



### Department of Chemistry

### M. Sc. Chemistry

S.No.	Course Code	Course Name	Course Outcomes
<b>SEMESTER - I</b>			
1.	21PCHC11	Core Course - I: Reaction Mechanism And Stereochemistry	<b>CO1[K2]:</b> explain reaction mechanism by kinetic and non-kinetic methods, substitution reactions using nucleophiles and electrophiles and stereochemistry <b>CO2[K3]:</b> determine aromaticity and stereochemistry of organic molecules <b>CO3[K4]:</b> compare the substituent effect through kinetic and non-kinetic methods, aromaticity and antiaromaticity and stereochemistry of mono and disubstituted cycloalkanes <b>CO4[K5]:</b> deduce the mechanism of various types of nucleophilic substitution reaction and asymmetric synthesis <b>CO5[K6]:</b> assimilate the knowledge of reaction intermediates and stereochemistry to propose a mechanism for the given reaction.



S.No.	Course Code	Course Name	Course Outcomes
2.	21PCHC12	Core Course - II: Structure And Bonding	<p><b>CO1[K1]:</b> describe the various concepts of bonding in covalent, ionic, inorganic polymers, chain, cages and cluster compounds</p> <p><b>CO2[K2]:</b> interpret weak chemical forces and packing in solid state</p> <p><b>CO3[K3]:</b> employ the concepts of hybridization, VB, VSEPR and MO theory to determine the shapes of various molecules in covalent, inorganic polymers, chain, cages and cluster compounds</p> <p><b>CO4[K4]:</b> discriminate the structure and defects of crystals</p> <p><b>CO5[K5]:</b> justify the structure and bonding of boranes, carboranes, metallocarboranes and metal clusters using Wade's Rule, Styx Number, isolobality and capping rule.</p>
3.	21PCHC13	Core Course - III: Electrochemistry, Thermodynamics And Surface Chemistry	<p><b>CO1[K2]:</b> explain the various laws of electrochemistry and thermodynamics</p> <p><b>CO2[K3]:</b> present the concepts of overvoltage, corrosion, polarography, catalysis and applications of adsorption</p> <p><b>CO3[K4]:</b> classify the types of electrodes, catalysis and adsorption</p> <p><b>CO4[K5]:</b> deduce the various parameters of thermodynamics and electrochemistry</p> <p><b>CO5[K6]:</b> elaborate the concepts and theories of surface and electrochemistry.</p>



S.No.	Course Code	Course Name	Course Outcomes
4.	21PCHC1P	Core Course - IV: Practical: Organic Quantitative And Qualitative Analysis	<b>CO1[K2]:</b> explain separation of organic mixture by chemical method <b>CO2[K3]:</b> perform organic analysis and preparation by following systematic procedure <b>CO3[K4]:</b> compare the estimation of glucose by different methods <b>CO4[K5]:</b> decide synthetic route for the preparation of organic compounds by multistep synthesis <b>CO5[K6]:</b> assemble principles of volumetric analysis for the quantitative estimation of organic compounds.
5.	21PCHO11	Elective Course - I: Green Chemistry	<b>CO1[K1]:</b> outline the basic principle and methodology involved in the green chemistry <b>CO2[K2]:</b> explain the ultrasound & microwave assisted and PTC reactions <b>CO3[K3]:</b> present the concepts of green & sonochemistry, microwave technology and ionic liquids <b>CO4[K4]:</b> analyse role of green solvents, catalysts and renewable energy involved in the green synthesis <b>CO5[K5]:</b> predict the synthetic pathway of various organic reactions using greener solvents, catalyst, ionic liquids, biomass and methods.



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6.	21PCHO12	Elective Course - I: Material Chemistry	<b>CO1[K1]:</b> recognize the basic knowledge on advanced materials based nanomaterials, silica based material, composite material and polymer materials <b>CO2[K2]:</b> classify different types of nano materials and polymer materials <b>CO3[K3]:</b> apply their knowledge in the field of nano chemistry for the preparation of new types of nano materials <b>CO4[K4]:</b> examine the ways of prediction of advanced materials <b>CO5[K5]:</b> assess the new types of materials used in the recent research trends.
7.	21PCHO13	Elective Course - I: Medicinal And Pharmaceutical Chemistry	<b>CO1[K1]:</b> recognize the various terms used in medicinal and pharmaceutical chemistry <b>CO2[K2]:</b> express the structural features of various drugs used in pharmaceuticals <b>CO3[K3]:</b> draw the structure of various drugs used in pharmaceuticals <b>CO4[K4]:</b> classify the drugs based on their functions and classify the membrane bound receptors <b>CO5[K5]:</b> appraise the use of various drugs by its action.
<b>SEMESTER - II</b>			



S.No.	Course Code	Course Name	Course Outcomes
8.	21PCHC21	Core Course - V: Rearrangement, Name Reactions, Oxidation And Reduction	<b>CO1[K2]:</b> interpret the type of reactions to be followed in the selected organic compounds <b>CO2[K3]:</b> apply the principles of addition, elimination, rearrangement reactions whenever needed <b>CO3[K4]:</b> compare addition and elimination reactions and reactivity of different oxidizing and reducing reagents <b>CO4[K5]:</b> deduce the mechanism of given reactions <b>CO5[K6]:</b> assemble the concept of reaction mechanism and propose scheme for organic reaction.
9.	21PCHC22	Core Course - VI: Coordination, Bioinorganic And Inorganic Photochemistry	<b>CO1[K1]:</b> outline on the theories of coordination compounds, biologically important inorganic compound and basics of photochemistry <b>CO2[K2]:</b> express the various reaction mechanisms involved in coordination compounds and structure of bioinorganic compounds <b>CO3[K3]:</b> apply the reaction mechanism to synthesize coordination compounds <b>CO4[K4]:</b> examine the function of bioinorganic compounds and photochemistry of Cr, Co, Cu and Ru complexes <b>CO5[K5]:</b> deduce the importance of metals in medicine and toxicity.



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10.	21PCHC23	Core Course - VII: Group Theory, Equilibria And Statistical Thermodynamics	<b>CO1[K2]:</b> explain symmetry operations, applications of group theory, concepts of statistical and non- equilibrium thermodynamics <b>CO2[K3]:</b> apply the concepts of group theory and thermodynamics to deduce the point groups and parameters of thermodynamics <b>CO4[K3]:</b> present the theories of phase and chemicalequilibria and quantum statistics <b>CO5[K4]:</b> examine the character tables, group multiplication tables, phase diagram for single and double salt <b>CO5[K5]:</b> predict hybridization and electronic transition of molecules using group theory and theorems of non-equilibrium thermodynamics.
11.	21PCHC2P	Core Course - VIII: Practical: Inorganic Quantitative And Qualitative Analysis	<b>CO1[K2]:</b> 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 <b>CO2[K3]:</b> determine the amount of nickel, barium, zinc and copper present in the given solution by gravimetric method <b>CO3[K4]:</b> compare and contrast complexometry, gravimetry & volumetry <b>CO4[K5]:</b> predict the familiar and less familiar cations in the given inorganic salt mixture <b>CO5[K6]:</b> develop the skills and tricks in the inorganic qualitative and quantitative analysis.



S.No.	Course Code	Course Name	Course Outcomes
12.	21PCHN21	Non Major Elective Course: Chemistry For Healthy Living	<b>CO1[K1]:</b> recognize the technical methods applied in the manufacture of various industrial products <b>CO2[K2]:</b> explain the raw materials used in chemical industries <b>CO3[K3]:</b> demonstrate properties and applications of polymers, leather and fuels <b>CO4[K4]:</b> classify fertilizers, polymers and fuels <b>CO5[K4]:</b> evaluate the raw materials used in the preparation of rubber industries.
<b>SEMESTER - III</b>			
13.	21PCHC31	Core Course - IX: Spectroscopy And Spectrometry	<b>CO1[K2]:</b> interpret the different functional group, fragments of the molecule through IR and Mass spectra <b>CO2[K3]:</b> apply the principles of spectroscopy for the structural elucidation of the molecule <b>CO3[K4]:</b> inspect the structure of organic compounds through different spectroscopic techniques <b>CO4[K5]:</b> predict the molecular formula of organic compounds by elemental analysis data and structural formula by spectral data <b>CO5[K6]:</b> elaborate the structure and functional groups present in the organic compound by the application of UV, IR, NMR and Mass spectroscopy.



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14.	21PCHC32	Core Course - X: Nuclear, Organometalics And Inorganic Spectroscopy	<b>CO1[K2]:</b> express the principle of the various spectroscopic techniques, organometallics and structure of nucleus <b>CO2[K2]:</b> explain the structure of inorganic compounds using given spectroscopic data <b>CO3[K3]:</b> apply the concept of spectroscopy in structural determination of inorganic compounds <b>CO4[K4]:</b> examine the splitting patterns of Mossbauer, NMR and ESR spectroscopy and structure of metal clusters <b>CO5[K5]:</b> evaluate the 10Dq and B values using electronic spectroscopy, spin-orbit coupling using ESR.
15.	21PCHC33	Core Course - XI: Spectroscopy And Photochemistry	<b>CO1[K2]:</b> express the basic principle involved in the spectroscopy and photochemistry <b>CO2[K3]:</b> apply the principle of spectroscopy to identify the rotational, Vibrational and electronic translational involved in the molecules <b>CO3[K4]:</b> analyse the possible electronic transitions by applying selection rules and width and intensity of spectral lines and techniques in the photochemistry <b>CO4[K5]:</b> predict the structure of known and unknown compounds by various spectroscopic techniques <b>CO5[K6]:</b> elaborate the various types of spectra and physical properties of excited state of molecules.





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16.	21PCHC3P	Core Course - XII: Practical: Physical Chemistry	<b>CO1[K2]:</b> demonstrate adsorption, conductometric titration and potentiometric titration <b>CO2[K3]:</b> perform the precipitation titrations, potentiometric redox titrations and adsorption experiments <b>CO3[K3]:</b> apply the principle of conductometry and potentiometry to carry out precipitation and redox titration <b>CO4[K4]:</b> examine the strength of acid by adsorption experiments <b>CO5[K5]:</b> evaluate solubility product by potentiometric method and dissociation constant by conductometric methods.
17.	21PCH031	Elective Course - II: Nuclear Reactions, Radiation Chemistry, Photoelectron Spectroscopy And Organometallics In Industry	<b>CO1[K2]:</b> express the basic concepts of nuclear reactions, radiation, NQR, PES and magnetic behavior of complexes. <b>CO2[K3]:</b> apply concepts of nuclear and radiation chemistry in various fields <b>CO3[K4]:</b> compare <b>CO4[K5]:</b> measure the radioactivity by various techniques and examine the use of tracer isotopes in various fields <b>CO5[K5]:</b> appraise the applications of radioactive isotopes, NQR, PES and AES.



S.No.	Course Code	Course Name	Course Outcomes
18.	21PCH032	Elective Course - II: Advanced Analytical Chemistry	<b>CO2[K2]:</b> explain the principles applications of instrumentation techniques <b>CO3[K3]:</b> apply statistical procedure to carry out data analysis <b>CO4[K4]:</b> examine analytes by electro analytical, chromatographic and spectroscopic techniques <b>CO5[K5]:</b> assess electroanalytical techniques and spectroscopic techniques for chemical analysis. <b>CO5[K5]:</b> select suitable physical methods of characterization.
19.	21PCH033	Elective Course - II: Drug Design And Discovery	<b>CO1[K2]:</b> express the various terms in pharmacology and its validation <b>CO2[K3]:</b> apply the retrosynthetic method and computer aided designing in the drug synthesis <b>CO3[K4]:</b> examine the various steps involved in drug discovery and its molecular interaction <b>CO4[K5]:</b> deduce the structural activity of drug using QASR studies <b>CO5[K5]:</b> evaluate the various physico-chemical parameters and predict the pharmacokinetics and pharmacodynamics mechanism and binding site of drugs.



S.No.	Course Code	Course Name	Course Outcomes
20.	21PCHM31	Self Paced Learning (Swayam Course): Advanced Transition Metal Organometallic Chemistry	<b>CO1[K1]:</b> identify the background and the key words in Advanced Transition Metal Organometallic Chemistry <b>CO2[K2]:</b> demonstrate independent and self-paced learning for clear understanding of the concept <b>CO3[K3]:</b> develop computer and communication skills to broaden their knowledge in the course <b>CO4[K3]:</b> use high quality reading resources, communication tools and technology to send assignments and to take up test <b>CO5[K4]:</b> analyse critically and apply technical skills to comprehend the ideas or theories in the video lectures.
21.	21PCHM32	Self Paced Learning (Swayam Course): Chemistry Of Main Group Elements	<b>CO1[K1]:</b> identify the background and the key words in Chemistry of Main Group Elements <b>CO2[K2]:</b> demonstrate independent and self-paced learning for clear understanding of the concept <b>CO3[K3]:</b> develop computer and communication skills to broaden their knowledge in the course <b>CO4[K3]:</b> use high quality reading resources, communication tools and technology to send assignments and to take up test <b>CO5[K4]:</b> analyse critically and apply technical skills to comprehend the ideas or theories in the video lectures.
<b>SEMESTER - IV</b>			



S.No.	Course Code	Course Name	Course Outcomes
22.	21PCHC41	Core Course - XIII: Photochemistry, Pericyclic Reactions, Heterocycles And Natural Products	<b>CO1[K2]:</b> illustrate various organic photochemistry and pericyclic reaction <b>CO2[K3]:</b> choose different methods to elucidate the structure of terpenoids, alkaloids and steroids <b>CO3[K4]:</b> discriminate different types of photochemical and electrocyclic reactions and reactivity of heterocycles <b>CO4[K5]:</b> critique the biological role of vitamins, Norrish type reaction, FMO approach the sigmatropic and cycloaddition reaction <b>CO5[K6]:</b> elaborate the structure of terpenoids, steroids, vitamins and alkaloids.
23.	21PCHC42	Core Course - XIV: Quantum And Chemical Kinetics	<b>CO1[K2]:</b> outline the fundamentals involved in the chemical kinetics and quantum mechanics <b>CO2[K2]:</b> illustrate the basic concept of kinetics of fast and chain reactions, operators, approximation methods and salt effect of compounds <b>CO3[K3]:</b> apply quantum mechanics to derive Schrodinger's wave equation for simple systems and approximation method to determine energy <b>CO4[K4]:</b> examine the various types of quantum statistics and theories of kinetics <b>CO5[K5]:</b> appraise the theories of quantum mechanics and chemical kinetics.



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24.	21PCHC43	Core Course - XV: Research Methodology	<p><b>CO1[K1]:</b> recognize the basic research ideas related to recent research, techniques and their methodologies</p> <p><b>CO2[K2]:</b> outline the basic concepts of research, literature survey and computer techniques in chemistry</p> <p><b>CO3[K3]:</b> apply the knowledge of fundamental concepts of chemistry in advanced research</p> <p><b>CO4[K4]:</b> simplify the outcome of instrumental method of analysis with the aid of chemistry softwares</p> <p><b>CO5[K5]:</b> appraise the ethics and art of science communication by developing the skill of effective thesis writing, paper writing and presentation in seminars and conferences.</p>
25.	21PCHJ41	Core Course - XVI: Project	<p><b>CO1[K2]:</b> demonstrate research ideas related to recent research through literature survey</p> <p><b>CO2[K3]:</b> perform research work based on the knowledge acquired from research papers</p> <p><b>CO3[K4]:</b> discriminate the products formed in synthetic work on the basis of characterisation by instrumentation techniques</p> <p><b>CO4[K5]:</b> judge the result of research work and propose the mechanism of the reaction</p> <p><b>CO5[K6]:</b> develop scheme for research in future, skill in thesis writing and publication of research work in reputed journals.</p>