




**THIRUVALLUVAR UNIVERSITY**  
**SERKKADU, VELLORE-632115**

**B. Sc. CHEMISTRY**

**SYLLABUS**

**FROM THE ACADEMIC YEAR**  
**2023 – 2024**

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## 1. INTRODUCTION

### **B.Sc. Chemistry: Programme Outcome, Programme Specific Outcome and Course Outcome**

Chemistry is the study of composition and transformation of matter. A science that is central to energy production, health care, new material development for electronics and other applied fields and environmental protection. Bachelor's degree in Chemistry is the culmination of in-depth knowledge of Inorganic, Organic and Physical chemistry and specialized courses such as Pharmaceutical Chemistry, spectroscopy, Nanoscience, Forensic Science, Cosmetics & Personal Grooming, Food chemistry, Dairy Chemistry and so on. Thus, this programme helps learners in building a solid foundation for higher studies in Chemistry. The hands on experience the students gain in Practicals enable them to apply theory to solve problems in everyday life, think critically and innovatively. An aptitude for research is instilled through project work and industrial internship.

Students completing this programme will be able to present the concepts of Chemistry clearly and precisely. They can find solutions to pressing problems that mankind is facing today. They can interpret data and present their findings to both scientific community and laymen and have ability to work as a team and evolve to become an entrepreneur

Completion of this programme will also enable the learners to join teaching profession, conducting research in Industry and Government run research labs. A B.Sc chemistry student has the option to diversify to other branches such as Biochemistry, Biotechnology, Forensic Science etc... They have employability opportunities in public and private sector jobs in energy, pharmaceutical, Food, cosmetic industries etc...

<b>LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME</b>	
<b>Programme:</b>	<b>B.Sc. Chemistry</b>
<b>Programme Code:</b>	
<b>Duration:</b>	<b>3 Years (UG)</b>

<p><b>Programme Outcomes:</b></p>	<p><b>1: Disciplinary knowledge:</b> Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p><b>2: Communication Skills:</b> Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p><b>3: Critical thinking:</b> Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p><b>4: Problem solving: Capacity</b> to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.</p> <p><b>5: Analytical reasoning:</b> Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p><b>6: Research-related skills:</b> A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p> <p><b>7: Cooperation/Team work:</b> Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p> <p><b>PO8: Scientific reasoning:</b> Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p> <p><b>PO9: Reflective thinking:</b> Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.</p> <p><b>PO10 Information/digital literacy:</b> Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.</p> <p><b>PO 11 Self-directed learning:</b> Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. <b>PO 12 Multicultural competence:</b> Possess knowledge of the values and beliefs of</p>
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	<p>multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p><b>PO 13: Moral and ethical awareness/reasoning:</b> Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p><b>PO 14: Leadership readiness/qualities:</b> Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p><b>PO 15: Lifelong learning:</b> Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p>
<p><b>Programme Specific Outcomes:</b></p>	<p>On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to:</p> <p><b>PSO1: Disciplinary Knowledge:</b> Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.</p> <p><b>PSO2: Critical Thinking:</b> Analyse complex problems, evaluate information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively</p> <p><b>PSO3: Problem Solving:</b> Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities.</p> <p><b>PSO4: Analytical &amp; Scientific Reasoning:</b> Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models.</p> <p><b>PSO5: Research related skills:</b> Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.</p> <p><b>PSO6: Self-directed &amp; Lifelong Learning:</b> Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.</p>

PO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
PO1	!!					
PO2		!!				
PO3			!!			
PO4				!!		
PO5					!!	
PO6						!!

## 2. Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising statistical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced statistical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Statistics based problem solving skills are included as mandatory components in the ‘Training for Competitive Examinations’ course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Statistical Quality Control course is included to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training,

project and internships will give students an edge over the counterparts in the job market.

- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest DBMS and Computer software for Analytics.

**Value additions in the Revamped Curriculum:**

Semester	Newly introduced Components	Outcome / Benefits
I	<b>Foundation Course</b> To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Statistics and simulating mathematical concepts to real world.	<ul style="list-style-type: none"> <li>• Instil confidence among students</li> <li>• Create interest for the subject</li> </ul>
I, II, III, IV	<b>Skill Enhancement papers</b> (Discipline centric / Generic / Entrepreneurial)	<ul style="list-style-type: none"> <li>• Industry ready graduates</li> <li>• Skilled human resource</li> <li>• Students are equipped with essential skills to make them employable</li> </ul>
		<ul style="list-style-type: none"> <li>• Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects</li> </ul>
		<ul style="list-style-type: none"> <li>• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.</li> </ul>
		<ul style="list-style-type: none"> <li>• Entrepreneurial skill training will provide an opportunity for independent livelihood</li> <li>• Generates self – employment</li> <li>• Create small scale entrepreneurs</li> <li>• Training to girls leads to women empowerment</li> </ul>
		<ul style="list-style-type: none"> <li>• Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools</li> </ul>
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	<ul style="list-style-type: none"> <li>• Strengthening the domain knowledge</li> <li>• Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature</li> <li>• Students are exposed to Latest topics on Computer Science / IT, that require strong statistical background</li> </ul>
		<ul style="list-style-type: none"> <li>• Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of statistical models in the respective sectors</li> </ul>



<b>IV</b>	DBMS and Programming skill, Biostatistics, Statistical Quality Control, Official Statistics, Operations Research	<ul style="list-style-type: none"> <li>• Exposure to industry moulds students into solution providers</li> <li>• Generates Industry ready graduates</li> <li>• Employment opportunities enhanced</li> </ul>
<b>II year Vacation activity</b>	Internship / Industrial Training	<ul style="list-style-type: none"> <li>• Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.</li> </ul>
<b>V Semester</b>	Project with Viva – voce	<ul style="list-style-type: none"> <li>• Self-learning is enhanced</li> <li>• Application of the concept to real situation is conceived resulting in tangible outcome</li> </ul>
<b>VI Semester</b>	Introduction of Professional Competency component	<ul style="list-style-type: none"> <li>• Curriculum design accommodates all category of learners; ‘Statistics for Advanced Explain’ component will comprise of advanced topics in Statistics and allied fields, for those in the peer group / aspiring researchers;</li> <li>• ‘Training for Competitive Examinations’ –caters to the needs of the aspirants towards most sought - after services of the nation viz, UPSC, ISS, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.</li> </ul>
<b>Extra Credits: For Advanced Learners / Honors degree</b>		<ul style="list-style-type: none"> <li>• To cater to the needs of peer learners / research aspirants</li> </ul>

<b>Skills acquired from the Courses</b>	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
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## 6. CREDIT DISTRIBUTION FOR UG PROGRAMME

Sem I	Credit	Sem II	Credit	Sem III	Credit	Sem IV	Credit	Sem V	Credit	Sem VI	Credit
1.1. Language – Tamil	3	2.1. Language – Tamil	3	3.1. Language – Tamil	3	4.1. Language - Tamil	3	5.1 Core Course – \CC IX	4	6.1 Core Course – CC XIII	4
1.2 English	3	2.2 English	3	3.2 English	3	4.2 English	3	5.2 Core Course – CC X	4	6.2 Core Course – CC XIV	4
1.3 Core Course – CC I	4	2.3 Core Course – CC III	4	3.3 Core Course – CC V	4	4.3 Core Course – CC VII Core Industry Module	4	5. 3.Core Course – CC -XI	4	6.3 Core Course – CC XV	4
1.4 Core Course – CC II	4	2.4 Core Course – CC IV	4	3.4 Core Course – CC VI	4	4.4 Core Course – CC VIII	4	5. 3.Core Course –/ Project with viva- voce CC -XII	4	6.4 Elective - VII Generic/ Discipline Specific	3
1.5 Elective I Generic/ Discipline Specific	3	2.5 Elective II Generic/ Discipline Specific	3	3.5 Elective III Generic/ Discipline Specific	3	4.5 Elective IV Generic/ Discipline Specific	3	5.4 Elective V Generic/ Discipline Specific	3	6.5 Elective VIII Generic/ Discipline Specific	3
1.6 Skill Enhancement Course SEC-1 (NME)	2	2.6 Skill Enhancement Course SEC-2 (NME)	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	4.6 Skill Enhancement Course SEC-6	2	5.5 Elective VI Generic/ Discipline Specific	3	6.6 Extension Activity	1
		2.7 Skill Enhancement Course –SEC-3	2	3.7 Skill Enhancement Course SEC-5	2	4.7 Skill Enhancement Course SEC-7	2	5.6 Value Education	2	6.7 Professional Competency Skill	2
1.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-1	2	2.8 Ability Enhancement Compulsory Course (AECC) Soft Skill-2	2	3.7 Ability Enhancement Compulsory Course (AECC) Soft Skill-3	2	4.7 7Ability Enhancement Compulsory Course (AECC) Soft Skill-4	2	5.5 Summer Internship /Industrial Training	2		
1.8 Skill Enhancement - (Foundation Course)	2			3.8 E.V.S	1	4.8 E.V.S	1				
	<b>23</b>		<b>23</b>		<b>23</b>		<b>24</b>		<b>26</b>		<b>21</b>
<b>Total Credit Points</b>											<b>140</b>

**1.Template for Curriculum Design for UG Programme in Chemistry**  
**Credit Distribution for UG Programme in Chemistry**

**B.Sc Chemistry**  
**First Year**

**Semester-I**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language - Tamil	3	6
Part-II	English	3	4
Part-III	Core Courses 2 (CC1, CC2)	8	10
	Elective Course 1 ( Generic / Discipline Specific)EC1	3	4
Part-IV	Skill Enhancement Course SEC-1 (Non Major Elective)	2	2
	Foundation Course FC	2	2
	Ability Enhancement Compulsory Course(AECC 1) Soft Skill-1	2	2
		<b>23</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language - Tamil	3	6
Part-II	English	3	4
Part-III	Core Courses 2 (CC3, CC4)	8	10
	Elective Course 1 ( Generic / Discipline Specific) EC2	3	4
Part-IV	Skill Enhancement Course -SEC-2 (Non Major Elective)	2	2
	Skill Enhancement Course -SEC-3 (Discipline Specific / Generic)	2	2
	Ability Enhancement Compulsory Course(AECC 2) Soft Skill-2	2	2
		<b>23</b>	<b>30</b>

**Second Year**  
**Semester-III**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language - Tamil	3	6
Part-II	English	3	4
Part-III	Core Courses 2 (CC5, CC6)	8	10
	Elective Course 1 ( Generic / Discipline Specific)EC3	3	4
Part-IV	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline Specific/ Generic)	2	2
	Ability Enhancement Compulsory Course(AECC 3) Soft Skill-3	2	2
	Environmental Studies(EVS)	-	1
		<b>22</b>	<b>30</b>

**Semester-IV**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language - Tamil	3	6
Part-II	English	3	4
Part-III	Core Courses 2 (CC7, CC8)	8	8
	CC7: Core Industry Module -1		
	CC8 : Any Core paper		
	Elective Course 1 (Generic / Discipline Specific)EC4	3	4
Part-IV	Skill Enhancement Course -SEC-6	2	2
	Skill Enhancement Course -SEC-7 (Discipline Specific / Generic)	2	2
	Ability Enhancement Compulsory Course(AECC 4) Soft Skill-4	2	2
	Environmental Studies EVS	2	2
		<b>25</b>	<b>30</b>

### Third Year

#### Semester-V

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-III	Core Courses 3(CC9, CC10, CC11)	12	15
	Elective Courses 2 (Generic / Discipline Specific) EC5, EC6	6	9
	Core /Project with Viva voce CC12	4	4
Part-IV	Value Education	2	2
	Internship / Industrial Training (Carried out in II Year Summer vacation) (30 hours)	2	
		<b>26</b>	<b>30</b>

#### Semester-VI

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-III	Core Courses 3 (CC13, CC14, CC15)	12	15
	Elective Courses 2 (Generic / Discipline Specific) EC7, EC8	6	11
Part IV	Professional Competency Skill Enhancement Course SE8	2	4
Part-V	Extension Activity (Outside college hours)	1	-
		<b>21</b>	<b>30</b>

**Consolidated Semester wise and Component wise Credit distribution**

<b>Parts</b>	<b>Sem I</b>	<b>Sem II</b>	<b>Sem III</b>	<b>Sem IV</b>	<b>Sem V</b>	<b>Sem VI</b>	<b>Total Credits</b>
<b>Part I</b>	3	3	3	3	-	-	12
<b>Part II</b>	3	3	3	3	-	-	12
<b>Part III</b>	11	11	11	11	22	18	84
<b>Part IV</b>	6	6	5	8	4	2	31
<b>Part V</b>	-	-	-	-	-	1	1
<b>Total</b>	23	23	22	25	26	21	<b>140</b>

**\*Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree**

<b>Methods of Evaluation</b>			
<b>Internal Evaluation</b>	Continuous Internal Assessment Test		25 Marks
	Assignments		
	Seminars		
	Attendance and Class Participation		
<b>External Evaluation</b>	End Semester Examination		75 Marks
	Total		100 Marks
<b>Methods of Assessment</b>			
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions		
<b>Understand/ Comprehend (K2)</b>	MCQ, True/False, Short essays, Concept explanations, Short summary or overview		
<b>Application (K3)</b>	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain		
<b>Analyze (K4)</b>	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge		
<b>Evaluate (K5)</b>	Longer essay/ Evaluation essay, Critique or justify with pros and cons		
<b>Create (K6)</b>	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations		

**B.Sc Chemistry Curriculum Design**  
**First Year**  
**Semester- I**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>Hours per week (L/T/P)</b>
Part-I	Language – Tamil	3	6
Part-II	English	3	6
Part-III	General Chemistry–I	5	5
	Quantitative Inorganic estimation (titrimetry) and Inorganic Preparations	5	5
	Mathematics (or)Botany /Zoology	3	4
Part-IV	Skill Enhancement Course SEC- <b>FOOD CHEMISTRY</b>	2	2
	Foundation Course FC	2	2
		<b>23</b>	<b>30</b>

<b>Title of the Course</b>	<b>GENERAL CHEMISTRY-I</b>						
<b>Paper No.</b>	<b>Core I</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	I	<b>Credits</b>	5	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	4	1	-		5		
<b>Prerequisites</b>	Higher secondary chemistry						
<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</li> <li>• fundamental concepts of organic chemistry</li> </ul>						
<b>Course Outline</b>	<b>UNIT I</b>						
	<b>Atomic structure and Periodic trends</b>						
	<p>History of atom (J.J.Thomson, Rutherford); Moseley's Experiment and Atomic number, Atomic Spectra; Electronic Configuration of Atoms and ions- Hund's rule, Pauli's exclusion principle and Aufbau principle; Black-Body Radiation and Planck's quantum theory - Bohr's model of atom; Interpretation of H- spectrum; Photoelectric effect, Compton effect; Dual nature of Matter- De- Broglie wavelength-Davisson and Germer experiment Heisenberg's Uncertainty Principle;</p> <p>Numerical problems involving the core concepts.</p>						
<b>Unit II</b>							
<b>Introduction to Quantum mechanics</b>							
<p>Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics 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>							
<b>Modern Periodic Table</b>							
<p><b>Cause of periodicity</b>; Features of the periodic table; classification of elements - Periodic trends for atomic size- Atomic radii, Ionic and Covalent radii; ionization energy, electron affinity, electronegativity-electronegativity scales, applications of electronegativity.</p> <p>Problems involving the core concepts</p>							

	<p><b>UNIT-III: Structure and bonding - I</b></p> <p><b>Ionic bond</b></p> <p>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; Fajans’ rules - effects of polarisation on properties of compounds; problems involving the core concepts.</p> <p><b>Covalent bond</b></p> <p>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: 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>; <math>\pi</math> magnetic characteristics, comparison of VB and MO theories.</p> <p>Coordinate bond: Definition, Formation of <math>BF_3</math>, <math>NH_3</math>, <math>NH_4^+</math>, <math>H_3O^+</math> properties</p> <p>Metallic bond-electron sea model, VB model; Band theory-mechanism of conduction in solids; conductors, insulator, semiconductor – types, applications of semiconductors</p> <p>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(Examples only); Effects of chemical force, melting and boiling points.</p>
	<p><b>UNIT-V:</b></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 nitrynes.</p> <p>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</p>



	<p>radicals, reactivity of vinyl chloride, dipole moment of vinyl chloride and nitrobenzene, bond lengths; steric inhibition to resonance.</p> <p>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>
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 and 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. Madan, R. D. and Sathya Prakash, <i>Modern Inorganic Chemistry</i>, 2<sup>nd</sup>ed.; S. Chand and Company: New Delhi, 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>, 38<sup>th</sup>ed.; Vishal Publishing Company: Jalandhar, 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 UN, Dharmarha OP, Soni P.L. <i>Textbook of Physical Chemistry</i>, Sultan Chand &amp; Sons: New Delhi, 2016</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Maron, S. H. and Prutton C. P. <i>Principles of Physical Chemistry</i>, 4<sup>th</sup>ed.; The Macmillan Company: New York, 1972.</li> <li>2. Lee, J. D. <i>Concise Inorganic Chemistry</i>, 4th ed.; ELBS William Heinemann: London, 1991.</li> <li>3. Gurudeep Raj, <i>Advanced Inorganic Chemistry</i>, 26<sup>th</sup>ed.; Goel Publishing House: Meerut, 2001.</li> <li>4. Atkins, P.W. &amp; Paula, J. <i>Physical Chemistry</i>, 10th ed.; Oxford University Press: New York, 2014.</li> <li>5. Huheey, J. E. <i>Inorganic Chemistry: Principles of Structure and Reactivity</i>, 4<sup>th</sup> ed.; Addison, Wesley Publishing Company: India, 1993.</li> </ol>
<b>Website and e-learning source</b>	<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 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, reaction intermediates electronic effects in organic compounds, types of reagents.**CO3:** apply the theories of atomic structure, bonding, to calculate energy of a spectral transition,  $\Delta x$ ,  $\Delta p$  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.

	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 /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'**

<b>Title of the Course</b>	<b>Quantitative Inorganic Estimation (titrimetry) and Inorganic Preparations</b>						
<b>Paper No.</b>	<b>Core II</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	I	<b>Credits</b>	2	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	-	-	3		3		
<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>	<p><b>Unit I</b></p> <p><b>Chemical Laboratory Safety in Academic Institutions</b></p> <p>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.</p> <p><b>Common Apparatus Used in Quantitative Estimation (Volumetric)</b></p> <p>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.</p> <p><b>Principle of Quantitative Estimation (Volumetric)</b></p> <p>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.</p>						
	<p><b>Unit II</b></p> <p><b>Quantitative Estimation(Volumetric)</b></p> <p>Preparation of standard solution, dilution from stock solution</p> <p><b>Permanganometry</b></p> <p>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>Argentimetry</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>  <b>Complexometry</b>  Estimation of hardness of water using EDTA  <b>Estimations</b>  Estimation of iron in iron tablets Estimation of ascorbic acid.  <b>Preparation of Inorganic compounds-</b> Potash alum  Tetraammine copper (II) sulphate  Hexamminecobalt (III) chloride  Mohr's Salt  (Any 5 experiments)</p>
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.
Recommended Text	<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Venkateswaran, V.; Veeraswamy, R.; Kalandivelu, A.R. <i>Basic Principles of Practical Chemistry</i>, 2<sup>nd</sup> ed.; Sultan Chand &amp; Sons: New Delhi, 1997.</li> <li>2. Nad, A. K.; Mahapatra, B.; Ghoshal, A.; <i>An advanced course in Practical Chemistry</i>, 3<sup>rd</sup> ed.; New Central Book Agency: Kolkata, 2007.</li> </ol>
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><b>Web References:</b></p> <ol style="list-style-type: none"> <li>1) <a href="http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis">http://www.federica.unina.it/agraria/analytical-chemistry/volumetric-analysis</a></li> <li>2) <a href="https://chemdictionary.org/titration-indicator/">https://chemdictionary.org/titration-indicator/</a></li> </ol>
<p><b>Course Learning Outcomes (for Mapping with POs and PSOs)</b></p> <p><b>On successful completion of the course the students should be able to</b></p> <p><b>CO1:</b> explain the basic principles involved in titrimetric analysis and inorganic preparations.</p> <p><b>CO2:</b> compare the methodologies of different titrimetric analysis.</p> <p><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.</p> <p><b>CO4:</b> assess the yield of different inorganic preparations and identify the end point of various titrations.</p>	

	<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	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)**

<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

<b>Title of the Course</b>	<b>FOOD CHEMISTRY</b>						
<b>Paper No.</b>	<b>SEC -I</b>						
<b>Category</b>	<b>Year</b>	I	<b>Credits</b>	2	<b>Course Code</b>		
	<b>Semester</b>	I					
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	2	-	-		2		
<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> </ul>						
<b>Course Outline</b>	<p><b>UNIT I</b></p> <p><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 adulterants and their detection. Detection of adulterated foods by simple analytical techniques.</p>						
	<p><b>Unit-II</b></p> <p><b>Food Poison</b> Food poisons - natural poisons (alkaloids - nephrotoxin) - pesticides, (DDT, BHC, Malathion) -Chemical poisons - First aid for poison consumed victims.</p>						
	<p><b>UNIT-III</b></p> <p><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><b>UNIT-IV</b></p> <p><b>Beverages</b> Beverages-softdrinks-soda-fruitjuices-alcoholicbeverages-examples. Carbonation-addictionto alcohol– diseases ofliver andsocial problems.</p>						
	<p><b>UNIT-V</b></p> <p><b>Edible Oils</b> 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 heartdiseases-determination of iodine value,RM value,saponification values and their significance.</p>						

<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.</li> <li>2. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand &amp; Co. Publishers, second edition, 2006.</li> <li>3. Food chemistry, H. K. Chopra, P. S. Panesar, Narosa publishing house, 2010.</li> <li>4. Food Chemistry, Dr. L. Rakesh Sharma, Evincepub publishing, 2022.</li> <li>5. Food processing and preservation, G. Subbulakshmi, Shobha A Udipi, Padmini S Ghugre, New age international publishers, second edition, 2021.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. H.-D. Belitz, Werner Grosch, Food Chemistry Springer Science &amp; Business Media, 4<sup>th</sup> Edition, 2009.</li> <li>2. M. Swaminathan, Food Science and Experimental Foods, Ganesh and Company, 1979.</li> <li>3. Hasenhuettl, Gerard. L.; Hartel, Richard. W. Food Emulsifiers and their applications Springer New York 2nd ed. 2008.</li> <li>4. Food Chemistry, H.-D. Belitz, W. Grosch, P. Schieberle, Springer, fourth revised and extended edition, 2009.</li> <li>5. Principles of food chemistry, John M. deMan, John W. Finley, W. Jeffrey Hurst, Chang Yong Lee, Springer, Fourth edition, 2018.</li> </ol>
<b>Website and</b>	

<b>e-learning source</b>	
<b>Course Learning Outcomes (for Mapping with POs and PSOs)</b>	
<b>On completion of the course the students should be able to</b>	
<b>CO 1:</b> learn about Food adulteration - contamination of Wheat, Rice, Milk, Butter.	
<b>CO 2:</b> get an awareness about food poisons like natural poisons (alkaloids - nephrotoxin) pesticides, DDT, BHC, Malathion	
<b>CO 3:</b> get an exposure on food additives, artificial sweeteners, Saccharin, Cyclamate and Aspartate in the food industries.	
<b>CO 4:</b> acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples.	
<b>CO 5:</b> study about fats and oils - Sources of oils - production of refined vegetable oils - preservation. Saturated and unsaturated fats –MUFA and PUFA	

	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
<b>CO5</b>	S	M	S	S	S	S	S	M	M	S

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

<b>CO /PO</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>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

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



<b>Title of the Course</b>	<b>FOUNDATION COURSE IN CHEMISTRY</b>						
<b>Paper No.</b>	<b>Foundation Course</b>						
<b>Category</b>	<b>Core</b>	<b>Year</b>	I	<b>Credits</b>	2	<b>Course Code</b>	<b>23UCHFC01</b>
		<b>Semester</b>	I				
<b>Instructional hours per week</b>	<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>		<b>Total</b>		
	2	-	-		2		
<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>• Understand the concepts of periodic table</li> <li>• To know the naming of compounds and its nature</li> <li>• Understand the mathematical concepts</li> <li>• to describe the errors and it's minimized</li> <li>• To know the chromatography technique</li> </ul>						
<b>Course Outline</b>	<p><b>UNIT-I: Atomic properties &amp; periodic properties</b>  Mendeleef's periodic laws and table-modern periodic laws – Periodicity of property and magic numbers – Size of atoms and (Atomic and Ionic radii) - Metallic radii – Atomic radius – vanderwaals radius – Ionization energy (Isoelectronic species) – Electronic affinity – Electronegativity (Pauling, Allard and Rochow's scale, Mulliken) – Applications of electronegativity – Electropositive and electronegative character of elements melting and boiling points of elements – Oxidation state of elements (basic).</p> <p><b>UNIT-II: Nomenclature &amp; Hybridization</b>  Covalent bond – Formation of sigma and pi bond – Differences between sigma and pi bond – Homolytic and heterolytic cleavage of covalent bond – Tetra valency of carbon - Hybridization – Sp, sp<sup>2</sup> and sp<sup>3</sup> hybridizations – hybridization and geometry of methane, ethylene and acetylene – Definition and examples for nucleophile, electrophile and free radicals.  IUPAC system of nomenclature of common organic compounds (upto C-10) - Alkanes, alkenes, alkynes, cycloalkanes, and aromatic compounds - Naming of organic compounds with one functional group - Halogen compounds, alcohols, phenol, aldehydes, ketones, carboxylic acids and its derivatives.</p> <p><b>UNIT-III: Solutions&amp; Thermodynamics</b>  Mathematical concepts – Function of a real variable, differentiation – Derivative of a function, integration –Methods of integration  Concentration units – Formality, normality, molarity, molality, mole ratio-stoichiometry – Chemical reaction stoichiometric calculation, oxidation number – Oxidation number calculation  Gaseous state – Gas law – Boyle's Law, Charles law, Avogadro hypothesis  Thermodynamics – Zeroth, first, second, third law -Terminology in thermodynamics</p>						

**UNIT-IV: Data Analysis**

Data analysis - Theory of errors - Idea of significant figures and its important with examples - Difference between precision and accuracy - Methods of expressing precision and accuracy.

Error Analysis - Methods of minimizing errors - Problems related to mean, mode and standard deviation confidence limit.

**UNIT-V: Chromatography**

Chromatography - Introduction - Classification of chromatographic method

Paper Chromatography - Principle, theory -  $R_f$ ,  $R_x$ ,  $R_g$  values - TLC - Principle.

Adsorption Column and Ionexchange Chromatography - Principle.

**Thiruvalluvar university**

**Foundation course**

**Model Question paper**

**Time: 3 Hrs**

**Marks: 75**

**Section A**

**Answer all the questions (10×2=20)**

1. Define the term precision and accuracy.
2. Define mean. Calculate the mean for 20.20, 20.08 and 20.01
3. What is meant by  $R_f$  value?
4. What are the principles of paper chromatography?
5. Define molality and molarity.
6. What is a function of a real value?
7. Write IUPAC name of the following.

- a)  $\text{Cl-CH}_2\text{-CH}_2\text{-CH}_2\text{-Cl}$   
b)  $\text{CH}_2=\text{CH-CH}_2\text{-Cl}$
8. What type of hybridisation is involved in methane and acetylene.  
9. Electron affinity value increases from N to F in the periodic table. Give reason.  
10. What are isoelectric ions? Arrange the given ions in order of their decreasing size:  $\text{F}^-$ ,  $\text{O}^{2-}$ ,  $\text{Mg}^{2+}$  and  $\text{Na}^+$ .

### Section B

Answer all the questions (5×5=25)

11. a) Write a note on significant figures.

Or

- b) Explain- "confidence level". How is it useful for an analytical chemist?

12. a) Give reasons for stating that thin layer chromatography is considered to be better than paper chromatography.

or

- b) How are the components of a mixture identified in paper chromatography method?

13. a) What is a derivative of a function? Explain with an example.

Or

- b) What is Avogadro's law? What are the limitations?

14. a) What are the factors affecting covalent bond?

Or

- b) Write the structural formula of following compounds.

- i) Pentane 2,4 dione  
ii) Cyclohexane 1,3,5-triene  
iii) 4- methyl pentene-2  
iv) Butane 3-ol-1  
v) 2,2,4 trimethyl pentane

15. a) Give an account of modern periodic table show how it is more useful than Mendeleef's periodic table.

Or

- b) What is electronegativity of an element? Explain Pauling's scale of electronegativity. Give the periodicity of the element

### Section c

Answer any three questions(3×10=30)

16. How are errors classified?
17. Explain the effect of PH on ion exchange chromatography. How are they used in the purification of water?
18. How many types of integration methods are there? Explain with examples.
19. What are the general rules of IUPAC nomenclature in naming organic compounds?
20. Define ionisation potential. What are the factors affecting ionisation? Give its trend across the period and down the group of periodic table.

