DEPARTMENT OF CHEMISTRY
PROGRAMME: M.Sc ORGANIC CHEMISTRY

PO No.	Programme Outcomes Upon completion of the M.Sc Organic Chemistry Programme, the graduate will be able to
PO-1	Determine the aromaticity of different compounds.
PO-2	Study of Asymmetric synthesis.
PO-3	Synthesis of Natural products and drugs by using proper mechanisms.
PO-4	Determine molecular structure by using UV, IR and NMR.
PO-5	Solve the reaction mechanisms and assign the final product.

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	Understand the various type of aliphatic, aromatic, nucleophilic substitution reaction.

PSO-2	Understand and apply principles of Organic Chemistry for understanding the scientific phenomenon in Reaction mechanisms.
PSO-3	Learn the Familiar name reactions and their reaction mechanisms.
PSO-4	Understand good laboratory practices and safety.
PSO-5	Study of free radical,bycyclic compound, conjugate addition of Enolates and pericyclic reactions.

Course Title	**Paper I – GENERAL CHEMISTRY-I**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	To learn about basic fundamentals of Quantum Chemistry and Molecular Spectroscopy.
CO-2	To learn about wave mechanics of simple systems with contact potential energy, particle in one dimensional box
CO-3	To learn about concepts of microwave and IR_spectroscopy
CO-4	To learn about Raman spectroscopy and electronic spectra of diatomic molecules

SEMESTER I

Course Title	**Paper II –INORGANIC CHEMISTRY-I**

Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire the knowledge on VSEPR,Valence bond and molecular orbital theories in explaining the structure of simple molecules
CO-2	Acquire the knowledge on preparation, structure and mechanisms of boranes,carboranes,metallocarboranes and cage componds
CO-3	To learn about crystal field theory, crystal field splitting pattern in different geometries and calculation of crystal field stabilization energy
CO-4	Acquire the knowledge on how to draw Orgel and Tanabe_Sugano diagrams for metal complexes

Course Title	Paper III – ORGANIC CHEMISTRY
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire the knowledge on Nature of bonding in organic molecules and Aromaticity.
CO-2	To understand the Stereo Chemistry & Molecular representation of organic molecules.
CO-3	Acquire the knowledge of Heterocyclic compounds.
CO-4	To learn about Chemistry of some typical natural products (Alkaloids and Terpenoids).

Course Title	Paper IV – PHYSICAL CHEMISTRY-I
Code	M.Sc OC

CO	Course Outcomes

No.	
CO-1	Acquire knowledge on Thermodynamics
CO-2	Acquire knowledge on Micelles and Macro molecules
CO-3	Acquire knowledge on Chemical Kinetics
CO-4	Acquire knowledge on Photochemistry

Course Title	Paper –I INORGANIC CHEMISTRY PRACTICAL
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To Synthesis the inorganic complexes like (i) Tetraamminecopper(II) sulphate (ii) Potassium tris-oxalato ferrate(III) trihydrate (iii) Tris-thiourea copper(I) sulphate
CO-2	Hands on experience on Semi micro qualitative analysis of six radical mixtures Anions: CO32- , S2- , SO32- , Cl- , Br - , I - , NO3 - , SO4 2-, CH3COO - C2O42- , C4 H4 O6 2- , PO4 3- , CrO4 2-, AsO4 3-, F - , BO3 3- Cations : Ammonium (NH4+) 1st group: Hg, Ag, Pb, Tl, W 2nd group: Hg, Pb, Bi, Cu, Cd, As, Sb, Sn, Mo 3rd group: Fe, Al, Cr, Ce, Th, Ti, Zr, V, U, Be 4th group: Zn, Mn, Co, Ni 5th group: Ca, Ba, Sr 6th group: Mg, K, Li

Course Title	Paper-I ORGANIC CHEMISTRY PRACTICALS
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Hands on experience on Preparation, recrystallization, and determination of melting point & yield of the following compounds: (i) Aspirin, (ii) Nerolin, (iii) Chalcone, (iv) p-Nitro acetanilide, (v) 2,4,6- Tribromoaniline, (vi) m-Dinitrobenzene, (vii) Phthalimide, (viii) Diels-Alder adduct.

Course Title	Paper –I PHYSICAL CHEMSITRY PRACTICALS
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire practical knowledge on Determination of critical solution temperature of phenol-water system
CO-2	Acquire practical knowledge on Effect of added electrolyte on the CST of phenol-water system
CO-3	Acquire practical knowledge on Conductometric titration of Strong acid versus Strong base
CO-4	Acquire practical knowledge on Dissociation constant of weak acid (CH3COOH) by conductometric method
CO-5	Acquire practical knowledge on Conductometric titration of Weak acid vs Strong base.
CO-6	Acquire practical knowledge on Determination of cell constant
CO-7	Acquire practical knowledge on Adsorption of acetic acid on animal charcoal or silica gel
CO-8	Acquire practical knowledge on Acid-catalyzed hydrolysis of methyl acetate
CO-9	Acquire practical knowledge on Determination of partial molar volume of solute – H2O system by apparent molar volume method.

SEMESTER II

Course Title	Paper I – GENERAL CHEMISTRY-II
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To learn about basic fundamental concepts of Quantum chemistry
CO-2	Acquire the knowledge on symmetry element, symmetry operation and point groups
CO-3	To learn about accuracy and precision in doing experiments, understands the different errors and methods for minimising errors
CO-4	To learn about introduction to computer programming_FORTRAN

Course Title	Paper II – INORGANIC CHEMISTRY-II
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To learn about classification of clusters and different structural pattern of metal clusters
CO-2	Acquired knowledge on 16&18 electron rule ,bonding modes of CO,NO
CO-3	Acquire the knowledge on how to determine stability constant of particular complex through spectrophotometric and pH_metric method
CO-4	To learn about different types of electron transfer reaction and factors affecting them

Course Title	Paper III –ORGANIC CHEMISTRY-II
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge on Aliphatic Nucleophilic Substitution, Nucleophilic Aromatic substitution and Elimination Reactions.
CO-2	To understand Addition to Carbon – Carbon Multiple Bonds Reactions,Addition to Carbon – Hetero Multiple Bonds Reactions.
CO-3	To understand Types of molecular rearrangements, migratory aptitude.
CO-4	Acquire Basic principles and importance of UV, IR, NMR and Mass, Protection of carbonyl, Hydroxyl, carboxylic and Amine groups.

Course Title	Paper IV –PHYSICAL CHEMISTRY-II
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To understand Physical methods of molecular structural elucidation.
CO-2	Acquire knowledge on Thermodynamics part –II and Statistical Thermodynamics.
CO-3	Acquire knowledge on Electrochemistry part-I
CO-4	Acquire knowledge on Electrochemistry part -II

Course Title	Paper –II INORGANIC CHEMISTRY PRACTICALS
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To understand Volumetric Determination of Ferric iron by photochemical reduction
CO-2	To understand Volumetric Determination of Nickel by EDTA
CO-3	To understand Volumetric Determination of Calcium and Magnesium in a mixture by EDTA

CO-4	To understand Volumetric Determination of Ferrocyanide by Ceric sulphate
CO-5	To understand Volumetric Determination of Copper(II) in presence of iron(III)
CO-6	To understand Gravimetric Determination of Zinc as Zinc pyrophosphate
CO-7	To understand Gravimetric Determination of Nickel from a mixture of Copper and Nickel

CourseTitle	**Paper –II ORGANIC CHEMISTRY PRACTICALS**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	To understand Systematic qualitative analysis of an organic mixture containing two compounds Identification of method of separation and the functional group(s) present in each of them and preparation of one solid derivative for the conformation of each of the functional group(s).

Course Title	**Paper –II PHYSICAL CHEMISTRY PRACTICALS**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	Acquire knowledge on Distribution of iodine between CHCl3 and water
CO-2	Acquire knowledge on Distribution of I2 between CHCl3 and aq.KI solution-calculation of equilibrium constant.
CO-3	Acquire knowledge on Determination of Coordination number of cuprammonium cation.
CO-4	Acquire knowledge on Titration of Fe+2 Vs K2Cr2O7 – potentiometry
CO-5	Acquire knowledge on Titration of mixture Strong acid and weak acid versus Strong base by conductometry
CO-6	Acquire knowledge on Titration of Strong acid Vs Strong Base – pH – metry.
CO-7	Acquire knowledge on Titration of mixture of (NaHCO3 + Na2CO3) Vs HCl – pH- metry.
CO-8	Acquire knowledge on Titration of Strong acid Vs Strong Base using Quinhydrone electrode.
CO-9	Acquire knowledge on Verification of Beer-Lambert‟s law by Iron-thiocyanate system –colorimetry.
CO-10	Acquire knowledge on Determination of single electrode potential of Cu2+/Cu and estimate the given unknown concentration.

SEMESTER III

Course Title	Paper I –ORGANIC REACTION MECHANISMS-I and PERICYCLIC REACTIONS
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To deep learning of Aliphatic Nucleophilic substitution and Aliphatic Electrophilic Substitution reactions.
CO-2	To understand Principles of asymmetric synthesis.
CO-3	Acquire knowledge on Molecular orbital symmetry, frontier orbitals of some compounds, classification of pericyclic reactions and Electrocyclic reactions.
CO-4	To understand FMO,PMOapproach for the explanation of sigma tropic rearrgements under thermal and photochemical conditions,sigmatropic rearrangements,sigmatropic rearrangements.

Course Title	Paper II –ORGANIC SPECTROSCOPY-I
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To understand UV-Visible spectroscopy and it‟s applications.
CO-2	To understand Infrared spectroscopy and it‟s applications.
CO-3	To understandNuclear Magnetic Resonance Spectroscopy(1HNMR&13C NMR) and it‟s applications.
CO-4	To understand Mass spectrometry and it‟s applications.

Course Title	Paper III –MODERN ORGANIC SYNTHESIS-I
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge on Formation of C-C single bonds.
CO-2	Acquire knowledge on Formation of Carbon-Carbon double bonds.
CO-3	Acquire knowledge on Reactions of unactivated C-H bonds and organoboranes.
CO-4	Acquire knowledge on Protecting groups and simple applications of microwave and ultrasound assisted reactions.

Course Title	Paper IV –CHEMISTRY OF NATURAL PRODUCTS
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge onIntroduction, isolation, general methods of structure elucidation and physiological action, degradation, classification based on nitrogen heterocyclic ring, structure, stereochemistry, synthesis and biosynthesis ofAlkoloids.
CO-2	Acquire knowledge on Occurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry, biosynthesis and synthesis ofTerpinoids.
CO-3	Acquire knowledge onOccurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry, biosynthesis and synthesis of Steroids.
CO-4	Acquire knowledge onOccurrence, isolation, general methods of structure determination, isoprene rule. Structure determination, stereochemistry, biosynthesis and synthesis ofFlavonoids and Isoflavonoids.

Course Title	III SEMESTER Laboratory Course-1
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Multistep Synthesis of fallowing Organic Compounds Benzanilide from Benzophenone, Benzilic acid from benzoin, P-Bromo Aniline from Aniline, Symmetrical Tribromo Benzene from aniline, 2,4,6-trimethylquinoline from p-toluidine , Flavone from o-hydroxy acetophenone, 2-phenylindole from phenylhydrazine

Course Title	III SEMESTER Laboratory Course-1I
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	To understand the Spectral Identification of Organic Compounds (UV, IR, 1H- and 13C- NMR, MASS).

SEMESTER IV

Course Title	Paper I – ORGANIC REACTION MECHANISMS-II and ORGANIC PHOTO CHEMISTRY
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge on Free Radical Reactions,Quantitative relationships between Molecular structure and Chemical reactivity and Rearrangements.
CO-2	To understand knowledge on Methodologies in asymmetric synthesis.

CO-3	Acquire knowledge on Photochemical energy, Frank Condon Principle, Types of Electronic Excitation and Molecular orbital view of excitation, Jablonski Diagram, singlet and triplet states, dissipation of photochemical energy, photosensitization, quenching, quantum efficiency and quantum yield, Determination of Quantum yield and Photo Chemistry of Carbonyl Compounds.
CO-4	Acquire knowledge on different types of photo chemical rearrangement reactions.

Course Title	**Paper II –ORGANIC SPECTROSCOPY-II**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	Acquire knowledge on Optical Rotatory Dispersion and The octant rule-application in structural studies-α- halo keto rule.
CO-2	To understand Improving the PMR spectrum,Simplification of complex spectra,2D NMR spectroscopy.
CO-3	To understand how to deduce the structure of unknown compound by using fallowing spectral data (UV, IR, NMR (1H&13C) and mass spectrometry).
CO-4	To understandSeparation Techniques and Instrumental Techniques (GC,HPLC,XRD).

Course Title	**Paper III –MODERN ORGANIC SYNTHESIS-II**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	Acquire knowledge on OrganoSilanes and it‟sSynthetic applications.
CO-2	To understand properties and Synthetic applications of the oxidizing reagents in the oxidation of functional groups like alkenes, alkynes, alcohols, aldehydes and ketones.
CO-3	To understand different types of Catalytic reductions,properties and Synthetic applications of the Reducing reagents in the reduction of functional groups.
CO-4	Acquire knowledge on Retro Synthetic Analysis.

Course Title	Paper IV – BIO-ORGANIC CHEMISTRY
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge onBiopolymers and Enzymes.
CO-2	Acquire knowledge on Antimalarials& Antibiotics.
CO-3	Acquire knowledge onVitamins and Prostaglandins.
CO-4	Acquire knowledge onNucleic Acids.

Course Title	IV – SEMESTER Laboratory Course-1
Code	M.Sc OC

CO No.	Course Outcomes
CO-1	Acquire knowledge on Thin layer chromatography: Determination of purity of a given sample, monitoring the progress of chemical reactions, identification of unknown organic compounds by comparing the Rf values of known standards
CO-2	Acquire knowledge on Isolation and identification of Natural Products (a) Isolation of caffeine from tea leaves (b) Isolation of euginol from cloves (c) Isolation of casein and lactose from milk (d) Isolation of limonene from lemon peel (e) Isolation of

piperines from black pepper (f) Isolation of lycopene from tomatoes (g) Isolation of β-carotene from carrots

Course Title	**IV – SEMESTER Laboratory Course-1I**
Code	**M.Sc OC**

CO No.	**Course Outcomes**
CO-1	Hands on experience on Estimation of (a) Glucose (b) Phenol (c) Aniline (d) Acetone (e) Aspirin (f) Ibuprofen (g) Paracetamol
CO-2	Acquire knowledge on Separation by column chromatography: Separation of a mixture of ortho and para nitroanilines using silicagel as adsorbent and chloroform as the eluent. The column chromatography should be monitored by TLC.