Programme Outcomes

PO-1. This programme provides the student an in depth understanding of the basic concepts of Chemical Sciences and enable them with tools needed for the practice of Chemistry, which remains a discipline with much stress on experimentation.

PO-2. It attempts to provide a detailed knowledge of the terms, concepts, methods, principles and experimental techniques of Chemistry.

PO-3. They can solve the problem and also think methodically, independently and draw a logical conclusion.

PO-4. The interdisciplinary approach of the program helps the student to contribute the academic knowledge to industrial requirement of the society.

PO-5. They will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PO-6. They will become proficient in the Chemistry lab.

PO-7. They have the ability to follow and understand general lab practice guidelines and safety measures.

PO-8. They can perform qualitative and quantitative chemical analysis, chemical synthesis and use modern chemical instrumentation.

PO-9. It creates an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.

PO-10. They employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.

Programme Specific Outcomes -

PSO-1. Gain the knowledge of Chemistry through theory and practical experiments.

PSO-2. To explain nomenclature, stereo chemistry, structures, reactivity, and mechanism of the chemical reactions.

PSO-3. Identify chemical formulae and solve numerical problems.

PSO-4. To understand the basic principles of Organic, Inorganic, Physical and Analytical Chemistry and its applications through Various laboratory experiments.

PSO-5. Use modern chemical tools, Models, Chem-draw, Charts and Equipment.

PSO-6. Understand good laboratory practices and safety.

PSO-7. Develop research-oriented skills.

PSO-8. Aware and handle the sophisticated instruments/equipment.

Course Outcomes Of Chemistry

B.Sc. Part - I (NEP-2020)

Semester – I

DSC-3A Chemistry Paper No. - I (Inorganic Chemistry)

CO1- Understand introductory inorganic chemistry, size, shape and electron distribution in shells and sub- shells of an atom.

CO2- Study of different types of bonds and nature of bonding in inorganic compounds. Calculations of different energies associated with ionic bonding.

CO3- Understand the Knowledge of nature of bonding, geometry, stability, and magnetic characters of covalent compounds by applying VBT.

CO4- Understand the role of acids and bases in chemistry.

CO5- Understand the properties and uses of the compounds of p-block elements

DSC-4A Chemistry Paper No. - II (Organic Chemistry)

CO1- Understand the fundamentals and basic principles involved in organic chemistry.

CO2- Understand the spatial arrangement of atoms of organic molecule and types of stereoisomers.

CO3- Understand the Knowledge the general properties and fundamental reactions of aromatic compounds.

CO4- Understand the basic knowledge of heterocyclic compounds.

Semester – II

DSC-3B: Chemistry Paper No. - III (Physical Chemistry)

CO1- Understand the basic concepts and rules of logarithms, graphs, derivative and integrations.

CO2- Understand of basic concepts in thermodynamics will be gained by the student.

CO3- Understand the knowledge about basic concepts in kinetics and first order, second order reactions with characteristics and suitable examples.

CO4- Understand the surface tension, viscosity and refractive index with suitable examples.

CO5- Understand the basic concepts in electrochemistry, conductors and conductivity cells, measurement of conductance with suitable examples and numerical problems.

DSC-4B-Chemistry Paper No. - IV (Analytical Chemistry)

CO1- Study of various analytical procedures and importance also sampling, accuracy and precision.

CO2- Study the Distinguish between classical and industrial chemistry. Understand the basic concepts and concentration terms. Understand the Knowledge of IPR.

CO3- Understand the Knowledge of chromatographic separation technique and terms involved in it. Learn the paper chromatography and thin layer chromatography.

CO4- Understand the Knowledge of various type of titrations, neutralization curves, indicators used in various titrations.

CO5- Understand the Knowledge about the chemical nature and cleansing action of soap.

Lab Course
Semester I & II

Inorganic Chemistry -

CO1 - Familiar with the quantitative analysis - titrimetric analysis

CO2 - Able to understand quality control
CO3 - Can practice paper chromatographic techniques

Organic Chemistry -
CO1- Study the methods for organic qualitative analysis of compounds
CO2- Study the different methods for quantitative analysis
CO3- Able to find out the melting and boiling points of different substances
CO4- Understand the organic qualitative analysis

Physical Chemistry -
CO1- Under the rate of Chemical reactions and the methods we can use to increase the rate of reaction
CO2- Able to Understand the change in enthalpy
CO3- Know about how to calculate unknown concentration of solution by using instrumental techniques
CO4- Study of Instrumental techniques to know the properties of liquids

B.Sc. Part - II (NEP-2020)

Semester - III

DSC-3B: Chemistry Paper No. - V (Physical Chemistry)
CO1- Understand the conductivity and transport number of the aqueous solutions with different applications. Experimental determination of transport number and numerical problems.
CO2- Understand basic concepts in thermodynamics and concept of Entropy will be gained by the student.
CO3- Understand the the knowledge about basic concepts in kinetics and third order reaction with characteristics, suitable examples, and methods for determination of order of reactions and numerical problems.
CO4- Understand the behavior of gases, ideal gas as model system and its extension to real gases, the dependence of physical state on P, V and T.
CO5- Understand the theoretical basis of adsorption phenomenon, dynamic nature of surface and its applications.

DSC-4B-Chemistry Paper No. - VI (Analytical Chemistry)
CO1- Understand the basic concepts in gravimetric analysis.
CO2- Know about the physical and chemical analysis of water.
CO3- Understand about corrosion and how to prevent corrosion.
CO4- Understand the basics of ion exchange and column adsorption chromatography.
CO5- Understand the Knowledge working of petroleum industries, biofuels, copyrights and Trademarks.

Semester - IV

DSC-3A Chemistry Paper No. - VII (Inorganic Chemistry)
CO1- Understand Basic concepts of coordination complexes.
CO2- Study the applications of chelates in analytical chemistry.
CO3- Understand the properties of 3d-series elements.
CO4- Study the characteristics, properties and separation of lanthanides.
CO5- Study of qualitative analysis of Inorganic compounds.

DSC-4A Chemistry Paper No. - VIII (Organic Chemistry)

CO1- Know about the synthesis, reactivity and applications of carboxylic acids.
CO2- Know about classification, preparation and applications of amines and diazonium salts.
CO3- Understand the classification, configuration and structure of carbohydrates.
CO4- Understand the nomenclature and reactivity of aldehydes and ketones.
CO5- Understand the knowledge of conformational analysis of some organic compounds.

Lab Course
Semester III & IV

Inorganic Chemistry -

CO1 - Can practice on gravimetric analysis of different metals quantitatively
CO2 - Can prepare inorganic complexes in normal laboratory conditions
CO3 - Familiar with the quantitative analysis - titrimetric analysis
CO4- Able to understand difference between titrimetric and gravimetric analysis
CO5- Able to separate cations and anions from mixture by semi-micro qualitative analysis

Organic Chemistry -

CO1- Study the methods for organic qualitative analysis of compounds
CO2- Practice to prepare different organic compounds
CO3- Study the different methods for quantitative analysis
CO4- Able to find out the melting and boiling points of different substances
CO5- Understand the organic qualitative analysis
CO6- Can practice thin layer paper chromatographic technique

Physical Chemistry -

CO1 - Under the rate of Chemical reactions and the methods we can use to increase the rate of reaction
CO2- Know about how to calculate unknown concentration of solution by using instrumental techniques
CO3- Study of Instrumental techniques to know the properties of liquid

B.Sc. Part - III (CBCS)

SEMESTER- V

DSE-E5- Chemistry Paper No. - IX (Inorganic Chemistry)

CO1- Study the role of acids, bases, non-aqueous solvents in chemistry.
CO2- Understand geometry, stability and nature of bonding between metal ion and ligand in complexes.
CO3- Study the synthesis and the applications of the semiconductors and Superconductors in electrical and electronic devices.
CO4- Study the structure, method of preparation and the applications of organometallic compound in various fields.
CO5- Understand the classification, types, mechanism and applications of catalyst in industrial fields.

DSE-E6- Chemistry Paper No. - X (Organic Chemistry)

CO1- Understand of energy associated with electromagnetic radiation and its use in analytical technique.
CO2- Study the chromophore, auxochrome and calculation of λ-max.

CO3- Study the vibrational transitions, regions of IR spectrum, functional group recognition.
CO4- Understand of magnetic, non-magnetic nuclei, shielding de-shielding, chemical shift, splitting pattern.
CO5- Knowledge of molecular ion, fragmentation pattern and different types of ions produced.
CO6- Understand the structure of organic compound with the help of provided spectral data.

DSE-E7- Chemistry Paper No. - XI (Physical Chemistry)

CO1- Understand quantum Chemistry, Heisenberg's uncertainty principle, concept of energy operators (Hamiltonian), learning of Schrodinger wave equation. Physical interpretation of the ψ and $\psi 2$. Particle in a one-dimensional box.
CO2- Study spectroscopy, Electromagnetic spectrum, Energy level diagram, Study of rotational spectra of diatomic molecules: Rigid rotor model, Microwave oven, vibrational spectra of diatomic molecules, simple Harmonic oscillator model, Raman spectra: Concept of polarizability, pure rotational and pure Vibrational Raman spectra of diatomic molecules.
CO3- Understand photochemical laws, reactions and various photochemical phenomena.
CO4- Study the various types of solutions, relations vapour pressure, temperature relations.
CO5- Understand the knowledge of emf measurements, types of electrodes, different types of cells, various applications of emf measurements.

DSE-E8- Chemistry Paper No. - XII (Analytical Chemistry)

CO1- Understand the techniques of gravimetric analysis.
CO2- Study the instrumental analysis of alkali and alkaline earth elements.
CO3- Understand working and applications of optical methods as an analytical tool.
CO4- Understand theory and applications of potentiometric titrations.
CO5- Understand the basics of ion exchange and column adsorption chromatography, Quality control practices in analytical industries / laboratories.

SEMESTER- VI

DSE-F5- Chemistry Paper No. - XII (Inorganic Chemistry)

CO1- Study the mechanism of the reactions involved in inorganic complexes of transition metals. Understand the thermodynamic and kinetic aspects of metal complexes.
CO2- Understand the generation of nuclear power with the help of nuclear reactions. Study the role of radio isotopes in medicinal, industrial and Archaeology fields.
CO3- Study the characteristics, properties and separation of lanthanides and Actinides. Understand the synthesis and IUPAC Nomenclature of transuranic elements (TU).
CO4- Study the techniques involved in ore dressing and extraction of cast iron from its ore.
CO5- Study the role of various metals and non-metals in our health.

DSE-F6- Chemistry Paper No. - XIV (Organic Chemistry)

CO1- Understand the reagents used in organic transformations and various reactions used in organic synthesis.
CO2- Study basic terms used in retrosynthetic analysis, retrosynthesis of some organic compounds.
CO3- Study addition reaction across >C=C< bond w.r.t. hydrohalogenation, hydration hydroxylation, ozonolysis and addition of halogen, halogen acid, hydrogen, water, etc. across −C≡C−bond.
CO4- Study the terpenoids and alkaloids w.r.t. occurrence, isolation, characteristics and classification. Analytical and synthetic evidences of Citral and Nicotine.
CO5- Understand classification of drugs, Qualities of ideal drug. Synthesis and uses of some representative drugs and Drug action of sulpha drugs.

DSE-F7- Chemistry Paper No. - XV (Physical Chemistry)

CO1- Understand of phase rule, learning of One component, Two component and Three component systems phase diagrams with suitable examples.

CO2- Study the basic concept of Thermodynamics, free energy, Gibbs-Helmholtz equation and its applications, problem related with it.

CO3- Understand Space lattice, lattice sites, Lattice planes, Unit cell. Laws of crystallography, Weiss indices and Miller indices, Cubic lattices and types of cubic lattice, planes or faces of a simple cubic system, Diffraction of X-rays, Derivation of Bragg's equation. Determination of crystal structure by Bragg's method. Crystal structure of NaCl and KCl on the basis of Bragg's equation.

CO4- Study the kinetics, Simultaneous reactions such as i) opposing reaction ii) side reaction iii) consecutive reactions: iv) chain reaction v) explosive reaction.

CO5- Understand the knowledge of distribution law, its modifications, applications of distribution laws, process of extraction, determination of solubility, distribution indicators, molecular weights.

DSE-F8- Chemistry Paper No. - XVI (Industrial Chemistry)

CO1- Understand the whole process of manufacture of sugar and byproducts of sugar industry.

CO2- Understand of physicochemical principles of production of ammonia, sulfuric acid, nitric acid and sodium carbonate along with its manufacturing plant.

CO3- Understand the classification, synthesis and applications of various polymers.

CO4- Understand the petroleum Industry, fuels and need of use of ecofriendly fuels.

CO5- Understand nanotechnology including classification, optical properties, synthesis routes, characterization techniques and applications of nano-materials.

Lab Course
Semester V & VI

Inorganic Chemistry -

CO1- Can practice on gravimetric analysis of different metals quantitatively

CO2- Can prepare inorganic complexes in normal laboratory conditions

CO3- Familiar with the quantitative analysis - titrimetric analysis

CO4- Familiar with the quantitative analysis - Commercial sample analysis

CO5- Able to understand difference between titrimetric and gravimetric analysis

CO6- Able to separate cations and anions by Ion exchange chromatography

Organic Chemistry -

CO1- Study the methods for organic qualitative analysis of compound or mixture of compounds

CO2- Practice to prepare different organic compounds

CO3- Study the different methods for quantitative analysis

CO4- Practice to prepare organic derivatives of different compounds

CO5- Able to find out the melting and boiling points of different substances

CO6- Understand the organic qualitative analysis

CO7- Can practice thin layer paper chromatographic technique

Physical Chemistry -

CO1 - Under the rate of Chemical reactions and the methods we can use to increase the rate of reaction

CO2- Know about how to calculate unknown concentration of solution by using instrumental techniques

CO3- Study of Instrumental techniques to know the properties of liquids

CO4- Familiar with conductometric titrations and potentiometric titrations
CO5- Able to find out the critical solution temperature of phenol-water system
CO6- Able to find out the concentration of acids and bases using conductometric titrations
CO7- Became familiar with colorimetry, pH-metry, refractometry

Semester V & VI
Project and Factory Visit

CO1- Inculcate proficiency to identify appropriate project
CO2- Familiarise with the preparation of project report and its preparation
CO3- Study tour in a factory or research institute help the student to visualise the chemical reactions and understand the sophisticated working of instruments