PROGRAM OUTCOMES (POs), PROGRAM SPECIFIC OUTCOMES (PSOs)

&

COURSE OUTCOMES (COs)

DEPARTMENT OF CHEMISTRY

B.Sc. (CHEMISTRY)

PROGRAM OUTCOMES:

PO1: To Develop an aptitude towards Science and Environment.

PO2: To Equip the students with the basic skills in Science and Technology and also competentCommunication.

PO3: To Understand the basic concepts, Fundamental principles and Scientific theories relatedto various Scientific phenomenon and their relevance in the day to day activity.

PO4: To impart Students with Fundamentals of Information Technology and to have competentdigital knowledge.

PO5: To impart the critical thinking among the students to find out innovative strategies toresolve day to day challenges.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Should have deep fundamental knowledge of basics of chemical analysis for industrial, academic and scientific explorations and should be able to analyze given sample with rational applications of chemical techniques without any ambiguity

PSO2: Should have competent knowledge of the advanced techniques of chemical analysis and design for career, entrepreneurial and skill oriented attributes.

PSO3: Laboratory safety and sustainability should be riveted for personal and organizational assurance and quality maintenance.

PSO4: Should have multidisciplinary approach to initiate and resolve the problems in the assigned tasks.

COURSE OUTCOMES (COs)

SEMESTER-I

PAPER-I

CO1: Able to understand the concepts of chemical bonding and chemical and structural aspects of representative compounds Group-13, 14 and15.

CO2: Able to answer structural impact on properties of organic compounds and specific reactions of alicyclic and aromatic compounds.

CO3: Student will have strong foundation in the concepts of atomic structure, gaseous state, liquid state and solutions.

CO4: Student can able to perform salt analysis to detect anionic and cationic parts and also understand structural aspects like isomerism, conformational analysis and Crystallography.

SEMESTER-II

PAPER-II

CO1: Able to understand the concepts of chemical bonding and chemical and structural aspects of oxides, interhalogens, polyhalides and student can able to analyze the concepts behind the peculiarity of d-block elements.

CO2: Able to describe preparation, specific chemical reactions and identification tests of Halogen compounds, hydroxyl compounds, ethers and carbonyl compounds.

CO3: Student will have fundamental knowledge in the concepts of Electrochemistry and their applications and also able to calculate EMF of simple Electrochemical cells.

CO4: Student can able to perform volumetric, gravimetric and water analysis of given sample and also have knowledge of specific properties of dilute solutions and Colligative properties.

SEMESTER-III

PAPER-III

CO1: Students can be able to analyze the concepts behind the peculiarity of f-block elements. Students can be able to understand the basic concepts of coordination complexes like nomenclature, coordination number, EAN and isomerism. Students should also have basic knowledge of structural aspects of metal carbonyls and organometallics.

CO2: Able to describe preparation, specific chemical reactions, synthetic applications and identification tests of carboxylic acids, nitrohydrocarbons, amines and cyanides and isocyanides.

CO3: Students will have fundamental knowledgeof thermodynamic and their applications with chemical transitions with special focus on numerical and derivatives.

CO4: Students can be able to analyze and evaluate the analytical data based on basic statistical operations.Students should also have basic knowledge of Phase rule and fundamental synthetic applications of carbanions.

SEMESTER-IV

PAPER-IV

CO1: Able to understand the advanced concepts of coordination complexes along with CFT and HSAB theories and also the applications of coordination complexes. Students should also have basic knowledge of role of essential elements in biological processes.

CO2: Able to describe Synthesis, inter-conversion, specific chemical reactions, structural aspects and identification tests of carbohydrates, amino acids and heterocyclic compounds.

CO3: Student will have core knowledge in the concepts of Chemical kinetics and their applications with specific examples. Student will have the basic concepts and mechanisms involved in photochemical changes.

CO4: Student will have core knowledge of theories of bonding in metal complexes, advanced synthetic applications of cabanions and basic concepts of chemistry beverages.

SEMESTER-V

PAPER-V

CO1: Student can understand the basic conceptsof Rotational, IR and Electronic spectroscopy and apply them in determination of bonding aspects of simple molecules.

CO2: Student will have the knowledge of principles and conceptsof 1H-NMR spectroscopy and Mass spectrometry for the determination of structural, molecular and isotopic aspects of simple molecules.

CO3: Student will able to understand concepts, techniques and applications of solvent extraction and chromatographic methods like TLC and PC.

CO4: Student should have basic knowledge of principles and techniques involved in CC, IEC, GC and HPLC along with their applications in chemical analysis.

SEMESTER-VI

PAPER-VI

CO1: Able to understand the basic terminology involved in the medicinal chemistry.

CO2: Student will have core knowledge of Enzymes and Receptors in Medicinal chemistry.

CO3: Student can able to depict the synthesis of selected drugs using organic synthetic strategies and understand their therapeutic actions.

CO4: Student will able to understand the physiological role of hormones, neurotransmitters and Drugs acting on specific metabolic and neural targets along with their synthesis. Students will also have basic knowledge of concepts involved in drug analysis.

ADVANCED CHEMISTRY (SPECIAL PAPER)

CO1: Studentscould able to understand the reaction mechanisms in complex compounds, apply the knowledge of symmetry operations to identify symmetry elements various chemical molecules and can apprehend the properties of non aqueous solvents.

CO2: Student gain the ability to design the synthesis of given organic molecules in economical and environmental friendly ways with definite stereochemistry.

CO3: Student get ample knowledge on polymers, types, preparation properties and their importance and role in human life and the need for biodegradation.

CO4: Student learn the fundamentals of electro analytical techniques and could able to apply the knowledge for quantitative analysis of any given substance in the provided sample.

M.Sc. (ORGANIC CHEMISTRY)

PROGRAMME OUTCOMES (POs):

On successful completion of this Programme, students will have the ability to:

PO1: Think critically and analyze chemical problems and issues with rational mind set.

PO2: Should have practical and theoretical knowledge of chemical science which will be applicable at Industrial as well as academic facilities with time to time self up-gradation in the field of research and innovations.

PO3: Work effectively and safely in a laboratory by applying green concepts to reuse, reduce and recycle the materials for sustainable and eco-friendly approaches.

PO4: Work in teams as well as independently with strategic action plan to assess and resolve targets in the allocated projects by apply modern methods of analysis to chemical systems in a laboratory environs.

PROGRAMME SPECIFIC OUTCOMES (PSOs):

PSO1: Should have strong core knowledge of basics of Organic synthesis for industrial, academic and scientific knowledge transfer paradigms.

PSO2: Should able to design and synthesize novel organic molecular scaffolds in the view of Pharma-based opportunities at regional as well as global level.

PSO3: Laboratory safety and sustainability should be riveted for personal and organizational assurance and quality maintenance.

PSO4: Can be able to bring the knowledge of different discipline of chemistry to analyze and illustrate the given synthetic scheme.

COURSE OUTCOMES (COs)

SEMESTER-I

PAPER-I-CH 101 (INORGANIC CHEMISTRY)

CO1: Student will have strong foundation in the Molecular symmetry and can able to understand symmetry operations of different molecules.

CO2: Student will have sufficient intelligence to analyze bonding in metal complexes.

CO3: Student will have depth knowledge about factors and conditions affecting Metal-complex formation.

CO4: Understand the concept of Metal-Ligand Bonding aspects of diatomic molecules.

PAPER-II-CH 102 (ORGANIC CHEMISTRY)

CO1: Student will have essential knowledge in the Stereochemistry and can able to understand its impact in reaction mechanism.

CO2: Student will have core idea about reaction mechanism to develop synthetic strategies.

CO3: Understand the concepts of conformational analysis and can able to apply them in analysis of acyclic systems.

CO4: Have the core idea about synthesis and chemical properties of Heterocyclic compounds and Natural products with structural importance.

PAPER-III-CH 103 (PHYSICAL CHEMISTRY)

CO1: Student will have core knowledgeof thermodynamical aspects in system transitions and reactions.

CO2: Student can understand the concept and definitions of Electrochemical aspects and will able to calculate EMF and other calculations pertaining to the Electrochemical cells.

CO3: Have the basic idea about the concepts and mathematical derivations of quantum mechanics along with the application of Quantum mechanical operations in chemistry.

CO4: Describe and apply concepts and theories of chemical kineticin structural and chemical transformations.

PAPER-IV-CH 104 (ANALYTICAL TECHNIQUES AND SPECTROSCOPY-I)

CO1: Student will able to understand concepts, procedures and applications of chromatographic techniques of GC and HPLC.

CO2: Student can understand the concept of 1H-NMR spectroscopy and apply them in structural evaluation of molecules along with assessment of reaction mechanism.

CO3: Have the basic idea about the concepts and applications of Ratational and Vibrational spectroscopy for structural elucidations of chemical entities.

CO4: Understand the concepts of Electronic spectroscopy and can able to apply them in analysis of Bonding and structural analysis of molecular structures.

SEMESTER-II

PAPER-I-CH 201 (INORGANIC CHEMISTRY)

CO1: Students can able to understand the types and factors affecting reaction mechanism of transition metal complexes in octahedral and square planar complexes with a special interest on Redox reactions.

CO2: Student will have core idea on Bonding in metal complexes with respect to their energy gradients.

CO3: Student will have theconcept and theories of factors affecting the Metal-Bonding formation in Metal carbonyls in order to obtain structural information.

CO4: Have the concurrent information about the structural and Metal-ligand bonding aspects of Bio-coordinated species.

PAPER-II-CH 202 (ORGANIC CHEMISTRY)

CO1: In depth knowledge about organic reaction mechanism with a special focus on nuceophilic aromatic substitutions, NGP and Electrophilic substitutions to understand and design synthetic reactions.

CO2: Student can understand the concept and terms involved inPericyclic reactions and will able to assess the molecular orbital and energy level changes.

CO3: Have the basic knowledge of the different types photochemical reactions along with the Energy transitions and selection rules for feasible photochemical reactions.

CO4: Understand the role of reactive intermediates involved in rearrangement reactions.

PAPER-III-CH 203 (PHYSICAL CHEMISTRY)

CO1: Understand the concepts of advance thermodynamics and their statistical aspects with related to chemical changes.

CO2: Student can develop the idea of mechanisms involved in photochemical changes.

CO3: Develop proficiency in numeracy and derivative frameworks which underlies with of Quantum chemistry.

CO4: Understand the base level structural arrangements of solid state chemistry with the help of modern theories.

PAPER-IV-CH 204 (ANALYTICAL TECHNIQUES AND SPECTROSCOPY-II)

CO1: Studentswill understand terms and concepts of advanced electro and thermal analytical techniques and their applications in modern chemical analysis.

CO2: Encompass achieved advanced knowledge about the NMR spectroscopyand their applications in organic chemistry to elucidate the structure of the organic compounds.

CO3: Student can understand the concept of Mass-spectrometry and apply them chemical analysis of samples of synthetic and biological origin.

CO4: Understand the concepts of Photoelectron and ESR and can be able to apply them in analysis of chemical moieties with specific properties.

SEMESTER-III

PAPER-I-CH-301 (SYNTHETIC REAGENTS, ADVANCED NMR, CONFORMATIONAL ANALYSIS AND ORD)

CO1: Students will have concurrent knowledge of synthetic reagents to design synthetic strategies.

CO2: Student will have deep focus on various synthetic reagents to develop multifunctional organic frameworks.

CO3: Student will have profound concepts of 13-C-NMR and 2D NMR spectroscopy to illustrate structural aspects of complex molecules.

CO4: Have the extensive proficiency about the Conformational aspects and ORD.

PAPER-III-CH 302 (MODERN ORGANIC SYNTHESIS)

CO1: Students will able to understand and design asymmetric synthetic strategies to design aimed organic molecular frameworks by using advance techniques of Asymmetric synthesis.

CO2: N Students will have deep knowledge of synthetic strategies to design synthetic protocols for complex molecular scaffolds using valid techniques like Retro-synthesis.

CO3: Student will have advanced and contemporary efficiency in organic synthetic reactions to apply them in strategic scheme development.

CO4: Students should have updated knowledge of newer techniques and concepts of organic synthesis for multi-step novel composites.

PAPER-III-CH 303 (BIOORGANIC CHEMISTRY)

CO1: Students will have core knowledge of synthetic, biological and structural aspects of specific carbohydrates.

CO2: Students will have extensive proficiency in structural and synthetic concepts of Nucleic acids and Lipids.

CO3: Student will be able to understand structural, synthetic and physiological importance of proteins and enzymes.

CO4: Student will be able to understand structural, synthetic and physiological importance of Vitamins and Co-enzymes.

PAPER-III-CH 304 (GREEN CHEMISTRY)

CO1: Students will have fundamental concepts of green synthetic procedures for sustainable for developing eco-friendly synthetic protocols.

CO2: Students will have deep concepts and able understand the alternative approach of Green chemistry in modern organic synthesis.

CO3: Student will be able to understand the applications of Nanotechnology in designing versatile Organic nanomaterials and their usage in organic synthesis for benign synthetic strategies.

CO4: Student will understand advance concepts of supramolecular chemistry and able to apply them in synthetic strategies.

SEMESTER-IV

PAPER-I-CH 401 (DRUG DESIGN AND DRUG DISCOVERY)

CO1: Understand the concepts and principles of drug design and discovery.

CO2: Students will have the good command over the Lead modification and they will able to analyze the SAR of specific drugs.

CO3: Develop proficiency in QSAR studies and able to understand the concepts of computer aided drug design.

CO4: Understand the principles and applications of Combinatorial synthesis in bioorganic molecular synthesis like polypeptides.

PAPER-II-CH 402 (DRUG SYNTHESIS AND MECHANISM OF ACTION)

CO1: Able to describe the drug synthesis and their mode of action of certain drugs which acts on metabolic process, cell wall and specific enzymes.

CO2: Able to describe the drug synthesis and their mode of action of certain drugs which acts on genetic material and immune system.

CO3: Able to describe the drug synthesis and their mode of action of certain drugs which acts on receptors and ion channels.

CO4: Student will have core knowledge of synthesis of chiral drugs.

PAPER-III-CH 403 (ADVANCED HETEROCYCLIC CHEMISTRY)

CO1: Students will have good understanding on synthesis and structural aspects of Non-aromaticheterocyclis and aromaticity.

CO2: Students will able to describe the synthesis and can elaborate structural features of Five and Six membered heterocyclics possessing TWO hetero atoms.

CO3: Student will be able to understand the synthetic and structural aspects of Heterocyclis havingmore than two hetero atoms.

CO4: Student can able to describe the synthesis and conformational analysis of larger ringheterocyclics and other specified heterocyclics.

PAPER-IV-CH 404 (ADVANCED NATURAL PRODUCTS)

CO1: Students will able to describe biosynthetic pathways of natural products.

CO2: Students will able to determine the basic natural products.

CO3: Students will able to determine the complex natural products.

CO4: Student can able to describe the synthesis of total stereo selective synthesis of naturalproducts.