ST. XAVIER'S COLLEGE JAIPUR

Affiliated to University of Rajasthan, Jaipur

Accredited with A Grade by NAAC (First Cycle, 2025)

An ISO 14001:2015 Certified Institution

COURSE OUTCOMES

B.Sc. (NEP)

Department of Science (Sem. IV, V & VI)

SESSION: 2025-2026

Course Outcomes (COs)

B.Sc. Science (Physics) Semester-IV

UG0803-PHY-64T-203: Thermodynamics and Statistical Physics

The learners will be able to:

CO 1.	Understand the principles of thermal interactions, laws of thermodynamics and thermodynamic scale, including the application of Maxwell relations.
CO 2.	Calculate entropy, Helmholtz free energy, and analyze Gibb's free energy and infinitesimal general interactions in thermodynamic systems.
CO 3.	Explore and explain phase transitions including the Clausius-Clapeyron equation and vapor pressure curves.
CO 4.	Evaluate the classical theories of specific heat capacity and apply them to study solids using Einstein and Debye models
CO 5.	Describe the production of low temperatures, regenerative cooling, and adiabatic demagnetization, including the properties of helium I and II.
CO 6.	Analyze the concepts of phase space, entropy, and quantum statistics including Bose-Einstein and Fermi-Dirac distributions, and explain the Chandrasekhar mass limit.

Course Outcomes (COs)

B.Sc. Science (Physics-Practical) Semester-IV

UG0803-PHY-64P-204: Physics Lab-IV

The learners will be able to:

CO 1.	Demonstrate proficiency in using various thermodynamically components and instruments required for conducting experiments.
CO 2.	Apply theoretical concepts of thermodynamics and statistical dynamics to design and execute experiments.
CO 3.	Analyze experimental data using appropriate mathematical and statistical techniques.
CO 4.	Interpret experimental results and draw conclusions based on data analysis.
CO 5.	Develop skills in accurately measuring physical quantities and recording experimental observations.
CO 6.	Communicate experimental procedures, results and conclusions effectively in written reports.

Course Outcomes (COs)

B.Sc. Science (Physics) Semester-V

UG0803-PHY-75T-301: Electronics and Solid State Devices

The learners will be able to:

CO 1.	Understand and apply Kirchhoff's laws and circuit theorems (Superposition, Thevenin, Norton) for the analysis and simplification of DC and AC circuits.
CO 2.	Analyze four-terminal networks and determine open-circuit, short-circuit, and hybrid parameters.
CO 3.	Explain and evaluate the behavior of P–N junctions, and their applications in rectifiers and voltage regulators.
CO 4.	Describe and analyze the working and characteristics of BJTs and FETs, including biasing methods and amplifier configurations.
CO 5.	Design and evaluate transistor and operational amplifier circuits, including feedback amplifiers and oscillators, and understand the conditions for sustained oscillations.
CO 6.	Apply the principles of Boolean algebra and logic gates to design and interpret basic digital logic circuits.

Course Outcomes (COs)

B.Sc. Science (Physics-Practicals) Semester-V

UG0803-PHY-75P-302: Physics Lab-V

The learners will be able to:

CO 1.	Demonstrate proficiency in using electronic instruments such as multimeters, oscilloscopes and function generators for circuit analysis and measurements.
CO 2.	Verify and apply fundamental electrical principles, including Kirchhoff's laws and the Maximum Power Transfer Theorem, through experimental investigation.
CO 3.	Analyze the characteristics of diodes, BJTs and FETs under various configurations to understand their operational behavior and applications.
CO 4.	Determine the semiconductor band gap and study the frequency response of amplifiers to evaluate gain variation and bandwidth.
CO 5.	Design and construct rectifiers, voltage regulators, oscillators, and voltage multipliers to develop hands-on circuit-building skills.
CO 6.	Investigate and interpret the influence of negative feedback on amplifier performance.
CO 7.	Develop skills in recording, analyzing, and presenting experimental data effectively to bridge theoretical knowledge with practical electronic applications.

Course Outcomes (COs)

B.Sc. Science (Physics) Semester-VI

UG0803-PHY-76T-303: Quantum Mechanics and Spectroscopy

The learners will be able to:

CO 1.	Understand the fundamental postulates and principles of quantum mechanics, and explain their significance in describing microscopic systems.
CO 2.	Apply the Schrödinger wave equation to simple systems and solve it for various potential problems.
CO 3.	Analyze the particle in a box, harmonic oscillator, and hydrogen atom to determine quantized energy levels and corresponding wavefunctions.
CO 4.	Explain and evaluate the concept of orbital angular momentum, its quantization, and related operators.
CO 5.	Interpret the rotational and vibrational spectra of molecules in terms of quantized energy levels and transitions in atomic and molecular Physics.
CO 6.	Integrate theoretical understanding with physical interpretation to explain experimental results and the behavior of quantum systems in solid state Physics and Nuclear Physics.

Course Outcomes (COs)

B.Sc. Science (Physics-Practicals) Semester-VI

UG 0803-PHY-76P-304: Physics Lab-VI

The learners will be able to:

CO 1.	Quantify fundamental Physics constants and demonstrate proficiency in using advanced experimental setups and instruments such as photocells, GM counters, spectrometers, and ballistic galvanometers.
CO 2.	Characterize material properties and apply theoretical concepts of modern physics, electromagnetism, and quantum mechanics to design and conduct experiments involving Planck's constant, Stefan's constant, and e/m measurement.
CO 3.	Analyze experimental data related to semiconductor resistivity, β-absorption, and magnetic susceptibility using appropriate physical and mathematical techniques.
CO 4.	Investigate light polarization and interpret and verify fundamental physical laws such as Brewster's Law, Malus's Law, and the inverse square law for radiation through systematic experimentation.
CO 5.	Develop skills in precise measurement of physical quantities such as resistance, magnetic field, rigidity and electric charge using calibrated instruments.
CO 6.	Integrate theoretical understanding with experimental findings to explain physical phenomena and develop proficiency in handling laboratory instrumentation.

Course Outcomes (COs)

B.Sc. Science (Chemistry) Semester-IV

CHM-64T-203-Chemistry of d & f Block Elements, Chemistry of Oxygen/Nitrogen-Containing Functional Groups and Chemical and Ionic Equilibrium, Second and Third Law of Thermodynamics

The learners will be able to:

CO 1.	Explain the general characteristics, periodic trends, and variable oxidation states of the first, second, and third transition series, lanthanides, and actinides based on their electronic configurations.
CO 2.	Discuss the types of complexes formed by d- and f-block elements and relate their properties such as colour, magnetism, and catalytic activity to their electronic structures.
CO 3.	Illustrate the structure, reactivity, and interconversion of organic compounds containing oxygen and nitrogen functional groups through appropriate mechanisms and reactions.
CO 4.	Apply the principles of chemical and ionic equilibrium to determine equilibrium constants, pH, buffer capacity, solubility products, and related quantitative problems.
CO 5.	Differentiate between various thermodynamic laws and describe the concepts of entropy, enthalpy, and Gibbs free energy in relation to spontaneity and equilibrium.
CO 6.	Evaluate thermodynamic parameters to predict the feasibility, direction, and efficiency of chemical and physical processes, integrating the second and third laws of thermodynamics.

Course Outcomes (COs)

B.Sc. Science (Chemistry- Practical) Semester-IV

CHM-64P-204- Chemistry Lab IV

The learners will be able to:

CO 1.	Demonstrate understanding of the theoretical concepts related to the chemistry of d- and f-block elements, lanthanides, and actinides through practical applications and experiments.
CO 2.	Identify and verify periodic trends, oxidation states, and characteristic reactions of transition metal ions using suitable laboratory techniques.
CO 3.	Carry out experiments involving the preparation, purification, and analysis of organic compounds containing oxygen and nitrogen functional groups.
CO 4.	Perform experiments related to chemical and ionic equilibria, including pH measurement, buffer preparation, and solubility product determination, using appropriate instruments.
CO 5.	Determine thermodynamic parameters such as enthalpy and equilibrium constants experimentally and interpret their significance in chemical processes.
CO 6.	Demonstrate laboratory safety, accurate data recording, analytical precision, and effective teamwork, and critically evaluate experimental results to draw valid conclusions.

Course Outcomes (COs)

B.Sc. Science (Chemistry) Semester-V

CHM-75T-301– Hard & Soft Acids and Bases, Transition Metal Complexes, Spectroscopy, Organosulphur Compounds, Synthetic Polymers, Drugs & Dyes, Electrochemistry

The learners will be able to:

CO 1.	Explain the principles of Hard and Soft Acids and Bases (HSAB) theory to predict the stability, reactivity, and preferred interactions among chemical species.
CO 2.	Describe the bonding, geometry, and magnetic properties of transition metal complexes using Crystal Field Theory (CFT) and Ligand Field Theory (LFT).
CO 3.	Interpret the structure and dynamics of molecules through spectroscopic techniques such as UV–Visible, IR, and NMR spectroscopy, and relate spectral data to molecular properties.
CO 4.	Analyze the structure, synthesis, and reactivity of organosulphur compounds and synthetic polymers, correlating their properties with industrial and biological applications.
CO 5.	Discuss the chemistry, synthesis, and applications of synthetic drugs and industrial dyes, emphasizing their environmental and health implications.
CO 6.	Evaluate electrochemical principles and apply concepts of redox reactions to understand the working and efficiency of batteries, fuel cells, and electroplating systems.

Course Outcomes (COs)

B.Sc. Science (Chemistry Practical) Semester-V

CHM-75P-302: Practical – V

The learners will be able to:

CO 1.	Demonstrate an understanding of the principles of Hard and Soft Acids and Bases (HSAB) theory through experiments that illustrate the stability and reactivity patterns of various chemical species.
CO 2.	Perform experiments related to coordination chemistry of transition metals and interpret results based on Crystal Field and Ligand Field Theories.
CO 3.	Determine molecular structure and bonding characteristics of compounds using spectroscopic techniques such as UV–Visible, IR, and NMR spectroscopy.
CO 4.	Synthesize and analyze organosulphur compounds, synthetic polymers, and industrial dyes, and correlate their structural features with their properties and applications.
CO 5.	Apply electrochemical principles to perform and analyze experiments involving redox reactions, electrolysis, batteries, fuel cells, and electroplating.
CO 6.	Demonstrate accuracy, precision, safety, and teamwork in laboratory work, critically evaluate experimental data, and draw meaningful conclusions connecting theory with practice.

Course Outcomes (COs)

B.Sc. Science (Chemistry) Semester-VI

CHM-76T-303– Bioinorganic Chemistry, Organometallic Chemistry, Heterocyclic Chemistry, Carbohydrates, Spectroscopy, Quantum Mechanics and MOT

The learners will be able to:

CO 1.	Explain the role of metal ions in biological systems, their coordination environments, and their functions in metalloproteins, enzymes, and metal–ligand interactions in bioinorganic chemistry.
CO 2.	Describe the structure, bonding, and reactivity of organometallic compounds and apply concepts such as 18-electron rule and metal–carbon bonding to understand catalytic processes.
CO 3.	Illustrate the synthesis, structure, and reactivity of heterocyclic compounds and carbohydrates and relate their chemical properties to their biological and industrial applications.
CO 4.	Interpret the structural and functional characteristics of organic and inorganic molecules using spectroscopic techniques such as UV–Visible, IR, NMR, and mass spectrometry.
CO 5.	Understand the fundamental postulates of quantum mechanics and apply them to explain atomic and molecular structures, energy quantization, and chemical bonding.
CO 6.	Evaluate molecular orbital theory (MOT) to analyze bonding, magnetic properties, and electronic transitions of diatomic and polyatomic molecules, integrating theoretical and spectroscopic data.

Course Outcomes (COs)

B.Sc. Science (Chemistry Practical) Semester-VI

CHM-76P-304– Practical – VI

The learners will be able to:

CO 1.	Demonstrate understanding of the role of metals in biological systems and their coordination environments through experiments related to bioinorganic chemistry.
CO 2.	Perform experiments on the preparation, characterization, and reactivity of organometallic compounds to study metal–carbon bonding and their catalytic properties.
CO 3.	Synthesize and analyze heterocyclic compounds and carbohydrates to understand their structure, chemical behaviour, and biological significance.
CO 4.	Use spectroscopic techniques such as UV–Visible, IR, Raman, and rotational spectroscopy to interpret electronic, vibrational, and rotational transitions in molecules.
CO 5.	Apply the principles of quantum mechanics and molecular orbital theory (MOT) to explain molecular bonding, symmetry, and electronic configuration experimentally or through data interpretation.
CO 6.	Demonstrate laboratory proficiency, including accurate data collection, interpretation, and safety practices, while critically evaluating experimental results to correlate theory with practice.

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-IV

UG0802 - BOT-64T-203 Plant Taxonomy and Economic Botany

The learners will be able to:

CO 1.	Define and explain classification systems in taxonomy, including artificial, natural, and phylogenetic approaches
CO 2.	Illustrate the principles of botanical nomenclature and the preparation of herbarium sheets.
CO 3.	Analyze diagnostic characters and economic importance of plant families like Malvaceae and Fabaceae.
CO 4.	Evaluate the origin and economic uses of cereals, pulses, oils, fibers, and medicinal plants.
CO 5.	ISynthesize modern tools such as cytotaxonomy and chemotaxonomy in classifying and studying plant diversity
CO 6.	Discuss and interpret the significance of Vavilov's centers of origin for plant domestication

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-IV

UG0802 - BOT-64T-203 Plant Taxonomy and Economic Botany

The students will be able to:

CO 1.	Define and explain classification systems in taxonomy, including artificial, natural, and phylogenetic approaches
CO 2.	Illustrate the principles of botanical nomenclature and the preparation of herbarium sheets.
CO 3.	Analyze diagnostic characters and economic importance of plant families like Malvaceae and Fabaceae.
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CO 5.	ISynthesize modern tools such as cytotaxonomy and chemotaxonomy in classifying and studying plant diversity
CO 6.	Discuss and interpret the significance of Vavilov's centers of origin for plant domestication

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-V

BOT-75T-301 - Plant Biochemistry and Physiology

The learners will be able to:

CO 1.	Understand the classification, structure, and function of major biomolecules—proteins, carbohydrates, lipids, and nucleic acids—and the nature and types of biological bonds such as glycosidic, peptide, and phosphodiester bonds.
CO 2.	Gain knowledge of enzyme structure, classification, and activity, understanding the factors influencing enzymatic reactions and their importance in plant metabolic processes.
CO 3.	Explain mechanisms of water and nutrient transport in plants, including osmosis, transpiration, and pressure flow.
CO 4.	Analyse key physiological and metabolic processes, such as photosynthesis and respiration, and explain their significance in plant energy production, growth, and overall productivity.
CO5	Identify essential macro- and micronutrients, describe their physiological significance, and diagnose common nutrient deficiency symptoms affecting plant growth and productivity
CO6	Interpret plant growth and developmental stages with emphasis on hormonal regulation and evaluate plant responses to environmental cues such as photoperiodism and vernalization.

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-V

UG0802 - BOT-75P-302 – Practical-V

The learners will be able to:

CO 1.	Identify and classify major biomolecules such as carbohydrates, proteins, lipids, and nucleic acids, explain their structural and functional roles, and understand the biochemical bonds (glycosidic, peptide, and phosphodiester) and metabolic processes like alpha and beta oxidation that sustain cellular activity.
CO 2.	Demonstrate a comprehensive understanding of enzymes—their structure, classification, mechanisms of action, and factors influencing activity—along with key aspects of nitrogen metabolism and biological nitrogen fixation, emphasizing their roles in plant productivity and sustainable agriculture.
CO 3.	Describe and analyze the mechanisms of water and nutrient transport in plants, including osmosis, transpiration, and root pressure.
CO 4.	Illustrate and evaluate fundamental physiological and metabolic processes in plants such as photosynthesis, respiration, photoperiodism, and vernalization, relating them to plant growth, energy production, and environmental adaptation.
CO5	Evaluate the physiological importance of essential macro- and micronutrients, identify their deficiency symptoms, and relate them to plant growth, development, and overall metabolic performance.
CO6	Illustrate and critically assess fundamental plant physiological and metabolic processes such as photosynthesis, respiration, photoperiodism, and vernalization, correlating them with plant energy production, growth regulation, and environmental adaptation.

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-VI

UG0802 - BOT-76T-303 Plant Morphology, Anatomy and Embryology

The students will be able to:

CO 1.	Understand the morphology and anatomy of flowering plants, gaining practical and experimental skills in studying plant structures, tissues, and their functional organization.
CO 2.	Comprehend the various modifications of roots, stems, and leaves, interpreting their adaptive significance and contribution to the growth, survival, and ecological success of plants.
CO 3.	Acquire detailed knowledge of the processes of secondary growth, abnormal secondary growth, and wood formation, relating these to plant development and structural complexity in higher plants.
CO 4.	Understand the organization and development of reproductive structures, including male and female gametophytes, embryology, and seed formation, highlighting their roles in plant reproduction and life cycle continuity.
CO5	Students will understand and evaluate the anatomy and classification of wood, interpreting its ecological, environmental, and economic significance.
CO6	Students will study and interpret the modifications of roots, stems, and leaves, relating these adaptations to the growth, survival, and ecological success of plants in different environments.

Course Outcomes (COs)

B.Sc. Science (Botany) Semester-VI

UG0802 - BOT-76P-304 – Practical-VI

The students will be able to:

CO 1.	Understand the organization of tissues and tissue systems in plants and apply anatomical knowledge to identify plant samples, interpreting the adaptive significance of their structural features.
CO 2.	Analyze and compare the vascular bundles and patterns of secondary growth in monocot and dicot plants.
CO 3.	Evaluate the anatomical characteristics of wood, interpret their relevance to ecological and climatic studies, and understand their applications in environmental analysis.
CO 4.	Identify and compare reproductive organs of angiosperms, understand double fertilization and its significance, and illustrate and interpret various aspects of embryology and seed development.
CO5.	Apply knowledge of plant anatomy to identify and compare plant samples, correlating structural features with adaptive functions in different plant groups.
CO6	Identify and evaluate anomalous patterns of secondary growth in various plant species and understand their developmental significance.

Course Outcomes (COs)

B.Sc. Science (Zoology) Semester-IV

UG0802-ZOO-64T-203: Cell Biology, Genetics & Biotechnology

The learners will be able to:

CO 1.	Provide fundamental knowledge of cell structure, organization, and functions of prokaryotic and eukaryotic cells, including the morphology, composition, and dynamic nature of the plasma membrane and cell organelles.
CO 2.	Help students understand the mechanisms of cell division, chromosomal organization, and the structural differences between prokaryotic and eukaryotic chromosomes, along with the role of cell junctions in maintaining cellular integrity and communication.
CO 3.	Develop analytical understanding of Mendelian inheritance, chromosomal behavior, linkage, crossing over, mutations, and genetic disorders for interpreting patterns of heredity and variations among living organisms.
CO 4.	Enable students to apply the principles of genetic and molecular techniques, such as cloning and recombinant DNA technology, to real-world biological and biotechnological contexts.
CO 5.	Impart technical and conceptual skills in animal biotechnology, including animal cell culture, transgenesis, and stem cell research, emphasizing their scientific and industrial applications.
CO 6.	Encourage students to explore industrial and agricultural applications of biotechnology—such as dairy and food biotechnology—and promote self-employment opportunities through bio-based and fermentation industries.

Course Outcomes (COs)

B.Sc. Science (Zoology-Practicals) Semester-IV

UG0802-ZOO-64P-204: Practicals based on Cell Biology, Genetics & Biotechnology

The learners will be able to:

CO 1.	Familiarize students with the basic principles and functions of microscopy, and to develop an understanding of various cytological preparations used to study cell division and cellular components.
CO 2.	Help students comprehend and distinguish the stages of mitosis and meiosis through squash preparations and permanent slides, and to understand chromosomal structures such as giant chromosomes.
CO 3.	Train students in cytological and hematological techniques such as blood smear preparation, staining, and identification of different blood cells, thereby enhancing their analytical and observational skills.
CO 4.	Apply genetic principles through hands-on exercises involving *Drosophila*—its life cycle, sex differentiation, and identification of wild and mutant forms—and to solve numerical problems on Mendelian inheritance.
CO 5.	Impart laboratory skills related to biotechnology, including the use of key instruments (centrifuge, autoclave, ph meter), DNA isolation, and gel electrophoresis techniques, as well as the assessment of milk quality
CO 6.	Encourage scientific inquiry and promote employment opportunities in cytogenetics, biomedical laboratories, and biotechnology industries by providing practical exposure to modern experimental techniques and analytical tools.

Course Outcomes (COs)

B.Sc. Science (Zoology) Semester-V

UG0802-ZOO-75T-301: Animal Physiology & Biochemistry

The learners will be able to:

CO 1.	Acquire comprehensive knowledge of the structure and physiological functions of major organ systems—digestive, respiratory, circulatory, excretory, nervous, muscular, reproductive, and endocrine—in animals.
CO 2.	Develop an in-depth understanding of the mechanisms underlying digestion, respiration, blood circulation, excretion, nerve impulse transmission, and muscle contraction, along with their biochemical and regulatory aspects.
CO 3.	Gain the ability to analyze physiological processes such as hormonal control, homeostasis, and metabolic regulation, integrating structure–function relationships across organ systems.
CO 4.	Able to apply physiological and biochemical concepts to explain processes such as enzyme action, energy metabolism (glycolysis, Krebs cycle, oxidative phosphorylation), and nitrogen metabolism in animals.
CO 5.	Develop skills in interpreting physiological and biochemical data, understanding feedback mechanisms, and correlating hormonal regulation with reproductive and metabolic functions in mammals.
CO 6.	Equipped with foundational knowledge relevant to advanced studies and employment in medical, veterinary, pharmaceutical, and biotechnological fields, and can explore entrepreneurship opportunities in physiological diagnostics and biochemical industries.

Course Outcomes (COs)

B.Sc. Science (Zoology-Practicals) Semester-V

UG0802-ZOO-75P-302: Practicals based on Animal Physiology & Biochemistry

The learners will be able to:

CO 1.	Acquire fundamental knowledge of blood physiology, including the principles behind cell counting, hemoglobin estimation, and hematocrit determination, to understand hematological parameters in animals.
CO 2.	Develop a clear understanding of the histological structure and function of major organs and endocrine glands, and relate these microscopic features to their physiological roles in the body.
CO 3.	Gain proficiency in laboratory techniques such as blood smear preparation and staining, enabling identification of various blood cell types and assessment of their relative abundance.
CO 4.	Apply biochemical principles to detect the presence of carbohydrates, proteins, and lipids in animal tissues or food samples, and to interpret the physiological significance of these biomolecules.
CO 5.	Develop hands-on skills in enzymology by demonstrating enzyme activity (catalase in liver) and studying the influence of ph and temperature on salivary amylase activity, enhancing their understanding of metabolic regulation.
CO 6.	Equipped with practical laboratory competencies applicable to careers in biomedical diagnostics, clinical biochemistry, veterinary sciences, and research laboratories, fostering employability and entrepreneurial potential in health and life science sectors.

Course Outcomes (COs)

B.Sc. Science (Zoology) Semester-VI

UG0802-ZOO-76T-303: Microbiology, Immunology & Biostatistics

The learners will be able to:

CO 1.	Acquire foundational knowledge of microorganisms, including their classification, structure, growth, and roles in health, disease, and the environment, along with the basic principles of immunology and biostatistics.
CO 2.	Develop an understanding of host–pathogen interactions, immune responses, and statistical concepts essential for analyzing biological variability and experimental outcomes in microbiology and immunology.
CO 3.	Interpret microbial and immunological data using statistical tools, such as measures of central tendency, dispersion, correlation, regression, and hypothesis testing, for meaningful scientific analysis.
CO 4.	Apply microbiological and immunological principles to explain infection control, vaccine development, antigen–antibody interactions, and epidemiological data interpretation using biostatistical methods.
CO 5.	Develop problem-solving and analytical thinking skills through case-based learning and data-driven exercises, integrating microbiology, immunology, and statistics for scientific and clinical research.
CO 6.	Equipped for careers in biomedical research, clinical diagnostics, pharmaceutical industries, and public health sectors, with the ability to apply microbiological, immunological, and statistical knowledge to real-world challenges.

Course Outcomes (COs)

B.Sc. Science (Zoology-Practicals) Semester-VI

UG 0802-ZOO-76P-304: Practicals based on Microbiology, Immunology & Biostatistics

The learners will be able to:

CO 1.	Gain foundational knowledge of microbiological media preparation, culturing, and staining techniques, enabling them to understand microbial morphology and diversity.
CO 2.	Develop an understanding of the structural and functional characteristics of bacteria and fungi, and their roles in food, health, and the environment.
CO 3.	Acquire hands-on experience in performing immunological tests such as blood grouping, Widal test, and differential leucocyte count, and learn to interpret immunodiagnostic results accurately.
CO 4.	Apply statistical tools—mean, median, mode, and standard deviation—to analyze biological and experimental data, and represent results effectively using bar diagrams and pie charts.
CO 5.	Develop technical and analytical competencies in handling microbial cultures, immunological assays, and statistical software, fostering precision, accuracy, and data interpretation skills for research contexts.
CO 6.	Be equipped with practical exposure to laboratory techniques and industrial applications through microbiology lab/industry visits, enhancing their employability in biomedical, dairy, and pharmaceutical sectors.

Course Outcomes (COs)

B.Sc. Science (Mathematics) Semester-IV

UG0809-MAT-64T-254-Real Analysis-II & Numerical Analysis

The students will be able to:

CO 1.	Understand and apply the properties of differentiable functions and theorems like Darboux's and Rolle's in multivariable contexts.
CO 2.	Analyze the concepts of limit, continuity, and differentiability for functions of two variables and compute directional and total derivatives.
CO 3.	Develop the ability to evaluate Riemann integrals and apply fundamental theorems of calculus to functions of bounded variation.
CO 4.	Understand the concept of finite differences and apply interpolation techniques like Newton's and Lagrange's formulas for data approximation.
CO 5.	Apply numerical differentiation techniques to estimate derivatives using interpolation-based formulas.
CO 6.	Solve problems in numerical integration and differential equations using various numerical methods and algorithms.

Course Outcomes (COs)

B.Sc. Science (Mathematics-Practicals) Semester-IV

UG0809-MAT-64P-255- Introduction to C Programming: As Mathematical Tool

The students will be able to:

CO 1.	Understand the basics of C programming, including variables, expressions, I/O operations, loops, and conditional statements.
CO 2.	Apply C programming techniques to implement mathematical algorithms such as Fibonacci sequence, factorial, summations, and prime checking.
CO 3.	Develop user-defined functions in C to compute series sums, GCD/LCM, and perform statistical calculations like mean and standard deviation.
CO 4.	Implement numerical integration techniques including Trapezoidal, Simpson's 1/3, 3/8, and Weddle's rule using C programming.
CO 5.	Construct and utilize forward and backward difference tables programmatically for interpolation tasks.
CO 6.	Solve algebraic/transcendental equations and initial value problems using numerical methods like Bisection, Newton-Raphson, and Runge-Kutta in C.

Course Outcomes (COs)

B.Sc. Science (Mathematics) Semester-V

UG0809-MAT-75T-301 - Abstract Algebra & Three Dimensional Geometry

The students will be able to:

CO 1.	Understand and recall the fundamental concepts of algebraic structures such as binary operations, groups, subgroups, cyclic groups, and their properties.
CO 2.	Apply and analyze group theorems like Lagrange's and Cayley's to explore normal subgroups, quotient groups, and homomorphisms.
CO 3.	Explain and differentiate among rings, subrings, integral domains, and fields; understand their morphisms and fundamental theorems.
CO 4.	Understand and derive the equations of three-dimensional geometric surfaces including spheres, cones, and cylinders.
CO 5.	Apply analytical and geometrical methods to determine tangent planes, angles of intersection, and relationships between 3-D surfaces.
CO 6.	Integrate abstract algebraic reasoning with three-dimensional geometry to model, interpret, and solve mathematical and real-world problems.

Course Outcomes (COs)

B.Sc. Science (Mathematics) Semester-VI

UG0809-MAT-76T-302 - Complex Analysis & Mechanics

The students will be able to:

CO 1.	Understand the concepts of limit, continuity, and differentiability for complex-valued functions and verify analyticity using Cauchy–Riemann equations.
CO 2.	Apply Cauchy's integral theorem, Cauchy's integral formula, and evaluate complex line integrals effectively.
CO 3.	Analyze series representations using Taylor's and Laurent's theorems and classify singularities of analytic functions.
CO 4.	Compute residues and apply the residue theorem to evaluate complex integrals.
CO 5.	Understand and apply laws of motion to problems involving velocity, acceleration, resistance, and motion along smooth curves.
CO 6.	Apply the principles of equilibrium, friction, virtual work, and catenary to solve problems in mechanics.

Course Outcomes (COs)

BSc. Science (Statistics) Semester-IV

STA-64T-203- Statistical Inference

The Learners will be able to

CO 1.	Define the concept of population parameters, point and interval estimation, Testing of Hypothesis, Sampling Distributions, Non-Parametric Tests and Large sample theory	K
CO 2.	Distinguish between various types of estimators with properties, Confidence Interval and hypothesis testing procedures.	U
CO 3.	Apply chi –square, t and F- distributions to test goodness of fit, population variance, and equality of variances, non-parametric tests, such as the sign test, run test, and median test, especially when parametric test assumptions are not met.	P
CO 4.	Differentiate between parametric and non- parametric tests and evaluate their appropriateness for different data	A
CO 5.	Develop innovative solutions for decision making from estimation theory, hypothesis testing and various tests.	S
CO 6.	Summarize statistical results obtained from different tests and determine their reliability using confidence intervals and significance levels.	E

Course Outcomes (COs)

BSc. Science (Statistics) SEM-IV

Statistics Lab-IV (STA-64P-204)

The Learners will be able to

CO 1.	Define the concepts of point estimation, confidence intervals and hypothesis testing.	K
CO 2.	Explain the significance of confidence intervals in making inference about population parameters.	U
CO 3	Compute BCR and confidence intervals by applying chi- square, t and F and Non – parametric tests, large sample test based on single mean and proportion and difference of means and proportions.	P
CO 4.	Analyze the outcomes of statistical concepts to determine the reliability and validity of inferences.	A
CO 5.	Enhance the critical thinking and problem-solving abilities through extensive practice with numerical examples and real-data applications in statistical analysis	S
CO 6.	Evaluate the reliability of confidence intervals, hypothesis testing and estimation techniques.	E

Course Outcomes (COs)

B.Sc. Science (Economics) SEM IV

ECO-64T-202 - Statistics

The learners will be able to:

CO 1.	Define key statistical terms, identify types of data, and describe appropriate data collection techniques and frequency distributions.	K
CO 2.	Interpret and calculate statistical averages (mean, median, mode), and evaluate data variability and symmetry using measures like variance, standard deviation, and skewness.	U
CO 3.	Develop the ability to fit regression lines, interpret correlation coefficients, and analyze time series data for economic forecasting.	P
CO 4.	Construct confidence intervals, test hypotheses, and determine statistical significance using standard procedures such as t-tests and sampling distributions.	A
CO 5.	Critically assess the appropriateness of statistical techniques, interpret findings, and recommend suitable tools for specific economic contexts.	E

COURSE OUTCOMES (COS)

B.Sc. Science (Geography) Semester-IV

GEO-64T-203- Geography of India

CO 1.	Identify the major physical features of India, including mountain ranges, rivers, and climate zones	K
CO 2.	Apply geographical knowledge to analyse the regional variations in economic development, agriculture, and urbanisation within India.	E
CO 3.	Analyse the impact of human activities on the environment in different regions of India, examining issues such as deforestation, water scarcity, and pollution	A
CO 4.	Critically evaluate the effectiveness of government policies and initiatives in addressing geographical challenges in India, considering their impact on social, economic, and environmental aspects	A
CO 5.	Understand the relevance of geographical knowledge of India to understand the contemporary issues.	P

COURSE OUTCOMES (COS)

BSc. Science (Geography) Semester IV

GEO-64P-204- Practical-IV

CO 1.	Awareness about the various types of maps and their use in further studies.	U
CO 2.	Develop skills and competency regarding the topographical sheets and make them to read various physical and cultural features.	A

COURSE OUTCOMES (COS)

B.Sc. Science (Geography) Semester-V

GEO-75T-301: World Regional Geography-I

CO 1.	Identify the concept of region and understand the major physiographic regions of the world.	K
CO 2.	Apply geographical knowledge to analyse the regional variations in economic development, agriculture, and urbanisation of Asia, Europe and North America.	E
CO 3.	Analyse the demographic characteristics of Asia, Europe and North America.	A
CO 4.	Critically evaluate the industrial regions of China, Japan, France, Germany, UK, USA and Canada.	A
CO 5.	Understand the relevance of Panama Canal, Trans-Siberian Railways and Mediterranean Agriculture.	P

Course Outcomes (COs)

BSc. Science (Geography) Semester V

GEO-75P-302: Practical-V

The Learners will be able to

CO 1.	Awareness about the various types of Projection for construction of maps.	U
CO 2.	Demonstrate an understanding of the principles and techniques of plane table surveying including radiation and intersection methods with open and close traversing.	A
CO 3	Awareness about the various types of Projection for construction of maps.	U

COURSE OUTCOMES (COS)

B.Sc. Science (Geography) Semester-VI

GEO-76T-303: Geography of Rajasthan

CO 1.	Identify the major physical features of Rajasthan.	K
CO 2.	Awareness about the drainage system, Soils, natural vegetation and livestock of Rajasthan.	E
CO 3.	Critically evaluate the mineral resources, energy resources and industrial development of Rajasthan.	A
CO 4.	Analyse the demographic characteristics of Rajasthan.	A
CO 5.	Critically evaluate the effectiveness of government policies and initiatives in addressing problems of desertification in Rajasthan.	P

Course Outcomes (COs)

BSc. Science (Geography) Semester VI

GEO-76P-304: Practical-VI

The Learners will be able to

CO 1.	Constructing three-dimensional diagrams for effective representation of statistical data.	U
CO 2.	Exploring application of computer in geography.	A
CO 3	Awareness about the various types of Projection for construction of maps.	U