MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 101

DEPARTMENT OF CHEMISTRY

B.Sc. Chemistry

Curriculum Framework, Syllabus and Regulations

(Based on TANSCHE Syllabus under Choice Based Credit System -CBCS)

(For the candidates to be admitted from the Academic Year 2023-24)

Mother Teresa Women's University, Kodaikanal
Department of Chemistry
Choice Based Credit System (CBCS)
(2023-2024 onwards)
B. Sc. Chemistry

1. About the Department

The Department of Chemistry, Mother Teresa Women's University, Kodaikanal was established in 2006 and is motivated to provide a complete learning opportunity and quality education encompassing developments in frontier research areas in chemistry. We aim to strongly motivate our students for research and provide them adequate training in synthesis, characterization, application studies and instrumentation and equip students to meet the global requisites for employment. The Department offers M. Sc., M. Phil., and Ph. D programs.The Department is specialized in research areas such as Coordination Chemistry, X-ray-crystallography, Medicinal Chemistry and Bioinorganic Chemistry.

2. About the Programme

The B.Sc Chemistry Degree Program aims to impart sound knowledge in the undamental aspects of the important branches of Chemistry. The curriculum is designed to integrate theoretical aspects with experimental/laboratory techniques and analytical thinking which are incorporated in the core and elective courses to equip the learners with the skills required for employability and research. The non-major elective courses, "Clinical chemistry" and "Applied chemistry" provide an overview of the important applications of chemistry to the non-major students. The unique features of the curriculum are ICT based and management oriented skilled based courses, which equip the learners with the essential knowledge of computer applications and managerial skills.

3. Programme Educational Objectives

PEO1	To develop broad knowledge in Chemistry in addition to understanding of key chemical concepts, principles and theories
PEO2	To employ critical thinking and scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
PEO3	To develop students' ability and skill to acquire expertise in solving both theoretical and applied chemistry problems.
PEO4	To provide knowledge and skill to the students' thus enabling them to undertake further studies in Chemistry related areas or multidisciplinary areas that can be helpful for self- employment/entrepreneurship.
PEO5	inculcate the scientific temperament in the students.

4. Eligibility

A candidate who has passed the Higher Secondary Examination with Chemistry, Physics and Mathematics/Zoology as core subjects of Tamil Nadu Higher Secondary Board or an examination of some other board accepted by Mother Teresa Women's University shall be eligible for admission into B.Sc., course in Chemistry.

5. General Guidelines for UG Programme

a. Duration: The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

b. Medium of Instruction: English

c. Evaluation: Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

i. **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**

ii. **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions (MCQs): 2 questions from each Unit	**10**
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 140**

- **Project Report**

A student should carry out and submit the Project Report at the end of the fifth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and anExternal Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

6. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent

75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

7. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance mustapply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

8. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

9. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

Program Outcomes (POs)

On completion of this Programme, the learners will be able to

PO1	To develop broad knowledge in chemistry in addition to understanding of key chemical concepts, principles and theories
PO2	To employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
PO3	To develop students' ability and skill to acquire expertise over solving both theoretical and applied chemistry problems.
PO4	To provide knowledge and skill to the students' thus enabling them to undertake further studies in chemistry in related areas or multidisciplinary areas that can be helpful for self-employment/entrepreneurship.
PO5	To inculcate the scientific temperament in the students.

Program Specific Outcomes (PSOs)

PSO1	Systematic and coherent understanding of the fundamental concepts in Physical chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry and all other related allied chemistry subjects.

PSO2	Ability to use the evidence based comparative chemistry approach to explain the chemical synthesis and analysis.
PSO3	Ability to demonstrate the experimental techniques and methods of their area of specialization in Chemistry.
PSO4	Developing critical thinking ability by way of solving problems/numerical using Basic chemistry knowledge and concepts
PSO5	Understand good laboratory practices and safety.
PSO6	Inculcating a habit of learning continuously through use of advanced ICT techniques and other available techniques/books/journals for personal academic growth as well as for increasing employability opportunity.

SYLLABUS FRAMEWWORK FOR B. Sc CHEMISTRY (As per TANSCHE from 2023-24)

SEMESTER I				
Part	**Course Code**	**List of Courses**	**Credit**	**No. of Hours**
Part-1	U23TAL11	Language-1 – Tamil	3	6
Part-2	U23ENL21	Language-2 – English	3	6
Part-3	U23CHT11	Core-1: Theory General Chemistry-I	5	5
	U23CHP11	Core-2: Practical Organic Analysis and Organic Estimation	5	5
	U23CHA11	Elective-1 Discipline Specific Elective (Allied) Mathematics I / Zoology	3	4
Part-4	U23CHS1A / U23CHS1B	Skill Enhancement Course SEC – 1: A - Food Chemistry / B - Role of Chemistry in Daily life	2	2
	U23CHF11	Foundation Course in Chemistry	2	2
Total			**23**	**30**

SEMESTER II				
Part	**Course Code**	**List of Courses**	**Credit**	**No. of Hours**
Part-1	U23TAL12	Language-1 – Tamil	3	6
Part-2	U23ENL22	Language-2 – English	3	6
Part-3	U23CHT22	Core-3: Theory General Chemistry- II	5	5
	U23CHP22	Core-4: Practical Quantitative Inorganic Estimation and Inorganic Preparation	5	5
	U23CHA22	Elective-2 Discipline Specific - (Allied) Mathematics II / Zoology Practical	3	4
Part-4	U23CHS22	Skill Enhancement Course -SEC - 2 (Soft Skills)	2	2
	U23CHS23	Skill Enhancement Course -SEC - 3 Entrepreneurial Skills in Chemistry	2	2
			23	**30**

<table>
<tr><td>Title of the Course</td><td colspan="7">GENERAL CHEMISTRY-I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core 1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">U23CHT11</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="2">-</td><td colspan="3">5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">The course aims at giving an overall view of the
• Various atomic models and atomic structure.
• Wave particle duality of matter.
• Periodic table, periodicity in properties and its application in explaining the chemical behaviour.
• Nature of chemical bonding and fundamental concepts of organic chemistry.</td></tr>
</table>

<table>
<tr><td rowspan="2">Course Outline</td><td>UNIT I

Atomic structure and Periodic trends
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; Photo electric 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 de-Broglie wavelength.</td></tr>
<tr><td>UNIT II

Introduction to Quantum mechanics
Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wave functions, Derivation of Schrodinger wave equation - Probability and electron density-visualizing the orbitals -Probability density and significance of Ψ and Ψ2.
Modern Periodic Table
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.</td></tr>
</table>

	UNIT III **Structure and bonding-I** **Ionic bond** Lewis dot structure of ionic compounds; properties of ionic compounds; Energy involved in ionic compounds; Born Haber cycle – lattice energies, Madelung constant; Ion polarization – polarising power and polarizability; Fajans' rules - effects of polarisation on properties of compounds. **Covalent bond** Shapes of orbitals, overlap of orbitals–σ and Π bonds –hybridization of CH_4, C_2H_4, C_2H_2, ; VSEPR theory - shapes of molecules $BeCl_2$, H_2O, PCl_3, NH_3, CH_4, PCl_5, SF_6. Partial ionic character of covalent bond-dipole moment, application to molecules of the type A_2, AB, AB_2, AB_3, AB_4– percentage ionic character.
	UNIT IV **Structure and bonding-II** VB theory– application to hydrogen molecule; concept of resonance-resonance structures of some inorganic species - CO_2,NO_2,CO_3^{2-} & NO_3^-; limitations of VBT;MO theory-bonding, anti-bonding and non-bonding orbitals, bond order, MO diagrams of H_2, C_2, O_2, O^{2-} N_2, CO, NO, HF. Magnetic characteristics, comparison of VB and MO theories. Coordinate bond: Definition, Adduct formation between BF_3 and NH_3. Metallic bond –electron sea model, VB model; Band theory-mechanism of conduction in solids (Brief idea only); conductors, insulator, semiconductor–types, applications of semi-conductors. Weak Chemical Forces - Vander Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Hydrogen bonding – Intramolecular and intermolecular hydrogen bonding, special properties of water, ice, stability of DNA (Structure of DNA not needed); Effects of hydrogen bonding on melting and boiling points.
	UNIT V **Basic concepts in Organic Chemistry and Electronic effects** Types of bond cleavage – heterolytic and hemolytic- reagents and substrates- types of reagents- electrophiles, nucleophiles, free radicals-reaction intermediates: carbanions, carbo-cations, carbenes and arynes. Inductive effect - reactivity of alkyl halides, acidity of halo acids, basicity of amines; inductomeric and electromeric effects. Resonance–resonance energy, conditions for resonance-acidity of phenols, basicity of aromatic amines, stability of carbonium ions, carbanions and free radicals.

	Hyperconjugation - stability of alkenes, bond length, orienting effect of methyl group. Types of organic reactions- addition, substitution, elimination and rearrangements.
Recommended Text	1. Madan,R.D.and Sathya Prakash, *Modern Inorganic Chemistry,* 2nded.; S. Chand and Company: New Delhi, 2003. 2. Puri, B. R. and Sharma, L. R. *Principles of Physical Chemistry,* 38thed.; Vishal PublishingCompany:Jalandhar,2002. 3. Bruce,P.Y. and Prasad K.J.R. *Essential Organic Chemistry*, Pearson Education: New Delhi, 2008. 4. A.Bahl and B.S.Bahl, Advanced Organic Chemistry, I Multi color Edition, S.Chand & Company, New Delhi,2010. 4. Satya Prakash, Advanced Inorganic Chemistry,R.D.Madan,VolI,5thEdition,S.Chandand Sons, New Delhi, 2012.
Reference Books	1. Maron,S.H.andPruttonC.P. *Principles of Physical Chemistry,*4thed.; TheMacmillanCompany:Newyork,1972. 2. Lee,J.D.*Concise Inorganic Chemistry,* 4thed.; ELBS William Heinemann: London, 1991. 3. GurudeepRaj, *Advanced Inorganic Chemistry,* 26thed.; Goel Publishing House: Meerut, 2001. 4. Atkins,P.W.&Paula,J.*PhysicalChemistry*,10thed.;Oxford University Press: NewYork,2014. 5. Huheey,J.E.*InorganicChemistry:PrinciplesofStructureandReactivity,* 4thed.; Addison, Wesley Publishing Company:India,1993.

Course Learning 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, reactions intermediate electronic effects in organic compounds, types of reagents.
CO3 Apply the theories of atomic structures, bonding, to calculate energy of spectral, transitions ,Δx, Δp electron gravity ,percentage ionic character and bond order.
CO4 Evaluate the relations existing between electronic configuration ,bonding, geometry of molecules and reactions; structure activity 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/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
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
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

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

<table>
<tr><td>Title of the Course</td><td colspan="6">ORGANIC ANALYSIS AND ORGANIC ESTIMATION</td></tr>
<tr><td>Paper No.</td><td colspan="6">Core 2</td></tr>
<tr><td>Category</td><td>Core Practical</td><td>Year I
Semester I</td><td colspan="2">Credits 5</td><td>Course Code</td><td>U23CHP11</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td>-</td><td colspan="2">-</td><td colspan="2">5</td><td>5</td></tr>
<tr><td>Prerequisites</td><td colspan="6"></td></tr>
<tr><td>Objectives of the course</td><td colspan="6">This course aims at providing knowledge on
• laboratory safety
• handling glassware
• analysis of organic compounds
• organic estimation</td></tr>
<tr><td rowspan="3">Course Outline</td><td colspan="6">UNIT I
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.</td></tr>
<tr><td colspan="6">Unit II
Qualitative Organic Analysis
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
• mono carboxylic acid, dicarboxylic acid
• monohydric phenol
• aldehyde, ketone, ester
• carbohydrate (reducing and non-reducing sugars)
• primary amine
• monoamide, diamide.
• anilide, nitro compound
• Preparation of derivatives for functional groups</td></tr>
<tr><td colspan="6">UNIT III
Organic Estimation
a. Estimation of aniline
b. Estimation of phenol</td></tr>
</table>

Reference Books	1. Venkateswaran,V.; Veeraswamy, R.; Kulandaivelu, A.R. *Basic Principles of Practical Chemistry*, 2nded.; Sultan Chand: New Delhi,2012. 2. Manna,A.K. *Practical Organic Chemistry*, Books and Allied: India, 2018. 3. Gurtu,J.N;Kapoor,R. *Advanced Experimental Chemistry (Organic)*, Sultan Chand: NewDelhi,1987. 4. Furniss,B.S.;Hannaford,A.J.;Smith,P.W.G.;Tatchell,A.R.*Vogel'sTextbook of Practical Organic Chemistry*, 5thed.; Pearson: India,1989.
Website and e-learning Source	https://www.vlab.co.in/broad-area-chemical-sciences

CO1 Estimate the amount of an organic compound in each solution.
CO2 Identify the presence of special elements and functional group in an unknown organic compound performing systematic analysis.
CO3 Compare mono and dicarboxylic acids, mono and diamides, mono and polyhydric phenols, aldehyde and ketone, reducing & non-reducing sugars and explain the reactions behind it.
CO4 Exhibit a solid derivative with respect to the identified functional group.

CO-PO Mapping (Course Articulation Matrix)

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

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

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD CHEMISTRY</td></tr>
<tr><td>Paper No.</td><td colspan="7">SEC-1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">U23CHS1A</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td></td><td colspan="3">-</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at giving an overall view of the
• Types of food
• Food adulteration and poisons
• Food additives and preservation</td></tr>
<tr><td rowspan="3">Course Outline</td><td colspan="7">UNIT I

Food Adulteration
Food adulteration-contamination of wheat, rice, milk, butter etc. with claystones, water and toxic chemicals Common adulterants, Ghee adulterants and their detection.</td></tr>
<tr><td colspan="7">UNIT II
Food Poison
Food poisons-natural poisons(alkaloids-nephrotoxin)pesticides, (DDT, BHC, Malathion)-Chemical poisons – First aid for poison consumed victims.</td></tr>
<tr><td colspan="7">UNITIII
Food Additives
Food additives-artificial sweeteners–Saccharin-Cyclomate and Aspartate Food flavours-some examples–Food colours–Emulsifying agents–preservatives-leavening agents. Baking powder–yeast–tastemakers–MSG-vinegar.</td></tr>
</table>

	UNIT-IV **Beverages** Beverages-soft drinks-soda-fruit juices-alcoholic beverages-examples. Carbonation-addiction to alcohol–diseases of liver and social problems.
	UNIT-V **Edible Oils** Fats and oils-Sources of oils-production of refined vegetable oils-preservation. Saturated and unsaturated fats - iodine value - role of MUFA and PUFA in preventing heart diseases.

	1.Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house,2010. 2.A text book of pharmaceutical chemistry by Jayashree Ghosh, S Chand publishing, 2012. 3.S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications,Karur,2006. 4.B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014. 5.Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor & Francis Group, 2019. 6.Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S.Chand & Co. Publishers, second edition, 2006.
Reference Books	1.Randolph. Norris Shreve, Chemical Process Industries, McGraw-Hill, Texas, fourth edition, 1977. 2.W.A.Poucher, Joseph A. Brink, Jr. Perfumes, Cosmetics and Soaps, Springer, 2000. 3.A.K. De, Environmental Chemistry, New Age International PublicCo.,1990.
Web site and e-learning source	

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

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students will be able to

CO1 Learn about Food adulteration-contamination of Wheat, Rice, Milk, Butter.
CO2 Get an awareness about food poisons like naturalpoisons(alkaloids-nephrotoxin)pesticides,DDT,BHC,Malathion
CO3 Get an exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries.
CO4 Acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.
CO5 **S**tudy about fats and oils-Sources of oils- production of refined vegetable oils-preservation. Saturated and unsaturated fats–MUFA and PUFA

<table>
<tr><td>Title of the Course</td><td colspan="7">ROLE OF CHEMISTRY IN DAILY LIFE</td></tr>
<tr><td>Paper No.</td><td colspan="7">SEC-1</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">U23CHS1B</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td></td><td colspan="3">-</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing an overall view of the
• Importance of Chemistry in everyday life
• Chemistry of building materials and food
• Chemistry of Drugs and pharmaceuticals</td></tr>
<tr><td rowspan="5">Course Outline</td><td colspan="7">UNIT I
General survey of chemicals used in everyday life. Air- components and their importance; photosynthetic reaction, green-house effect and the impact on our lifestyle. Water-Sources of water, qualities of potable water, soft and hard water.</td></tr>
<tr><td colspan="7">UNIT II
Building materials - cement, ceramics, glass and refractories - definition, composition and application only. Uses of Plastics polythene, PVC, bakelite, polyesters, melamine-formaldehyde resins.</td></tr>
<tr><td colspan="7">UNIT III
Food and Nutrition - Carbohydrates, Proteins, Fats -definition and their importance as food constituents– balanced diet–Calories minerals and vitamins(sources and their physiological importance).</td></tr>
<tr><td colspan="7">UNIT IV
Chemicals in food production–fertilizers-need, natural sources; urea, NPK fertilizers and super phosphate. Fuel – classification - solid, liquid and gaseous; nuclear fuel examples and uses.</td></tr>
<tr><td colspan="7">UNIT V
Pharmaceutical drugs-analgesics and antipyretics-paracetamol and aspirin. pigments and dyes - examples and applications.</td></tr>
</table>

Recommended Text	1.Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house,2010. 2.A textbook of pharmaceutical chemistry by Jayashree Ghosh, S Chandpublishing,2012. 3.S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications,Karur,2006. 4.B.K,Sharma,Industrial Chemistry; GOEL publishing house, Meerut,sixteenthedition,2014. 5.Introduction to forensic chemistry, Kelly M. Elkins, CRC Press Taylor& Francis Group, 2019. 6.Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S.Chand & Co. Publishers, second edition,2006.
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Website and e-learning source	

Course Learning Outcomes (for Mapping with Pos and PSOs) On completion of the course
CO1: Learn about the chemicals used in everyday life as well as air pollution and water pollution.

CO2: Get knowledge on building materials cement, ceramics, glass and plastics, polythene, PVC bakelite, polyesters,
CO3: AcquireinformationaboutFoodandNutrition.Carbohydrates,Proteins, Fats Also have an awareness about Cosmetics Toothpastes, face powder, soaps and detergents.
CO4: Discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuel classification solid, liquid and gaseous; nuclear fuel-examples and uses
CO5: Have an idea about the pharmaceutical drugs analgesics and antipyreticslike paracetamol and aspirin and also about pigments and dyes and its applications

CO-PO Mapping (Course Articulation Matrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
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
Weight age	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

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

<table>
<tr><td>Title of the Course</td><td colspan="7">FOUNDATION COURSE IN CHEMISTRY</td></tr>
<tr><td>Category</td><td>Foundation Core</td><td>Year
Semester</td><td>I
I</td><td>Credits</td><td>2</td><td>Course Code</td><td>U23CHF11</td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td></td><td>2</td><td>-</td><td colspan="3">-</td><td>2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing an overall view of
• Creating interest and confidence in chemistry.
• Understanding the fundamental concepts.
• Knowing the impact of chemistry in life.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT I
Remarkable Discoveries and Inventions
Major Contributions of Scheele, Lavoisier, Henry Becquerel, Mary Curie, Friedrich Wöhler, Michael Faraday, William Henry Perkin, Ramsay, Sir.C.V.Raman, Haber, Alexander Fleming, Hans Van Pechmann (Only brief idea for each) - Use of MRI scanning, Dialysis in blood purification.</td></tr>
<tr><td></td><td colspan="7">UNIT II
Laboratory hygiene and safety
Reactive inorganic substances and their toxicity (strong acids, bases, halogens, chromates). Hazards due to chemicals, toxic solids, liquids, gases, and other harmful substances - carcinogenic substances. Emergency procedures in chemical splashes to skin and eyes, burns and electric shock. Introduction to lab safety-regulatory requirements-labels, material safety-MSDS. Knowledge of hazard warning information and symbols.</td></tr>
<tr><td></td><td colspan="7">UNIT III
Principles of volumetric analysis
Moles, equivalent weights, Molality, Molarity, Normality, Percentage by Weight and Volume, ppm, - principle of volumetric analysis – primary and secondary standards.</td></tr>
<tr><td></td><td colspan="7">UNIT IV
Principles of Qualitative Analysis
Inorganic qualitative analysis –Common ion effect and solubility product and their application in the precipitation of cations in a mixture.</td></tr>
<tr><td></td><td colspan="7">UNIT V
Impact of Chemistry in human life
Everyday consumer items - Food preservatives, anti-oxidants, (brief idea only) - handmade soaps, shampoo, antiseptics, hair oils, and moisturizer (brief idea only) - Farmyard manure, Compost - Gaseous fuels at home – Glass fibre reinforced plastics and carbon Fibre Reinforced Plastics – examples.</td></tr>
</table>

Recommended Text	1.Elements of Analytical Chemistry by Gopalan Subramanian P.S. Gopalan R., Rangarajan K.Sultan Chand,2003. 2.Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house,2010. 3.S. Vaithyanathan, Textbook of Ancillary Chemistry; Priya Publications,Karur,2006. 4.B.K,Sharma,Industrial Chemistry; GOEL publishing house, Meerut,sixteenthedition,2014. 5.Introductiontoforensicchemistry,KellyM.Elkins,CRCPressTaylor&FrancisGroup,2019.
Reference Books	1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd ed.; Sultan Chand: New Delhi, 2012. 2. Mendham, J.; Denney, R. C.; Barnes, J. D.; Thomas, M.; Sivasankar, B.; Vogel's Textbook of Quantitative Chemical Analysis, 6th ed.; Pearson Education Ltd: New Delhi, 2000.
Web site and e-learning source	1. Timeline of chemistry – Wikipedia. 2. https://www.chemir.com/

Level of Correlation between PSO's and CO's

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

CO-PO Mapping (Course Articulation Matrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
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
Weightage	15	15	15	15	15

Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Course Learning Out comes (for Mapping with POs and PSOs)
On completion of the course the students should be able to

CO1	Appreciate the evolution of chemistry and the chemists who contributed for chemistry.
CO2	Demonstrate the lab safety-regulatory requirements, procedures in chemical splashes.
CO3	Explain the principles of volumetric analysis.
CO4	Discuss the principles of qualitative analysis.
CO5	Appreciate the impact of chemistry in human life.

SEMESTER II

Title of the Course	**GENERAL CHEMISTRY-II**						
Paper no.	**Core 3**						
Category	**Core**	**Year**	I	**Credits**	5	**Course Code**	U23CHT22
		Semester	II				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	4	1	-			**5**	
Prerequisites	General Chemistry I						

Objectives of the course	This course aims at providing an overall view of the • chemistry of acids, bases and ionic equilibrium • properties of s and p-block elements • chemistry of hydrocarbons • applications of acids and bases • compounds of main block elements and hydrocarbons
Course Outline	**UNIT I** **Acids, bases and Ionic equilibria** 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. Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson Hasselbalch equation. 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. Solubility product - determination and applications. Numerical problems involving the degree of hydrolysis and solubility product. **UNIT II** **Chemistry of s - Block Elements** 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. Preparation, properties and uses of NaOH, Na_2CO_3, $KClO_3$- Alkaline earth metals-General group discussion. **UNIT III** **Chemistry of p-Block Elements (Group15-18)** General characteristics of elements of Group15; chemistry of H_3N, NH_4^+, HN_3 and HNO_3. Chemistry of oxy acids of phosphorous (H_3PO_3 and H_3PO_4). General properties of elements of group16 Structure and allotropy of elements – Preparation, properties and structure of ozone - Classification of oxides – Oxy 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. Comparative study of halogen acids (HF, HCl, HBr and HI). Uses of $HClO_4$. Basic concepts of inter-halogen compounds- Structure of ICl, ClF_3, BrF_5 and IF_7. Basic nature of Iodine. Noble gases: Position in the periodic table. **Chemistry of p- Block Elements (Group 13 & 14)** Structure of XeF_2, XeF_4, XeF_6 and $XeOF_4$; uses of noble gases- clathrate compounds. Preparation and structure of diborane and borazine. Chemistry of borax. Extraction of Al and its uses. Alloys of Al. **UNIT IV** Comparison of carbon with silicon. Carbon-di-sulphide – Preparation, properties, structure and uses. Structure and uses of percarbonates. **Hydrocarbon Chemistry-I** **Petroproducts**: Fractional distillation of petroleum; cracking, isomerisation, alkylation, reforming and uses. **Alkenes**-Nomenclature, general methods of preparation – Mechanism of ß-elimination reactions – E1 and E2 mechanism - Hofmann and Saytzeff rules. Reactions of alkenes – addition reactions – Markownikoff's rule, Kharasch effect, oxidation reactions – hydroxylation, oxidative degradation, epoxidation, ozonolysis, polymerization. **Alkadienes** Nomenclature - classification – isolated, conjugated and cumulated dienes– Diels–Alder reactions. **Alkynes**

	Nomenclature; general methods of preparation, properties and reactions; acidic nature of terminal alkynes and acetylene. **Cycloalkanes**: Nomenclature, Relative stability of cycloalkanes, Bayer's strain theory and its limitations.
	UNIT V **Hydrocarbon Chemistry-II** **Benzene:** Source, structure of benzene, stability of benzene ring, molecular orbital picture of benzene, aromaticity, Huckel's (4n+2) rule and its applications. General mechanism of aromatic electrophilic substitution-nitration, sulphonation, halogenation, Friedel-Craft's alkylation and acylation. Mono substituted and di

	substituted benzene- Effect of substituent–orientation and reactivity. **Polynuclear Aromatic hydrocarbons**: Naphthalene – nomenclature, Haworth synthesis- reactions–preferential substitution at ß -position–reduction, oxidation–uses.
Extended Professional Component (is a Part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/JAM/TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired From this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	1. Madan R D, Sathya Prakash,(2003),Modern Inorganic Chemistry, 2nd ed, S.Chand and Company, New Delhi. 2. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2003),Advanced Inorganic Chemistry,17th ed.,S.Chand and Company, New Delhi. 3. Bahl BS, Arul Bhal,(2003),Advanced Organic Chemistry,3rd ed., S. Chand and Company, New Delhi. 4. Tewari KS, Mehrothra SN and Vishnoi NK,(1998), Text book of Organic Chemistry ,2nd ed., Vikas Publishing House, New Delhi. 5. Puri BR, Sharma LR, (2002), Principles of Physical Chemistry,38th ed., Vishal Publishing Company, Jalandhar.
Reference Books	1. Maron S Hand Prutton CP, (1972), Principles of Physical Chemistry, 4th ed., The Macmillan Company, New york. 2. Barrow GM,(1992), Physical Chemistry,5th ed., Tata McGraw Hill, New Delhi. 3. Lee JD, (1991),Concise Inorganic Chemistry,4th ed., ELBS William Heinemann, London. 4. Huheey JE,(1993), Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., Addison Wesley Publishing Company, India. 5. Gurudeep Raj, (2001), Advanced Inorganic Chemistry Vol–I,26th ed.,

	Goel Publishing House, Meerut. 6. Agarwal OP,(1995), Reactions and Reagents in Organic Chemistry,8th ed., Goel Publishing House, Meerut.

Website and e-learning source	https://onlinecourses.nptel.ac.inhttp://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.htmlhttp://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64 -atomic-structure-and-chemical-bonding **MOOC components** http://nptel.ac.in/courses/104101090/ Lecture1:Classificationofelementsandperiodicpropertieshttp://nptel.ac.in/courses/104101090/

Course Learning Out comes (for Mapping with POs and PSOs)
On completion of the course the students should be able to

CO1 Explain the concept of acids, bases and ionic equilibria; periodic properties of sand p-block elements, preparation and properties of aliphatic and aromatic hydrocarbons.
CO2 Discuss the periodic properties of s and p-block elements, reactions of aliphatic and aromatic hydrocarbons and strength of acids.
CO3 Classify hydrocarbons, types of reactions, acids and bases, examine the properties and p-block elements, reaction mechanisms of aliphatic and aromatic hydrocarbons.
CO4 Explain theories of acids, bases and indicators, buffer action and important compounds of s-block elements.
CO5 Assess the application of hard and soft acids indicators, buffers, compounds of s and p-block elements.

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

Level of Correlation between PSO's and CO's

CO-PO Mapping (Course Articulation Matrix)

CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5
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
Weight age	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

<table>
<tr><td>Title of the course</td><td colspan="7">QUANTITATIVE INORGANIC ESTIMATION AND INORGANIC PREPARATION</td></tr>
<tr><td>Paper no.</td><td colspan="7">Core IV</td></tr>
<tr><td>Category</td><td>Core Practicals</td><td>Year
Semester</td><td>I
II</td><td>Credits</td><td>5</td><td>Course Code</td><td>U23CHP22</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>-</td><td>-</td><td colspan="2">5</td><td colspan="3">5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher Secondary chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing knowledge on
• Laboratory safety
• Handling glasswares
• Quantitative estimation
• Preparation of inorganic compounds</td></tr>
<tr><td>Course outline</td><td colspan="7">UNIT I
Common Apparatus Used in Quantitative Estimation (Volumetric)
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.
Principle of Quantitative Estimation (Volumetric)
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,iodimetricandiodometrictitrations;indicators– types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.</td></tr>
<tr><td></td><td colspan="7">UNIT II
Quantitative Estimation (Volumetric)
Preparation of standard solution, dilution from stock solution
Acidimetry and alkalimetry
Titration acids: hydrochloric acid, sulphuric acid Standard solutions prepared: sodium carbonate, sodium bicarbonate, oxalic acid.
Permanganometry
Estimation of ferrous sulphate and oxalic acid using standard ferrous ammonium sulphate.
Dichrometry
Estimation of ferric alum using standard dichromate (external indicator)
Estimation of ferric alum using standard dichromate (internal indicator)
Iodometry
Estimation of copper in copper sulphate using standard dichromate
Argentimetry (Demonstration only)
Estimation of chloride in barium chloride using standard sodium chloride/</td></tr>
</table>

	Estimation of chloride in sodium chloride (Volhard's method)
	UNIT III **Complexometry** Estimation of hardness of water using EDTA **Preparation of Inorganic compounds** Tetra ammine copper(II) sulphate Mohr's Salt
Skills acquired From this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	**Reference Books:** 1. Venkateswaran,V.;Veeraswamy,R.;Kulandivelu, A.R. *Basic Principles of Practical Chemistry*,2nd ed.;Sultan Chand&Sons:NewDelhi,1997. 2. Nad,A.K.;Mahapatra,B.;Ghoshal,A.;*Anadvanced course in Practical Chemistry*, 3rded.; New Central Book Agency:Kolkata,2007.
Reference Books	1.Mendham,J.;Denney,R.C.;Barnes,J.D.;Thomas,M.;Sivasankar,B.; *Vogel's Textbook of Quantitative Chemical Analysis*, 6thed.;PearsonEducationLtd:NewDelhi,2000.
Website and e-learning source	**Web References:** 1) http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis 2) https://chemdictionary.org/titration-indicator/

Course Learning Outcomes (for Mapping with Pos and PSOs)

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

CO1 Explain the basic principles involve Titrimetric analysis and inorganic preparations.

CO2 Compare the methodologies of different titrimetric analysis

CO3 Calculate the concentrations of unknown solution in different ways and develop the skill estimated the amount of a substance present in a given solution.

CO4 Assess the yield of different inorganic preparations and identify the end point of various titrations.

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

CO-PO Mapping (Course Articulation Matrix)

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

<table>
<tr><td>Title of the Course</td><td colspan="6">SOFT SKILLS</td></tr>
<tr><td>Course Code</td><td colspan="6">U23CHS22</td></tr>
<tr><td>Paper No.</td><td colspan="6">Skill Enhancement Course (SEC-II)</td></tr>
<tr><td>Category</td><td colspan="2">Skill Enhancement Course-SEC-2</td><td>Year</td><td>I</td><td>Credits</td><td>2</td></tr>
<tr><td></td><td colspan="2"></td><td>Semester</td><td>II</td><td></td><td></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td>1</td><td>1</td><td colspan="3">-</td><td>2</td></tr>
<tr><td>Prerequisites</td><td colspan="6">Communicative skills acquired in Higher Secondary</td></tr>
<tr><td>Objectives of the Course</td><td colspan="6">The Course aims at
enabling the learners to make self-discovery
enhancing the learners’ overall personality
instilling the learners with positive attitudes to life
enabling the learners to efficiently manage their Time in learning and working environments
Improving the communication skills of the learners
Equipping the learners with interview skills</td></tr>
<tr><td>Course Outline</td><td colspan="6">Unit-I Soft Skills-Introduction
What are soft skills? - Importance of Soft Skills-Difference between Hard Skills and Soft Skills-Kinds of Soft Skills
Self-Discovery-SWOC Analysis-Advantages of SWOC analysis</td></tr>
<tr><td></td><td colspan="6">Unit-II-Attitude
What is Attitude? -Formation of attitudes-Positive and Negative attitudes - Power of positive attitude- Obstacles in Developing Positive Attitudes- Overcoming Negative Attitude and its Impacts- Developing Positive</td></tr>
</table>

	Attitude
	Unit III-Time Management Value of Time-Sense of Time management- Reasons for procrastination-Overcoming procrastination- Tips for Time Management-Deciding upon Priorities-Effective Scheduling
	Unit-IV-Communication Skills Listening-Listening and Hearing- Active and Passive Listening Speaking-Verbal and Non-verbal Communications Reading- Skimming, Scanning, Intensive, and Extensive Reading Writing-Formal and Informal Letters-Drafting Mails and Memos
	Unit V- Interview Skills Preparing Resume/CV Preparing Resume/CV-Covering Letter Interview Etiquette, Dress Code, Dos, and Don'ts
Recommended Texts	1. Alex, K.*Soft Skills.* S Chand & Co Ltd., Chennai: 2009. 2. Butterfield, Jeff et.al. *Soft Skills for Everyone*. Cengage India, New Delhi: 2022. 3. Hariharan, S., N. Sundararajan, S.P. Shanmugapriya. *Soft Skills.Gauvrav Books, Chennai:2020* 4. Sharma, Prashant. Soft Skills: Personality Development for Success. BPB Publications, Bengalaru: 2019.
Reference Books	1. Almonte, Richard. *A Practical Guide to Soft Skills: Communication, Psychology, and Ethics for Your Professional Life.* Routledge,Oxford: 2021. **2.** Bardhan, Peeta Bobby & Dr. Krishaveer Abhishek Challa. *A Complete Textbook on Soft Skills*. Kanishka Publisher, Chennai:2020. 3. Mitra, Barun K.*Personality Development and Soft Skills* (Second Edition). Oxford UVP., New Delhi:2016. 4. BAOU. *Business Communication & Soft Skills.*https://baou.edu.in/assets/pdf/BBAATR-304.pdf 5. GoSkills. *Learn Soft Skills*. https://www.goskills.com National Council of Educational Research and Training. *Soft skills for effective communication.*https://ncert.nic.in/textbook/pdf/kect108.pdf 6. SIRC of ICAI. *Soft Skills and Personality Development.* https://www.sirc-icai.org/images/cabf/Soft Skills & Personality Development.pdf

Course Learning Outcomes (for Mapping with Pos and PSOs)

On completion of the course, the learners will be able to

CO1: identify their strengths andweaknesses

CO2: identify the opportunities and the challenges

CO3: inculcate a positive attitude

CO4: understand the importance of scheduling their work based on priority
CO5: cultivate their LSRW skills for effective communication
CO6: prepare their CV/Resume on their own and discharge efficient interview skills

<table>
<tr><td>Title of the Course</td><td colspan="7">ENTREPRENEURIAL SKILLS IN CHEMISTRY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Skill Enhancement Course 3</td></tr>
<tr><td>Category</td><td>Skill Enhancement Course</td><td>Year
Semester</td><td>I
II</td><td>Credits</td><td>2</td><td>Course Code</td><td>U23CHS23</td></tr>
<tr><td>Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td></td><td>1</td><td>-</td><td colspan="2">1</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">General Chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims at providing training to
Develop entrepreneur skills in students.
To provide hands on experience to prepare and develop products.
Develop startups</td></tr>
<tr><td rowspan="2">Course Outline</td><td colspan="7">UNITI

MILK AND MILK PRODUCTS
Composition of Milk- Flavour and aroma of Milk - Effect of heat on milk ; Pasteurisation ; Homogenisation - Some Milk products : Cheese, Paneer, Cream, Butter, Ice Cream, Milk powder, Curd and butter milk.</td></tr>
<tr><td colspan="7">UNITII

Hands on Experience (Students can choose any four)

Detection of adulterants in food items like coffee, tea, pepper, chilli powder, turmeric powder, butter, ghee, milk, honey etc., by simple techniques.
Preparation of Jam, squash and Jelly, Gulkand, cottage cheese.

Preparation of products like candles, soap, detergents, cleaning powder, shampoos, pain balm, toothpaste/ powder and disinfectants in small scale.

Testing of water samples using a testing

kit.
Dyeing–Cotton fabrics with natural and synthetic
dyes Printing–tie and dye, batik.</td></tr>
</table>

Skills acquired From this course	Entrepreneurial skills.
Recommended Text	1. George S & Muralidharan V,(2007) Fibre to Finished Fabric–A Simple Approach, Publication Division, University of Madras, Chennai. 2. Appaswamy G P, A Handbook on Printing and Dyeing of Textiles.
Reference Books	Shyam Jha, Rapid detection of food adultery ants and contaminants(Theory and Practice), Elsevier,e-BookISBN9087128004289,1st Edition,2015
Website and e-learning source	https://www.vlab.co.in/broad-area-chemical-sciences

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to
CO1: Identify adulterated food items by doing simple chemical tests.
CO2: Prepare cleaning products and become entrepreneurs
CO3: Educate others about adulteration and motivate them to become entrepreneurs.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
Weightage	6	6	6	6	6
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Allied Papers offered by Chemistry Department
(For Zoology, Physics and Integrated Biotechnology)
Semester I

Title of the Course	**Fundamentals of Chemistry**						
Paper No.	**Elective 1**						
Category	**Core**	**Year**	I	**Credits**	**3**	**Course Code**	
		Semester	I				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	3	**1**	-			**4**	

Objectives

1. To understand the handling of chemicals and errors in chemical analysis
2. To get knowledge in chemical bonding and hybridization
3. To acquire knowledge in volumetric analysis
4. To understand the basic concept of chemistry of Thermodynamics and Kinetics

UNIT I

HANDLING OF CHEMICALS AND DATA ANALYSIS

a) Storage and handling of chemicals: Handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first-aid procedure.

b) Errors in chemical analysis: Accuracy, precision. Types of error- absolute and relative errors. Methods of eliminating and minimizing errors.

c) Separation techniques–Solvent extraction. Principle of adsorption and partition chromatography, column chromatography, thin layer chromatography (TLC), paper chromatography and their applications.

UNIT II

CHEMICAL BONDING

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing the formation of ionic bond.

b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based on hybridization.

c) Coordinate Bond: Nature of coordinate bond. Coordination complexes. Werner's theory. Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin

d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogen bonding. Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and

RNA.

e) van der Waal's forces: Dipole – dipole and dipole - induced dipole interactions.

UNIT III

VOLUMETRIC ANALYSIS

a)Methods of expressing concentration: normality, molarity, molality, ppm.

b)Primary and secondary standards: preparation of standard solutions

c)Principle of volumetric analysis: end point and equivalence points.

d)Strong and weak acids and bases - Ionic product of water , pH, pKa, pKb. Buffer solutions -pH of buffer solutions. Mention of Henderson equation & its significance.

UNIT IV

KINETICS

a) Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions.

b) Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry.

UNIT V

THERMODYNAMICS

a) Introduction: Scope and importance of thermodynamics- system and surrounding-isolated, closed and open systems- state of the system- intensive and extensive variables. Thermodynamic process- reversible and irreversible, isothermal and adiabatic process-

b) First law of thermodynamics- statement- definition of internal energy (E),enthalpy (H), applications of first law of thermodynamics.

The second law of thermodynamics: Limitations of first law and the need for the second law, different ways of stating II law and its significance, Spontaneous or irreversible process.

The concept of entropy – definition and physical significance of entropy.

Text Books:

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand& Company, New Delhi,2010.

2.Satya Prakash, Advanced Inorganic Chemistry, R.D. Madan, VolI, 5th Edition, S.Chand and Sons, New Delhi, 2012.

3.B.R. Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 46thEdision, Vishal Publishing Company, New Delhi, 2013.

Reference Book:

1.1. R. Gopalan, S. Sundaram, *Allied Chemistry*, Sultan Chand and Sons, 1995.

CO	Course outcomes	Remarks
CO1	Students can gain the knowledge on the handling of chemicals and errors in chemical analysis.	K2, K3
CO2	Learn Chemical Bonding and Hybridization	K2
CO3	Learn the calculations of preparing standard solutions	K2, K3
CO4	Understand and appreciate the advanced concepts and rate equations in chemical kinetics.	K2
CO5	Calculate change in thermodynamic properties, equilibrium constants, partial molar quantities, chemical potential	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S
CO3	S	S	S	S	M	M	S	M	S	S
CO4	S	S	S	S	M	M	S	S	S	S
CO5	S	S	S	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Semester II

<table>
<tr><td>Title of the Course</td><td colspan="7">VOLUMETRIC ANALYSIS</td></tr>
<tr><td>Paper No.</td><td colspan="7">Allied practical</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Skill Enhancement Course</td><td>Year</td><td>I</td><td>Credits</td><td>2</td><td>Course Code</td><td rowspan="2"></td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>1</td><td>-</td><td colspan="3">1</td><td colspan="2">2</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Higher Secondary</td></tr>
</table>

This course aims at providing knowledge on

- laboratory safety
- handling glasswares
- Volumetric analysis

Acidimetry and alkalimetry: Titration acids used: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodium bi carbonate, oxalic acid.

Oxidation and reduction titration: Oxidising agents: Potassium permanganate (permanganometry) Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid

Standard solutions prepared: Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid.

Iodometry titrations: titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions.

Standard solutions: potassium dichromate, copper sulphate.

Text Books

1.Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996.

2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.

Reference Books

1. Practical Chemistry by A.O. Thomas, Scientific Book Centre, Cannanore, 2003.

2. Basic Principles of Practical Chemistry, V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Learn the concept of Titration methods and various Titrations	**K2**
CO2	Understand the Acidimetry and alkalimetry titrations	**K2**
CO3	The preparation of standard solutions and methods of analyze the various salts	**K2, K4**