**Department of Chemistry**

**PROGRAMME OUTCOMES:**

**PO1. Critical Thinking:**To inculcate creative thinking, innovation, inquiry, analysis, evaluation andsynthesis of information.

**PO2**. **Problem Solving:** Understand and solve problems of relevance to society to meet thespecified needs using the knowledge, skills and attitudes acquired.

**PO3. Effective Communication:** The programme enables the learner to present scientific information in a clear and concise manner.

**PO4. Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development and the ability to act with an informed awareness of issues andparticipate in civic life through volunteering.

**PO5. Skill enhancement:** Fundamental theoretical knowledge and its application in designing of laboratory works copes the learner to contribute innovations to the society.

**PO6. Environment and Sustainability:** Understand the issues of environmental contexts and find out the green route for sustainable development.

**PO7. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and lifelong learning in the broadest context of socio-technological changes.

**PO8**.**Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding both theoretical and practical knowledge in all disciplines of Chemistry. The Programme curriculum is designed in such a way that Chemistry graduate Students can handle instruments and acquire idea about synthesize different pharmaceutical compounds.

**Programme Specific Outcomes**

**PSO-1**. Are able to communicate the results of their work to chemists and non-chemists.

**PSO-2**. To explain nomenclature, stereochemistry, structures, reactivity and mechanism of the

chemical reactions.

**PSO-3.** Identify chemical formulae and solve numerical problems.

**PSO4.** Use modern chemical tools, Models, Charts and equipment.

**PSO-5 .** Know structure-activity relationship.

**PSO-6 .** Understand good laboratory practices and safety.

**PSO-7 .** Develop research-oriented skills.

**PSO-8 .** Make aware and handle the sophisticated instruments/ equipment

**PSO-9 .** Know the structure and bonding in molecules/ ions and predict the Structure of molecule/ions.

**PSO10.** Understand and apply principles of Organic Chemistry for understanding the scientific

Phenomenon in Reaction mechanisms.

**PSO11.** Learn the Familiar name reactions and their reaction mechanisms.

**PSO-12.** Understand good laboratory practices and safety.

**PSO-13.** Study of organometallic reactions.

**PSO-14.** Study of free radical, bicyclic compound, conjugate addition of Enolates and pericyclic

reactions.

**PSO-15.**Are able to use modern library searching and retrieval methods to obtain information about

a topic, chemical, chemical technique, or an issue relating to chemistry.

Course Outcomes:

C-I (INORGANIC CHEMISTRY-I)

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| CO1 | Understand the Born Haber cycle to calculate lattices energy | National |
| CO2 | Brief idea about Ionic bond, Covalent bond, Molecular orbital theory & VSEPR theory |
| CO3 | Study the structure of atom, Hund’s rule, term symbol, calculation of microstate and selection rule. |
| CO4 | Discuss S, P, block elements and role of Periodic table and their groups in the field of Inorganic chemistry |

C-II (PHYSICAL CHEMISTRY-I)

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| CO1 | State and apply the concept of electrolyte, ionization, dissociation, buffer and calculation of PH | Regional/global/National |
| CO2 | Apply the concepts of colloids and gels |
| CO3 | Learning in depth about liquid states |
| CO4 | Justify the Classification of solids and laws of crystallography |

C-III (ORGANIC CHEMISTRY-I)

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| CO1 | Estimate the reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry. | National/Global |
| CO2 | Identify aromaticity of an organic compounds and mechanism of aromatic reactions. |
| CO3 | Explaination about Electrophile, nucleophiles, free radicals, electronegativity, resonance, and intermediates along the reaction pathways. |
| CO4 | How to use their understanding of organic mechanisms to predict the outcome of reactions. |

C-IV (PHYSICAL CHEMISTRY-II)

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| CO1 | Describe the thermodynamic derivation of relations between the various equilibrium constants Kp, Kc and Kx. Le-Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase. | National |
| CO2 | Differentiate between microscopic properties of molecules with macroscopic thermodynamic observable. |
| CO3 | Outline the simple models for predictive understanding of physical phenomena associated to  Chemical thermodynamics |
| CO4 | Able to differentiate colligative properties of solution like elevation of boiling point, depression of freezing point with relatively lowering the vapor pressure |

C-V (INORGANICCHEMISTRY-II)

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| CO1 | Understand bonding, Preparation, uses and Properties of S and P block elements. | Global |
| CO2 | Create an understanding about the use of inorganic polymer compounds and acid base theory. |
| CO3 | Create an overall idea about the ores, minerals and metal extraction and metallurgy. |
| CO4 | Analyze the concept of noble gases, their properties, preparation of some special compounds and to evaluate their structure by applying VSEPR theory. |

C-VI (ORGANIC CHEMISTRY-II)

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| CO1 | Classify alkyl halides and aryl halides including their preparation, and chemical properties. | Global |
| CO2 | Create a general idea about different classes of organic compounds like alcohols, phenols, ethers, and epoxides. |
| CO3 | Analyze and evaluate the different physical properties and chemical reactivity of different classes of carbonyl compounds. |
| CO4 | Understand the importance of acid derivatives by classifying their reactivity and mechanistic study of some important name reactions. |

C-VII (PHYSICAL CHEMISTRY-III)

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| CO1 | Understand the concept of phases, component and degree of freedom. And analyze different types of phase system. | Local/  Regional/  National/ Global |
| CO2 | Creating a brief idea about three component system and binary solution. |
| CO3 | Understand the difference of order and molecularity, and kinetics of complex reactions. |
| CO4 | Evaluate the concept of mechanism of different types of catalytic reactions and theory of surface chemistry. |

C-VIII (INORGANIC CHEMISTRY-III)

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| CO1 | Apply Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds. | National/ Global |
| CO2 | Understanding the nomenclature of coordination compounds/complexes, Molecular orbital theory, d-orbital splitting in tetrahedral, octahedral, square planar complexes, chelate effects. |
| CO3 | know about the separation of Lanthanoids and Actinoids, its color, spectra and magnetic Properties. |
| CO4 | Understand the chemistry of metals in biological systems, and their importance. |

C-IX (ORGANIC CHEMISTRY-III)

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| CO1 | Understand the classification and synthesis as well as chemical properties of nitrogen containing functional groups. | Global |
| CO2 | Illustrate reaction mechanism of and diazonium compounds and some important heterocyclic hydrocarbons. |
| CO3 | Classify aromatic compounds having hetero atoms and understand the concept behind aromaticity and their relative reactivity. |
| CO4 | Understand Classification, structure, mechanism of reactions of biologically important alkaloids and terpenes. |

C-X (PHYSICAL CHEMISTRY-IV)

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| CO1 | Understand the concept of electrolytes and conductance through the analysis of various important equations. | National/  Global |
| CO2 | Correlate the mobility of ions and conductance by applying different measurement methods. |
| CO3 | Create a brief idea of electrochemistry on electrolysis, redox process, metallurgy and different types of electrode. |
| CO4 | Apply the concept of electrochemistry on various system and its advance application. |

C-XI (ORGANIC CHEMISTRY-IV)

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| CO1 | Interpret the different energy levels of molecule and UV spectroscopy to analyze color and energy absorption of molecules. | Global |
| CO2 | Illustrate the modes of vibration in a molecule through IR spectroscopy and its application to identify an unknown molecule. |
| CO3 | Analyze the structure of a molecule by using NMR and Mass spectroscopy. |
| CO4 | Understand the chemistry of carbohydrates, structure of triose, tetrose, pentose, hexoses, stereochemistry of glucose. |

C-XII (PHYSICAL CHEMISTRY-V)

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| CO1 | Discuss the importance and the impact of quantum revolution in science. | Global |
| CO2 | Analyze the quantum mechanical treatment of chemical bonding. |
| CO3 | Understand the principle of different type of physical spectroscopy and their application on simple molecules. |
| CO4 | Predict molecular structure , bond length and degree of freedom of simple molecules by spectroscopic method . |

C-XIII (INORGANIC CHEMISTRY-IV)

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| CO1 | Apply 18 electron rule to understand bonding in organometallic compound | National/Global |
| CO2 | Discuss the preparation and properties of transition metal complexes. |
| CO3 | Explain Reaction mechanism and application of Homogeneous and Heterogeneous Catalyst. |
| CO4 | Understand the thermodynamic and kinetic aspect of reaction of metal complexes . |

C-XIIV (ORGANIC CHEMISTRY-V)

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| CO1 | Classify amino acids , peptides and proteins. | Local/National/Global |
| CO2 | Understand the mechanism of enzyme action. |
| CO3 | Discuss the energy concept of biosystems. |
| CO4 | focus on structure of pharmaceutical compounds and to release their importance . |

Discipline Specific Elective Papers

DSE-I (POLYMER CHEMISTRY)

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| CO1 | Introduce students with different types of polymer, their nomenclature, and various forces in it and its importance. | National |
| CO2 | Articulate mechanism and kinetics of different types of polymerization process and crystallization methods. |
| CO3 | Determine the weight of different polymers using various methods. |
| CO4 | Estimate the physical properties of polymers and a brief idea about some industrially important polymers. |

DSE-II (GREEN CHEMISTRY)

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| CO1 | Recognize the importance of environmental impact of chemistry and need of greener methods in chemical synthesis. | Global |
| CO2 | Develop environmentally friendly methods for various industrially important chemicals. |
| CO3 | Reframe the greener version of synthesis of some selected chemicals and to interpret its advantage over traditional methods. |
| CO4 | Develop a basic idea to choose chemicals for designing a new synthetic route and future aspects of green chemistry. |

DSE-III (INDUSTRIAL CHEMICALS AND ENVIRONMENT)

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| CO1 | Illustrate the industrial production of gases, and some chemicals like acids, bases, and redox reagents. | Local/Regional/National/ Global |
| CO2 | Identify the different segments of environment and to focus on cause and preventive measures of air pollution. |
| CO3 | Outline various components of water system and identify the cause of pollution and to implement waste management methods. |
| CO4 | Classify different types of energy sources and discrimination between renewable and non-renewable sources. |

DSE-IV (DISSERTATION)

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| CO1 | Implement the theoretical knowledge of a student to increase their curiosity and interpretation ability to present their response. | Local/Global |
| CO2 | Develop the practical knowledge and application of small experiments and instruments to solve their problem which will make them enthusiastic to pursue research further. |

GE-1

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| CO1 | Understand atomic and molecular structure and Wave mechanics | National/Global |
| CO2 | Discuss the nature of bonding using VBT and MOT |
| CO3 | Identify the stereochemistry of organic Chiral Molecules |
| CO4 | focus on preparation and reaction of different hydrocarbons |

GE-2

|  |  |  |
| --- | --- | --- |
| CO1 | Understand atomic and molecular structure and Wave mechanics | National/Global |
| CO2 | Discuss the nature of bonding using VBT and MOT |
| CO3 | Identify the stereochemistry of organic Chiral Molecules |
| CO4 | focus on preparation and reaction of different hydrocarbons |

GE-3

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| CO1 | Analyze the Thermo chemical datas of Different Compounds | Global |
| CO2 | Discuss application of solubility and solubility product |
| CO3 | Develop a route for preparation of Aromatic compounds |
| CO4 | Explain different types of reaction of alchols, aldehyde and ketones |

GE-4

|  |  |  |
| --- | --- | --- |
| CO1 | Analyze the Thermo chemical datas of Different Compounds | Global |
| CO2 | Discuss application of solubility and solubility product |
| CO3 | Develop a route for preparation of Aromatic compounds |
| CO4 | Explain different types of reaction of alchols, aldehyde and ketones |