



Government of West Bengal

Government General Degree College, Nakashipara

Department of Chemistry

MURAGACHHA, NADIA, PIN- 741154

Phone No.: 03474-268008 web: www.muragachhagovtcollege.org e-mail: chemistry.mgc15@gmail.com

Ref. No.....

Date.....

COURSE & PROGRAM OUTCOME OF CHEMISTRY HONOURS (B.Sc.) UNDER CBCS

The CBCS Course curriculum of the discipline of Chemistry is well designed and very promising. The core course would help to enrich the subject knowledge of the students and increase their confidence level in the field of both academia and industry. Generic electives make integration among various interdisciplinary courses to fulfill the vision and mission of designing the course. The introduction of Skill Enhancement Courses (SEC) would help to gain more powerful knowledge not only in their core Chemistry subject but also in interrelated multidisciplinary subjects both theoretically and practically. The inclusion of Discipline Specific Courses (DSC) has brought an opportunity in front of students to gain knowledge on various naturally and industrially important useful materials and also helps them become familiar and expert in handling different chemistry-based software after proper training. In brief the student graduated with this type of curriculum would be able to disseminate subject knowledge along with necessary skills to suffice their capabilities for academia, entrepreneurship and industry.

After careful analysis of the course, the department of Chemistry has pointed out the following outcomes of the course.

Course Outcomes

Semester	Course Code	Course Outcomes
SEM-I	CC-1	CO-1: To know extra nuclear structure and wave mechanical concept of atom CO-2: To understand classification of the elements on the basis of their electronic configuration and properties

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		<p>CO-3: To understand the basic concept of kinetic theory of gases and know how to solve numerical problems related to that topic.</p> <p>CO-4: To realise the basic difference between real gas and ideal gas</p> <p>CO-5: To learn about different types of forces which acting in gaseous molecules.</p> <p>CO-6: To learn the concept of heat, work, internal energy and enthalpy</p> <p>CO-7: To understand the heat of formation of a molecule or compound from their elemental state and stability of the molecule.</p> <p>CO-8: To learn about the knowledge of P_H, heat neutralization and acid-base titration method practically.</p>
	CC-2	<p>CO-1: To understand the concept of hybridization, geometry and shape of the organic compounds.</p> <p>CO-2: To know the electrons distribution pattern in the organic molecule and their reactivity on the basis of polarization, dipolemoment and polarizability.</p> <p>CO-3: To know Qualitative idea about molecular orbitals, bonding and antibonding interactions of organic molecule and basic idea about Frontier MOs (FMO); concept of HOMO, LUMO and SOMO.</p> <p>CO-4: To understand the concept of aromaticity and classification of compounds on the basis of aromatic, anti-aromatic and nonaromatic behaviour.</p> <p>CO-5: To learn mechanism of organic reaction like addition, elimination, substitution reactions and elementary idea of electrophilicity and nucleophilicity.</p> <p>CO-6: To understand the knowledge of reaction intermediate in organic reaction.</p> <p>CO-7: To learn the basic concepts of Stereochemistry</p> <p>CO-8: To understand relative, absolute configuration and optically activity of the chiral and achiral organic molecule.</p> <p>CO-9: To learn stereochemistry of chiral compounds arises due to presence of stereo-axis; concept of stereoisomerism and concept of conformations of stereo isomers.</p> <p>CO-10: To study the identification test of pure organic solid and liquid</p> <p>CO-11: To understand the practical knowledge of separation of compounds by crystallization and determination of melting point.</p>
SEM-2	CC-3	<p>CO-1: To know the basic concepts of redox reactions</p> <p>CO-2: To understand electrochemical series and its application to explore</p>

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		<p>the feasibility of redox reactions and equilibrium constants and effect of pH, complexation and precipitation on redox potentials, formal potential.</p> <p>CO-3: To learn the concept of solubility and solubility product of sparingly soluble salt and its application to the precipitation and separation of common metallic ions as hydroxides, sulphides, carbonates, sulphates and halides.</p> <p>CO-4: To know the basic concept of Acid and Bases</p> <p>CO-5: To study relative strength of different acid and bases</p> <p>CO-6: To understand the concept of SHAB principle and its application.</p> <p>CO-7: To experience the knowledge of buffer solution, choice of indicator in acid base titration, acid base equilibrium in aqueous solution.</p> <p>CO-8: To learn in detail about the second laws of Chemical Thermodynamics and the related terms; to get idea about thermochemistry and thermodynamic relationships and system of variable compositions.</p> <p>CO-9: To understand rate laws, rate equations of different types of reactions, determine rate constant values, order of reactions, effect of temperature and other factors on reaction rate, homogenous catalysis, catalytic effect on reaction rate, equations related to chemical catalysis.</p> <p>CO-10: To learn experimentally how to estimate Fe(II), Cu(II), Ca(II), Cr(II) from unknown solution with different titrimetric method.</p> <p>CO-11: To study the kinetics of decomposition of H₂O₂, acidcatalyzed hydrolysis of methyl acetate.</p>
	CC-4	<p>CO-1: To learn about Stereoisomerism of substituted cumulenes with even and odd number of double bonds; chiral axis in allenes, spiro compounds</p> <p>CO-2: To understand Concept of prostereoisomerism</p> <p>CO-3: To study the conformational nomenclature of organic compound.</p> <p>CO-4: To study the general treatment of reaction mechanism.</p> <p>CO-5: To understand about organic acid bases and application in various fields.</p> <p>CO-6: To study the concept of tutomerism and application of thermodynamic principles in tautomeric equilibria</p> <p>CO-7: To study the modern approach of reaction kinetics in organic reaction.</p> <p>CO-8: To learn briefly about Substitution and Elimination Reactions and application in organic reaction.</p>

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		CO-9: To know experimentally of several organic reactions like aromatic nitration reaction, condensation reaction, Diazo coupling reactions etc.
SEM-3	CC-5	CO-1: To gain vast knowledge application of thermodynamics Partial (properties and chemical potential) CO-2: To study the thermodynamic conditions for equilibrium, degree of Advancement. CO-3: To study the chemical potential and other properties of idea substances-pure and mixtures: Pure ideal gas CO-4: To learn about beginning of Quantum Mechanics CO-5: To experience concept of wave function, operator and particle in box. CO-6: To learn experimentally how to do conductometric titrations of different compositions, determine the of K_{eq} for $KI + I_2 = KI_3$ and partition coefficient for the distribution of I_2 between water and CCl_4 .
	CC-6	CO-1: To learn about the basic concepts and types of chemical bonding, laws, rules and equations for formation of chemical bonds, solubility, hybridization and dipole moment of molecules. CO-2: To study the modern approaches of chemical bonding (Molecular Orbital Theory, Metallic Bonding concept, Role of weak intermolecular forces) CO-3: To gain vast knowledge and Idea about ores and minerals, operations involved in metallurgy CO-4: To learn experimentally how to estimate different metal ion from their mixture.
	CC-7	CO-1: To learn in detail about the synthesis, properties, chemical reactions and reaction mechanisms of alkenes and alkynes CO-2: To understand about different types of electrophilic and nucleophilic aromatic substitution reactions, reaction intermediates and their mechanisms. CO-3: To study the properties and reactions of carbonyl compounds and corresponding reaction mechanisms. CO-4: To learn preparations, reactions and corresponding reaction mechanisms of organometallic compounds. CO-5: To bringing the Elementary ideas of Green Chemistry CO-6: To study the nucleophilic addition to α, β -unsaturated carbonyl system

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		<p>CO-7: To study experimentally the qualitative detection solid and liquid organic compounds.</p>
	SEC-1	<p>SEC-1A. MATHEMATICS AND STATISTICS FOR CHEMISTS</p> <p>CO-1: Helps to understand functions, differential equations, probability, vectors, matrices and determinants.</p> <p>CO-2: To learn about qualitative and quantitative aspects of analysis and helps to understand how to present a data after analysis</p> <p>SEC-1B: BASIC ANALYTICAL CHEMISTRY</p> <p>CO-1: To learn Strategies of Analytical Chemistry and its interdisciplinary applicability</p> <p>CO-2: To learn the concept of complexometric titrations, Chelation, Chelating agents, use of indicators and and to know how to analyze soil.</p> <p>CO-3: To study and analyze water and sources responsible for contaminating water. To learn water sampling methods etc.</p> <p>CO-4: To experience how analysis of food products is done and how the foods get contaminated. To learn about food adulteration of some common foods.</p> <p>CO-5: To learn different Chromatographic techniques and separation of some metal ions (Fe_{3+} and Al_{3+}) chromatographically.</p> <p>CO-6: To learn analysis of cosmetics and determination of constituents of some cosmetics.</p> <p>CO-7: To get acquainted with some instrument like UVVisible, IR and NMR spectroscopy in detail for organic and inorganic compound analysis.</p>
SEM-4	CC-8	<p>CO-1: To understand vapour pressure of solution; Ideal solutions, ideally dilute solutions and colligative properties</p> <p>CO-2: Helps to understand the applications of Thermodynamics in Colligative Properties and Phase Equilibrium.</p> <p>CO-3: To study the ideal solution at fixed temperature and pressure; Principle of fractional distillation</p> <p>CO-4: To study the Electrical Properties of molecules and chemical potential of an ion in solution; Activity and activity coefficients of ions in</p>

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		<p>solution</p> <p>CO-5: To learn polarizability of atoms and molecules, dielectric constant and polarization, molar polarization for polar and non-polar molecules.</p> <p>CO-6: To learn the concept of fundamentals Quantum Chemistry and its application.</p> <p>CO-7: To know experimentally how to do conductometric titrations of different compositions, determination of solubility of sparingly soluble salt in water and to study phenol-water phase diagram.</p>
	CC-9	<p>CO-1: To understand the concept of radioactivity and radioactive compounds, nuclear reactions, artificial radioactivity, radio carbon dating, hazards of radiation and safety measures.</p> <p>CO-2: To study the chemistry of s and p block elements including noble gases and their compounds in detail.</p> <p>CO-3: To know the meaning of various terms involved in coordination chemistry, Werner's theory for complex formation, structural and stereoisomerism of co-ordination complexes.</p> <p>CO-4: To learn complexometric and gravimetric estimation of different ions, chromatographic separation of (i) Ni (II) and Cu (II) ions, (ii) Fe (III) and Al (III) ions and preparation of some inorganic compound like</p> <ol style="list-style-type: none">Mohr's saltPotassium tris(oxalato)chromate(III) trihydrateTetraamminecarbonatocobalt(III) nitratePotassiumbis(oxalato)cuprate(II) dihydrateTris(ethylenediamine)nickel(II) chloride
	CC-10	<p>CO-1: To study nitrogen containing aromatic and aliphatic compounds and their identification test.</p> <p>CO-2: To understand the rearrangement reaction of electrondeficient carbon electron-deficient nitrogen and electron-deficient oxygen</p> <p>CO-3: To learn the Logic of Organic Synthesis like retrosynthetic analysis, strategy of ring synthesis and asymmetric synthesis.</p> <p>CO-4: To details study of organic Spectroscopy like UV-Visible, IR and NMR spectroscopy.</p> <p>CO-5: To know experimentally how to do estimation of glucose by titration using Fehling's solution, estimation of sucrose by titration using Fehling's solution and Estimation of phenol by bromination (Bromate-Bromide) method.</p>
	SEC-2	SEC-2A. PHARMACEUTICALS CHEMISTRY

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		<p>CO-1: Helps to understand drug discovery, design and development of representative drugs of the following classes: Antipyretic, Analgesics, Anti-inflammatory, Antibacterial, Antifungal, Antiviral, Antibiotics, Anti-laprosy, Central Nervous System agents, HIV-AIDS related drugs</p> <p>CO-2: To know about aerobic and anaerobic fermentation, importance of Vitamins and Amino acids, synthesis of Penicillin, Cephalosporin, Chloromycetin, Streptomycin and their role as an antibiotic.</p> <p>CO-3: To learn experimentally how to prepare aspirin in the laboratory and how to analyze it.</p> <p>CO-4: To learn experimentally how to prepare magnesium bisilicate in the laboratory.</p> <p>SEC-2B. ANALYTICAL CLINICAL BIOCHEMISTRY</p> <p>CO-1: Helps to understand preparation, structures, reactions and biological importance of carbohydrates, proteins, enzymes, lipids and lipoproteins.</p> <p>CO-2: To know the biochemistry of different diseases through a diagnostic approach by blood and urine analysis.</p> <p>CO-3: To learn how to isolate proteins and how to perform the qualitative estimation of carbohydrate, proteins and lipids.</p> <p>CO-4: To study the quantitative estimation of carbohydrate, cholesterol, nucleic acids, determination of the iodine number of oil and saponification number of oil.</p>
SEM-5	CC-11	<p>CO-1: Helps to understand VBT, CFT, MOT and the structures, stability, colour, magnetism and Orgel diagram of the co-ordination compounds on the basis of modern concepts of chemical bonding.</p> <p>CO-2: To study chemical and physical properties of d and f Block elements and their compounds.</p> <p>CO-3: To learn reaction kinetics and mechanisms of inorganic reactions.</p>

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	<p>CO-4: To study experimentally how to synthesize inorganic complexes and determine the λ_{\max} values of inorganic complexes.</p> <p>CO-5: To calculate the 10Dq value by spectrophotometric method.</p> <p>CO-6: To know experimentally how to estimate the percentage of chlorine in bleaching powder; available oxygen in pyrolusite, Fe in cement, vitamin C; Preparation of $Mn(acac)_3$ and determination of its λ_{\max} colorimetrically.</p>
CC-12	<p>CO-1: To learn various molecular Spectroscopy</p> <p>CO-2: Details study of Rotation spectroscopy, Vibrational spectroscopy, Raman spectroscopy, Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy</p> <p>CO-3: To learn photochemistry, photochemical process and rate of photochemical process.</p> <p>CO-4: To study about surface phenomenon, Surface tension and energy, absorption and colloids.</p> <p>CO-5: To know experimentally how to estimate surface tension of a liquid using Stalagmometer, Determination of CMC from surface tension measurements, Study of kinetics of $K_2S_2O_8+KI$ reaction, spectrophotometrically.</p>
DSC-1	<p>1A. POLYMER CHEMISTRY</p> <p>CO-1: To learn history, classification and functionality of polymeric materials.</p> <p>CO-2: To know kinetics of polymerization, details on crystallization and morphology of crystalline polymers, determination of crystalline melting point of a crystalline material and the factors effecting crystalline melting point.</p> <p>CO-3: To understand the nature and structure of polymers, determination of molecular weight of polymers and thermodynamics of polymer solution.</p> <p>CO-4: To study preparation, structure, properties and application of different types of addition and condensation polymers.</p> <p>CO-5: To know how to prepare polymers by using free radical polymerization, redox polymerization, interfacial polymerization, precipitation polymerization, addition polymerization and</p>

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	<p>condensation polymerization process.</p> <p>CO-6: To learn experimentally how to characterize and analyze a polymeric compound or material.</p> <p>1B. INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE</p> <p>CO-1: Helps to understand the manufacture, properties, compositions, classes and applications of industrially important materials such as ceramics, glasses, cements, fertilizers, surface coating materials and batteries.</p> <p>CO-2: To know about alloys, manufacture of steel, composition and properties of different types of steels.</p> <p>CO-3: To learn general principles, properties, classification, industrial use, deactivation and regeneration of catalysis.</p> <p>CO-4: Helps to understand preparation and explosive properties of organic and inorganic explosives and the basic idea of rocket propellant.</p> <p>CO-5: To learn how to analyze the composition of cement, composition of percentage of metals in alloy, electroless metallic coatings on ceramic and plastic.</p> <p>CO-6: To know how to determine free acidity in ammonium sulphate fertilizer, estimation of Calcium in Calcium ammonium nitrate fertilizer and phosphoric acid in superphosphate fertilizer.</p>
DSC-2	<p>2A. INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE</p> <p>CO-1: Helps to understand manufacture, properties, compositions, classes and applications of industrially important materials such as ceramics, glasses, cements, fertilizers, surface coating materials and batteries.</p> <p>CO-2: To know alloys, manufacture of steel, composition and properties of different types of steels.</p> <p>CO-3: To learn general principles, properties, classification, industrial use, deactivation and regeneration of catalysis.</p> <p>CO-4: Helps to understand the preparation and explosive properties of organic and inorganic explosives and the basic idea of rocket propellant.</p> <p>CO-5: To learn how to analyze the composition of cement, composition</p>

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	<p>of percentage of metals in alloy, electroless metallic coatings on ceramic and plastic.</p> <p>CO-6: To know how to determine free acidity in ammonium sulphate fertilizer, estimation of Calcium in Calcium ammonium nitrate fertilizer and phosphoric acid in superphosphate fertilizer. determination of equivalence point and pKa values.</p> <p>CO-4: To learn experimentally different types of separation techniques such as Solvent extraction technique and Chromatography technique.</p> <p>CO-5: To learn the methods of separation of stereoisomers, calculation of enantiomeric and diastereomeric excess ratios and determination enantiomeric composition by spectral, chemical and chromatographic data analysis.</p> <p>CO-6: To study experimentally how to separate a mixture of monosaccharides, a mixture of dyes and active ingredients of plants, flowers and juices by chromatography method.</p> <p>CO-7: To learn experimentally how to separate a mixture of ions by solvent extraction technique; determination of pH of soil and estimation of Ca, Mg and phosphate ion in soil.</p> <p>CO-8: To determine the pKa values, COD and BOD by Spectrophotometry method in presence of a indicator.</p> <p>2B: Instrumental Methods of Chemical Analysis</p> <p>CO-1: To learn various molecular Spectroscopy</p> <p>CO-2: Detailed study of UV-visible, IR-spectroscopy, Near IR – emission, absorption and fluorescence</p> <p>CO-3: To learn Nuclear Magnetic Resonance (NMR) spectroscopy, Electron Spin Resonance (ESR) spectroscopy.</p> <p>CO-4: To learn principles of chromatography and separation of compounds using chromatography in laboratory.</p> <p>CO-5: To know instrument handling for atomic spectroscopy: atomic</p>
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		<p>absorption, atomic emission, and atomic fluorescence</p> <p>CO-6: To learn basic idea about X-ray analysis and electron Spectroscopy</p> <p>2C. GREEN CHEMISTRY AND CHEMISTRY OF NATURAL PRODUCTS</p> <p>CO-1: To learn green chemistry and its necessity.</p> <p>CO-2: To study the principles of green chemistry and designing the green synthetic routes.</p> <p>CO-3: To know examples of green reactions and future trends in green reaction.</p> <p>CO-4: To learn the synthesis, isolation medicinal importance and other synthetic use of terpenoids and alkaloids</p> <p>CO-5: To learn how to perform green synthesis of a number of organic compounds in the laboratory.</p>
SEM-6	CC-13	<p>CO-1: To study the Theoretical Principles in Molecular symmetry and Point group</p> <p>CO-2: To learn about Organometallic Chemistry</p> <p>CO-3: To know catalytic role of organometallic compounds in different types of industrial processes.</p> <p>CO-4: To learn about Bioinorganic Chemistry</p> <p>CO-4: To study experimentally the qualitative detection of known and unknown radicals and insoluble materials in a mixture.</p>
	CC-14	<p>CO-1: To learn in detail the synthesis, properties, chemical reactions and reaction mechanisms of polynuclear hydrocarbons and their derivatives.</p> <p>CO-2: To study the chemical reactions, properties and synthesis of heterocyclic compounds.</p> <p>CO-3: To know in detail about the stereochemistry, properties and chemical reactions of alicyclic compounds.</p> <p>CO-4: To learn the mechanism, stereochemistry and regioselectivity of pericyclic reactions.</p> <p>CO-5: Helps to understand classification, structure, properties, reactions and use of carbohydrate molecules.</p> <p>CO-6: Deals with the synthesis, structure, properties, chemical and biological reactions of amino acids, peptides and nucleic acids.</p> <p>CO-7: To learn experimentally how to separate molecules by</p>

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		chromatographic methods CO-8: To study how to analyze Organic compounds by spectroscopic techniques.
	DSE-3	CO-1: To learn crystal system, crystal structure and how crystal structures are determined. CO-2: Helps to understand statistical thermodynamics CO-3: To learn classification of polymer, specific heat of solids. CO-4: To learn experimentally Computer Programming based on numerical methods
	DSC-4	CO-1: To learn project works, how to write project work

Program Outcomes

PO-1: Disciplinary knowledge and skill: A graduate student is expected to be capable of demonstrating comprehensive knowledge and understanding of both theoretical and practical knowledge in all disciplines of Chemistry. Students can solve their subjective problems very methodically, independently and finally draw a logical conclusion. Further, the student will be capable of applying modern technologies, handling advanced instruments and Chemistry related softwares for chemical analysis, characterization of materials and in separation technology.

PO-2: Skilled communicator: The course curriculum incorporates basic and advanced training in order to make a graduate student capable of expressing the subject through technical writing as well as through oral presentation.

PO-3: Critical thinker and problem solver: The course curriculum also includes components that can be helpful to graduate students to develop critical thinking and to design, carry out, record and analyze the results of chemical reactions. Students will be able to think and apply evidence based comparative chemistry approach to explain chemical synthesis and analysis.

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PO-4: Sense of inquiry: It is expected that the course curriculum will develop an inquisitive characteristic among the students through appropriate questions, planning and reporting experimental investigation.

PO-5: Team player: The course curriculum has been designed to provide opportunity to act as team player by contributing in laboratory, field-based situation and industry.

PO-6: Skilled project manager: The course curriculum has been designed in such a manner as to enable a graduate student to become a skilled project manager by acquiring knowledge about chemistry project management, writing, planning, study of ethical standards and rules and regulations pertaining to scientific project operation.

PO-7: Digitally literate: The course curriculum has been designed to impart a good working knowledge in understanding and carrying out data analysis, use of library search tools, use of chemical simulation softwares and related computational work.

PO-8: Ethical awareness: A graduate student requires understanding and developing ethical awareness or reasoning which is adequately provided through the course curriculum. Students can also create an awareness of the impact of chemistry on the environment, society, and also make development outside the scientific community.

PO-9: Environmental Awareness: As an inhabitant of this green planet a Chemistry graduate student should have many social responsibilities. The course curriculum is designed to teach a Chemistry graduate student to follow the green routes for the synthesis of chemical compounds and also find out new greener routes for sustainable development. The course also helps them to understand the causes of environmental pollution and thereby applying environmentally friendly policies instead of environmentally hazardous ones in every aspect.

PO-10: Lifelong learner: The course curriculum is designed to inculcate a habit of learning continuously through use of advanced ICT technique and other available e-techniques, e-books and e-journals for personal academic growth.

PO-11: Analytical skill development and job opportunity: The course curriculum is designed in such a way that Chemistry graduate students can handle many Chemistry-based softwares,

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modern instruments and advanced technologies to synthesize, characterize and analyze chemical compounds very skillfully. Such wonderful practice in the graduate level will bring a good opportunity to the students for getting job in industries besides academic and administrative works.

Programme Specific Outcomes

PSO-1: Core competency: The chemistry graduates are expected to gain knowledge of the fundamental concepts of chemistry and applied chemistry through theory and practical. These fundamental concepts would be reflected in the latest understanding of the field.

PSO-2: Communication skills: Chemistry graduates are expected to possess requisite standards of communication skills to read and understand documents so that they can solve their problems very methodically, independently and with logical argument. Graduates are expected to build good communication skill so that they can easily share their idea/finding/concepts to others.

PSO-3: Critical thinking: Chemistry graduates are expected to achieve critical thinking ability to design, carry out, record and analyze the results of chemical reactions. They are expected to have potential and confidence so that they can overcome many difficulties with the help of their sharp scientific knowledge and logical approaches.

PSO-4: Psychological skills: Chemistry graduates are expected to possess basic psychological skills so that they can deal with individuals and students of various socio-cultural, economic and educational levels. Psychological skills are very important for proper mind setting during performing, observing and giving conclusion of a particular reaction. It is also important for self-compassion, self-reflection, interpersonal relationships, and emotional management.

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PSO-5: Problem-solving: Graduates are expected to be well trained with problem-solving philosophical approaches that are pertinent across the disciplines.

PSO-6: Analytical skill development and job opportunity: Chemistry graduates are expected to possess sufficient knowledge on how to synthesize a chemical compound and perform necessary characterization and analysis in support of the formation of the product by using modern analytical tools and advanced technologies. Because of this course curriculum chemistry graduates have a lot of opportunity to get job not only in academic and administrative field but also in industry.

PSO-7: Research motivation: Chemistry graduates are expected to be technically well trained with modern devices and Chemistry based software and have powerful knowledge in different disciplines of Chemistry so they can easily involve themselves in theory and laboratory-based research activities.

PSO-8: Teamwork: Graduates are expected to be team players, with productive co-operations involving members from diverse socio-cultural backgrounds.

PSO-9: Digital Literacy: Graduates are expected to be digitally literate so that they can enroll and increase their core competency via e-learning resources such as MOOC and other digital tools for lifelong learning.

PSO-10: Social Awareness: As an inhabitant of this green world, it is our duty to make our planet clean and suitable for living to all. In this context Chemistry graduates are expected to be more aware about finding green chemical reaction routes for sustainable development. They are expected to maintain good laboratory practices and safety. They can also create an awareness of the impact of chemistry on the environment, society, and also make development outside the scientific community.

Course Outcomes of Chemistry Generic Elective **[For students having Honours in subjects other than Chemistry]**

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Department of Chemistry

MURAGACHHA, NADIA, PIN- 741154

Phone No.: 03474-268008 web: www.muragachhagovtcollege.org e-mail: chemistry.mgc15@gmail.com

Semester	Course Code	Course Outcome
SEM-1	CC-1/GE-1	<p>CO-1: To know in detail Kinetic Theory of Gases; Liquids and Chemical kinetics</p> <p>CO-2: To learn the basic concept, terms and equations of Atomic Structure; Chemical Periodicity and Acids and Bases</p> <p>CO-3: To learn about the Fundamentals of Organic Chemistry; Stereochemistry; Types, Mechanism and Examples of Nucleophilic Substitution Reaction and Elimination Reaction</p> <p>CO-4: To learn practically how to do the quantitative estimation of ions in a solution by using iodometric titration, permanganate titration and dichromate titration.</p> <p>CO-5: To learn how to estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture and how to estimate water of crystallization in Mohr's salt by titrating with KMnO_4.</p> <p>CO-6: To study estimation of oxalic acid by titrating it with KMnO_4.</p>
SEM-2	CC-2/GE-2	<p>CO-1: To understand in detail about Chemical thermodynamics, Chemical equilibrium, Solutions, Phase Equilibrium and Solids.</p> <p>CO-2: To learn about synthesis, properties and reactions of aliphatic hydrocarbons</p> <p>CO-3: To understand Error analysis and Computer Applications</p> <p>CO-4: To know the basic knowledge, types and applications of Redox Reactions</p> <p>CO-5: To study the kinetics of acid-catalyzed hydrolysis of methyl acetate and decomposition of H_2O_2 (Clock Reaction)</p> <p>CO-6: To determine the viscosity of unknown liquid (glycerol, sugar) with respect to water, surface tension of a liquid using Stalagmometer and the solubility of sparingly soluble salt in water</p> <p>CO-7: To learn preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method.</p>
SEM-3	CC-3/GE-3	<p>CO-1: To learn about Chemical bonding and Molecular structure, Comparative study of p-block elements, Transition Elements and</p>

Officer-in-Charge
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		<p>Coordination Chemistry</p> <p>CO-2: To know the basic concept, terms, equations and applications of Electrochemistry</p> <p>CO-3: To understand about the synthesis, properties, chemical reactions and mechanisms of Aromatic Hydrocarbons, Organometallic Compounds and Aryl Halides</p> <p>CO-4: To study experimentally the qualitative detection of known and unknown radicals in a mixture</p>
SEM-4	CC-4/GE-4	<p>CO-1: To learn in detail about the preparation, properties, chemical reactions and mechanisms of Alcohol, Phenol, Ethers, Aldehydes, Ketones, Carboxylic acids, Esters, Amides, Amines, Diazonium salts, Amino-acids and Carbohydrates.</p> <p>CO-2: To know in detail about Crystal Field Theory.</p> <p>CO-3: To study the fundamental concepts of Quantum Chemistry and Spectroscopy.</p> <p>CO-4: To learn experimentally the qualitative analysis of single known and unknown solid organic compounds and also the identification of pure solid and liquid organic compounds.</p>