

SIKKIM MANIPAL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CHEMISTRY
COURSE OUTCOME

M.Sc. Chemistry

Ist Semester

Sl.No.	Semester	Subject Code	Subject Name	Course Outcome
1.	I st	CH20101A	Principles of Inorganic Chemistry	<p>CO1: In-Depth knowledge of periodic properties of elements, structure and bonding in molecules. Ability to assign structure and deduce properties of a given molecules.</p> <p>CO2: Ability to explain acid base concept, magnetic properties of molecules, and their application in deducing properties of a molecule.</p> <p>CO3: In-Depth knowledge of synthesis, properties bonding of p- block elements and their compounds and applications.</p> <p>CO4: In-Depth knowledge of synthesis, properties bonding of Boranes, Carboranes, Metallocarboranes, Borazines, Phosphazenes, Sulfur-Nitrogen compounds, silicates, silicones. Iso- and Hetero-poly anions. Understand the concept of allotropy and its significance.</p> <p>CO5: In-Depth knowledge of Metal-Metal bonds, industrial importance of the compounds of main group elements. Brief review of inorganic chains, rings and cages, organometallic compounds of non-transition elements.</p>
2.		CH20102A	Principles of Organic Chemistry	<p>CO1: Ability to use MOT for predicting reaction mechanism</p> <p>CO2: Able to solve problems related with stereochemistry</p> <p>CO3: Able to use acidic and basic conditions for carrying out suitable reactions</p> <p>CO4: Understanding of role of reaction intermediate in organic synthesis and nucleophilic substitution reaction.</p>
3.		CH20103A	Chemical Thermodynamics	<p>CO1: To impart fundamental concepts of solution thermodynamics involving ideal and non-ideal systems.</p>

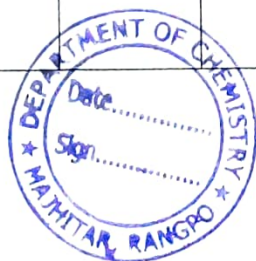


				<p>CO2: To use solution thermodynamic concepts and phase equilibria in two-component and multi-component systems.</p>
4.		CH20104A	Analytical Chemistry	<p>CO1: Understand the principles of Chemometrics. CO2: Understand the underlying principles, techniques, data analysis of Separation techniques and quantitative analysis. CO3: Ability to apply chemical analysis techniques for determining composition of samples. CO4: Interpret and optimize results.</p>
5.		CH20401A	Analytical Chemistry Lab	<p>CO1: Independently perform separation of components. CO2: Perform accurately volumetric and gravimetric analysis. CO3: Ability to analyse results.</p>
6.		CH20402A	Physical Chemistry Laboratory	<p>CO1: Ability to apply basic techniques of solution preparation and determine the aggregation process through Viscometric and conductometric methods. CO2: Understand the experimental procedure to determine the kinetic parameters of selected reactions. CO3: Ability to apply the knowledge of conductometric and potentiometric titration for determination of solubility of sparingly soluble salts. CO4: Ability to determine the composition and complex formation through spectroscopic analysis.</p>



IInd Semester

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1.	II nd	CH20105A	Modern Spectroscopic Techniques	<p>CO1: Understanding fundamentals of spectroscopy and ability to solve numerical problems (Determination of spectroscopic quantities, molar absorption coefficient).</p> <p>CO2: Understanding fundamentals of rotational spectroscopy, interpret spectra and solve numerical problems. (Determination of rotational constants Bond Length).</p> <p>CO3: Understanding fundamentals of vibrational spectroscopy, interpret spectra and solve numerical problems. (Force constant/Bond Energy).</p> <p>CO4: Understanding fundamentals of Electronic spectroscopy of atoms and molecules, interpret spectra and solve numerical problems.</p> <p>CO5: Understanding fundamentals of NMR and EPR spectroscopy, interpret spectra and solve numerical problems.</p>
2.		CH20106A	Organic Reactions And Mechanisms	<p>CO1: Build up a strong foundation on various aspects of a reaction mechanism to establish it.</p> <p>CO2: A clear conceptual understanding on various phenomena of organic compounds (especially unsaturated system)/intermediates through MOT.</p> <p>CO3: A detail understanding about rearrangement reactions based on substrate nature & reaction condition and their reaction path.</p> <p>CO4: A comprehensive knowledge on elimination reaction bases on substrate nature, used reagents and reaction conditions in organic synthesis.</p> <p>CO5: Develop a power to reason, creative thought on elimination reaction based on substrate nature and reaction condition.</p>
3.		CH20107A	Computer Fundamentals and Programming	<p>CO1: Understand the functioning of functioning of hardware and software.</p> <p>CO2: Knowledge of basics of C-programming.</p> <p>CO3: Ability to write C-programs using conditional statements and loops.</p>



				CO4: Ability to write C-programs for solving common analytical problems in chemistry.
4.		CH20108A	Quantum Chemistry- I	<p>CO1: To acquire basic knowledge in fundamentals of quantum chemistry.</p> <p>CO2: To understand the concept of wave function through the Schrodinger equation and understand the use of operators in quantum mechanics.</p> <p>CO3: To understand the applications of Schrodinger equation in simple systems like atoms and molecules.</p> <p>CO4: To acquire knowledge on quantum mechanical treatment of the Harmonic Oscillator, Energy eigenvalues and symmetry of the wave function.</p> <p>CO5: To understand the use of Schrodinger wave equation in polar coordinates, particle in a ring, angular momentum and particle on a sphere model.</p>
5.		CH20403A	Computer Programming Lab	<p>CO1: Ability to write simple programs using logical operators, loops and arrays.</p> <p>CO2: Simplify complex problems using functions.</p> <p>CO3: Ability to write C-programs for data analysis for chemical problems.</p>
6.		CH20404A	Organic Chemistry Lab	<p>CO1: Learn and apply techniques used in Organic Chemistry laboratory for synthesis, purification and identification.</p> <p>CO2: Employ the basic techniques used in Organic Chemistry laboratory for analysis such as chromatography, spectroscopy and estimation.</p>

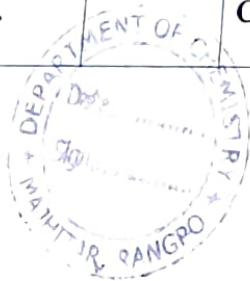


IIIrd Semester

Sl.No.	Semester	Subject Code	Subject Name	Course Outcome
1.	III rd	CH20109A	Advanced Coordination Chemistry & Inorganic Reaction Mechanism	<p>CO1: Understanding of VBT, CFT and their applications.</p> <p>CO2: Ability to predict electronic transitions and interpret electronic spectra of transition metal complexes and influence of distortion, calculation of CFSE.</p> <p>CO3: Understanding fundamentals of molecular orbital theory and interpretation of electronic spectra.</p> <p>CO4: Understanding fundamentals of reaction mechanism & electron transfer reaction mechanism.</p> <p>CO5: Understand the importance of use of organometallic catalysts in different reactions & bonding in carbonyl complexes</p>
2.		CH20110A	Concepts in Organic Synthesis	<p>CO1: Ability to identify and deduce mechanisms of various types of pericyclic and photochemical reactions.</p> <p>CO2: In-depth understanding of solid state chemistry of peptides and its applications.</p> <p>CO3: In-depth understanding of catalysis in chemistry and its applications.</p> <p>CO4: Ability to identify and apply the oxidation-reduction reactions in synthesis.</p> <p>CO5: In-depth knowledge of heterocyclic chemistry and its applications.</p>
3.		CH20111A	Chemical Dynamics and Electrochemistry	<p>CO1: To impart basic knowledge of Chemical Kinetics of Collision theory and the activated complex theory. To understand the mechanisms of unimolecular reactions.</p> <p>CO2: To understand the chemistry of Complex reactions, consecutive reactions, chain reactions, oscillatory, Thermal & photochemical chain reactions. To understand the kinetics of fast reactions.</p> <p>CO3: To acquire knowledge on the principles of Debye-Huckel model of ion-ion interactions and its verification.</p> <p>CO4: To understand the theory of electrolytic conductance and the principle of Dispersion of conductance through the Debye- Falkenhagen effect and Wien effect.</p>



				<p>CO5: To impart knowledge on the chemistry of Ion-Solvent interaction, its concept, the experimental determination and its application to equilibria.</p>
4.		CH20112A	Biochemistry	<p>CO1: Basic knowledge of biomolecules, biochemical solvents, important functional groups, importance of non-covalent bonds in biochemistry and biochemical thermodynamics</p> <p>CO2: Fundamental knowledge of protein, carbohydrate and lipid structures and functions</p> <p>CO3: Basic knowledge of polynucleotide structures, gene, genetic code, protein synthesis within cell and control of genetic expressions</p> <p>CO4: Fundamental knowledge about the relationship between properties and structure of the enzymes, their mechanism of action and kinetics of enzymatic reactions.</p> <p>CO5: An understanding of biochemistry in photosynthesis, carbon assimilation, functioning of the biochemical components of photosystems, photoexcitation and de-excitation of LHC.</p>
5.		CH20301A	Photoinorganic Chemistry	<p>CO1: In- depth understanding of photochemical Laws, Ability to explain various photophysical process taking place in excited state and factors influencing them.</p> <p>CO2: Ability to identify and explain photophysical kinetics of excited state gaseous and liquid state and electron transfer process</p> <p>CO3: In-depth understanding of photo-reduction and related reactions.</p> <p>CO4: Ability to identify various types of photochemical reactions and its application.</p> <p>CO5: In-depth understanding of photochemical reactions in biological processes and its explanation using model systems.</p>
6.		CH20302A	Synthetic Organic Chemistry	<p>CO1: A comprehensive knowledge of organometallic and their uses in organic synthesis.</p>



				<p>CO2: A comprehensive knowledge of organometalloid and their uses in organic synthesis.</p> <p>CO3: Ability to demonstrate knowledge of asymmetric synthesis.</p> <p>CO4: Ability to design retro-synthetic strategies independently for compounds of moderate complexity.</p> <p>CO5: Ability to project and deprotect functional group during organic synthesis.</p>
7		CH20303A	Advanced Physical Chemistry	<p>CO1: Able to find the connection between statistics and thermodynamics. and differentiate between classical statistics and quantum statistics</p> <p>CO2: Able to account for the physical interpretation of partition functions and be able to calculate thermodynamic properties of model systems with using Boltzmann, Fermi-Dirac and Bose-Einstein statistics.</p> <p>CO3: Able to understand process of aggregation of amphiphilic molecules and their industrial application.</p>
8		CH20405A	Inorganic Chemistry Lab	<p>CO1: Ability to synthesize different first row transition metal complexes, their purification and crystallization.</p> <p>CO2: Ability to determine percentage of yield of the products and to characterize physical properties.</p> <p>CO3: Ability to carry out UV-vis spectroscopic studies of the prepared complexes.</p> <p>CO4: Ability to analyse UV-vis spectral data (Molar extinction coefficient, identification of d-d transition and charge transfer).</p>

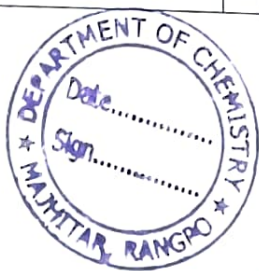


IVth Semester

Sl.No.	Semester	Subject Code	Subject Name	Course Outcome
1.	IV th	CH20113A	Bio-inorganic Chemistry	<p>CO1: Understanding of basic reactions in the biological systems and storage & transport of metabolic energy.</p> <p>CO2: Ability to understand ion transport across the biological membrane.</p> <p>CO3: In-depth knowledge of biological redox reactions, their importance and dioxygen in biological systems.</p> <p>CO4: In-depth Knowledge of metalloproteins in biological system and their active site structures.</p> <p>CO5: Knowledge of metalloenzymes and their applications in biological systems.</p>
2.		CH20114A	Solid State Chemistry & Interface Science	<p>CO1: Able to understand basic concept of crystal structure, its defect and its application to explain electrical properties of the solid material.</p> <p>CO2: Able to describe the fundamental aspects of colloid and surface chemistry and demonstrate how colloid and surface chemistry is applied in industry and the environment.</p>
3.		CH20115A	Group Theory – A Chemist Approach	<p>CO1: Ability to identify the symmetry elements and symmetry operation in molecules.</p> <p>CO2: Ability to identify point group, group multiplication table, subgroups and various groups.</p> <p>CO3: Ability to make transformation matrix for various symmetry elements.</p> <p>CO4: Ability to make irreducible character representation of a point group.</p> <p>CO5: Able to construct character table and apply them to find various properties of molecules.</p>
4.		CH20116A	Quantum Chemistry II	<p>CO1: Understanding of approximation methods in quantum chemistry</p> <p>CO2: Application of these methods for multi-electronic systems</p> <p>CO3: Application of these methods for explaining chemical bonding.</p>
5.		CH20304A	Chemistry of Nanomaterials	<p>CO1: Understanding of basics of nanomaterials.</p> <p>CO2: Ability to generate new methods for synthesis of nanomaterials.</p>



				<p>CO3: Knowledge of various experimental techniques and characterizations of nanomaterials.</p> <p>CO4: Applications of nanomaterials in various fields of chemistry.</p>
6.		CH20305A	Supramolecular Chemistry	<p>CO1: Understanding Host-Guest Chemistry, receptors & Macrocyclic effects</p> <p>CO2: Understanding of various intermolecular forces and its application in construction of supramolecules.</p> <p>CO3: Understanding chemistry of formation of various supramolecular systems and their application.</p> <p>CO4: Knowledge of self-assembly process in construction of supramolecules.</p> <p>CO5: Understanding the role of coordination chemistry in construction of functional supramolecular materials.</p>
		CH20306A	Medicinal Chemistry	<p>CO1: In-depth understanding of mode of action of drugs.</p> <p>CO2: Synthesis and ability to establish structure-activity relationships of various classes of drug.</p> <p>CO3: Understanding the role and function of Antihistaminics.</p> <p>CO4: Expertise in synthesis and classifications of various classes of local Anaesthetics.</p> <p>CO5: In-depth understanding of various classes of Antimalarial drugs.</p>



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