Government General Degree College, Dantan-II

Department of Chemistry

Under CBCS System

Programme Outcome

After successful completion of the program in Chemistry a student should be able to

PO-1	Understand the fundamental concepts of chemistry.
PO-2	Gain good practical knowledge and laboratory skills.
PO-3	Gather knowledge about preparation of laboratory solutions, reagents and also protocols for their safe disposal.
PO-4	Carry out experiments, analyze the data and interpretation of the results.
PO-5	Develop good communication skills in speaking and writing.
PO-6	Build up problem-solving skills.
PO-7	Gather basic IT skills to use relevant software for higher studies and research.
PO-8	Develop Interdisciplinary Knowledge.

Deptt. of Chemistry
Govt Gen. Degree College, Dantan-II

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Programme Specific Outcome

PSO-1: The chemistry graduates are expected to increase knowledge of the fundamental concepts of chemistry and applied chemistry through theory and practical.

PSO-2: They are expected to possess minimum standards of communication skills to read and understand documents so that they can solve the problems independently as well as they can easily share their idea/finding/concepts to others.

PSO-3: Chemistry graduates are expected to achieve critical thinking ability to design, carry out, record and analyze the results of chemical processes.

PSO-4: Chemistry graduates are expected to possess basic psychological skills to deal with individuals and students of various socio-cultural, economic and educational levels.

PSO-5: Chemistry graduates are expected to possess analytical skill to synthesize a chemical compound and perform necessary characterization using modern analytical tools and advanced technologies.

PSO-6: Chemistry graduates are expected to be technically well trained with modern devices and Chemistry based software for research activities.

PSO-7: They are expected to be more aware about finding green chemistry for sustainable development.

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Course Outcome

Core Course	Course Title	Course Outcome
CC-1	Organic Chemistry-I (Theory)	Learner will be able to 1. Understand the physical properties of organic molecules. 2. Know the Valence Bond Theory and the MO Theory. 3. Explain structures, nomenclature, stereochemistry, reactivity, and mechanism of the chemical reactions. 4. Gain knowledge of aromaticity and the effect of structure on organic compound reactivity. 5. Understand molecular inter-conversions and symmetry elements of organic molecules and reactions.
	Organic Chemistry-I(Practical)	Learners will be able 1. To identify Organic Compounds. 2. To separate compounds from binary mixtures. 3. To determine boiling point of some organic compounds.
CC-2	Physical Chemistry-I (Theory)	Students will get proper knowledge on 1. Basic application of kinetic theory, distribution of molecular velocities and energies etc. 2. Differentlaws of thermodynamics, thermochemistry and their applications in our everyday life. 3. Order, molecularity, different rate processes, consecutive reactions, collision and transition state theory, homogeneous and heterogeneous catalytic processes, Enzyme catalysis etc.
	Physical Chemistry-I (Practical)	Students learn how to determine 1. Rate constant and order of a chemical reaction. 2. pH of an unknown buffer. 3. Heat of neutralization of acid and bases.
CC-3	Inorganic Chemistry-I ((Theory)	Students will get proper knowledge on 1. Extra nuclear structure of atom 2. Different theories on atomic structures, postulates, drawbacks and applications. 3. Orbits, orbitals, configurations. 4. Periodic table along with chemical periodicity of various properties of different elements. 5. Acids and bases, buffer, pH and ionic equilibrium. 6. red-ox behavior of different elements.
	Inorganic Chemistry-I (Practical)	Students learn how to estimate 1.Carbonate, bicarbonate and hydroxide in a mixture. 2. Metal ions in a mixture.
CC-4	Organic Chemistry-II (Theory)	Learners will get fundamental knowledge on 1. Mechanism of nucleophilic aromatic and aliphatic electrophilic substitution reactions. 2. Chirality, stereoisomerism, conformation etc. 3. Kinetics and thermodynamics of reactions. 4. Different organic processes and their intermediates mechanistically.
	Organic Chemistry-II (Practical)	1. Improve individual's skills on preparation of compounds. 2. One learns purification process of organic compounds.

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CC-5	Physical Chemistry-II (Theory)	Learners will get fundamental knowledge on 1. Transportphenomenon like viscosity of liquids and conductance of ionic solutions. 2. Chemical equilibrium as an application of chemical thermodynamics. 3. Introductory quantum mechanics and application in chemical science.
	Physical Chemistry-II (Practical)	Learner will get practical knowledge on 1.How to determine viscosity co-efficient of an unknown liquid; (ii) equilibrium constant of the reaction $KI + I_2 = KI_3$; 2.Rate constant of saponification reaction and ionization constant of a weak acid.
CC-6	Inorganic Chemistry-II (Theory)	Learners will get fundamental knowledge on 1. Ionic bond, covalent bond, polarizability, ionic potential, Lewis structures, formal charge, Valence Bond Theory, hybridizations, dipole moments, VSEPR theory, shapes of molecules and ions, σ and π bond, lattice energy, solvation energy, ionic potential, molecular orbital theory ofbonding, LCAO-MO; HOMO, LUMO. Bondorders,bond lengths etc. 2.Nuclear stability, natural radioactivity, nuclear binding energy, artificial radioactivity, nuclear energy etc. 3.Principles of determination of age of rocks and minerals, radio carbon dating, hazards of radiation and safety measures.
	Inorganic Chemistry-II (Practical)	Learner will get practical knowledge on 1. Estimation of metal content in some selective samples. 2. Iodometric method, its application on quantitative estimation of metal ions from unknown samples.
CC-7	Organic Chemistry-III (Theory)	Learners will get fundamental knowledge on 1. Mechanisms of aromatic substitution reactions. 2. Basic understanding of carbonyl chemistry. 3. Green Chemistry. 4. Organometallicchemistry.
	Organic Chemistry-III (Practical)	Learner will get practical knowledge on 1. How to identify the nature of the functional groups present in an organic molecule. 2. Preparation, purification and melting point determination of a crystalline derivative of a given compound.
SEC-1	Analytical Clinical Biochemistry and Pharmaceutical Chemistry (Theory)	Learners will get fundamental knowledge on 1. Basic understanding of the structures, properties and functions of carbohydrates, lipids and proteins. 2. Biochemistry of diseases. 3. drug discovery, design and development, analgesics agents, antipyretic agents, anti-inflammatory agents, antibiotics, antibacterial and antifungal agents etc. 4. Applications of drugs.
	Analytical Clinical Biochemistry and Pharmaceutical Chemistry (Practical)	Learner will get practical knowledge on 1. Identification and estimation of Carbohydrates, Lipids,Proteins. 2. Determination of the iodine number of oil, saponification number of oil, protein by the Biuret reaction. 3. Determination of nucleic acids. 4.Preparation of Aspirin and Antacid.
CC-8	Physical Chemistry-III(Theory)	1. Application part of thermodynamics (colligative properties, phase rule, binary solutions, ionic equilibrium and electromotive force).

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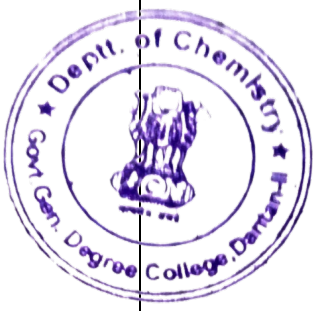
		2. Students become familiar with the quantummechanical treatment of hydrogenic system.
	Physical ChemistryIII(Practical)	Learner will get practical knowledge on 1. Potentiometric titration. 2. Determinationof solubility product. 3. Effect of ionic strength on the rate of Persulphate – Iodide reaction. 4. phenol-water phase diagram. 5. pH-metric titration of acid (mono- and di-basic) against strong base.
CC-9	Inorganic Chemistry-III (Theory)	Learners will get fundamental knowledge on 1.The general principles of Metallurgy: 2. Methods of purification of metals 3. Chemistry of s and p block elements as well as nobel gases. 4. Inorganic polymers, their types, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes. Borazines, silicates and phosphazenes. 5. Primary concept of coordination chemistry.
	Inorganic Chemistry-III (Practical)	Learner will get practical knowledge oncomplexometric titration and Inorganic preparations.
CC-10	Organic Chemistry-IV (Theory)	Learners will get fundamental knowledge on 1. Mechanisms of rearrangement reactions. 2.Synthesis and reactions of nitrogenous compounds. 3. Asymmetric synthesis. 4. spectroscopy of organic molecules with a focus on UV-Vis, IR, and NMR spectroscopy and their applications. 5. retrosynthesis in designing of organic compound synthesis.
	Organic ChemistryIV(Practical)	Learner will get practical knowledge on 1. Quantitative estimations of glycine, glucose, sucrose, vitamin-C, aromatic amine, phenol, formaldehyde, acetic acid, urea etc. 2.Saponification value of oil/fat/ester.
SEC-2	Basic Analytical Chemistry and Pesticide Chemistry (Theory)	Learners will get fundamental knowledge on 1. analysis of soil compositions by complexometric titration 2. Water purification process. 3. Separation of metal ions by different chromatographic methods 4. Idea on food product analysis. 5. Analysis of cosmetic products and their harmful effects on human body as well as on environment. 6. Basic knowledge of Pesticide Chemistry.
	Basic Analytical Chemistry and Pesticide Chemistry (Practical)	Learner will get practical knowledge on 1. Determination of pH of soil samples. 2. Determination of pH, acidity and alkalinity of a water sample. 3. Determination of dissolved oxygen (DO) of a water sample. 4. Identification of adulterants in some common food items like coffee powder, asafoetida,chilli powder, turmeric powder, coriander powder and pulses, etc. 5. Paper chromatographic separation of mixture of metal ions. 6. how to calculate acidity/alkalinity in given sample of pesticide.
CC11	Inorganic Chemistry-IV (Theory)	Learners will get fundamental knowledge on 1.Basic theories of coordination chemistry specially VBT, CFT and MOT. 2.The basis of Jahn Teller Theorem, origin of colour of the complexes. 3. Selection rules; orgel diagram; TS diagram.

		4. Magnetic materials like ferromagnet, antiferromagnet, ferrimagnet etc. 5. Different general properties (like electronic configuration, oxidation state, electronic spectra, magnetic properties, etc...) of d- and f-block elements.
	Inorganic Chemistry-IV (Practical)	Learner will get practical knowledge 1. about the technique for the separation of different metal ions (like Ni+2 & Co+2) from the mixture by paper chromatography. 2. on estimation of metal ion quantitatively by gravimetric precipitation method.
CC-12	Organic Chemistry-V (Theory)	Learners will get fundamental knowledge on 1. Heterocyles and carbocycles. 2. Stereochemistry of cyclic compound. 3. Pericyclic processes. 4. Properties and reactions of carbohydrates, peptides, nucleic acids, and amino acids.
	Organic Chemistry-V (Practical)	Learner will get practical knowledge on 1. Chromatographicseparations. 2. Structure determination of various organic molecules using spectroscopic methods .
DSE-1	Advanced Physical Chemistry-I (Theory)	Learners will get fundamental knowledge on 1. The laws of crsytallography, lattice structure of crsytalline solids and the basic theory behind the X-ray crsytallography. 2. Preliminary concepts of statistical thermodynamics. 3. Polymer science and dielctric properties of molecules.
	Advanced Physical Chemistry-I (Practical)	Learners will be familiar with numerical methods of computation with the help of Computer Programming.
DSE-2	Analytical Methods in Chemistry and Instrumental Methods of Chemical Analysis(Theory)	Learners will get fundamental knowledge on 1. sample preparation 2. Spectroscopic methods of analysis . 3. Thermogravimetric estimation of metals. 4. Different electroanlytical methods e.g., potentiometric methods, conductometric methods, pH metric methods etc. 5. Instrumentation in Infrared spectroscopy, Mass spectrometry, NMR spectroscopy. 6. potentiometric& voltammetry.
	Analytical Methods in Chemistry and Instrumental Methods of Chemical Analysis(Practical)	Learner will get practical knowledge on 1. Separation techniques using chromatography. 2. Analysis of soil. 3. Determination of pKa values of indicator using spectrophotometry. 4. Determination of chemical oxygen demand (COD) and Biological oxygen demand (BOD). 5. safety practices in the Chemistry Laboratory 6. Titration curve of an amino acid. 7. Determination of a mixture of Cobalt and Nickel. 8. IR Absorption Spectra (Study of Aldehydes and Ketones) 9. Determination of Calcium, Iron, and Copper in Food by Atomic Absorption Spectroscopy. 10. Quantitative analysis of mixtures by Gas Chromatography.
CC-13	Inorganic Chemistry-V (Theory)	Learners will get fundamental knowledge on 1.Different biological process in human body (like O2 & CO2 transport mechanism). 2. Mechanism of nitrogen fixation and photosynthesis electron transfer process (PS-I & PS-II). 3. Effects of metal toxicity in human being. 4. Different catalysis reactions like alkene hydrogenation;



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		Hydroformylation; Wacker Process; Synthetic gasoline; Ziegler-Natta catalysis etc. 5. Inorganic reaction mechanism with special attention on S_N2, S_N1, S_N1CB reactions of octahedral and square planar complexes. 6. Understanding of kinetic and thermodynamic stability of complexes.
	Inorganic Chemistry-V (Practical)	Learner will get practical knowledge on 1. Detection methods of different inorganic metal ions and anions. 2. Principleof solubility product in the precipitation of different group metal ions. 3. Technique to separate similar acid radicals like Cl-, Br-, I- etc...
CC-14	Physical Chemistry-V (Theory)	Learners will get fundamental knowledge on 1. rotation spectroscopy: Selection rules, determination of bond lengths of diatomic and linear triatomic molecules, isotopic substitution. 2. vibrational spectroscopy: Morse potential, dissociation energies, molecules, modes of vibration, diatomic vibrating rotator, P, Q, R branches. 3. Raman spectroscopy: qualitative treatment of Rotational Raman effect; effect of nuclear spin,Vibrational Raman spectra, Stokes and anti-Stokes lines; their intensity difference, rule ofmutual exclusion. 4. principles of NMR spectroscopy and Electron Spin Resonance (ESR) spectroscopy. 5. photochemistry: Lambert-Beer's law, quantum yields, Fluorescence and phosphorescence, Jablonskii diagram, chemiluminescence. 6. Differentsurface phenomenon and properties of colloid.
	Physical Chemistry-V(Practical)	Learner will get practical knowledge on 1. Determination of surface tension of a liquid using Stalagmometer. 2. Determination of CMC from surface tension measurements. 3. Beer and Lambert's Law for $KMnO_4$ and $K_2Cr_2O_7$ solution 4. determination of pH of unknown buffer spectrophotometrically 5. Spectrophotometric determination of CMC.
DSE-3	Green Chemistry and Inorganic Materials of Industrial Importance (Theory)	Learners will get fundamental knowledge on 1. Principles of Green Chemistry . 2. Future Trends in Green Chemistry. 3. Silicate Industries, fertilizers, surface Coatings, batteries, alloys and chemical explosives etc.

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	Green Chemistry and Inorganic Materials of Industrial Importance (Practical)	Learner will get practical knowledge on 1. Preparation of nanoparticles of gold using tea leaves. 2. Preparation of biodiesel from vegetable/ waste cooking oil. 3. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide. 4. Extraction of D-limonene from orange peel using liquid CO2 prepared form dry ice. 5. Determination of free acidity in ammonium sulphate fertilizer. 6. Estimation of Calcium in Calcium ammonium nitrate fertilizer. 7. Estimation of phosphoric acid in superphosphate fertilizer. 8. Determination of composition of dolomite (by complexometric titration). 9. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 10. Analysis of Cement. 11. Preparation of pigment (zinc oxide).
DSE-4	Polymer Chemistry (Theory)	Learners will get fundamental knowledge on 1. Different polymerisation processes, step growth, chain growth polymerisation, 2. Viscometric, osmometric determination of molecular wt . 3. Thermodynamics of polymer solutions. 4. Properties and applications of different polymers.
	Polymer Chemistry (Practical)	Learner will get practical knowledge on 1. Viscometric determination of molecular weight of polymer. 2. Preparation of nylon-66.
Generic Elective-1	GE-1 (Theory)	Learner will accrue basic understanding on 1. Atomic models. 2. Different periodic properties like electronegativity; electron affinity; Ionisation energy etc... 3. Acid base equilibrium and concepts of pH . 4. Balancing of chemical equation by oxidation reduction and ion electron methods. 5. Molecularinterconversions and symmetry elements. 6. Mechanisms of electrophilic addition reactions, elimination reactions, and the determination of reaction mechanisms.
	GE-1(Practical)	Learner will get practical knowledge on 1. Estimationusing permanganometry, iodometry and dichromatometry. 2. Identification of the nature of the functional groups present in an organic molecule.
Generic Elective-2	GE-2 (Theory)	Learners will get fundamental knowledge on 1. Kinetic theory of gases, pressure and temperature, distribution of speed and kinetic energy, principle of equipartition of energy, deviation of gases from ideal behavior. 2. surface tension, viscosity and there dependence on temperature. 3. Forms of solids, crystallography, defects in crystals etc. 4. Chemical bonding and molecular structure. 5.p block elements.
	GE-2 (Practical)	Learner will get practical knowledge on 1. Surface tension and viscosity of liquid. 2. Kinetics of reactions.
Generic Elective-3	GE-3 (Theory)	Learners will get fundamental knowledge on 1. Different laws and application of thermodynamics. 2. Ionicequilibria. 3. Mechanisms of aromatic substitution reactions.

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		4. Carbonyl chemistry. 5. Chemistry of organometallics. 6. Unsaturated molecules' chemistry.
	GE-3(Practical)	Learner will get practical knowledge on 1. measurement of pH 2. preparation of different buffer solutions 3. solubility of sparingly soluble salt 4. identification of some pure organic compounds like oxalic acid, succinic acid, resorcinol, urea, glucose, benzoic acid and salicylic acid, acetone, aniline etc.
Generic Elective-4	GE-4(Theory)	Learners will get fundamental knowledge on 1. Ideal& non-ideal solutions. 2. Phaseequilibria. 3. Conductance of ionic solutions. 4. Electromotive force.
	GE-4 (Practical)	Learner will get practical knowledge on 1. Phase diagram of water phenol system. 2. Determination of dissociation constant of weak acid. 3. Potentiometric titration.

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