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| **Semester :** | I | PAPER | I |
| **Course Title:** | **Inorganic Chemistry and Organic Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Understand the basic concepts of p-block elements. |
| **CO-2** | Explain the difference between solid, liquid and gases in terms of inter- molecular interactions. |
| **CO-3** | Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses. |
| **CO-4** | Understand the basic concepts of qualitative analysis of inorganic mixture. |
| **CO-5** | Use glassware, equipment and chemicals and follow experimental procedures in the laboratory. |
| **CO-6** | Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis. |

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| **Semester** | II | PAPER | II |
| **Course Title:** | **Organic and General Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt. |
| **CO-2** | Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved. |
| **CO-3** | Learn and identify many organic reaction mechanisms including Free Radical Substitution, Electrophilic Addition and Electrophilic Aromatic Substitution. |
| **CO-4** | Correlate and describe the stereo chemical properties of organic compounds and reactions. |
| **CO-5** | Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibrium. |
| **CO-6** | Learn and identify the concepts of a standard solution, primary and secondary standards. |

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| **Semester** | III | PAPER | III |
| **Course Title** | **Organic Chemistry and Spectroscopy** | | |

**COURSE OUTCOMES**

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| **CO-1** | Understand preparation, properties and reactions of halo alkanes, halo arenes and oxygen containing functional groups. |
| **CO-2** | Use the synthetic chemistry learnt in this course to do functional group transformations. |
| **CO-3** | To propose plausible mechanisms for any relevant reaction. |
| **CO-4** | How to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately |
| **CO-5** | How to dispose of chemicals in a safe and responsible manner |
| **CO-6** | How to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner. |

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| **Semester** | IV | PAPER | IV |
| **Course Title:** | **Inorganic ,Organic and Physical Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | To learn about the laws of absorption of light energy by molecules and the subsequent photochemical reactions. |
| **CO-2** | To understand the concept of quantum efficiency and mechanisms of photo chemical reactions. |
| **CO-3** | Use glassware, equipment and chemicals and follow experimental procedures in the laboratory. |
| **CO-4** | Determine melting and boiling points of organic compounds. |
| **CO-5** | Understand the application of concepts of different organic reactions studied in theory part of organic chemistry. |

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| **Semester** | IV | Paper | V |
| **Course Title** | **Inorganic Chemistry and Physical Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Understand concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values |
| **CO-2** | Application of quantization to spectroscopy. |
| **CO-3** | Various types of spectra and their use in structure determination. |
| **CO-4** | Use glassware, equipment and chemicals and follow experimental  Procedures in the laboratory. |
| **CO-5** | Apply concepts of electrochemistry in experiments |
| **CO-6** | Be familiar with electro analytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte. |

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| **Semester** | V | PAPER | V |
| **Course Title** | Inorganic, Physical and Organic chemistry | | |

**COURSE OUTCOMES**

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| **CO-1** | Know the meaning of various terms involved in co-ordination chemistry, Werner’s Theory , shapes of d-orbital’s and degeneracy of d-orbitals, crystal filed theory - splitting of d-orbitals in octahedral, tetrahedral and square-planar complexes, geometrical and optical isomerism of complexes, stereo chemistry of complexes with 4 and 6 coordination numbers. |
| **CO-2** | Know the Spectral and magnetic properties of metal complexes, Types of magnetic behavior, magnetic susceptibility-Gouy method, Stability of metal complexes, Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect. |
| **CO-3** | Understand Nitro hydrocarbons- Nomenclature and classification Preparation of Nitro alkanes, Nef reaction and Mannich reaction leading to Micheal addition and reduction. |
| **CO-4** | Know Nitrogen compounds and Nomenclature, Classification into 1°, 2°, 3° Amines and Quarter nary, Preparative methods Amines, Physical properties and basic character - Comparative basic strengths of different amines. |
| **CO-5** | Understand Thermodynamics, The first law of thermodynamics-statement, Second law and third law of thermodynamics, Carnot cycle and its efficiency. |

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| **Semester** | V | PAPER | VI |
| **Course Title** | **Inorganic , Organic and Physical Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Know about Reactivity of metal complexes, Labile and inert complexes, Tran’s effect and applications of trans effect, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and Cl- Structure and functions of hemoglobin, Myoglobin and Chlorophyll. |
| **CO-2** | Understand Chemical kinetics - Rate of reaction, order and molecularity, Derivation of rate constants for first, second, third and zero order reactions, Arrhenius equation, concept of activation energy. Photochemistry, Laws of photochemistry, Quantum yield-Photochemical reaction mechanism, fluorescence, phosphorescence, Photosensitized reactions. |
| **CO-3** | Know about Heterocyclic Compounds, preparation and properties of five membered ring compounds with one hetero atom Ex. Furan, Thiophene and pyrrole. |
| **CO-4** | To know Carbohydrates - preparation, properties and reactivity of Monosaccharaides namely Glucose,Fructose and Inter conversion of Monosaccharaides. |
| **CO-5** | To know Definition, classification, Methods of synthesis, Physical properties, Chemical properties of Amino acids, Zwitter ion structure, isoelectric point and Structure and nomenclature of peptides and proteins. |

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| **Semester** | VI | PAPER | VIIA |
| **Course Title** | **Analytical Methods in Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Identify the importance of solvent extraction and ion exchange method. |
| **CO-2** | Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis. |
| **CO-3** | Demonstrate the usage of common laboratory apparatus used in quantitative analysis. |
| **CO-4** | Understand the theories of different types of titrations. |
| **CO-5** | Gain knowledge on different types of errors and their minimization methods. |

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| **Semester** | VI | PAPER | VIIIC1 |
| **Course Title** | Organic Spectroscopic Techniques | | |

**COURSE OUTCOMES**

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| **CO-1** | To know Nuclear spin, Principles of NMR-Classical and Quantum Mechanical methods, Magnetic moment and Spin angular momentum. Larmour Frequency. Instrumentation. Relaxation spin-spin & spin lattice relaxation. Shielding constants, Chemical shifts, -Factors influencing Chemical shift. |
| **CO-2** | Understand Spin decoupling, Spin tickling, Deuterium exchange, Chemical shift reagents and Nuclear over Hauser effect. Applications in Medical diagnostics, Reaction kinetics and mechanically induced dynamic nuclear polarization. FT NMR and its Advantages. |
| **CO-3** | To know Electronic spectra of diatomic molecules. The Born-Oppenheimer approximation Vibrational coarse structure The Franck-Condon principle. Types of transitions,Chromophores, Conjugated dienes, trienes and polyenes, unsaturated carbonyl compounds-Woodward – Fieser rules. |
| **CO-4** | Understand Electronic spectra of poly atomic molecules. Chemical analysis by Electronic spectroscopy – Beer-Lambert’s Law. Deviation from Beer’s law. Quantitative Determination of metal ions (Mn+2, Fe+2, NO2-, Pb+2). Simultaneous determination of Chromium and Manganese in a mixture. |
| **CO-5** | Know the Basic Principles, Theory of ESR and Comparison of NMR & ESR. Instrumentation Factors affecting the ‘g’ value, determination of ‘g’ value Applications. |

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| **Semester** | VI | PAPER | VIIIC2 |
| **Course Title** | **Advanced Organic Reactions** | | |

**COURSE OUTCOMES**

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| **CO-1** | Know Molecular orbitals, carbonyl chromophore–triplet states, Jablonski diagram, inter–system crossing. Energy transfer. Energies properties and reaction of singlet and triplet states of and transitions in organic photochemistry. |
| **CO-2** | Understand Norrish cleavages, type I &II Mechanism, influence of sensitizer, photo Fries rearrangement. |
| **CO-3** | Know Principles of (1) Protection of alcohols, ethers, diols, carboxylic acids, esters, carbonyl compounds and amines. |
| **CO-4** | Understand Mannich reaction – Mannich bases – Robinson annulations. The Shapiro reaction, Stork–enamine reaction. Use of dithio acetals – Umpolung, phase Transfer catalysis – mechanisms and use of benzyl trialkyl ammonium halides. Witting reaction. |
| **CO-5** | Know Baylis–Hill man reaction, RCM olefm metathesis, Grubb catalyst, Mukayama aldol Reaction, Mitsunobu reaction, Mc-Murrey reaction, Julia–Lythgoe olefination, and Peterson's stereo selective olefination, Heck reaction. |

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| **Semester** | VI | PAPER | VIIC3 |
| **Course Title** | **Pharmaceutical and Medicinal Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Know the Pharmacy, Pharmacology, Pharmacophore, Pharmacodynamics, pharmacokinetics (ADME, Receptors - brief treatment) Metabolites and Anti metabolites. |
| **CO-2** | Understand Nomenclature: Chemical name, Generic name and trade names with examples Classification: Classification based on structures and therapeutic activity with one example each. |
| **CO-3** | know the **Synthesis and therapeutic activity of the compounds**  a. Chemotherapeutic Drugs Sulphadrugs2.Antibiotics - β-Lactam Antibiotics, Macrolide Antibiotics, 3. Anti-malarial Drugs (chloroquine) b. Psycho therapeutic Drugs: 1.antipyretic (Paracetamol) 2.Hypnotics, 3.Tranquilizers (Diazepam) 4.Levodopa. |
| **CO-4** | **Understand Pharmacodynamics Drugs**1. Anti-asthma Drugs (Salbutamol) 2.Antianginals (Glycerol Trinitrate)4. Diuretics |
| **CO-5** | Know the Immunity - CD-4cells, CD-8cells, Retro virus, Replication in human body, Investigation available, prevention of AIDS, Drugs available - examples with structures: PIS: Indivanir (crixivan), Nelfinavir . |

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| **Semester** | V | Paper | VIB |
| **Course Title** | **Analytical methods in Chemistry** | | |

**COURSE OUTCOMES**

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| **CO-1** | Identify the importance of solvent extraction and ion exchange method. |
| **CO-2** | Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis. |
| **CO-3** | Demonstrate the usage of common laboratory apparatus used in quantitative analysis. |
| **CO-4** | Understand the theories of different types of titrations. |
| **CO-5** | Gain knowledge on different types of errors and their minimization methods. |

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| **Semester** | V | Paper | VIIB |
| **Course Title** | **Analytical methods in chemistry1** | | |

**COURSE OUTCOMES**

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| **CO-1** | Estimate Iron (II) using standard Potassium dichromate solution. |
| **CO-2** | Learn the procedure for the estimation of total hardness of water. |
| **CO-3** | Demonstrate the determination of chloride using Mohr’s method. |
| **CO-4** | Acquire skills in the operation and calibration of pH meter. |
| **CO-5** | Perform the strong acid vs strong base titration using pH meter. |