



Department of Chemistry

M.Sc. Chemistry

S.No.	Course Code	Course Name	Course Outcomes
SEMESTER- I			
1.	23PCHC1 1	Core Course - I: Organic Reaction Mechanism - I	CO1[K2]: explain reaction mechanism , principles of organic chemistry CO2[K3]: determine reaction mechanism, substitution reaction and stereochemistry of organic molecules CO3[K4]: compare the reaction mechanism, substituent effect in aromaticity and aliphatic compounds and stereochemistry CO4[K5]: interpret the principles of kinetic and non- kinetic methods, mechanism of electrophilic and nucleophilic substitution reaction, racemization, Cram's-Prelog rule, ORD, Cotton effect, Hammett principle and asymmetric synthesis CO5[K6]: predict reaction intermediates, synthesize organic compounds, electrophilic, nucleophilic substitution – aromatic & aliphatic compounds and stereochemistry to propose a mechanism for the given reaction.



S.N o.	Course Code	Course Name	Course Outcomes
2.	23PCHC1 2	Core Course - II: Structure And Bonding in Inorganic Compounds	CO1[K2]: express the various theories in bonding, clusters and solid state chemistry CO2[K3]: employ the theories, concept of packing and various characterization techniques in the crystals and cages. CO3[K4]: analyze the ionic crystals by the XRD, SEM, TEM, structure of ionic solids and cages and defects in crystals CO4[K5]: interpret the solid state compounds, silicones and clusters. CO5[K6]: discuss the various concepts in solid state and cluster compounds
3.	23PCHC1 P	Core Course - III: Practical: Organic Chemistry	CO1[K2]: explain separation of organic mixture by chemical method CO2[K3]: perform organic analysis and preparation by following systematic procedure CO3[K4]: analyze organic compounds by qualitative and quantitative methods CO4[K5]: decide synthetic route for the preparation of organic compounds by multistep synthesis CO5[K6]: assemble principles of volumetric analysis for the quantitative estimation of organic compounds.



S.No.	Course Code	Course Name	Course Outcomes
4.	23PCHO 11	Elective Course Generic/ Discipline Specific – I: Pharmaceutical Chemistry	<p>CO1[K2]: express the principles and applications of isotopic dilution analysis and drug dosage, product development in pharmaceutical chemistry.</p> <p>CO2[K3]: draw the structures of various drugs used in isotopic dilution analysis, drug dosage and development of new drugs in pharmaceutical chemistry .</p> <p>CO3[K4]: classify the dosage form based on their drug dosage and product development, properties of drugs</p> <p>CO4[K5]: appraise the use of various drugs by its action of computers in pharmaceutical chemistry</p> <p>CO5[K6]: develop the new drugs and pharmaceutical products</p>
5.	23PCHO 12	Elective Course Generic/ Discipline Specific – I: Nanomaterials and Nanotechnology	<p>CO1[K2]: describe the various concepts in nanotechnology, synthesis, properties, characterization</p> <p>CO2[K3]: interpret the properties of semiconductor nanomaterials, nanocomposite, synthesis, applications, characterization</p> <p>CO3[K4]: outline the concepts of nanotechnological synthesis, properties, nanocomposites, applications</p> <p>CO4[K5]: assess the features of nanotechnology in synthesis, properties, nanocomposite and characterization</p> <p>CO5[K6]: adapt and understand the approaches of synthesis, properties, application, characterization of nano in new technology.</p>



S.N o.	Course Code	Course Name	Course Outcomes
6.	23PCHO 13	Elective Course Generic/ Discipline Specific -II: Electrochemistry	<p>CO1[K2]: explain the concept of electrolytes in solution, electrode-electrolyte interface, electrode reactions, electrochemical cells, batteries and compare the structures of electrical double layer of different models.</p> <p>CO2[K3]: predict the kinetics of electrode reactions, theories of electrolytes, electrolyte interfacial phenomenon and electrode polarization.</p> <p>CO3[K4]: analyze mechanism of electrochemical reactions, principle of polarography, electrode reactions, structure of electrical double layer and ionic activity of electrolytes.</p> <p>CO4[K5]: discuss the theories of electrolytes, electrical double layer, electrochemical cells of electrode reactions and polarography.</p> <p>CO5[K6]: predict the concept of storage devices, mechanism of electrochemical reactions, phenomenon of electrode-electrolyte interface and behavior of electrolytes.</p>



S.No.	Course Code	Course Name	Course Outcomes
7.	23PCHO 14	Elective Course Generic/ Discipline Specific – II: Molecular Spectroscopy	<p>CO1[K2]: explain the importance of rotational, Raman, vibrational, electronic, NMR, ESR, mass, Mossbauer and EPR spectroscopy.</p> <p>CO2[K3]: apply the principles of spectroscopy for the structural elucidation of the molecule.</p> <p>CO3[K4]: inspect the structure of compounds through different spectroscopic techniques.</p> <p>CO4[K5]: interpret the UV, IR, Raman, XPS, Mass, EPR, NMR, Mossbauer and ESR spectroscopic techniques,</p> <p>CO5[K6]: discuss the knowledge on principle, instrumentation and structural elucidation of simple molecules using different Spectroscopy techniques.</p>
SEMESTER- II			
8.	23PCHC2 1	Core Course - IV: Organic Reaction Mechanism - II	<p>CO1[K2]: examine the basic principles of elimination, oxidation – reduction reactions, rearrangements, addition, reagents involved in organic compounds</p> <p>CO2[K3]: apply the principles of addition, elimination, oxidation, reduction, rearrangement reactions, reagents used in organic compounds</p> <p>CO3[K4]: compare elimination reactions, oxidation, reduction, rearrangements, reagents and reactivity in organic compounds</p> <p>CO4[K5]: justify the mechanism, rearrangements, reagents, synthesis routes of given reactions</p> <p>CO5[K6]: discuss the concept of reaction mechanism. rearrangements.</p>



S.No.	Course Code	Course Name	Course Outcomes
9.	23PCHC2 2	Core Course – V: Physical Chemistry - I	<p>CO1[K2]: explain the basic concepts of spectroscopy, Statistical thermodynamics and chemical kinetics</p> <p>CO2[K3]: apply the principles of spectroscopy, thermodynamic and kinetics to determine the structure, thermodynamic parameters and rate of reactions respectively.</p> <p>CO3[K4]: examine the various thermodynamic parameters, chain reactions and structure of the molecules</p> <p>CO4[K5]: explain the theories of complex reactions, statistical thermodynamics and spectroscopic techniques</p> <p>CO5[K6]: discuss the reaction rates, statistical approach of the function and structural elucidation of the molecules</p>
10.	23PCHC2 P	Core Course – VI: Practical: Inorganic Chemistry	<p>CO1[K2]: estimate the amount of copper, calcium, ferrous and zinc present in the given solution by volumetrically and the amount of zinc, magnesium, copper and nickel by complexometric titration</p> <p>CO2[K3]: determine the amount of nickel, barium, zinc and copper present in the given solution by gravimetric method</p> <p>CO3[K4]: compare and contrast complexometry, gravimetry & volumetry</p> <p>CO4[K5]: predict the familiar and less familiar cations in the given inorganic salt mixture</p>



S.N o.	Course Code	Course Name	Course Outcomes
11.	23PCHO 21	ElectiveCourseGeneric/DisciplineSpecific -III:Medicinal Chemistry	CO1[K2]: express the various terms used in medicinal and pharmaceutical chemistry CO2[K3]: describe the structural features of various drugs used in pharmaceuticals CO3[K4]: examine the structure of various drugs used in pharmaceuticals CO4[K5]: interpret the drugs based on their functions and classify the membrane bound receptors CO5[K6]: predict the use of various drugs by its action
12.	23PCHO 22	ElectiveCourseGeneric/DisciplineSpecific -III:Green Chemistry	CO1[K2]: indicate the basic principle, chemical techniques and methodology used in conventional industrial preparations and in green innovations CO2[K3]: find out the various technology used in chemical industries and in laboratory CO3[K4]: compare the advantages of organic reactions assisted by renewable energy sources and non-renewable energy sources CO4[K5]: assess the principles of PTC, ionic liquid, microwave and ultrasonic assisted organic synthesis CO5[K6]: predict the synthetic pathway of various organic reactions using greener solvents, catalyst, ionic liquids, biomass and methods



S.N o.	Course Code	Course Name	Course Outcomes
13.	23PCHO 23	ElectiveCourseGeneric/DisciplineSpecific -IV:Bio-Inorganic Chemistry	<p>CO1[K2]: identify the role of trace elements, oxygen carriers, biological redox systems and copper proteris.</p> <p>CO2[K3]: explain the biological redox systems, metallo enzymes, transport phenomenon of proteins, metal toxicity and properties of enzymes.</p> <p>CO3[K4]: analyze the toxicity in metals, concept of metalloproteins, photosynthesis and essential trace elements.</p> <p>CO4[K5]: discuss the concept of diagnosis, storage of metal ions, therapeutic compounds, mechanism of enzyme, structure and function of chlorophyll.</p> <p>CO5[K6]: elaborate nitrogen fixation process, photosynthetic mechanism, enzymes, proteins and co enzymes.</p>



S.No.	Course Code	Course Name	Course Outcomes
14.	23PCHO 24	ElectiveCourseGeneric/DisciplineSpecific -IV : Material Science	<p>CO1[K2]: express the basic knowledge on advanced materials based properties of crystals, special materials, crystallography and crystal growth methods.</p> <p>CO2[K3]: apply their knowledge in the field of crystal growth methods, properties of crystals and special materials.</p> <p>CO3[K4]: classify different types of special materials and materials for energy conversions.</p> <p>CO4[K5]: assess the ways of prediction of special materials, properties of crystals and crystal growth methods.</p> <p>CO5[K6]: predict the new types of materials used in the materials for renewable energy conversion.</p>
15.	23PCHN 21	Non-Major Elective Course – I: ChemistryinFoodPreservation	<p>CO1[K2]: explain the methods of preservation, food laws, additives, fermentation</p> <p>CO2[K3]: compare the methods of food preservation</p> <p>CO3[K4]: examine the importance of food preservation, processing, fermentation, laws, additives</p> <p>CO4[K5]: interpret the basics of food preservation</p> <p>CO5[K6]: predict the different ideas of preservation of food.</p>



S.N o.	Course Code	Course Name	Course Outcomes
SEMESTER- III			
16.	23PCHC3 1	Core Course – VII: Organic Synthesis and Photochemistry	CO1[K2]: relate the concept of organic synthesis – methods, pericyclic reactions and organic photo chemistry CO2[K3]: apply principles to understand the reagents and to correlate their reactivity with reaction conditions in organic and photochemistry CO3[K4]: analyze the synthetic strategies, methodology of organic compounds and photochemistry CO4[K5]: predict the suitability of reaction conditions in the preparation compounds, reaction, mechanism in organic and photochemistry



S.N o.	Course Code	Course Name	Course Outcomes
17.	23PCHC3 2	Core Course – VIII: Coordination Chemistry – I	<p>CO1[K2]: illustrate the concept of coordination compounds, spectral characteristics, stability, kinetics and mechanism of complexes.</p> <p>CO2[K3]: determine the properties of coordination complexes, stability constants, kinetics and mechanism of electron transfer reactions.</p> <p>CO3[K4]: explain the theories of coordination complexes, energy level diagrams, stability of complexes, substitution and electrode transfer reactions.</p> <p>CO4[K5]: predict the electronic transitions in a complex based on correlation diagrams, crystal field stabilization energy, magnetic property of complexes, theories of trans effect and photo-redox reactions.</p> <p>CO5[K6]: discuss the kinetics and mechanism of substitution reactions</p>
18.	23PCHC3 P	Core Course – IX: Practical: Physical Chemistry	<p>CO1[K2]: illustrate the principles associated with various physical chemistry experiments</p> <p>CO2[K3]: apply scientifically, plan and perform all the experiments</p> <p>CO3[K4]: analyze systematically and record the readings in all the experiments</p> <p>CO4[K5]: evaluate and process the experimentally measured values and compare with graphical data</p> <p>CO5[K6]: predict the experimental data scientifically to improve students' efficiency for societal developments</p>



S.N o.	Course Code	Course Name	Course Outcomes
19.	23PCHC3 Q	CoreCourse- X:Practical:AnalyticalInstrumentationtech niques	CO1[K2]: illustrate the principles associated with various inorganic organic and physical chemistry experiments CO2[K3]: apply the basic principle plan and perform all the experiments CO3[K4]: analyze and record systematically the readings in all the experiments CO4[K5]: evaluate and process the experimentally measured values andcompare with graphical data. CO5[K6]: predict the experimental data scientifically to improve students efficiency for societal developments
20.	23PCHO 31	Elective Course Generic/ Discipline Specific – V: Pharmacognosy and Phytochemistry	CO1[K2]: explain the basic knowledge of extraction techniques of alkaloids, terpenoids and drugs containing volatile oils. CO2[K3]: apply pharmacognosy and standardization of herbal drugs in phytochemistry CO3[K4]: examine the structural features of alkaloids, terpenoids. CO4[K5]: assess drugs containing terpenoids, alkaloids and volatile oils in chemical analysis CO5[K6]: predict the suitable physical methods of characterization plant glycosides and marine drugs.



S.N o.	Course Code	Course Name	Course Outcomes
21.	23PCHO 32	Elective Course Generic/ Discipline Specific – V: Biomolecules And Heterocyclic Compounds	<p>CO1[K2]: explain the basic knowledge of carbohydrate metabolism, hormones, proteins and heterocyclic compounds</p> <p>CO2[K3]: find out the different methods of preparation of biomolecules and heterocyclic compounds</p> <p>CO3[K4]: examine the structural features of biomolecules and heterocyclic compounds.</p> <p>CO4[K5]: assess reactions of biomolecules and heterocyclic compounds</p> <p>CO5[K6]: discuss the application of biomolecules and their functions in metabolism.</p>
22.	23PCHN 31	Non-Major Elective Course – II: Chemistry of Consumer Products	<p>CO1[K2]: interpret the various concepts of soaps, detergents, shampoos and skin care products</p> <p>CO2[K3]: determine manufacturing process of consumer products</p> <p>CO3[K4]: compare the ingredients, types, manufacturing of various consumer products</p> <p>CO4[K5]: interpret the principles of consumer products</p> <p>CO5[K6]: predict the features and specification of consumer products.</p>



S.N o.	Course Code	Course Name	Course Outcomes
23.	23PCHJ3 1	Internship/ Industrial Training	<p>CO1[K2]: identify different career paths within the industry and gain insights into potential future roles.</p> <p>CO2[K3]: apply theoretical concepts and academic knowledge to real-world situations and challenges encountered during the internship.</p> <p>CO3[K4]: analyze problems, generate innovative solutions, and make informed decisions.</p> <p>CO4[K5]: evaluate how to manage time effectively and prioritize tasks to meet deadlines and deliver quality work.</p> <p>CO5[K6]: create a portfolio of the work, projects, and achievements</p>
SEMESTER- IV			



S.N o.	Course Code	Course Name	Course Outcomes
24.	23PCHC4 1	Core Course – XI: Coordination Chemistry – II	<p>CO1[K2]: illustrate the fundamental concepts of organometallic compounds and inorganic spectroscopy.</p> <p>CO2[K3]: apply the principles of inorganic spectroscopy for the structural elucidation of the complexes and understand the structure and bonding in organometallic compounds.</p> <p>CO3[K4]: examine the reactions of organometallic compounds and the structure of complexes through different spectroscopic techniques.</p> <p>CO4[K5]: discuss the catalytic cycles in organometallic compounds, structural identification of complexes using inorganic spectroscopy.</p> <p>CO5[K6]: predict the structure of coordination complexes using spectroscopic tools such as IR, NMR, ESR, Mossbauer and optical rotatory dispersion studies and predict the structure and bonding in organometallic complexes.</p>
25.	23PCHC4 2	Core Course – XII: Physical Chemistry – II	<p>CO1[K2]: illustrate the fundamentals involved in the group theory and quantum mechanics</p> <p>CO2[K3]: identify the symmetry elements and operations in group theory and wave equations in quantum mechanics</p> <p>CO3[K4]: explain the concept of quantum mechanics and group theory to predict the electronic structure.</p> <p>CO4[K5]: discuss the applications of quantum mechanics and construct the character tables using group theory</p> <p>CO5[K6]: elaborate the theories of quantum mechanics and group theory.</p>



S.N o.	Course Code	Course Name	Course Outcomes
26.	23PCHJ4 1	CoreCourse–XIII:ProjectWithVivaVoce	CO1[K2]: find the unexplored areas of research CO2[K3]: apply the latest rules of documentation to cite Print, Non-print and Web Publications in a research paper CO3[K4]: analyze the stages in writing a thesis – collecting and evaluating sources and drafting documentation CO4[K5]: discuss the objectives in formulating a research paper CO5[K6]: prepare a rightly documented research project with adequate discussion, interpretation and evaluation
27.	23PCHO 41	Elective Course Generic/ Discipline Specific – VI: Chemistry of Natural Products	CO1[K2]: express the biological importance of natural products CO2[K3]: plan and perform the isolation and characterization of synthesized natural products CO3[K4]: determine the structural of photochemical constituents by chemical and physical methods. CO4[K5]: interpret the experimental data scientifically to improve biological activity of active components in natural products CO5[K6]: predict the structural features of alkaloids, terpenoids and anthocyanine, steroids and dyes.



S.N o.	Course Code	Course Name	Course Outcomes
28.	23PCHO 42	Elective Course Generic/ Discipline Specific – VI: Polymer Chemistry	<p>CO1[K2]: express the basic concepts of polymers</p> <p>CO2[K3]: apply concepts of polymers, techniques, polymerization reaction, processing, preparation and uses</p> <p>CO3[K4]: examine the determination, properties, techniques, various methods, preparation and applications of polymers</p> <p>CO4[K5]: measure the molecular weight of polymers, techniques, processing applications</p> <p>CO5[K5]: appraise the applications of polymeric techniques and interpret the experimental data scientifically to improve the quality of polymers.</p>
29.	23PCHS4 1	Skill Enhancement Course: Professional Competency Course: Chemistry for Competitive Examinations	<p>CO1[K1]: describe the basic concepts in organic, inorganic and physical chemistry</p> <p>CO2[K2]: express the various principles used in organic, inorganic and physical chemistry</p> <p>CO3[K3]: apply those concepts in the problem solving in organic, inorganic and physical chemistry</p> <p>CO4[K4]: analyze the various competitive exam question papers</p> <p>CO5[K5]: evaluate the methodology behind problem solving and critical thinking</p>