COURSE OUTCOME

Chemistry

	Semester	Course Code	Course Title	Outcome
Chemistry Honours	Semester	Course Code	Course Title	Outcome
	Semester-I	CHEMHT-1	Inorganic Chemistry – IA ,	To know extra nuclear structure of atom; Periodic properties as well as Modern IUPAC periodic table and classification of elements in the table
			Physical Chemistry - IA	To understand Kinetic Theory and Gaseous state; Chemical Thermodynamics - I
		CHEMHP-1 (Practical)	Inorganic Chemistry – IA	1. Method of preparation of standard solutions of titrantsii. 2.Estimation of carbonate and hydroxide present together in a mixture 3. Estimation of carbonate and bicarbonate present together in a mixture

			Physical Chemistry - IA	i. Determination of pH of unknown solution (buffer), by color matching method. ii. Determination of heat of neutralization of a strong acid by a strong base. iii. Determination of heat of solute ion of oxalic acid from solubility measurement.
		CHEMHT-2	Organic Chemistry – I	To know the Basics of Organic Chemistry(Valence Bond Theory, Electronic displacements), Bonding and Physical Properties, General Treatment of Reaction Mechanism and Stereochemistry
		CHEMHP-2		To know the separation processes , determination of boiling point and identification of a Pure Organic Compound by chemical test(s)

		(Practical)		
		CHEMGT-1	Inorganic Chemistry - I	To know Atomic Structure,Chemical Periodicity, Acids and Bases,Redox Reactions,
			Organic Chemistry – I	General Organic Chemistry & Aliphatic Hydrocarbons
		CHEMGP-1 (Practical)	Inorganic Chemistry - I	1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with $KMnO_4$. 3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$. 4. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$. 5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.
			Organic Chemistry – I	Qualitative Analysis of Single Solid Organic Compound(s)
	Semester-II			To understand

		CHEMHT-3	Inorganic-1B	a) Redox Reactions and precipitation reactions : b) Acid-Base Concepts and Solvents :
		CHEMHP-3 (Practical)	Physical – 1B	To study: 1.Chemical Thermodynamics – II and 2.Chemical kinetics
			Inorganic-1B	To perform the following experiments: i. Estimation of Fe(II) using $K_2Cr_2O_7$ solution ii. Estimation of Fe(III) using $K_2Cr_2O_7$ and $KMnO_4$ solution iii. Estimation of Ca^{2+} using $KMnO_4$ solution iv. Estimation of Cu^{2+} iodometrically Estimation of Cr^{3+} using $K_2Cr_2O_7$ soluti

			Physical – 1B	i. Study of kinetics of acid-catalyzed hydrolysis of methyl acetate. ii. Study of kinetics of decomposition of H_2O_2.
		CHEMHT-4	(Organic - II)	To understand Stereochemistry(II), General Treatment of Reaction Mechanism, Substitution and Elimination Reactions
		CHEMHP-4 (Practical)		To study the Nitration of aromatic compounds; Condensation reactions and Purification of the crude product is to be made by crystallisation from water/alcohol,crystallization after charcoal treatment, or sublimation, whichever is applicable.

		CHEMGT-2	Physical Chemistry – I	To understand the States of Matter & Chemical Kinetics
			Inorganic Chemistry - II	To study Chemical Bonding & Molecular Structure, P-Block
		CHEMGP-2 (Practical)	Physical Chemistry – I	1.Surface tension measurement (use of organic solvents excluded)a. 2.Determination of the surface tension of a liquid or a dilute solution using a Stalagmometerb. 3. Study of the variation of surface tension of a detergent solution with concentration 4.Viscosity measurement (use of organic solvents excluded)
			Inorganic Chemistry - II	**Qualitative semi-micro analysis of mixtures containing three radicals.**

	Semester-III	CHEMHT-5	Physical – II	To know the Transport processes, Applications of Thermodynamics – I, and Foundation of QuantumMechanics
		CHEMHP-5 (Practical)		i. Study of viscosity of unknown liquid (glycerol, sugar) with respect to water. ii. Determination of partition coefficient for the distribution of I_2 between water andCCl_4. iii. Determination of K_{eq} for $KI + I_2 = KI_3$, using partition coefficient between water and CCl_4. iv. Conductometric titration of an acid (strong, weak/ monobasic, dibasic) against strong base. v. Study of saponification reaction conductometrically. vi. Verification of Ostwald's dilution law and determination of Ka of weak acid

		CHEMHT-6	Inorganic - II	To understand Chemical Bonding – 1 & II, Metal extraction and purification from ores and minerals
		CHEMHP-6 (Practical)		i. Estimation of Fe(II) and Fe(III) in a given mixture using K_2 Cr $_2$ solution ii. Estimation of Fe(III) and Cu(II) in a given mixture using $K_2Cr_2O_7$ solution iii. Estimation of Cr(VI) and Mn(II) in a given mixture using $K_2Cr_2O_7$ solution
		CHEMHT-7	Organic-III	To understand Chemistry of alkenes and alkynes, Aromatic Substitution, Carbonyl and Related Compounds, Organometallics
		CHEMHP-7 (Practical)		To carry out Qualitative Analysis of Single Solid Organic Compounds
		CHEMGT-3	Physical - II	To study the Chemical Energetics, Equilibria
			Organic	To know: 1. Aromatic Hydrocarbons

			Organic Chemistry - II	2.OrganometallicCompounds 3.Aryl Halides 4.Alcohols, Phenols and Ethers
		CHEMGP-3 (Practical)	Physical - II	1. Determination of heat capacity of calorimeter for different 2. Determination of enthalpy of neutralization of hydrochloric acid 3. Determination of enthalpy of ionization of acetic acid 4. Determination of enthalpy of hydration of copper sulphateIonic
			Organic Chemistry - II	To study Identification of a pure organic compound
		CHEMHS-1A	IT skills for Chemist	To study Mathematics Computer programming
		CHEMHS-1B	Basic Analytical Chemistry	To understand the Introduction Complexometry Soil Analysis Analysis of water Analysis of food products Analysis Ion-exchange Analysis of cosmeticsSuggested Applications (Any Suggested Instrumental demonstrations.
	Semester-IV	CHEMHT-8	Physical – III	To understand the Application of Thermodynamics – II, Electrical Properties of molecules, Quantum Chemistry
		CHEMHP-8 (Practical)	Physical – III	To carry out the following experiments:

				i. Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator). ii. Potentiometric titration of Mohr's salt solution against standard K_2Cr_2O-solution. iii. Determination of K $_{sp}$ for AgCl by potentiometric titration of $AgNO_3$solution against standard KCl solution. iv. Effect of ionic strength on the rate of Persulphate –Iodide reaction. v. Study of phenol-water phase diagram. vi. pH-metric titration of acid (mono-and di-basic) against strong base.
			Inorganic – III	

		CHEMHT-9		To understand the Radioactivity and nuclear chemistry, Chemistry of s and p-block elements, Coordination Chemistry - I
		CHEMHP-9 (Practical)		To study Complexometric Titration and Preparation of inorganic salt.
		CHEMHT-10		To understand Nitrogen compounds, Rearrangements, The Logic of Organic Synthesis, Organic Spectroscopy;
		CHEMHP-10 (Practical)	Organic-IV	i. Estimation of glycine by Sörensen's formol method ii. Estimation of glucose by titration using Fehling's solution

				iii. Estimation of sucrose by titration using Fehling's solution iv. Estimation of vitamin-C (reduced)
		CHEMGT-4	Physical Chemistry – III	To study Solutions, PhaseEquilibria, Conductance,Electrochemistry
			Inorganic Chemistry - III	To study : 1.Transition Elements (3d series) 2. Coordination Chemistry 3. Crystal Field Theory (CFT)
		CHEMGP-4 (Practical)	Physical Chemistry – III	1. Distribution Law (Any one) 2. Conductance 3. Determination of dissociation constant of a weak acid (cell constant, equivalent conductanceare also determined)
				To carry out the following experiments: 1. Complexometric estimation of (i) Mg^{2+} or (ii) Zn^{2+} using EDTA.

			Inorganic Chemistry - III	2. Preparation of any two of the following complexes: a. tetraamminecarbonatocobalt (III) nitrate b. tetraamminecopper(II) sulphate c. potassium trioxalatochromate(III) trihydrate d. potassium bisoxalatocuprate(II) trihydrate
		CHEMHS – 2A	Pharmaceutical Chemistry	To study Drugs & Pharmaceuticals: Fermentation
		CHEMHS - 2B	Analytical clinical Biochemistry	Review of Concepts from Core Course: Carbohydrates: Enzymes: Lipids: Biochemistry of disease: A diagnostic approach by blood/ urine analysis. Blood: Urine:
	Semester-V			Understanding the

		CHEMHT-11	Inorganic – IV	Coordination Chemistry – II, Magnetochemistry, Chemistry of d- and f-block elements, Reaction Kinetics and Mechanism
		CHEMHP-11 (Practical)		Quantitative: i. Estimation of available chlorine in bleaching powder using iodometry ii. Estimation of available oxygen in pyrolusite using permanganometry iii. Estimation of Cu in brass using iodometryiv. Estimation of Fe in cement using permanganometry Paper chromatographic separation of Ni(II) and Co(II)
		CHEMHT-12	Physical-IV	To know Molecular Spectroscopy, Photochemistry, Surface phenomenon

		CHEMHT-12 (Practical)		i. Determination of surface tension of a liquid using Stalagmometer. ii. Determination of CMC from surface tension measurements. iii. Verification of Beer and Lambert's Law for $KMnO_4$and $K_2Cr_2O_7$solu iv. Study of kinetics of $K_2S_2O_8$+ KI reaction, spectrophotometrically. v. Determination of pH of unknown buffer, spectrophotometrically. vi. Spectrophotometric determination of CMC.
		CHEMHTDSE-1A		To study the Introduction, Functionality and itspolymers, Tg , Solubility and Properties importance, Kinetics of Polymerization, Crystallization and crystallinity, Nature and structure of polymers, molecular weight of

			PolymerChemistry	
		CHEMHPDSE-1A (Practical)		1.Polymer Synthesis 2.Polymer characterization 3. Polymer analysis
		CHEMHTDSE-1B		To know the Silicate Industries, Fertilizers, Surface Coatings, Batteries, Alloys, Catalysis and explosives
		CHEMHPDSE-1B (Practical)	Inorganic Materials of Industrial Importance	1. Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of Calcium in Calcium ammonium nitrate fertilizer. 3. Estimation of phosphoric acid in superphosphate fertilizer. 4. Electroless metallic coatings on ceramic and plastic material. 5. Determination of composition of dolomite (by complexometric titration).

				6. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 7. Analysis of Cement. 8. Preparation of pigment (zinc oxide).
		CHEMHTDSE-2A	Analytical Methods in Chemistry	Qualitative and quantitative, Optical methods of analysis. Thermal and Electroanalytical methods of analysis. Separation techniques
		CHEMHPDSE-2A		To study Separation Techniques – Chromatography; Solvent Extractions Ion exchange: Spectrophotometry
				To study the

		CHEMHTDSE-2B	Instrumental Methods of Chemical Analysis	Introduction to spectroscopic methods of analysis, Molecular spectroscopy, Chromatography, Elemental analysis, NMR spectroscopy, Electroanalytical techniques,Radiochemical Methods: Elementary Analysis,Radiochemical Methods: Elementary Analysis
				1. Safety Practices in the Chemistry Laboratory 2. Determination of Cobalt and Nickel from mixture

		CHEMHPDSE-2B		3. Study of Electronic Transitions in Organic Molecules (i.e., acetone in water) 4. IR Absorption Spectra (Study of Aldehydes and Ketones)
		CHEMHTDSE-2C	Green	To understand Introduction to Green Chemistry, Principles of Green Chemistry and Designing a Chemical synthesis, Examples, Future Trends
		CHEMHPDSE-2C (Practical)		1. Preparation and characterization of nanoparticles of gold using tea leaves. 2. Preparation of biodiesel from vegetable/ waste cooking oil. 3. Benzoin condensation using Thiamine cation (anchored enzyme) as a catalyst instead of cyanide.
	Semester-VI	CHEMHT-13		To understand the Molecular Symmetry and Point group, (12 L)

		CHEMHT-13	Inorganic – V	Bio-inorganic Chemistry, Organometallic Chemistry and Catalysis
		CHEMHP-13 (Practical)		Qualitative semimicro analysis of mixtures containing four radicals (excluding oxide and carbonate).
		CHEMHT-14	Organic-V	To study Carbocycles and Heterocycles, Cyclic Stereochemistry, Pericyclic reactions, Carbohydrates, Carbohydrates, Biomolecules
		CHEMHP-14		To know the Chromatographic Separations of organic compounds.
		CHEMHTDSE-3	AdvancedPhysicalChemistry	To study the Crystal Structure, StatisticalThermodynamics, Special selected topics,
		CHEMHPDSE-3		Computer Programming based on numerical methods for:
		CHEMHTDSE-4	Dissertation	A dissertation has to be prepared on a topic from any area of Chemistry.

Chemistry PCC	**Semester-I**	CHEMGT-1	Inorganic Chemistry - I	To know Atomic Structure,Chemical Periodicity, Acids and Bases,Redox Reactions,
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			Organic Chemistry – I	Qualitative Analysis of Single Solid Organic Compound(s)
			Physical Chemistry – I	To understand the States of Matter & Chemical Kinetics

	Semester-II	CHEMGT-2		
			Inorganic Chemistry - II	To study Chemical Bonding & Molecular Structure, P-Block
		CHEMGP-2 (Practical)	Physical Chemistry – I	1.Surface tension measurement (use of organic solvents excluded)a. 2.Determination of the surface tension of a liquid or a dilute solution using a Stalagmometerb. 3. Study of the variation of surface tension of a detergent solution with concentration 4.Viscosity measurement (use of organic solvents excluded)
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		CHEMGT-3	Physical Chemistry - II	To study the Chemical Energetics, Equilibria
			Organic Chemistry - II	To know: 1. Aromatic Hydrocarbons 2.OrganometallicCompounds

			Chemistry - II	3.Aryl Halides 4.Alcohols, Phenols and Ethers
	Semester-III	CHEMGP-3 (Practical)	Physical Chemistry - II	1. Determination of heat capacity of calorimeter for different volumes 2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide 3. Determination of enthalpy of ionization of acetic acid 4. Determination of enthalpy of hydration of copper sulphateIonic Equilibria
			Organic Chemistry - II	To study Identification of a pure organic compound
		CHEMGT-4	Physical Chemistry – III	To study Solutions, PhaseEquilibria, Conductance,Electrochemistry
			Inorganic Chemistry - III	To study : 1.Transition Elements (3d series) 2. Coordination Chemistry 3. Crystal Field Theory (CFT)

Semester-IV	CHEMGP-4 (Practical)	Physical Chemistry – III	1. Distribution Law (Any one) 2. Conductance 3. Determination of dissociation constant of a weak acid (cell constant, equivalent conductanceare also determined)
		Inorganic Chemistry - III	To carry out the following experiments: 1. Complexometric estimation of (i) Mg^{2+} or (ii) Zn^{2+} using EDTA. 2. Preparation of any two of the following complexes: a. tetraamminecarbonatocobalt (III) nitrate b. tetraamminecopper(II) sulphate c. potassium trioxalatochromate(III) trihydrate d. potassium bisoxalatocuprate(II) trihydrate
Semester-V			

		CHEMGTDSE-1	Analytical and Environmental Chemistry & Analytical Industrial Chemistry	To study Analytical, Environmental andIndustrial Chemistry
		CHEMGPDSE-1 (Practical)		1. To find the total hardness of water by EDTA titration.2. To find the pH of an unknown solution by comparing color of a series of HCl solutions + 1drop of methyl orange, and a similar series of NaOH solutions + 1 drop of phenolphthalein. 2. Titration of Na_2CO_3 and $NaHCO_3$ mixture vs HCl using phenolphthalein and methyl orangeindicators.
	Semester-VI		Advanced Organic Chemistry and	To study : 1. Carboxylic acids

		CHEMGTDSE-2	Industrial Chemistry	2. Amines and Diazonium Salts 3. Amino Acids and Carbohydrates
			Industrial Chemistry	To study: 1. Polymers: 2. Paints: 3. Varnishes: 4. Drugs and pharmaceuticals: 5. Fermentation chemicals:
		CHEMGPDSE-2	Advanced Organic Chemistry and Industrial Chemistry	To carry out: a. Nitration of aromatic compounds b. Condensation reactions c. Hydrolysis of amides/imides
			Industrial Chemistry	1. Estimation of saponification value of oil / ester / fat. 2. Estimation of available chlorine in bleaching powder. 3. Estimation of acetic acid in commercial vinegar.

				4. Estimation of amino acid by formol titration