B.Sc HONOURS CHEMISTRY

Paper	Paper Name	Outcomes After completion of the course the student should be able to
		SEMESTER I
COURSE 1	**ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**	**CO 1 :**Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures. **CO 2 :** To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations **CO 3 :** To Explain the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life. **CO 4 :**Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts. **CO 5 :** To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.
COURSE 2	**ADVANCES IN MATHEMATICAL, PHYSICALAND CHEMICAL SCIENCES**	**CO 1 :**Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems. **CO 2 :**To Explain the basic principles and concepts underlying a broad range of fundamental areas of physics and to Connect their knowledge of physics to everyday situations. 3. Understand the different sources of renewable energy and their generation processes and advances in nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials. **CO 3 :**Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health. **CO 4 :** Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

		CO 5 : Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite).
SEMESTER II		
COURSE 3	GENERAL AND INORGANIC CHEMISTRY	**CO 1 :** Understand the structure of atom and the arrangement of elements in the periodic table. **CO 2 :** Understand the nature and properties of ionic compounds. **CO 3 :** Identify the structure of a given inorganic compound. **CO 4 :** Explain the existence of special types of compounds through weak chemical forces. **CO 5 :** Define acids and bases and predict the nature of salts.
	PRACTICAL GENERAL AND INORGANIC CHEMISTRY	**CO 1 :**. Understand the basic concepts of qualitative analysis of inorganic simple salt. **CO 2 :** Use glassware, equipment and chemicals and follow experimental procedures in the laboratory **CO 3 :** Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis
COURSE 4	INORGANIC CHEMISTRY- I	**CO 1 :** Understand the basic concepts of p-block elements. **CO 2 :** Explain the concepts of d-block elements **CO 3 :** Distinguish lanthanides and actinides. 4. Describe the importance of radioactivity.
	PRACTICAL	**CO 1 :** Understand the basic concepts of inorganic preparations. **CO 2 :** Use glassware, equipment and chemicals and follow experimental procedures in the laboratory **CO 3 :** Apply the properties of various elements for the preparation of inorganic compounds.
SEMESTER III		
COURSE 5	FUNDAMENTALS IN ORGANIC CHEMISTRY	**CO 1 :** Understand and explain the differential behaviour of organic compounds based on fundamental concepts learnt. **CO 2 :** Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved. **CO 3 :** Learn and identify many organic reaction mechanisms . **CO 4 :** Correlate and describe the stereo-chemical properties of organic compounds and reactions.
	PRACTICAL Organic Qualitative analysis	**CO 1 :** Use glassware, equipment and chemicals and follow experimental procedures in the laboratory **CO 2 :** Determine melting and boiling points of organic compounds **CO 3 :** Understand the application of concepts of different organic reactions studied in theory part of organic chemistry
COURSE 6	ORGANIC CHEMISTRY	**CO 1 :** Understand the concept of SN1andSN2and SNimechanisms. **CO 2 :** Describe the reactivity of alcohols and phenols. **CO 3 :** Achieve the skills required to propose various mechanisms

		CO 4 : Apply the concepts for synthesising various oxygen containing organic compounds 5. Interconvert the monosaccharides.
	PRACTICAL Organic preparations	**CO 1 :** How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory. **CO 2 :** How to calculate limiting reagent, theoretical yield, and percent yield. **CO 3 :** How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration. **CO 4 :** How to critically evaluate data collected to determine the identity, purity and percent yield of products and to summarize findings in writing in a clear and concise manner
COURSE 7	PHYSICAL CHEMISTRY - I	**CO 1 :** Understand the ideal and non ideal behaviour of solutions. **CO 2 :** Determine the molecular mass of non-volatile solutes. **CO 3 :** Discuss the basic concepts of Photochemistry. **CO 4 :** Apply the principles of electrical conductivity. **CO 5 :** Explain the importance of emf and its applications.
	PRACTICAL PHYSICAL CHEMISTRY -I	**CO 1 :** Use of glassware, equipment and chemicals and follow experimental procedures in the laboratory. **CO 2 :** Understand and apply the concepts of solutions practically. **CO 3 :** Apply concepts of electrochemistry in experiments.
COURSE 8	INORGANIC AND PHYSICAL CHEMISTRY	**CO 1 :**Apply IUPAC nomenclature for Coordination compounds **CO 2 :**Understand the various theories, structure and stereo chemistry of coordination compounds. **CO 3 :**Explain the reaction mechanism in complexes. **CO 4 :** Apply the 18 electron rule. **CO 5 :** Discuss the basic concepts of thermodynamics.
	PRACTICAL QUALITATIVE INORGANIC ANALYSIS	**CO 1 :** Understand the basic concepts of qualitative analysis of inorganic mixture. **CO 2 :** Use glassware, equipment and chemicals and follow experimental procedures in the laboratory. **CO 3 :** Apply the concepts of common ion effect, solubility product and concepts relatedto qualitative analysis.
SEMESTER IV		
COURSE 9	PHYSICAL CHEMISTRY -II	**CO 1 :**Explain the difference between solids liquids and gases in terms of intermolecular interactions. **CO 2 :**Differentiate ideal and real gases. **CO 3 :** Discuss the basic concepts of two component systems **CO 4 :**Apply the concepts of adsorption. **CO 5 :** Understand the basic concepts of crystallography.
	PRACTICAL Organic Preparations	**CO 1 :** Use glassware, equipment and chemicals and follow experimental procedures in the laboratory **CO 2 :** Apply concepts of surface chemistry in experiments. **CO 3 :** Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.
COURSE 10	GENERAL AND PHYSICAL CHEMISTRY	**CO 1 :** Correlate and describe the stereochemical properties of organic compounds. **CO 2 :** Explain the biological significance of various elements present in the human body. **CO 3 :** Apply the concepts of ionic equilibrium for the qualitative and

		quantitative analysis. **CO 4 :** Determine the order of a chemical reaction. **CO 5 :** Describe the basic concepts of enzyme catalysis.
	PRACTICAL Physical Chemistry - Volumetric Analysis	CO 1 : Use glassware, equipment and chemicals and follow experimental procedures in the laboratory CO 2 : Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria CO 3 : Learn and identify the concepts of a standard solutions, primary and secondary standards CO 4 : Facilitate the learner to make solutions of various molar concentrations..
COURSE 11	Nitrogen containing Organic Compounds & Spectroscopy	**CO 1 :** Distinguish primary secondary and teritiary amines and their properties. **CO 2 :** Describe the preparation and properties of amino acids. **CO 3 :** Explain the reactivity of nitro hydrocarbons. **CO 4 :** Discuss heterocyclic compounds with N, O and S. **CO 5 :** Apply the concepts of UV and IR to ascertain the functional group in an organic compound
	PRACTICAL Organic preparations and IR Spectral Analysis	CO 1 : Use glassware, equipment and chemicals and follow experimental procedures in the laboratory CO 2 : Calculate limiting reagent, theoretical yield, and percent yield CO 3 : Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately CO 4 : Dispose of chemicals in a safe and responsible manner CO 5 : Perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration. CO 6 : Create and carry out work up and separation procedures