - Homogenised milk - flavoured milk – vitaminized milk - toned milk -Incitation milk - Vegetable toned milk - humanized milk – condensed milk - definition, composition and nutritive value.
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	<b>UNIT V</b> <span style="float: right;"><b>6 Hours</b></span> <b>Fermented and other Milk Products</b> Fermented milk products – fermentation of milk - definition, conditions, cultured milk - definition of culture - example, conditions - cultured cream, butter milk - Bulgariou milk -acidophilous milk – Yoheer Indigeneous products- khoa and chhena definition - Ice cream -definition-percentage composition-types-ingredients-manufacture of ice-cream, stabilizers – emulsifiers and their role-milk powder-definition-need for making milk powder- drying process-types of drying. Milk based health food.
<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Bagavathi Sundari K, <i>Applied Chemistry</i>, MJP Publishers, 1<sup>st</sup> Ed, 2006.</li> <li>2. Rangappa K.S, Acharya K. T, <i>Indian Dairy Products</i>, Asia Publishing House New Delhi, 1974.</li> <li>3.Mathur M.P, Datta Roy D, Dinakar P, <i>Text book of Dairy Chemistry</i>, Indian Council of Agricultural Research, 1<sup>st</sup> Ed, 2008.</li> <li>4. Saurav Singh, <i>A Text book of dairy chemistry</i>, Daya Publishing house, 1<sup>st</sup> Ed, 2013.</li> <li>5. Choudhary P. L, <i>Text book of Dairy Chemistry</i>, Bio-Green book Publishers, 2021.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Robert Jenness, Patom S, <i>Principles of Dairy Chemistry</i>, S. Wiley, New York, 2005.</li> <li>2. Wond F.P, <i>Fundamentals of Dairy Chemistry</i>, Springer, Singapore, 2006.</li> <li>3. Sukumar De, <i>Outlines of Dairy Technology</i>, Oxford University Press, New Delhi, 1980.</li> <li>4. Fox P.F, Mcsweeney P.L.H, <i>Dairy Chemistry and Biochemistry</i>, Springer, 2<sup>nd</sup> Ed, 2016.</li> <li>5. Fox P.F, Uniacke-Lowe T, McSweeney P.L.H, OMahony J.A, <i>Dairy Chemistry and Biochemistry</i>, Springer, 2<sup>nd</sup> Ed, 2015.</li> </ol>
<b>Website and e-learning source</b>	



**Course Learning Outcomes (for Mapping with POs and PSOs)**

**On completion of the course the students should be able to**

**CO 1:** discuss about general composition of milk – constituents and its physical properties.

**CO 2:** describe pasteurization of milk and various types of pasteurization -Bottle, Batch and Ultra High Temperature Pasteurization.

**CO 3:** distinguish between cream and butter, their composition and how to estimate fat in cream and Ghee

**CO 4:** explain about homogenized milk, flavoured milk, vitaminised milk and toned milk.

**CO 5:** Summarize different types of drying process of milk.

**Board of Studies Date : 02.11.2023**

<b>Title of the Course</b>	<b>INHERITED KNOWLEDGE IN COSMETIC CHEMISTRY</b>						
<b>Course No.</b>	<b>Skill Enhancement Course-III (Indian Knowledge System)</b>						
<b>Category</b>	<b>SEC</b>	<b>Year</b>	<b>I</b>	<b>Cre dits</b>	<b>2</b>	<b>Course Code</b>	<b>23UCHSEC3</b>
		<b>Semester</b>	<b>II</b>				
<b>Instructional</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
<b>hours per week</b>	<b>2</b>	<b>-</b>	<b>-</b>		<b>2</b>		
<b>Prerequisites</b>	Higher secondary Chemistry						
<b>Objectives of the course</b>	<p>This course aims at familiarizing the students with</p> <ul style="list-style-type: none"> <li>• formulations of various types of cosmetics and their significance</li> <li>• hair, skin and dental care</li> <li>• makeup preparations and personal grooming</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b>						<b>6 Hours</b>
	<b>Skin care: Ancient and modern perspective</b>						
	Indian Knowledge system for cosmetics- Dinacharya for healthy skin, ayurvedic formulations for skin care- cosmetic tailams, Ghritas and Kosta etc. Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, skin tonics – key ingredients, skin lightness.						
	<b>UNIT II</b>						<b>6 Hours</b>
	<b>Ancient formulations for Hair care and Dental care</b>						
	Sanskrit origin of shampoo, types of shampoo- traditional and modern-powder, cream, liquid and gel, ingredients; tips from ancient Indian system for hair care- Kayakalpa-vettiver bath. Dental care – Dantashauscha- Neem and babul sticks, Oil pulling, Tooth pastes – ingredients – mouth wash.						
	<b>UNIT III</b>						<b>6 Hours</b>
	<b>Types of Make up</b>						
	Base – foundation – types – ingredients; lipstick-ancient Indian origin, eyeliner, mascara, eye shadow, concealers, rouge.						
	<b>UNIT IV</b>						<b>6 Hours</b>
	<b>Natural and Synthetic Perfumes</b>						
	Indian perfume Industry-attars- -essential oils- Medicinal values of herbal products, some important perfume oil, dhavana oil, musk, ambrette oil, champaka oil and oil of vettiver, synthetic – classification emphasizing characteristics –esters – alcohols – aldehydes – ketones.						



CO5	S	M	S	S	S	S	S	S	M	S
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**CO-PO Mapping (Course Articulation Matrix)**

CO /PO	PS O1	PS O 2	PS O3	PS O4	PS O 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage of Course Contribution to Pos</b>	3.0	3. 0	3.0	3.0	3.0

**Level of Correlation between PSO's and CO's**

**Board of Studies Date : 02.11.2023**