

Programme Outcome, Programme Specific Outcome and Course Outcome

Name of the Department: Chemistry

2019 Admission Onwards (BSc Chemistry)

Programme Outcomes

1. Critical Thinking:

1.1. Acquire the ability to apply the basic tenets of logic and science to thoughts, actions and interventions.

1.2. Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.

1.3 Develop self-critical abilities and also the ability to view positions, problems and social issues from plural perspectives.

2. Effective Citizenship:

2.1. Learn to participate in nation building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy and the values that guide a republic.

2.2. Develop and practice gender sensitive attitudes, environmental awareness, empathetic social awareness about various kinds of marginalisation and the ability to understand and resist various kinds of discriminations.

2.3. Internalise certain highlights of the nation's and region's history. Especially of the freedom movement, the renaissance within native societies and the project of modernisation of the postcolonial society.

3. Effective Communication:

3.1. Acquire the ability to speak, write, read and listen clearly in person and through electronic media in both English and in one Modern Indian Language

3.2. Learn to articulate, analyse, synthesise, and evaluate ideas and situations in a well-informed manner.

3.3. Generate hypotheses and articulate assent or dissent by employing both reason and creative thinking.

4. Interdisciplinarity:

4.1. Perceive knowledge as an organic, comprehensive, interrelated and integrated faculty of the human mind.

4.2. Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.

4.3. Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.

Programme Specific Outcomes

1. Understand the fundamental concepts, principles and processes underlying the academic field of chemistry, its different subfields (analytical, inorganic, organic and physical), and its linkages with related disciplinary areas/subjects;

2. Demonstrate procedural knowledge that creates different types of professionals in the field of chemistry and related fields such as pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.;

3. Employ critical thinking and the scientific method to design, carry out, record and analyze the results of chemical experiments and get an awareness of the impact of chemistry on the environment and the society.

4. Use chemical techniques relevant to academia and industry, generic skills and global competencies, including knowledge and skills that enable students to undertake further studies in the field of chemistry or a related field, and work in the chemical and non-chemical industry sectors.

5. Undertake hands on lab work and practical activities which develop problem solving abilities required for successful career in pharmaceuticals, chemical industry, teaching, research, environmental monitoring, product quality, consumer goods industry, food products, cosmetics industry, etc.

6. Understand safety of chemicals, transfer and measurement of chemical, preparation of solutions, and find out the green route for chemical reaction for sustainable development.

7. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.

Course Outcome

Sl. No.	Name of Course (paper)	Outcomes
1	1B01CHE-Theoretical and Inorganic Chemistry	<ul style="list-style-type: none">5. Correlate the structure and behavior of atom6. Differentiate the various chemical interactions in molecules through bonding concepts7. Analyze and interpret the gradation in the properties of elements in the periodic table8. Predict the nuclear transmutations CO5: identify the role of radioactive materials in different applications
2	2B03CHE- Analytical & Inorganic Chemistry 1	<ul style="list-style-type: none">6. Determine the error, standard deviation and relative standard deviation of analytical data.7. Understand statistical treatment of analytical data and the principles underlying volumetric titrations.8. Understand basic principles behind selective precipitation

		<p>of cation.</p> <p>9. Summarize the characteristics of s- and p- block elements</p> <p>10. Compare the various concepts of acids and bases</p>
3	1B02CHE & 2B02CHE- Practical 1- Volumetric Analysis	<p>7. Apply the theoretical concepts while performing experiments.</p> <p>8. Acquire practical skill to estimate acid, base, oxidizing agents etc by volumetric titration method</p> <p>9. Estimate the metallic ions by complexometric titration method</p> <p>10. Acknowledge experimental errors and their possible sources.</p> <p>11. Able to prepare inorganic complexes</p> <p>12. Design, carry out, record and analyze the results of chemical experiments</p>
4	3B04CHE- Organic Chemistry -1	<p>7. Explain the types of electron displacement in organic molecules and predict the properties of molecules based on electron displacement effect.</p> <p>8. Distinguish aromatic, anti aromatic and nonaromatic compounds and ions and analyse the mechanistic details of aromatic electrophilic substitution</p> <p>9. Classify stereo isomers, understand the property of chirality, apply CIP rules to recognize the configuration and explain the stability of conformations drawing energy profile diagram</p> <p>10. Explain the mechanism of polymerization, synthesis and application of industrially important Polymers</p> <p>11. Explain the classification and the methods of preparation of important dyes</p> <p>12. Illustrate the preparative methods and synthetic applications of important synthetic reagents</p>
5	4B06CHE-Organic Chemistr-2	<p>5. Describe mechanisms for substitution and elimination reactions, and predict the effect of nucleophile, leaving group, and solvent on the relative rates of SN1 versus SN2 reactions, and E1 versus E2 reactions, as well as on the relative rates of substitution versus elimination.</p>

		<ol style="list-style-type: none"> 6. Explain Chugaev and Cope eliminations and E1CB mechanism 7. Illustrate the preparative methods and important properties of Hydro carbons, halogen compounds, Hydroxy compounds and Carbonyl Compounds 8. Explain the mechanism of important name reactions including rearrangements involving hydroxyl and Carbonyl functional groups
6	3B05CHE & 4B05CHE- Practicals 2- Inorganic Qualitative Analysis	<ol style="list-style-type: none"> 5. Apply the theoretical concepts while performing experiments. 6. Acquire practical skill to analyse the anions and cations qualitatively present in a mixture of inorganic salts 7. Able to design, carry out, record and analyze the results of chemical experiments 8. Learns the effective usage of chemicals
7	5B07CHE-Analytical & Inorganic Chemistry 2	<ol style="list-style-type: none"> 5. Understand the qualitative and quantitative aspects of analysis and separation techniques. 6. Explain instrumentation and working principle of different analytical techniques –TGA, DTA and radio chemical method of analysis. 7. Familiarize with the preparation, properties and uses of some inorganic compounds like hydrides of boron, sulphur and silicon based inorganic polymers and understand their importance 8. Explain the classification of refractories. 9. Know the position, electronic configuration and physical properties of noble gases and explain hybridization and geometry of different xenon compounds 10. Explain various steps involved in metallurgical operations and power metallurgy and understand Corrosion, theories of Corrosion and factors affecting Corrosion
8	5B08CHE- Inorganic Chemistry	<ol style="list-style-type: none"> 5. Understand the behavior of transition and inner transition elements and explain the separation of lanthanides by ion exchange method and lanthanide contraction 6. Understand key features of co-ordination compounds and illustrate the theories of coordination complexes, stability

		<p>of complexes and explain factors affecting crystal field splitting.</p> <p>7. Explain biological functions of metal ions.</p> <p>8. Familiarize new elements in periodic table and Understand recent developments in inorganic chemistry</p>
9	5B09CHE- Physical Chemistry 1	<p>7. Recognize and relate the properties of ideal and real gases</p> <p>8. Describe the properties of liquids.</p> <p>9. Identify and distinguish the types of solutions</p> <p>10. Explain colligative properties of dilute solution and determine the molecular weight of a solute</p> <p>11. Identify different crystallographic systems and various types of crystal defects</p> <p>12. Describe X ray diffraction to explain internal structure of solids</p>
10	5B010CHE- Physical Chemistry 2	<p>7. Identify the fundamental concepts of thermodynamics</p> <p>8. Relate and Interpret the various laws of thermodynamics</p> <p>9. Understand the concept of entropy and how the whole universe is related to it.</p> <p>10. Construct phase diagrams and study the equilibrium exists between various states of matter. and apply principles phase diagram to separation processes and for property modification of different type of system.</p> <p>11. Understand basic principles of surface chemistry and its application in various fields</p> <p>12. Correlate the types of colloids with its properties and to explore the applications in day today life.</p>
11	6B14CHE- Organic Chemistry 3	<p>7. Acquaint with the classification, structures and properties of carbohydrates, explain the configuration of glucose and fructose, their inter conversion, illustrate Killiani-Fischer synthesis and Ruff degradation</p> <p>8. Illustrate the preparative methods and the properties of different classes of organic acids, nitrogen containing compounds and heterocyclic compounds.</p> <p>9. Classify amino acids and peptides and explain the synthesis of simple peptides by N protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid phase synthesis. Explain the methods</p>

		<p>of determination of primary structure of peptides</p> <p>10. Distinguish the components of nucleic acids and lipids and their roles in biological system and the biological importance of various natural products .Familiarise with important drugs and their therapeutic applications</p> <p>11. Recognise the types and characteristics of pericyclic reaction and analyse the pericyclic reactions by FMO methods. Understand the photochemistry of carbonyl compounds</p> <p>12. Understand the principles of Green Chemistry and the importance of green synthesis and recognize the impact of green chemistry on human health and the environment</p>
12	6B15CHE- Physical Chemistry 3	<p>7. Understand the mechanism of electrical conductance, theories of electrical conductance, and conductometric titrations</p> <p>8. Understand the basic principle of ionic equilibrium and its application in laboratories</p> <p>9. Design different types of electro chemical cell and able to calculate its potential.</p> <p>10. Familiarise with electro analytical methods</p> <p>11. Acquaint with kinetics of simple, complex, enzymatic and surface reactions</p> <p>12. Understand basic principles of photochemistry and its application in spectrophotometry</p>
13	6B16CHE – Physical Methods in Chemistry	<p>6. i) Explain the important principles of spectroscopy ii) Apply spectroscopic techniques in analyzing the structure of simple organic molecules</p> <p>7. Acquainting the working principles of various instruments and their functions</p> <p>8. Understand the basic principles of symmetry and group theory and its applications in chemistry</p> <p>9. Study the basic principles of nanochemistry and understand the various nanofabrication methods</p> <p>10. Explain the important principles for quantum chemical and molecular mechanic methods of computing the geometry and energy of molecules</p>

14	6B17CHE/PCH A- Environmental Chemistry	<ol style="list-style-type: none"> 6. Know the importance of environmental studies and methods of conservation of natural resources 7. Describe the structure and function of an ecosystem and explain the values and Conservation of bio-diversity. 8. Explain the sources, environmental effects and control measures of various types of pollutions. 9. Identify the toxic chemicals in environment and understand the sources, effects and treatment of heavy metal poisoning 10. Understand the methods of domestic water treatment , Sewage analysis and Sewage treatment
15	5B11CHE & 6B11CHE- Practicals 3- Gravimetric Analysis	<ol style="list-style-type: none"> 7. Make use of standardised procedures for the Gravimetric analysis 8. learn the skills of Precipitation process, digestion, filtration, incineration etc. 9. Acquire practical Knowledge of co-precipitation 10. Handle sintered glass vessels 11. Acknowledge experimental errors and their possible sources. 12. Able to design, carry out, record and analyze the results of chemical experiments
16	5B12CHE 7 6B122CHE – Practical 4- Organic Chemistry	<ol style="list-style-type: none"> 6. Apply the theoretical concepts while performing experiments. 7. Acquire practical skill in qualitative analysis of organic compounds 8. Acquire practical skill in preparing organic compounds and in their purification by crystallisation 9. Separate organic compounds in a mixture –by steam distillation, TLC and Column Chromatography 10. Acquire the habit of working safely with the chemicals and handling of equipments
17	6B18CHE – Practical 5- Physical Chemistry	<ol style="list-style-type: none"> 5. Acquire practical skill in physical chemistry experiments such as Cryoscopy, Transition Experiments ,Phase Rule Experiments, Conductometric titrations ,Potentiometric titrations , colorimetry and Chemical Kinetics 6. Learn statistical approach for evaluating data 7. Able to carry out and record these experiments in a skilful

		manner 8. Acquire the habit of working safely with the chemicals and handling of equipments
18	5B13CHE & 6B13CHE- Project & Industrial Visit	3. Able to enhance the skills of managing the resources, time and team work 4. Students will be able to function as a member of an interdisciplinary problem