DEPARTMENT OF CHEMISTRY

PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE & POST GRADUATE PROGRAMME (2022 ONWARDS)

NAME OF THE PROGRAMME: B.SC CHEMISTRY – PROGRAMME OUTCOME	
PO1	Describe the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in day-to-day life.
PO2	Employ critical thinking for solving problems using basic chemistry knowledge and concepts.
PO3	Acquire skills in handling scientific instruments, planning and performing laboratory experiments and drawing logical inferences from the chemical experiments.
PO4	Analyze the given scientific data critically and systematically to draw a logical conclusion.
PO5	Develop various communication skills such as reading, listening, speaking, etc., to express ideas and views clearly and effectively.
PO6	Create an intellectual curiosity and ability to think in a scientific manner and get sensitized to social and environmental realities.
PO7	Develop an interest in pursuing higher studies in Chemistry and related subjects which are relevant to employment and entrepreneurship.
PO8	Capable of self-paced and self-directed learning aimed atpersonal developmentand for improving knowledge/skill development and reskilling.
PO9	Demonstrate the knowledge of professional and ethical practices.
PO10	Integrate the knowledge and skills developed in multidisciplinary environments and function effectively as an individual or a leader and contribute towards the needs of the society
	M.Sc CHEMISTRY
PO1	Undertake further studies related to chemistry
PO2	Prepare students for pursuing research or careers in industry in chemical science
PO3	Student can pursue teaching profession,can also write specific competative exams like GATE, Foresenic Science, Adulteration related.
PO4	Quality control in all category of industries basic chemistry is required.
PO5	Graduates of the degree will have the capacity to develop their knowledge
PO6	Demonstrate basic laboratory skill necessary for chemistry research

PO7	Demonstrate basic knoledge kowledge about periodic trends and atomic structure
PO8	Identify the levels of molecules in instrumental analysis

NAME OF THE PROGRAMME: B.SC CHEMISTRY – COURSE OUTCOMES	
SEMESTER I	
GENERAL CHEMISTRY	1. Recollect the Chemistry of Quantum Numbers. 2. Review and apply periodicity of properties. 3. Discuss various types of bonding through VB & MO theories. 4. Name simple Aliphatic and Aromatic Compounds. 5. Illustrate and apply electron displacement effects and reaction mechanisms. 6. Elaborate the basic concepts of solid, liquid and gaseous states
SEMESTER II	
GENERAL CHEMISTRY	1. Compare the basic properties of elements and their Compounds of s & p – block elements. 2. Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products. 3. Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes. 4. Recollect the basic concepts of Quantum Theory and Thermodynamics. 5. Calculate the thermodynamic parameters using thermo chemical equations and data.
SEMESTER-III	
GENERAL CHEMISTRY	1. Compare the basic properties of elements and their Compounds of s & p – block elements. 2. Explain the reaction mechanisms of alkanes, alkenes and alkynes and predict the products. 3. Classify dienes and analyze the stability of alkanes, alkenes and cycloalkanes. 4. Recollect the basic concepts of Quantum Theory and Thermodynamics. 5. Calculate the thermodynamic parameters using thermo chemical equations and data.
WATER TREATMENT ANALYSIS	1. Classify water based on the presence of dissolved salts in it. 2. Explain the various methods to make the water potable.

	3. Discuss the softening methods of hardwater and determine hardness of water. 4. Understand electrodialysis and RO methods to desalinate Brackish water. 5. Analyse the presence of Chemical substances in water indicative of pollution by measuring BOD and COD. 6. Illustratrate the methods used for biological examination of water.
SEMESTER-IV	
GENERAL CHEMISTRY	1. The chemistry of noble gases and structure and properties of their compounds. 2. Preparation and properties of monocarboxylic and dicarboxilic acids. 3. Preparation and properties of alcohols and phenols.. Thermodynamic Equation of Stateand Free energy and Work function. 4. Third law of thermodynamics and its applications.
FOOD CHEMISTRY	1. Describe the structures and nutritive values of cereals, Pulses and sugar and their medicinal values. 2. Illustrate the composition and nutritive values of Vegetables, Fruits, Milk, Egg and soya beans. 3. Define and classify Beverages and functions of appetizers. 4. Explain the methods of preservation of foods. 5. Discuss about Food Additives and their functions.
SEMESTER-V	
INORGANIC CHEMISTRY	Upon completion of this course, the students will be able to 1. Compare the properties of Halogens and their Compounds. 2. Recollect the basic concepts and nomenclature of Co-ordination Compounds. 3. Explain the theories of Co-ordination Compounds. 4. Compare VBT with MOT and apply Complexes in qualitative and quantitative analyses. 5. Calculate the CFSE Values of Octahedral and Tetrahedral Complexes. 6. Analyze the bonding and structure of metallic carbonyls. 7. Draw the structures of ionic crystals and explain the defects
ORGANIC CHEMISTRY	Upon completion of this course, the students will be able to 1. Elucidate the structures of saccharides.

	2. Assign the stereo configuration of Organic Compounds. 3. Compare the Conformation and Configuration of cyclohexanes and substituted cyclohexanes. 4. Explain the preparation, properties and uses of Nitro alkanes. 5. Apply different reagents in studying various Organic reactions. 6. Explain the mechanism of Organic named reactions. 7. Explain the synthesis and properties of five and six membered heterocyclic compounds and condensed heterocyclic compounds. 8. Compare the basicity of heterocyclic Compounds.
PHYSICAL CHEMISTRY	Upon completion of this course, the students will be able to 1. Explain the Thermodynamics of ideal and Non-ideal solutions, Nernst distribution law and its applications. 2. Draw and explain phase diagrams of one Component and two Component systems having congruent and incongruent melting points. 3. Derive law of Chemical equilibrium and Van't Hoff isotherm. 4. Determine molar mass from the colligative properties. 5. Explain variation of conductivity with dilution, measurement of conductivity and concept of Transport Number and its determination. 6. Explain Debye-Huckel Theory of strong electrolytes. 7. Apply conductivity measurements and explain conductometric titrations.
ANALYTICAL CHEMISTRY	Upon completion of this course, the students will be able to 1. Analyze Data and explain the methods of purification of solids. 2. Purify solid and liquid Organic Compounds. 3. Explain the concept of Gravimetric Analysis. 4. Describe the principles, Instrumentation and applications of UV, Visible, Microwave, IR and Raman Spectroscopy.
APPLIED CHEMISTRY	Upon completion of this course, the students will be able to 1. Explain the refining process of petroleum and differentiate between Thermal and Catalytic Cracking. 2. Explain the various processes involved in paper technology. 3. Recover glucose from molasses and estimate sugar. 4. Prepare alcohol from molasses. 5. Explain the Proximate and Ultimate analysis of Coal. 6. Describe Chemical changes occurring in Milk during processing. 7. Define the principle involved in photography.

SEMESTER-VI	
INORGANIC CHEMISTRY	Upon completion of this course, the students will be able to 1. Explain the stability of nuclides in terms of N/P ratio, mass defect, binding energy and packing fraction. 2. Describe natural and artificial radioactivity and compare high energy nuclear reactions. 3. Describe the various processes involved in Metallurgy. 4. Compare the properties of d-block elements. 5. Compare the properties of lanthanides and actinides. 6. Classify Organometallic Compounds and discuss the biological importance of Fe, Cu and Zn.
ORGANIC CHEMISTRY	Upon completion of this course, the students will be able to 1. Explain the mechanisms of inter and intra molecular rearrangements. 2. Classify amino acids and explain their preparation and properties and synthesis of Peptides. 3. Differentiate between DNA and RNA. 4. Explain primary and secondary structures of proteins. etc. 5. Elucidate the structures of Antibiotics, Alkaloids and Terpenoids
PHYSICAL CHEMISTRY	Upon completion of this course, the students will be able to 1. Derive Nernst equation and explain Cell reactions. 2. Explain Concentration Cells and polarization. 3. Derive rate constant expressions for zero, first, second and third order reactions and determine the order of a raection. 4. Compare Collision theory and ARRT. 5. Explain Lindemann's theory of unimolecular reactions. 6. Explain Langmuir Theory of Adsorption. 7. Derive Michaelis-Menten equation for enzyme catalyzed reactions. 8. State laws of photochemistry and explain the kinetics of photo chemical reactions.
ANALYTICAL CHEMISTRY	Upon completion of this course, the students will be able to 1. Explain the principles and techniques of column, paper and thin layer chromatography,ion-exchange, high - pressure liquid and gas chromatography 2. Elucidate the structure of organic compounds using NMR,Mass and ESR spectroscopy .

	3. Discuss the principle and applications of TGA, DTA and thermometric titrations. 4. Explain the principle of polarography and amperometric titrations
POLYMER CHEMISTRY	Upon completion of this course, the students will be able to 1. Classify polymers and explain the various types of polymerization techniques. 2. Explain various methods of determining molecular weights of polymers. 3. Describe the chemistry of plastics and resins. 4. Explain the preparation of commercial, natural and synthetic polymers. 5. Enumerate the importance of Biopolymers, Conducting polymers and Acrylic polymers.
APPLIED CHEMISTRY	1. Explain the structure Texture and Chemical properties of soil 2. Define and classify fertilizers and illustrate the requirements of a good fertilizer. 3. Control the pollution caused by fertilizers. 4. Define and classify insecticides. 5. Discuss leather tanning methods. 6. Control pollution caused by tannery effluents.

NAME OF THE PROGRAMME: MSC CHEMISTRY - COURSE OUTCOMES	
SEMESTER –I	
ORGANIC CHEMISTRY	1. Describe the concept of Stereochemistry 2. Illustrate the importance of Conformation 3. Analyze the mechanism of Aliphatic and Aromatic Substitution reactions 4. Acquire knowledge on the various concepts of reaction kinetics and mechanism.
INORGANIC CHEMISTRY	1. Explain Isopolyacids and hetropolyacids of Vanadium, Chromium, Molybdenum and Tungsten. 2. Descirbe the structure, properties, correlation and applications of some Inorganic polymers. 3. Illustrates the chemistry of metal clusters. 4. Discuss polyhedral boranes, carboranes and metallocarboranes.

	5. Explain the stability constant of co-ordination complexes. 6. Apply the stereo chemistry for co-ordination complexes.
PHYSICAL CHEMISTRY	1. Explain partial molar properties and the concept of fugacity. 2. Describe the phase diagrams of three component systems involving solid-liquid and liquid-liquid equilibria. 3. Gain the knowledge about micelles, surfactants, structure and stability of colloids. Illustrate the effect of pressure, dielectric constant and ionic strength of the solution on the rate of the reaction. 4. Describe acid base and enzyme catalysis.
ADVANCED POLYMER CHEMISTRY	1. Have the knowledge on classification, nomenclature and properties of polymers. 2. Adequate knowledge on kinetics and mechanism of polymerisation. 3. Understanding on characterization of polymers. 4. Understand the morphology and applications of polymers.
SEMESTER II	
ORGANIC CHEMISTRY	1. Elucidate the mechanism of addition and elimination reactions 2. Appreciate the synthetic usage of various oxidizing and reducing reagents 3. Illustrate the importance of free radicals 4. Describe the concept of aromaticity
INORGANIC CHEMISTRY	1. Explain about the structure and properties of solids. 2. Describe the types of Nuclear reactions. 3. Explain about the stellar energy. 4. Discuss the types of Nuclear reactors. 5. Describe the chemistry of lanthanides and actinides. 6. Applying Nanotechnology to various metals. 7. Illustrate the types of transport proteins.
PHYSICAL CHEMISTRY	1. Describe the rate expression for complex reactions and experimental study of fast reactions. 2. Describe Debeye-Huckel limiting law and Bronsted equation. 3. Explain the structures of double layer and deriving Lippmann equation. 4. Apply group theory and finding the symmetries and point group to construct character tables of C2V and C3V.
MODERN SEPARATION	1. Have knowledge on principles on chromatography. 2. Working knowledge on gas and HPCL chromatographic

TECHNIQUES	techniques. 3. Adequate knowledge on application of ion-exchange chromatography. 4. Understanding on solvent extraction and distillation techniques.
SEMESTER III	
ORGANIC CHEMISTRY	1. Visualize the importance of UV-Visible and IR spectroscopy. 2. Acquire knowledge of vibrational transition and identify various functional groups 3. Apply the concept of Mass spectroscopy to different compounds 4. Elucidate the structure of organic compounds using NMR 5. Solve photochemical and pericyclic problems 6. Illustrate the synthesis of heterocycles
INORGANIC CHEMISTRYT	1. Explain about carbon donors 2. Describe the structure and bonding of metallocenes (ferrocenes) 3. Illustrate the different types of reaction of organo metallic compounds. 4. Discuss the various catalysis processes in organo metallic chemistry. 5. Explain the Electron transfer reactions of co-ordination compounds. 6. Analyse various types of photochemical reactions
PHYSICAL CHEMISTRY	1. Derive Butler-Volmer equation and explain Pourbaix and Evan's diagram of corrosion. 2. Explain electrical and magnetic properties of solids. 3. Describe the basic principles and applications of microwace, vibrational, Raman, NMR and electronic spectroscopy. 4. Compare Maxwell-Boltzmann and Fermi-Dirac and Bose-Einstein statistics.
SEMESTER IV	
ORGANIC CHEMISTRY	1. Develop problem solving skills requiring application of chemical reaction. 2. Acquire knowledge of terpenes and alkaloids. 3. Elucidate the structure of proteins and nucleic acids. 4. Solve problems related to molecular rearrangements 5. Attain skills on separation and purification of organic compounds.
PHYSICAL CHEMISTRY	1. Explain photophysical processes with the help of Jablonski diagram and analyze stern-volmer equation. 2. Describe photovoltaic, galvanic cell and solar energy conversion.

	3. Illustrate Schrodinger equation and its applications. 4. Explain Huckel theory of conjugate molecules and compare LCAO and MO theory for diatomic molecules. 5. Illustrate Einstein and Debye heat capacity models and Derive Sackur tetrode equation..