

DSCC - 1

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSC)

CC1: Fundamentals of Chemistry - I

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

C01: Extra nuclear structure of atoms and Periodicity:

C02: Basics of Organic Chemistry Bonding and Physical Properties, Valence Bond Theory, Electronic displacement, MO Theory, Physical properties, Stereochemistry – I

C03: Thermodynamics -I, Chemical Kinetics-I,

C04: Acid-Base Titrations, Oxidation-Reduction Titrimetry

COs-POs Mapping

CC1: Fundamentals of Chemistry - I

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC - 2

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSC)

CC2: Fundamentals of Chemistry - II

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

C01: Chemical Bonding – I, Theoretical principles of inorganic qualitative analysis

C02: Stereochemistry – II, General Treatment of Reaction Mechanism–I, Reactive intermediates, Reaction thermodynamics, Reaction kinetics, Substitution Reaction

C03: Kinetic Theory and Gaseous state, Real gas and Virial equation,

C04: Qualitative semimicro analysis of mixtures containing three radicals.

COs-POs Mapping

CC1: Fundamentals of Chemistry - II

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC3

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSCC-3)

PAPER: CHEM-H-CC3-3
(Credit: Theory -03, Practical – 01)

Physical Chemistry - II

Course learning outcome (COs)

CO1: Thermodynamics – II, Second Law, Systems of Variable Compositions

CO2: Applications of Thermodynamics – I, Chemical Equilibrium

CO3: ELECTROCHEMISTRY-I, Conductance, Ionic Equilibrium

CO4: Chemical Kinetics (Analytical) Experiments

COs-POs Mapping

DSCC3: Physical Chemistry - I

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√		√	√	√

DSCC - 4

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC4-3: Organic Chemistry – I

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- CO1:** Aromatic Substitution, Electrophilic aromatic substitution, Nucleophilic aromatic substitution, Birch Reduction of benzenoid aromatics, General Treatment of Reaction Mechanism –II, Concept of organic acids and bases, Tautomerism
- CO2:** Stereochemistry –III, Nucleophilic substitution reactions, Elimination reactions
- CO3:** Chemistry of alkenes and alkynes, Addition to $C\equiv C$ (in comparison to $C=C$),
- CO4:** Identification of Pure Single organic Compound

COs-POs Mapping

DSCC-4: Organic Chemistry – I

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√					√
C02	√	√		√	√					√
C03	√	√		√	√					√
C04	√	√	√	√	√		√		√	√

DSCC - 5

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC5-4: Inorganic Chemistry - I

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- C01: Chemical bonding–II: Molecular orbital concept of bonding, Metallic Bond, Weak Chemical Forces.**
- C02: Acids and bases: Acid-Base concept, Acid-base equilibria in aqueous solution..**
- C03: Radioactivity: Nuclear stability, Nuclear Reactions, Radiocarbon dating**
- C04: Complexometric Titration: Ca (II) and Mg (II) in a mixture, Hardness of water, Fe (III) and Al (III) in a mixture, Cu (II) and Zn (II) in a mixture, Cu (II) and Ni (II) in a mixture**

COs-POs Mapping

DSCC-5: Inorganic Chemistry - I

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC - 6

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC6-4: Organic Chemistry – II

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- C05: Stereochemistry – IV: Conformation-II, Concept of prostereoisomerism, Chirality arising out of stereoaxis.**
- C06: Chemistry of carbonyl Compounds: Nucleophilic Addition to C=O, Exploitation of acidity of α -H of C=O, Nucleophilic addition to α , β -unsaturated carbonyl system, Substitution at sp^2 carbon (C=O system).**
- C07: Organometallics**
- C08: Qualitative analysis of single solid organic compound**

COs-POs Mapping

DSCC-6: Organic Chemistry – II

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√					√
C02	√	√		√	√					√
C03	√	√		√	√					√
C04	√	√	√	√	√		√		√	√

DSCC7

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSCC-7)

PAPER: CHEM-H-CC7-4
(Credit: Theory -03, Practical – 01)

Physical Chemistry - II

Course learning outcome (COs)

CO1: Transport processes and Liquid State, Diffusion and Viscosity, Surface tension and energy

CO2: Solid State, Bravais Lattice and Laws of Crystallography, Crystal plane

CO3: Application of Thermodynamics – II, Colligative properties, Phase Equilibrium, Phase Rule, Binary solutions

CO4: ELECTROCHEMISTRY-II, Electromotive Force,

CO5: Surface tension measurements using Stalagmometer, Viscosity measurement using Ostwald's viscometer, Conductometric Experiments

COs-POs Mapping

DSCC7: Physical Chemistry - II

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	
C03	√	√		√	√				√	√
C04	√	√		√	√				√	
C05	√	√	√	√	√	√		√	√	√

DSCC - 8

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC8-4: Inorganic Chemistry - II

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- C01:** Coordination chemistry: Basics of coordination chemistry, Valence bond theory and crystal field theory, Electronic spectra of complexes and magnetic properties.
- C02:** Supramolecular chemistry.
- C03:** Redox reactions: Basic principle of redox reactions, Redox titrations,
- C04:** Estimation of mixtures of metal ions: Fe^{3+} and Cu^{2+} in a mixture, Fe^{3+} and Cr^{3+} in a mixture, Fe^{3+} and $\text{Cr}_2\text{O}_7^{2-}$ in a mixture, Fe^{3+} and Mn^{2+} in a mixture, Cr^{3+} and Mn^{2+} in a mixture.

COs-POs Mapping

DSCC-8: Inorganic Chemistry - II

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC - 9

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC9-5: ORGANIC CHEMISTRY – III

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- CO1: Organic Spectroscopy -I: UV Spectroscopy, IR Spectroscopy, NMR Spectroscopy.**
- CO2: Rearrangements: Rearrangement to electron-deficient carbon, Rearrangement to electron-deficient nitrogen, Rearrangement to electron-deficient oxygen, Aromatic rearrangements: Migration from oxygen to ring carbon, Migration from nitrogen to ring carbon.**
- CO3: Nitrogen compounds: Amines: Aliphatic & Aromatic, Nitro compounds (aliphatic and aromatic), Alkyl nitrile and isonitrile, Diazonium salts and their related compounds.**
- CO4: Organic Preparations.**

COs-POs Mapping

DSCC-9: ORGANIC CHEMISTRY – III

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	√	√		√	√					√
CO2	√	√		√	√					√
CO3	√	√		√	√					√
CO4	√	√	√	√	√		√		√	√

DSCC - 10

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC10-5: Inorganic Chemistry - III

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

C01: s- and p- block elements

C02: d- and f- block elements

C03: Nuclear Model and Radiotracer methods

C04: Analysis of materials of industrial importance: Cu and Zn in brass, CaCO_3 and MgCO_3 in Dolomite, Cr and Mn in steel, Vitamin C, DO in water sample, Fe_2O_3 in Portland cement, Mg in talcum powder.

COs-POs Mapping

DSCC-10: Inorganic Chemistry - III

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC 11

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (HONS.)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSCC-11)

PAPER: CHEM-H-CC11-5-Th
(Credit: Theory -03, Practical – 01)

Physical Chemistry - III

Course learning outcome (COs)

CO1: Foundation of Quantum Mechanics, Particle Aspect of Radiation, Wave Aspect of particles, Schrodinger Equation and Wavefunction, Concept of Operators, The Postulates and General Principles of Quantum Mechanics

CO2: Exactly Solvable Systems -1, Particle in a box, Stationary states under special potentials

CO3: Surface Chemistry, Adsorption, Colloids, Electrical Properties of molecules, Dipole moment and polarizability

CO4: Conductometric Experiments, Potentiometric Experiments, Solubility Product

COs-POs Mapping

CC11: Physical Chemistry - III

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	
C02	√	√		√	√				√	
C03	√	√		√	√		√		√	√
C04	√	√	√	√	√	√		√	√	√

DSCC - 12

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

[illegible]

DSCC13

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (HONS.)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core (DSCC-13)

PAPER: CHEM-H-CC13-6
(Credit: Theory -03, Practical – 01)

Physical Chemistry - IV

Course learning outcome (COs)

CO1: Exactly Solvable Systems -2, Quantum Harmonic Oscillator, Rigid Rotator, Hydrogen atom and hydrogen-like ions

CO2: Molecular Spectroscopy, Rotation spectroscopy, Vibrational spectroscopy, Electronic Spectroscopy, Raman spectroscopy

CO3: Photochemistry, Rate of Photochemical processes,

CO4: Using Spreadsheet Software, MS Excel

COs-POs Mapping

DSCC13: Physical Chemistry - IV

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
CO1	√	√		√	√				√	
CO2	√	√		√	√				√	
CO3	√	√		√	√	√		√	√	√
CO4	√	√	√	√	√	√		√	√	√

DSCC - 14

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC14-6: FUNDAMENTALS OF CHEMISTRY – III

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

- C01: Chemistry of Biomolecules: Carbohydrate Chemistry, Monosaccharides, Amino acids, peptides and nucleic acids**
- C02: Statistical Thermodynamics, The Boltzmann Distribution, Ensemble and Molecular Partition function, Thermodynamic variables and partition function, Applications, 3rd law of thermodynamics, Adiabatic demagnetization, Specific heat of Solids**
- C03: Silicate Materials of Industrial Importance. Glass, Cements, Chemical Explosives,**
- C04: Spectroscopic Analysis of Organic Compounds**

COs-POs Mapping

DSCC-14: FUNDAMENTALS OF CHEMISTRY – III

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√		√		√	√

DSCC - 15

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Core competency

P02: Disciplinary knowledge and skill

P03: Skilled communicator

P04: Critical thinker and problem solver

P05: Sense of inquiry

P06: Team player

P07: Skilled project manager

P08: Digitally literate

P09: Ethical awareness/reasoning

P010: Lifelong learner

Discipline Specific Core Course (DSCC)

Paper: CHEM-H-CC15-6: Inorganic Chemistry - IV

(Credit: Theory -03, Practical – 01)

Course learning outcome (COs)

C05: Organometallic Chemistry–I

C06: Bioinorganic Chemistry – I

C07: Reaction kinetics and mechanism

C08: Preparation of Inorganic Complexes: *cis*-K[Cr(C₂O₄)₂(H₂O)₂], [Co(NH₃)₄(CO₃)] Cl, [Ni(en)₃]Cl₂, [Fe(acac)₃], [Cu(acac)₂], [VO(acac)₂], [Ni(salen)₂].

COs-POs Mapping

DSCC-15: Inorganic Chemistry - IV

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
C01	√	√		√	√				√	√
C02	√	√		√	√				√	√
C03	√	√		√	√				√	√
C04	√	√	√	√	√	√			√	√

DSCC - 16

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Develop Scientific Inquiry: Demonstrate a spirit of scientific inquiry and critical thinking by understanding the fundamental principles and concepts of the core areas of Chemistry.

P02: Analyze Chemical Phenomena: Apply theoretical knowledge to analyze, interpret, and explain chemical observations, reactions, and phenomena encountered in various branches of Chemistry.

P03: Problem-Solving Ability: Develop the ability to identify, formulate, and solve qualitative and quantitative problems using appropriate chemical principles and analytical methods.

P04: Practical Competence: Acquire hands-on laboratory skills through experiments and practical exercises, enabling the application of theoretical concepts in real-life chemical investigations.

P05: Laboratory Safety and Technical Skills: Demonstrate proficiency in the safe handling of chemicals, reagents, laboratory apparatus, and scientific instruments while adhering to standard laboratory practices and safety protocols.

P06: Data Analysis and Interpretation: Develop the ability to record observations accurately, analyse experimental data, interpret results scientifically, and draw valid conclusions based on experimental evidence.

Discipline Specific Core Course (DSCC)

Paper: DSCC-16: Inorganic Chemistry - V

(Credit: Theory -03, Tutorial – 01)

Course learning outcome (COs)

- CO1:** Explain the principles of advanced coordination chemistry, including crystal field theory, d-orbital splitting in different geometries, crystal field stabilization energy (CFSE), nephelauxetic effect, electronic spectra, Tanabe–Sugano diagrams, and microstate/term symbol analysis for transition metal complexes.
- CO2:** Interpret EPR and Mössbauer spectroscopic data to determine the electronic structure, oxidation state, spin state, and coordination environment of transition metal complexes, particularly iron-containing systems. Reaction kinetics and mechanism
- CO3:** Analyze the structure, function, and mechanisms of biologically important metal containing systems, including ion transport, metalloenzymes, photosynthetic processes, vitamin B12, metal toxicity, chelation therapy, medicinal metal complexes, and metal-dependent diseases.
- CO4:** Explain the bonding, structure, reactivity, and applications of advanced organometallic compounds, including fluxional molecules, isolobal relationships, metal–allyl/alkyne complexes, ferrocene, C–H bond activation, carbene and carbyne complexes, and organometallic compounds used as drugs and sensors.
- CO5:** Apply electrochemical analytical techniques such as cyclic voltammetry, polarography, anodic stripping voltammetry, amperometry, coulometry, and electrogravimetry for qualitative and quantitative chemical analysis, including solving relevant numerical problems.

COs-POs Mapping

DSCC-16: Inorganic Chemistry - V

	P01	P02	P03	P04	P05	P06
C01	√	√	√	√	√	√
C02		√		√	√	√
C03	√	√	√	√	√	√
C04	√	√	√	√		√
C05	√	√	√	√	√	√

DSCC - 17

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Develop Scientific Inquiry: Demonstrate a spirit of scientific inquiry and critical thinking by understanding the fundamental principles and concepts of the core areas of Chemistry.

P02: Analyze Chemical Phenomena: Apply theoretical knowledge to analyze, interpret, and explain chemical observations, reactions, and phenomena encountered in various branches of Chemistry.

P03: Problem-Solving Ability: Develop the ability to identify, formulate, and solve qualitative and quantitative problems using appropriate chemical principles and analytical methods.

P04: Practical Competence: Acquire hands-on laboratory skills through experiments and practical exercises, enabling the application of theoretical concepts in real-life chemical investigations.

P05: Laboratory Safety and Technical Skills: Demonstrate proficiency in the safe handling of chemicals, reagents, laboratory apparatus, and scientific instruments while adhering to standard laboratory practices and safety protocols.

P06: Data Analysis and Interpretation: Develop the ability to record observations accurately, analyse experimental data, interpret results scientifically, and draw valid conclusions based on experimental evidence.

Discipline Specific Core Course (DSCC)

Paper: DSCC-17: Organic Chemistry - V

(Credit: Theory -03, Tutorial – 01)

Course learning outcome (COs)

- C01:** Explain the concepts of aromaticity and linear free energy relationships by applying Hückel molecular orbital theory, Frost diagrams, Hammett equations, and substituent effects to predict the stability and reactivity of conjugated organic systems.
- C02:** Analyze the mechanisms, stereochemistry, regioselectivity, and orbital symmetry requirements of pericyclic reactions, including cycloaddition, electrocyclic, and sigmatropic rearrangements using Frontier Molecular Orbital (FMO) and correlation diagram approaches.
- C03:** Describe the structure, synthesis, biological activity, medicinal importance, and structure elucidation of representative terpenoids and alkaloids using chemical and spectroscopic methods.
- C04:** Apply the principles of green chemistry to design environmentally benign chemical syntheses by emphasizing atom economy, waste minimization, green solvents, energy-efficient methodologies, catalysis, and sustainable chemical processes.
- C05:** Evaluate and apply green synthetic methodologies, including microwave- and ultrasound-assisted reactions, green alternatives to conventional organic reactions, and environmentally friendly rearrangement reactions for sustainable organic synthesis.

COs-POs Mapping

DSCC-17: Organic Chemistry - V

	P01	P02	P03	P04	P05	P06
C01	√	√	√	√	√	√
C02	√		√	√	√	√
C03	√	√	√	√	√	√
C04	√	√	√		√	√
C05	√	√	√	√	√	√

DSCC - 18

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Develop Scientific Inquiry: Demonstrate a spirit of scientific inquiry and critical thinking by understanding the fundamental principles and concepts of the core areas of Chemistry.

P02: Analyze Chemical Phenomena: Apply theoretical knowledge to analyze, interpret, and explain chemical observations, reactions, and phenomena encountered in various branches of Chemistry.

P03: Problem-Solving Ability: Develop the ability to identify, formulate, and solve qualitative and quantitative problems using appropriate chemical principles and analytical methods.

P04: Practical Competence: Acquire hands-on laboratory skills through experiments and practical exercises, enabling the application of theoretical concepts in real-life chemical investigations.

P05: Laboratory Safety and Technical Skills: Demonstrate proficiency in the safe handling of chemicals, reagents, laboratory apparatus, and scientific instruments while adhering to standard laboratory practices and safety protocols.

P06: Data Analysis and Interpretation: Develop the ability to record observations accurately, analyse experimental data, interpret results scientifically, and draw valid conclusions based on experimental evidence.

Discipline Specific Core Course (DSCC)

Paper: DSCC-17: Physical Chemistry - V

(Credit: Theory -03, Tutorial – 01)

Course learning outcome (COs)

- C01:** Apply mathematical concepts such as calculus, Legendre transformations, constrained optimization, power and Taylor series, and matrix methods to solve problems in physical chemistry and thermodynamics.
- C02:** Explain the origin and interpretation of atomic spectra, including Zeeman splitting, fine structure, spin-orbit coupling, Lande g factor, and atomic and molecular term symbols.
- C03:** Analyze the kinetics of fast and ultra-fast chemical reactions using modern experimental techniques, and interpret kinetic models involving autocatalysis, oscillating reactions, and electrode processes through the Nernst, Butler–Volmer, and Tafel equations.
- C04:** Describe the mechanisms, kinetics, thermodynamics, and molecular weight characteristics of polymers, distinguishing between step-growth and chain-growth polymerization processes.
- C05:** Interpret absorption and emission spectroscopic phenomena by applying Beer Lambert law, Einstein's transition theory, fluorescence principles, laser concepts, charge and energy transfer processes, fluorescence quenching, and time-resolved spectroscopic techniques.

COs-POs Mapping

DSCC-18: Physical Chemistry - V

	P01	P02	P03	P04	P05	P06
C01	√		√		√	√
C02	√		√		√	√
C03	√		√		√	√
C04	√		√		√	√
C05	√		√		√	√

DSCC - 19

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Develop Scientific Inquiry: Demonstrate a spirit of scientific inquiry and critical thinking by understanding the fundamental principles and concepts of the core areas of Chemistry.

P02: Analyze Chemical Phenomena: Apply theoretical knowledge to analyze, interpret, and explain chemical observations, reactions, and phenomena encountered in various branches of Chemistry.

P03: Problem-Solving Ability: Develop the ability to identify, formulate, and solve qualitative and quantitative problems using appropriate chemical principles and analytical methods.

P04: Practical Competence: Acquire hands-on laboratory skills through experiments and practical exercises, enabling the application of theoretical concepts in real-life chemical investigations.

P05: Laboratory Safety and Technical Skills: Demonstrate proficiency in the safe handling of chemicals, reagents, laboratory apparatus, and scientific instruments while adhering to standard laboratory practices and safety protocols.

P06: Data Analysis and Interpretation: Develop the ability to record observations accurately, analyse experimental data, interpret results scientifically, and draw valid conclusions based on experimental evidence.

Discipline Specific Core Course (DSCC)

Paper: DSCC-19: Practical (Inorganic Chemistry)

(Credit: Practcal – 04)

Course learning outcome (COs)

- C01:** Systematically analyze and identify cationic and anionic radicals, including rare elements and insoluble materials, in complex inorganic mixtures using semimicro qualitative analysis and interpret the chemical principles underlying their separation and confirmation.

COs-POs Mapping

DSCC-19: Practical (Inorganic Chemistry)

	P01	P02	P03	P04	P05	P06
C01	√	√	√	√	√	√

DSCC - 20

PROGRAMME OUTCOME OF B. SC. CHEMISTRY (MAJOR)

P01: Develop Scientific Inquiry: Demonstrate a spirit of scientific inquiry and critical thinking by understanding the fundamental principles and concepts of the core areas of Chemistry.

P02: Analyze Chemical Phenomena: Apply theoretical knowledge to analyze, interpret, and explain chemical observations, reactions, and phenomena encountered in various branches of Chemistry.

P03: Problem-Solving Ability: Develop the ability to identify, formulate, and solve qualitative and quantitative problems using appropriate chemical principles and analytical methods.

P04: Practical Competence: Acquire hands-on laboratory skills through experiments and practical exercises, enabling the application of theoretical concepts in real-life chemical investigations.

P05: Laboratory Safety and Technical Skills: Demonstrate proficiency in the safe handling of chemicals, reagents, laboratory apparatus, and scientific instruments while adhering to standard laboratory practices and safety protocols.

P06: Data Analysis and Interpretation: Develop the ability to record observations accurately, analyse experimental data, interpret results scientifically, and draw valid conclusions based on experimental evidence.

Discipline Specific Core Course (DSCC)

Paper: DSCC-20: Practical (Physical Chemistry)

(Credit: Practcal – 04)

Course learning outcome (COs)

C01: Perform pH-metric and spectrophotometric analyses to determine acid–base properties, validate Lambert–Beer’s law, estimate unknown concentrations, evaluate spectroscopic parameters, and investigate reaction kinetics using experimental data.

COs-POs Mapping

DSCC-20: Practical (Physical Chemistry)

	P01	P02	P03	P04	P05	P06
C01	√	√	√	√	√	√