SEMESTER –I (M.Sc Organic and Analytical Chemistry)

Course	Outcomes After completion of these courses a student will gain knowledge in
P –I General Chemistry	CO -1 - Basics of Quantum chemistry like Operators, Properties of wave function, Postulates , Setting of Operators for Observables Eigen values and Eigen functions
	CO- 2 - Quantization of all forms of energies using models like particle in 1 D box, Particle in 3 D box, Rigid Rotor , Simple Harmonic Oscillator and Tunneling effect
	CO-3 - Knowledge on interaction of electromagnetic radiation and matter and its application in spectroscopy.
P-II Inorganic Chemistry	CO-1 - The application of VSEPR theory and molecular orbital theory
	CO- 2 - Inorganic cage and ring compounds
	CO-3 - Concepts of Crystal field splitting, Jahn teller effect and Term symbols.
	CO-4 - Electronic spectra & magnetic properties of transition metal complexes
P-III Organic chemistry	CO-1 - Reaction mechanisms and various reagents in Different Reactions
	CO-2 - Applying the mechanisms to Hetrocyclic Chemistry and natural Products
P-IV Physical Chemistry	CO- 1 - Chemical equilibria , Partial molar property, Effect of Temperature on Pressure and Vice Versa, Entropy and its measurement
	CO -2 - Surfactant and their applications, Polymers , Kinetics of polymerization and molecular weight determination
	CO-3 - Theories of Reaction rates, Factors affecting Rate, Free energy relationship, Fast Reactions
	CO- 4 - Photophysicall Process and Photochemical Process

SEMESTER – II (M.Sc Organic and Analytical Chemistry)

Course	Outcomes After completion of these courses a student will gain knowledge in
P –I General Chemistry	**CO-**1 Shapes of orbitals , Probability distribution, approximation methods .
	CO-2 Approximation methods like Variation Method and Perturbation Theory. To understand the shapes of orbitals.
	CO- 3 Basics of Group theory and its applications to classification of molecules into groups
	CO -4 **W**riting flowcharts for certain important equations involved in Chemistry
P-II Inorganic Chemistry	CO - 1 - Concepts of structure and bonding in metal clusters
	CO - 2 - Basic ideas of metal carbonyls, Nitrosyls and Dinitrogen complexes, acquainted with Metallocenes and Isolobal relationship
	CO-3 - Concept of stability constant, their determination and SHAB principle
	CO-4 - Inert and Labile complexes according to VBT and CFT
	CO-5 - Acid – Base hydrolysis and trans effect, Electron transfer reaction
P-III Organic chemistry	**CO-1** Reactions and their mechanisms
	CO-2 Spectroscopic methods to analyse the structure of all organic compounds
P-IV Physical Chemistry	**CO- 1** **M**agnetic properties, Principle of nuclear magnetic spectroscopy, and Ability to interpret the NMR spectrum and the structure of Compound corresponding to it
	CO -2 Paramagnetic substances and their ESR spectrum
	CO-3 **V**arious types of Electrochemical cells and their applications, Determination of redox potentials and factors affecting the potentials.
	CO- 4 Butler volmer equation, tafel plot and their application in Electroanalytical techniques

SEMESTER – III (M.Sc ORGANIC CHEMISTRY)

Course	**Outcomes** After completion of these courses a student will gain knowledge in
P- I, Organic reaction mechanism	CO-1 Developing expertise in the areas of pericyclic reactions and photochemistry.
	CO-2 Understanding the reaction mechanisms and applications of pericyclic reactions.
	CO-3 Practical applications such as synthesis of organic compounds.
	CO-4 Understanding the process involved in vision, photosynthesis, solar energy conversions etc..
P-II, Organic Spectroscopy	CO-1 Identification of the functional groups of the organic molecules.
	CO-2 Determining the molecular identity and structure of organic compounds.
	CO-3 Measuring mass to charge ratio(m/z) of one or more molecules present in a sample.
	CO-4 Determining the complete structure of the organic molecules using all the above spectroscopic methods.
P-III, Organic Synthesis	CO-1 Generating C-C bond by using different named reactions. Learning about organometallic reagents.
	CO-2 In learning and applying wittig and pyrolytic elimination reactions in various mechanisms.
	CO-3 Understanding various applications of polymers with the help of HLF and BARTON reactions.
	CO-4 Learning concept of chirality in molecules. Using nano materials and phase transfer catalysis.
P-IV, Chemistry of natural products	CO-1 Various types of antibiotics and their applications.
	CO-2 Synthesis of various alkaloids like morphine and reserpine and their applications in medicinal chemistry.
	CO-3 Terpenes applications in medicinal chemistry.
	CO-4 Applications of natural pigments in our daily life

SEMESTER – III (M.Sc ANALYTICAL CHEMISTRY)

Course	Outcomes After completion of these courses a student will gain knowledge in
P- I, Separation methods	CO-1 The principles of Chromatography .
	CO-2 Learning the concepts of paper chromatography, TLC, HPTLC.
	CO-3 In column chromatography, gel filteration chromatography and Capillary electrophoresis.
	CO-4 Principles and instrumentation of gas chromatography and GCMs.
P-II, Quality control and traditional methods of analysis	CO-1 Quality control in analytical chemistry. Evaluation, reliability and statistical data .
	CO-2 Decomposition techniques in the analysis of organic and inorganic compounds. Principles of microwave and ultrasonic decomposition techniques.
	CO-3 Principles and applications in the analysis of oxidant systems.
	CO-4 Classification of organic functional groups with examples and their determinations.
P-III, Applied analysis	CO-1 Scope of metallurgical analysis, quantitative determinations of constituents present in different ores.
	CO-2 Analysis of finished products like steel, refractive materials, fluxes.
	CO-3 Analysis of oils, paints, soaps, cement.
	CO-4 Determination of BOD, COD, DO in water sample and assessment of water quality.
P-IV, Instrumentational method of analysis	CO-1 Principles and instrumentation of uv- visible spectroscopy and its applications.
	CO-2 Interpreting IR spectrum and acquiring knowledge in FTIR and ATR.
	CO-3 Principles and instrumentation of NMR and ESR and their applications.
	CO-4 Principle, instrumentation and applications of mass and X-ray spectroscopy.

SEMESTER – IV (M.Sc ORGANIC CHEMISTRY)

Course	**Outcomes** After completion of these courses a student will gain knowledge in
P- I, Organic reaction mechanism	CO-1 Modern synthesis and multicomponent reactions.
	CO-2 Oxidation reactions and the reagents involved.
	CO-3 Reduction reactions and reagents involved.
	CO-4 New methods of Organic synthesis
P-II, Organic Spectroscopy	CO-1 Applications of 13C NMR in hetero-nuclear couplings.
	CO-2 Assigning the structure of too complicated molecules with 2DNMR.
	CO-3 Finding out the configurations of molecules.
	CO-4 Finding out the structures of natural products by spectral methods.
P-III, Organic Synthesis	CO-1 Designing different organic molecules.
	CO-2 Synthetic applications of organo boranes and organo silanes.
P-IV, Chemistry of natural products	CO-1 Understanding basic consideration of drugs.
	CO-2 Drug designing, synthesis and their importance.

SEMESTER – IV (M.Sc ANALYTICAL CHEMISTRY)

Course	**Outcomes** After completion of these courses a student will gain knowledge in
P- I, Separation methods-II	CO-1 Principles and applications of Ion exchange Chromatography and ion Chromatography.
	CO-2 Principles and instrumentation of liquid-liquid partition chromatography, HPLC and LCMS.
	CO-3 Sampling of solids, liquids and gases.
	CO-4 Importance of analytical chemistry in Research and development. Principles of solvent extraction methods.
P-II, Quality control and traditional methods of analysis	CO-1 Precipitation, coprecipitation, post precipitation methods and titrations.
	CO-2 PFHS, Gravimetric determinations of inorganic and organic precipitants and electrogravimetric analysis.
	CO-3 Principles and applications in the analysis of reductant systems.
	CO-4 Basic Classification of drugs and their determinations.
P-III, Applied Analysis	CO-1 Analysis of raw materials like non ferrous alloys and ferrous alloys.
	CO-2 Analysis of soils, fertilizers and fuels.
	CO-3 Assessment of air quality.
	CO-4 Kinetic methods of analysis and non-aqueous titrations.
P-IV, Instrumentational method of Analysis	CO-1 Theory and instrumentation of atomic absorption spectroscopy, flame photometry, ICPAES and ICPMS.
	CO-2 Thermal methods of analysis like, TG, DTA, and DSC.
	CO-3 Analysis of voltametry, polarography, anode stripping voltametry and coloumetric analysis.
	CO-4 Ion selective electrodes and radiochemical methods of analysis..