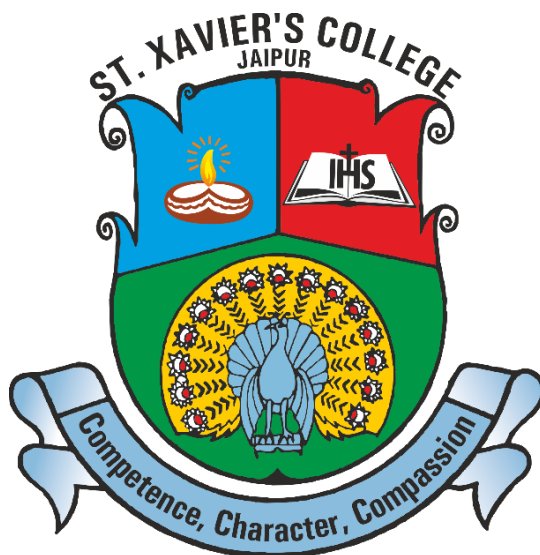


ST. XAVIER'S COLLEGE JAIPUR

Nevta - Mahapura Road, Jaipur - 302029, Rajasthan, India

Affiliated to the University of Rajasthan

Approved under Section 2(f) & 12(B) of the UGC Act, 1956



COURSE OUTCOMES

B.Sc.

(Bachelor of Science)

Department of Science

Course Outcomes (COs)

B.Sc. (Physics) Part-I

P-101: Mechanics & Oscillators

The learners will be able to:

CO 1. (K)	Recall the basics of Mechanics and Oscillations
CO 2. (U)	Discuss of motion under Gravitational and other central forces
CO 3. (A)	Demonstrate the mechanical behaviour of real objects
CO 4. (S)	Synthesise concepts in damped oscillatory systems
CO 5. (E)	Determine the various kinds of oscillations and how different waves travel in space using their different modes of oscillation

P-102: Electromagnetism

The learners will be able to:

CO 1. (K)	Outline the basic theory of electric fields and magnetic field of Electromagnetism
CO 2. (U)	Discuss magnetism, Maxwell Equation and Electromagnetism
CO 3. (P)	Classify the different types of Interferences and Diffraction processes
CO 4. (A)	Illustrate the concepts of electricity and magnetism and examine how current is generated in various arrangements
CO 5. (E)	Verify the Maxwell Equations

P-103: Optics

The learners will be able to:

CO 1. (P)	Examine the exchange between heat and work through various interactions
CO 2. (U)	Elaborate and examine Optics
CO 3. (K)	Study Holographic Methods
CO 4. (S)	Enhance Newton rings, Air wedge, and some interferometers of the lasers
CO 5. (A)	Analyse technology-based devices such as Laser, Holography and Fibre optics

PHY-104: Physics (Practical)	
The learners will be able to:	
CO 1. (S)	Develop skills in error analysis and graph techniques essential for scientific data interpretation and experimentation in mechanics
CO 2. (S)	Enhance the ability to characterise and understand material properties such as coefficient of viscosity, surface tension, and specific heat capacity
CO 3. (U)	Elaborate the practical grasp of optical phenomena
CO 4. (S)	Enhance their skills in precision measurement techniques

Course Outcomes (COs)	
B.Sc. (Physics) Part-II	
P-201: Thermodynamics and Statistical Physics	
The learners will be able to:	
CO 1. (K)	Define Statistical and Quantum Mechanics
CO 2. (U)	Elaborate the three Laws of Thermodynamics
CO 3. (A)	Illustrate how industrial level high temperatures are produced using different set-ups based on thermal laws
CO 4. (A)	Analyse the exchange between heat and work through various interactions
CO 5. (S)	Depict the collective behaviour of molecules and atoms in any medium via classical statistics and quantum statistics

P-202: Mathematical Physics and Special Theory of Relativity	
The learners will be able to:	
CO 1. (K)	Define Mathematical physics and elaborate how it is different from general physics
CO 2. (A)	Examine the techniques of Lorentz transformations, four-vector formulations
CO 3. (S)	Categorise differential equations and equations of first-order and second-order differential equations
CO 4. (P)	Calculate homogeneous linear differential equations
CO 5. (P)	Solve Boundary value problems, Laplace equations, and separation techniques

P-203: Electronics & Solid-State Devices

The learners will be able to:

CO 1. (U)	Describe the charge distribution and charge transfer process in semiconductors
CO 2. (S)	Design and analyse electronic circuits. calculating the parameters of the rectifiers, transistors, and De Morgan's laws
CO 3. (P)	Examine amplification oscillator and amplifiers
CO 4. (K)	Describe the band theory of solids and the carried concentration in solids
CO 5. (P)	Calculate parameters associated with semiconducting devices and analyse devices based on their applications

PHY-204: Physics (Practical)

The learners will be able to:

CO 1. (E)	Verify and design various logic gates, and construct adder and subtractor circuits, fostering proficiency in digital logic circuit design and analysis
CO 2. (P)	Demonstrate basic experiments in thermal physics to develop practical skills in thermal physics concepts
CO 3. (E)	Determine values of inductance in LCR series/parallel circuits, gaining hands-on experience in inductance measurement techniques
CO 4. (S)	Construct experiments focusing on rotational dynamics, particularly involving a flywheel, to deepen their understanding of rotational motion principles

Course Outcomes (COs)

B.Sc. (Physics) Part-III

P-301: Quantum Mechanics & Spectroscopy

The learners will be able to:

CO 1. (K)	Define the basic concept of principles of quantum mechanics and enumerate its applications to simple systems like simple harmonic oscillations
CO 2. (U)	Describe angular momentum and spin dynamics of quantum systems and solve the angular momentum using co-efficient
CO 3. (P)	Calculate the energy and wave functions of quantum conservative systems
CO 4. (P)	Solve Schrodinger equations and how their solutions explain the internal phenomena of hydrogen atoms
CO 5. (E)	Justify the molecular structure and various spectroscopic technique and their modern developments

P-302: Nuclear and Particle Physics

The learners will be able to:

CO 1. (K)	List basic properties of nuclei, nuclear interactions, nuclear structure and reactions
CO 2. (U)	Express the strengths and limitations of various models
CO 3. (P)	Apply the knowledge of basic laws of conservation and momentum in the determination of particle properties of process in the subatomic world
CO 4. (S)	Categorise elementary particles in physics and related theoretical predictions and measurement results
CO 5. (P)	Demonstrate the quark models based on nuclei in the subatomic molecules

P-303: Solid State Physics

The learners will be able to:

CO 1. (U)	Classify the types of structure of solids and their characterisation of X-Ray technique
CO 2. (A)	Distinguish between thermal and electrical properties of solids, specifically heat, and some models for calculations
CO 3. (U)	Elaborate the bonding crystal structure, crystallography, diffraction and band theory of solids
CO 4. (U)	Characterise solid based on fermi level position in the semiconductors
CO 5. (K)	Trace the origin of magnetism, various types of magnetic materials and its use in modern technology

Course Outcomes (COs)

B.Sc. (Physics) Part-III

PHY-304: Physics (Practical)

The learners will be able to:

CO 1. (P)	Construct electronic circuits to foster proficiency in circuit design analysis
CO 2. (P)	Acquire experimental skills to find the Hall coefficient to enhance their understanding of material properties and experimental techniques
CO 3. (A)	Categorise the hydrogen spectrum to calculate wavelengths of various spectral lines and develop skills in spectral analysis and atomic physics
CO 4. (K)	List the characteristics of GM counters, diodes, and transistors to develop skills in device characterisation and practical electronics
CO 5. (E)	Determine focal lengths of lens combinations and calculate the refractive index of glass, developing proficiency in lens properties and their practical applications

Course Outcomes (COs)	
B.Sc. (Mathematics) Part-I	
M-101: Discrete Mathematics	
The learners will be able to:	
CO 1. (K)	Identify set theory and number theory
CO 2. (S)	Outline Boolean algebra and its significance to the theory of probability, geometry of sets, and information theory
CO 3. (P)	Determine proposition in augmentation/argumentation so that it can be used to create new propositions
CO 4. (U)	Review Graph Theory and important terms of graph theory
CO 5. (P)	Apply Graph Theory

M-102: Calculus	
The learners will be able to:	
CO 1. (K)	Recall the Infinity Series
CO 2. (K)	Identify Derivatives of Arcs
CO 3. (P)	Demonstrate the concept of maxima minima function of two variables
CO 4. (A)	Explore Beta and Gamma Function
CO 5. (K)	Define Area and rectification

M-103: Analytic Geometry and Optimization Theory	
The learners will be able to:	
CO 1. (P)	Calculate Polar Equations of Conic section
CO 2. (P)	Compute Sphere and cone theory
CO 3. (E)	Interpret the equations of Cylinder and Coincides
CO 4. (U)	Characterise generating lines
CO 5. (P)	Solve Linear Programming Problem

M-104: Mathematics (Practical)	
The learners will be able to:	
CO 1. (S)	Depict the graphs of hyperbolic functions and inverse trigonometric functions
CO 2. (E)	Analyse and plot the graphs of polynomials
CO 3. (P)	Solve mathematical operations of complex functions through C programming

Course Outcomes (COs)	
B.Sc. (Mathematics) Part-II	
M-201: Real Analysis	
The learners will be able to:	
CO 1. (A)	Outline real Analysis and its application
CO 2. (K)	Trace Real Sequence and Convergence of sequence
CO 3. (U)	Compute the properties of derivatives
CO 4. (K)	Define Riemann Integral
CO 5. (E)	Evaluate Sequence and Series of Functions

M-202: Differential Equations	
The learners will be able to:	
CO 1. (U)	Describe Differential Equations and Equations of first order and first degree
CO 2. (K)	Enumerate the concept of First order and of higher degree
CO 3. (A)	Characterise Homogeneous linear differential equations
CO 4. (K)	Recognise linear differential equation of second order
CO 5. (E)	Evaluate Differential Equations and Equations of first order and first degree

M-203: Numerical Analysis

The learners will be able to:

CO 1. (P)	Acquire basic knowledge for solving interpolation with equal-interval problems by various numerical methods and estimate the missing terms through interpolation methods
CO 2. (A)	Analyse the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method
CO 3. (P)	Derive and understand the Trapezoidal rule, Simpson's $1/3$ – rule, Simpson's $3/8$ rule, and Waddle's rules
CO 4. (P)	Solve linear systems by using Direct methods, Matrix Inversion method, Gaussian elimination methods, Gauss-Jordan Method, and Method of factorisation
CO 5. (P)	Solve ordinary differential equations of first order by the Euler Method

M-204: Mathematics (Practical)

The learners will be able to:

CO 1. (A)	Analyse the Fibonacci sequence
CO 2. (A)	Explore Trapezoidal, Simpson ($1/3$ and $3/8$ rule) and Waddle method through C programming
CO 3. (E)	Assess the concept of numerical integration

Course Outcomes (COs)

B.Sc. (Mathematics) Part-III

M-301: Abstract Algebra

The learners will be able to:

CO 1. (K)	Define Group Theory
CO 2. (A)	Depict the usage and application of Morphism of the group
CO 3. (A)	Analyse simple properties of Ring and Subring
CO 4. (U)	Describe Ideals and Quotient Ring
CO 5. (E)	Evaluate Linear Combinations and Vector Space

M-302: Complex Analysis

The learners will be able to:

CO 1. (U)	Describe Complex Plane
CO 2. (P)	Demonstrate Complex Integration
CO 3. (A)	Analyse Taylor's Theorem
CO 4. (A)	Identify Singularities of an Analytic Function
CO 5. (A)	Analyse Conformal Mapping

M-303: Mechanics

The learners will be able to:

CO 1. (U)	Differentiate radial, transverse velocity and it's acceleration
CO 2. (P)	Calculate Motion in resisting medium
CO 3. (E)	Assess Central orbits
CO 4. (U)	Discuss the Equilibrium of coplanar
CO 5. (K)	Recognise Virtual Work and Catenary

M-304: Mathematics (Practical)

The learners will be able to:

CO 1. (P)	Derive the solution of transcendental equations using C programming
CO 2. (K)	Outline the concept of solving matrix by using different matrix operations through C programming
CO 3. (P)	Solve differential equation by numerical analysis using C programming

Course Outcomes (COs)

B.Sc. (Chemistry) Part-I

CH-101: Inorganic Chemistry

The learners will be able to:

CO 1.	Discuss band theories, ionic structure, and defects, including the properties associated with them
CO 2.	Study the theories of bonding, explore the geometry of inorganic molecules, and understand the ionic, dipolar, and electronegativity characteristics of bonds
CO 3.	Demonstrate the periodic properties of the 's' and 'p' block elements within the periodic table
CO 4.	Explain the structure, formation, and properties of compounds involving 'p' block elements
CO 5.	Tabulate the laws, concepts, and kinetics related to radioactivity, particles, reactions, and the stability features of the nucleus

CH-102: Organic Chemistry

The learners will be able to:

CO 1.	Enumerate the general reaction mechanisms, intermediates, energy pathways, and methods used to determine reaction mechanisms
CO 2.	Explore stereochemistry in organic molecules, encompassing optical, geometrical, and conformational isomerism, as well as different types of isomers and their representation
CO 3.	Tabulate the nomenclature, preparation, and properties of alkanes, cycloalkanes, alkenes, cycloalkenes, alkadienes, and alkynes
CO 4.	Express aromaticity, synthesis, reactions, and the directive influence on benzene in organic compounds
CO 5.	Compare and contrast the formation and chemical properties of alkyl, aryl, benzyl, and vinyl halides

CH-103: Physical Chemistry

The learners will be able to:

CO 1.	Practice mathematical formulas commonly used in chemistry, along with gaining a qualitative understanding of liquid crystals
CO 2.	Differentiate between the ideal and non-ideal behaviour of gases, including different types of isotherms, velocity, and physical parameters in gaseous molecules
CO 3.	Acquire knowledge about crystal lattice, laws of crystallography, and diffraction patterns, enabling them to identify crystal structures
CO 4.	Enlist the order of reactions, exploring physical and experimental methods for identifying them and understanding the terms and theories related to chemical kinetics

Course Outcomes (COs)

B.Sc. (Chemistry) Part-I

CH-104: Chemistry (Practical)

The learners will be able to:

CO 1.	Analyse cations and anions from inorganic mixtures
CO 2.	Identify elements and functional groups present in the organic compounds
CO 3.	Calculate viscosity, surface tension and kinetics of reactions
CO 4.	Calculate boiling point, and melting point and optimise crystallisation of organic compounds

Course Outcomes (COs)

B.Sc. (Chemistry) Part-II

CH-201: Inorganic Chemistry

The learners will be able to:

CO 1.	List the characteristics and properties of d-block elements and their compounds
CO 2.	Apply nomenclature, isomerism, concepts and theories related to coordination compounds
CO 3.	Explore the general chemical properties, occurrence, and separation methods of lanthanides and actinides
CO 4.	Characterise redox chemistry through the analysis of Frost, Latimer, and Pourbaix diagrams
CO 5.	Analyse concepts of acidic and basic behaviour, along with the classification and characteristics of some aqueous and non-aqueous solvents

CH-202: Organic Chemistry

The learners will be able to:

CO 1.	Describe the electromagnetic spectrum, laws of UV & IR spectroscopy, λ_{\max} values, chemical shift, types of vibrations and regions of radiation.
CO 2.	Study of nomenclature, synthesis, and physical and chemical properties of alcohol, phenols, ethers and epoxides
CO 3.	Outline the preparation and chemical reactions of aldehydes and ketones
CO 4.	Study the synthesis, physical properties and reaction mechanism of carboxylic acids, acid halides, anhydrides, esters and amides
CO 5.	Synthesise nitro and amine derivatives of alkanes and arenes

CH-203: Physical Chemistry

The learners will be able to:

CO 1.	Define terms, systems, surroundings and Laws of thermodynamics
CO 2.	Acquire knowledge of theorems related to the laws of thermodynamics, derivations of functions related to it, and concepts of chemical equilibrium
CO 3.	Study the phase rule and terms related to it, phase diagram of phase systems and mixtures
CO 4.	Discuss terms, theories, experiments and applications related to conductivity
CO 5.	Tabulate types of electrodes and cell, emf and pH measurements by using by Conductometric titration

Course Outcomes (COs)

B.Sc. (Chemistry) Part-II

CH-204: Chemistry (Practical)

The learners will be able to:

CO 1.	Describe terms, systems, and processes involved in thermodynamics, calculations related to first law and thermochemistry
CO 2.	Illustrate second and third law of thermodynamics, derivations of functions, and concepts of chemical equilibrium
CO 3.	Construct phase rule and phase diagram of mixtures
CO 4.	Recognise the types of electrodes and cells and measure EMF and pH

Course Outcomes (COs)

B.Sc. (Chemistry) Part-III

CH-301: Inorganic Chemistry

The learners will be able to:

CO 1.	Indicate acid-base behaviour based on hard and soft concepts and theories related to it
CO 2.	Review the splitting of 'd' orbital, theories and factors affecting it, reasons for magnetic behaviour in metal complexes
CO 3.	Study reactions and stability, types, and electronic transitions of metal complexes,
CO 4.	Explain preparation, properties, bonding and applications of different organometallic compounds
CO 5.	Differentiate structure and bonding in some inorganic polymers

CH-302: Organic Chemistry

The learners will be able to:

CO 1.	Develop the structure for organic molecules using NMR spectroscopy and explain the role of the active methylene group in organic synthesis.
CO 2.	Analyse the preparation, properties, and chemical reactions of some benzo fused, five and six-membered heterocycles
CO 3.	Show classification, structure, stereochemistry, bonding pattern, and physical & and chemical properties of carbohydrates
CO 4.	Review the structure, stereochemistry, and properties of amino acids, constitution, and bonding in proteins and nucleic acids
CO 5.	Study organosulphur compounds having different functional groups, classification, formation and bonding in organic polymers and dyes

CH-303: Physical Chemistry

The learners will be able to:

CO 1.	Study quantum mechanics - laws and principles, Schrödinger and sinusoidal wave equations and concepts related to it
CO 2.	Characterise the bonding, antibonding, and hybrid molecular orbitals
CO 3.	Categorise the principle, energy, and selection rules in vibrational, rotational, Raman, and electronic spectrum
CO 4.	Discuss the laws of photochemistry and process involved in, dipole moment and optical activity of molecules
CO 5.	Interpret concentration measurements in solution, colligative properties, and calculation of molecular weight.

Course Outcomes (COs)

B.Sc. (Chemistry) Part-III

CH-304: Chemistry (Practical)

The learners will be able to:

CO 1.	Synthesise and analyse coordination compounds
CO 2.	Separate ions/compounds by solvent extraction, ion exchange and steam distillation methods
CO 3.	Separate organic compounds of mixture and functional group identification, melting/boiling point measurements and derivative preparation
CO 4.	Synthesise new organic compounds
CO 5.	Demonstrate experiments and applications related to conductivity

Course Outcomes (COs)

B.Sc. (Botany) Part-I

B-101: Algae Lichens & Bryophytes

The learners will be able to:

CO 1.	List general characters & classification of Algae
CO 2.	State the reproduction, life cycle & economic importance of Algae
CO 3.	Discuss the lifecycle of Oscillatoria, Nostoc, Volvox & Chara
CO 4.	Describe the lifecycle of Vaucheria, Ectocarpus, Polysiphonia
CO 5.	Enumerate the general characters, origin & evolution of bryophytes
CO 6.	Articulate the lifecycle of Riccia, Marchantia & Anthoceros
CO 7.	Outline of the life cycle of Funaria & Lichens

B102: Cell Biology & Genetics

The learners will be able to:

CO 1.	Describe cells and cell membranes
CO 2.	Study of cell organelles like Nucleus, Mitochondria, ER, Chloroplast, Plasma Membranes etc.
CO 3.	Analyse chromosomes, chromosomal aberrations, lamp brush, polytene & sex chromosomes
CO 4.	Recall Mendel's laws of inheritance
CO 5.	Study Monohybrid Cross, Dihybrid Cross, Test Cross & Back Cross
CO 6.	Discuss about the concept of gene, operon concept, one gene-one enzyme theory
CO 7.	Elaborate plan breeding and techniques of plant breeding
CO 8.	Study applications of plant breeding

Course Outcomes (COs)	
B.Sc. (Botany) Part-I	
B-103: Microbiology, Mycology and Plant Pathology	
The learners will be able to:	
CO 1.	Define Microbiology
CO 2.	Describe the structure & reproduction of bacteria
CO 3.	Discuss the classification & economic importance of bacteria
CO 4.	Study the life cycle of Mycoplasma & virus
CO 5.	State the general characteristics of fungi, their classification & economic importance
CO 6.	Discuss about the general account of plant pathology
CO 7.	Describe the diseases caused in plants like white rust, green ear, black rust, smut & early blight

BOT-104: Botany (Practical)	
The learners will be able to:	
CO 1.	Conduct laboratory exercises related to the genera of Algae & Bryophytes, including identification, slide preparation & section cuttings
CO 2.	Assess permanent specimens of Lichens.
CO 3.	Observe and record and perform Mitosis & Meiosis
CO 4.	Draw permanent specimens of special chromosomes, and study permanent slides & solve problems of genetics
CO 5.	Practise staining & preparation of slides of genera of Fungi
CO 6.	Perform Gram Staining of bacteria, study of micrographs & permanent specimens

Course Outcomes (COs)

B.Sc. (Botany) Part-II

B-201: Pteridophyte, Gymnosperm, & Paleobotany

The learners will be able to:

CO 1.	Study the general characters of gymnosperms
CO 2.	Describe the life cycle of Cycas, Pinus & Ephedra
CO 3.	Outline the classification & economic importance of gymnosperms
CO 4.	Study the classification & economic importance of Pteridophytes
CO 5.	Discuss Paleobotany
CO 6.	Study the life cycle of Fossil plants

B-202: Molecular Biology & Biotechnology

The learners will be able to:

CO 1.	Describe the biological, physical & chemical nature of hereditary material DNA & RNA
CO 2.	Outline the function of DNA replication & preliminary account of DNA damage & repair
CO 3.	Discuss the idea on central dogma of life
CO 4.	Describe the genetic code, initiation, elongation & termination of translation
CO 5.	Study the regulation of gene expression in prokaryotes & eukaryotes
CO 6.	Describe in detail the basic aspects of Biotechnology, the concept of culture techniques, plant tissue culture & their applications
CO 7.	Describe in detail recombinant DNA technology

Course Outcomes (COs)

B.Sc. (Botany) Part-II

B-203: Plant Physiology & Biochemistry

The learners will be able to:

CO 1.	Study the physicochemical properties of water, transpiration, guttation, & their factors
CO 2.	Describe in detail about mineral nutrition in plants
CO 3.	Discuss in detail about transport of organic substances in plants
CO 4.	Elaborate the theoretical & practical aspects of photosynthesis
CO 5.	Discuss the theoretical & practical aspects of respiration
CO 6.	Categorise carbohydrates, proteins & lipids
CO 7.	Study about enzymes, growth, and plant hormones

BOT-204: Botany (Practical)

The learners will be able to:

CO 1.	Practice section cutting, slide preparation of vegetative & reproductive parts of pteridophytes & gymnosperms
CO 2.	Study and observe permanent specimens of fossil plants
CO 3.	Practice media preparation, culture techniques, identification & working of equipment
CO 4.	Demonstrate and perform processes like photosynthesis, respiration, growth, transpiration etc.

Course Outcomes (COs)

B.Sc. (Botany) Part-III

B-301: Plant Morphology & Anatomy

The learners will be able to:

CO 1.	Study the basic body plan of flowering plants
CO 2.	Compare and contrast diversity of plant forms
CO 3.	Describe the branching pattern & canopy architecture in plants
CO 4.	Elaborate the tissue, tissue system, and shoot apical meristem in detail
CO 5.	Describe the primary structure of the stem, leaf & root
CO 6.	Review the secondary growth in plants
CO 7.	Study the structure & ecological adaptation in seed

B-302: Taxonomy & Embryology

The learners will be able to:

CO 1.	Classify the plant families
CO 2.	Study the general characteristics of different flowering plants
CO 3.	Demonstrate the floral aspect of families in the curriculum
CO 4.	Study ovules in detail, including the types of ovules, endosperm, ovary, etc.
CO 5.	Record field visits to Botanical gardens, herbaria, and research institutes

B-303: Ecology & Economic Botany

The learners will be able to:

CO 1.	Describe in detail about plant ecology
CO 2.	Study the climatic, edaphic & biotic factors affecting plants
CO 3.	Describe in detail population ecology & community ecology
CO 4.	Study about the plant succession & ecosystem
CO 5.	Describe in detail the vegetation of India
CO 6.	Evaluate economic botany with reference to cereals, starch, sugar plants, vegetables, fruits, spices, beverage plants, fibre plants, wood, rubber, oil leading plants & medicinal plants
CO 7.	Provide an account of Ethnobotany

Course Outcomes (COs)	
B.Sc. (Botany) Part-III	
BOT-304: Botany (Practical)	
The learners will be able to:	
CO 1.	Practice laboratory exercises on the study of root, stem, leaf, flower, section cutting, staining, slide preparation
CO 2.	Record field visits to Botanical gardens, herbaria, and research institutes
CO 3.	Study anatomical and morphological characters of flowering plants of different families
CO 4.	Perform quadrat exercises
CO 5.	Identify the economic importance of cereals, beverages, tea, rubber, wood, oil-yielding plants, spices, fruits, vegetables and medicinal plants

Course Outcomes (COs)	
B.Sc. (Zoology) Part-I	
Z-101: Diversity of Animals	
The learners will be able to:	
CO 1.	Define taxonomy, cladistics, nomenclature
CO 2.	Discuss the concepts of organisation levels, Protozoa and Metazoa
CO 3.	Classify chordates and Non-chordates: Concepts on symmetry, coelom, segmentation and embryogeny
CO 4.	Differentiate between Non-chordates and Chordates
CO 5.	Describe Phylum - their habitats, habits, morphology, structure, and physiological system along with affinities and adaptations
CO 6.	Discuss in detail about Phylum Ctenophora, Platyhelminthes, Aschelminths, and Annelida

Z-102: Cell Biology and Genetics

The learners will be able to:

CO 1.	Study the structural and functional aspects of Prokaryotic and Eukaryotic animal cell
CO 2.	Study the cell membrane, its structure and the concept of the unit membrane
CO 3.	Discuss about transport across the cell membrane, osmosis, facilitated diffusion and active transport
CO 4.	Study organelles, their structure and function
CO 5.	Study the function and physiological process of the cell
CO 6.	Describing nuclear organisations with a detailed account of chromosomes and their organisation
CO 7.	Study Nucleic acids: DNA structure & RNA structure and its type
CO 8.	Describe Replication, Transcription & Translation
CO 9.	Discuss about genetic code & cell reproduction: Mitosis, Meiosis & Cell Cycle
CO 10.	Study concepts of Genetics: Mendel's Law of Inheritance, Chromosomal mutations, Linkage, Genetic Interaction, Multiple Gene Inheritance, Cytoplasm inheritance

Course Outcomes (COs)

B.Sc. (Zoology) Part-I

Z-103: Gamete and Developmental Biology

The learners will be able to:

CO 1.	Study the concepts of developmental processes and stages
CO 2.	Study the concepts of Gametogenesis, Fertilisation & Parthenogenesis
CO 3.	Discuss about the patterns and processes: Cleavage, Fate maps, Embryonic Induction
CO 4.	Trace the developmental process of chick up to the 96-hour stage
CO 5.	Describe extra embryonic membranes in chicks their development & Function
CO 6.	Define Paedogenesis and Neoteny
CO 7.	Describe the concepts of Regeneration.
CO 8.	Infer from the study of the concepts of stem cells, their application, and the cloning of animals through different techniques
CO 9.	Describe the concepts teratogenesis, the biology of ageing & cell Death

Z-104: Zoology (Practical)

The learners will be able to:

CO 1.	Observe microscopes and practice slide preparation & general idea of composition, preparation and use of Fixatives, stains, common reagents
CO 2.	Practice collection and culture methods: such as <i>Amoeba</i> , <i>Paramecium</i> , <i>Euglena</i> , <i>Daphnia</i> etc.
CO 3.	Study Microscopic slides of Phylum Protozoa, Porifera, Coelenterata, Platyhelminthes, Aschelminthes etc.
CO 4.	Study Anatomical features of Earthworm & Leech
CO 5.	Practice Permanent slide preparation
CO 6.	Perform the exercises in Cell Biology: Study of Mitosis, Meiosis & Giant Chromosomes
CO 7.	Study and observe <i>Drosophila</i> : Life cycle Sex comb etc.
CO 8.	Trace the development of frog/Toad and chick with the help of slides/Models
CO 9.	Identify Blood Group

Course Outcomes (COs)

B.Sc. (Zoology) Part-II

Z-201: Structure and Function of Invertebrate Types

The learners will be able to:

CO 1.	Describe features, organs and systems, affinities & adaptations of Arthropoda, Onychophora, Mollusca, Echinoderms, and Hemichordata
CO 2.	Describe Palaemon, Scorpion, Periplaneta, Apis, Peripatus, Pila, Unio, Sepia, Ascaris, Echinus etc.
CO 3.	List the salient features of Hemichordata
CO 4.	Discuss about canal system of sponges & parasitic adaptations in

	Helminthes
CO 5.	Outline social organisation in termites and honeybees; direct & indirect development in insects
CO 6.	Describe the water vascular system of starfish
CO 7.	Study of Parasitism in Crustacea, Crustacean larvae & mouth parts in Insects

Z-202: Animal Physiology and Biochemistry

The learners will be able to:

CO 1.	Discuss Animal Physiology with special reference to mammals
CO 2.	Outline the physiology of digestion, blood circulation, respiration, and Excretion
CO 3.	Discuss the concepts on the physiology of nerve impulse and reflex action, physiology of muscle contraction, reproduction & preliminary idea of neurosecretion, hypothalamic control of pituitary function
CO 4.	Study the concepts of biochemistry
CO 5.	Describe carbohydrates
CO 6.	Describe proteins: structure, function and significance
CO 7.	Describe lipids: structure, function and significance, pathways, and biosynthesis of biomolecules

Course Outcomes (COs)

B.Sc. (Zoology) Part-II

Z-203: Immunology, Microbiology and Biotechnology

The learners will be able to:

CO 1.	Elaborate and discuss about the immune system
CO 2.	Discuss about Antigen-Antibody reactions, immunity regulating cells, mechanism of humoral or antibody-mediated immunity and cell-mediated Immunity
CO 3.	Define microbes
CO 4.	Outline of the concept of structural organisation: Prokaryota (Bacteria) Size, Shapes, Structural organisation
CO 5.	Study Genetic Material of Bacteria
CO 6.	Describe reproduction in Bacteria: asexual, binary fission, budding, sexual reproduction etc.
CO 7.	Outline concepts of microbial nutrition & bacterial of medical importance
CO 8.	Outline detailed concepts, scope and application of biotechnology
CO 9.	Describe animal cells, tissue organs and embryo cultures
CO 10.	Describe recombinant DNA technology, monoclonal antibodies and cloning

Z-204: Zoology (Practical)

The learners will be able to:

CO 1.	Study specimens of Phylum: Onychophora, Arthropoda, Mollusca, Echinodermata, Hemichordata
CO 2.	Study microscopic slides of Arthropoda, Mollusca and Echinodermata
CO 3.	Study the anatomy of <i>Prawn/Squilla, Pila</i>
CO 4.	Study microbes in food materials, Antigen-Antibody reactions -Precipitation, agglutination
CO 5.	Investigate and observe counting of RBC & WBC, Estimate haemoglobin and Haematocrit value
CO 6.	Study histological structure of Endocrine glands
CO 7.	Detect Protein, Carbohydrate and Lipid in animal tissue/food samples
CO 8.	Study different kinds of mono-, di- and polysaccharides in the given food samples
CO 9.	Study chromatography of dyes/amino acids

Course Outcomes (COs)

B.Sc. (Zoology) Part-III

Z-301: Structure and Function of Chordate Types

The learners will be able to:

CO 1.	Describe chordates with special reference to Herdmania and Branchiostoma
CO 2.	Discuss affinities of Hemichordata, Urochordata and Cephalochordata
CO 3.	Describe Ascidian tadpole larva and its metamorphosis

CO 4.	Compare and contrast the structure, organ systems of Pisces, Amphibia, Reptilia, Aves, mammal
CO 5.	Describe chordate adaptation
CO 6.	Discuss parental care with reference to Amphibia
CO 7.	Discuss flight adaptations, types of feathers, bird migration for Aves
CO 8.	Discuss adaptive radiation & dentition in Mammals

Z-302: Ecology, Environmental Biology and Evolution	
The learners will be able to:	
CO 1.	Elaborate the concepts of ecology, concepts of limiting factors and ecosystem: biotic and abiotic factors
CO 2.	Describe ecosystem: production, consumption & decomposition in the ecosystem
CO 3.	Discuss about Biogeochemical cycles of O ₂ , CO ₂ , H ₂ O, N, P.
CO 4.	Detailed account of ecosystem, population ecology, community ecology, habitat ecology & ecological succession
CO 5.	Define environment and list its concepts, hydrosphere, lithosphere and Atmosphere
CO 6.	Define the concepts of natural resources, environmental pollution, greenhouse effect, ozone layer depletion
CO 7.	Enumerate the concepts of bioaccumulation, biomagnification, impact of urbanisation.
CO 8.	Define Darwinism and discuss variations, isolations, mutations, concept of species and speciation
CO 9.	Discuss adaptations, polymorphism and evolution of man
CO 10.	Categorise Zoogeography, zoogeographical realms and faunal peculiarities

Course Outcomes (COs)

B.Sc. (Zoology) Part-III

Z-303: Applied Zoology, Ethology and Biostatistics

The learners will be able to:

CO 1.	Distinguish between Vermiculture, Sericulture, Lac culture, Apiculture, Prawn culture, and Poultry keeping
CO 2.	State the economic importance of Protozoa, Corals & Coral Reefs, Helminthes, Arthropods, Molluscs
CO 3.	Discuss the concepts of insects and their management
CO 4.	Analyse and evaluate behaviour through Ethology
CO 5.	Define Pheromones, Societies, Biological Rhythms & Biological Clocks
CO 6.	Elaborate the concepts related to biostatistics

Course Outcomes (COs)

Z-304: Zoology (Practical)

The learners will be able to:

CO 1.	Observe Anatomical features of Wallago/Labeo
CO 2.	Prepare permanent slide & study microscopic slides
CO 3.	Study museum specimens
CO 4.	Record a detailed account of osteology
CO 5.	Analyse Soil pH, water, Qualitative estimation of zooplankton
CO 6.	Study insect pest, antennal grooming in cockroach & study of chemical communication: Ants/Earthworm
CO 7.	Record preparation for visiting a zoo/museum/wildlife sanctuary to study local faunal biodiversity

Course Outcomes (COs)

B.A. Economics Part-I

P1: Microeconomic Theory

The learners will be able to:

CO 1.	Outline the nature and scope of Economics
CO 2.	Analyse Consumer Behaviour Theory
CO 3.	Assess the theory of production
CO 4.	Interpret the concepts of cost and revenue
CO 5.	Evaluate the different types of markets
CO 6.	Elaborate the theory of Factor Pricing
CO 7.	Apply the theories of Rent, Interest, and Profit

P2: Indian Economy I

The learners will be able to:

CO 1.	Demonstrate the study of basic features and issues of Indian Economy, like Population and demographic features, major trends, and Human Resource Development
CO 2.	Evaluate the concepts of national income, its composition and trends in India
CO 3.	Outline and discuss natural resources, land reforms, and the growth of modern inputs in agriculture
CO 4.	Demonstrate the concepts & terminologies, and development of the agriculture sector in India
CO 5.	Discuss the industrial sector and disinvestment in India and differentiate between the public and private sectors
CO 6.	Examine the foreign capital movement in India
CO 7.	Assess the role of globalisation in the economic development of India
CO 8.	Evaluate labour issues and labour reforms

Course Outcomes (COs)

B.A. Economics Part-II

P3: Macroeconomic Theory

The learners will be able to:

CO 1.	Define and describe the nature & scope of macroeconomics, circular flow of income, and concepts of national income
CO 2.	Analyse the Classical & Keynesian model of income & employment determination
CO 3.	Assess the Income-Consumption relationship and different consumption hypotheses and laws
CO 4.	Describe the simple Keynesian model of income determination and the concept of Multiplier
CO 5.	Demonstrate the Classical, Keynesian, and Post-Keynesian quantity theories to analyse money supply and money demand
CO 6.	Analyse the Phillips curve and Inflation theories
CO 7.	Review the IS-LM Model of income and rate of interest determination
CO 8.	Describe and evaluate the different theories of Trade Cycle and their relevance in current economic conditions

P4: History of Economic Thought

The learners will be able to:

CO 1.	Trace the study of economic thoughts of Mercantilism and Physiocracy
CO 2.	Elaborate the economics thoughts of classical economists: Adam Smith, Ricardo, and Malthus and their critics
CO 3.	Assess the economics thoughts of J S Mill, Utopian Socialists and the critic of classicism and socialism
CO 4.	Evaluate the economic thoughts of Karl Marx, German School and Mathematical School
CO 5.	Demonstrate the thoughts of Neo-Classical Economist
CO 6.	Evaluate the Keynesian economics concepts of Underemployment Equilibrium, Effective Demand, and the Role of Fiscal Policy
CO 7.	Critique Indian Economic Thought

Course Outcomes (COs)

B.A. Economics Part-III

P5: Introduction to International Trade, Public Finance, and Development

The learners will be able to:

CO 1	Define and outline International Trade: Need and Importance
CO 2	Examine the Trade Theories (Classical, Modern Theories and Factor Price Equalization Theorem)
CO 3	Evaluate the theories of economic growth and development and the concepts of poverty and inequality
CO 4	Assess the role of international institutions such as IMF, ADB, and WTO
CO 5	Discuss the meaning and measurement of development – GDP and PCI as indicators of development, HDI - structural changes in the development process, and obstacles
CO 6	Explore the meaning of public finance, its nature, subject matter, the differences between public finance and private finance, and differentiate between the public and private goods

P6: Environmental Economics

The learners will be able to:

CO 1.	Study the relationship between Environment and Economy
CO 2.	Analyse Market Failure: Externalities, Non-Exclusion, Non-Rivalry, Non-Convexities, Asymmetric Information
CO 3.	Assess Environment and Development: Natural Resources, Sustainable Development, Green GDP
CO 4.	Enumerate Environmental Legislation
CO 5.	Explore the nature and scope of environmental economics, interaction of the economy and the environment.
CO 6.	Evaluate Environment as a public Good and the Tragedy of Commons
CO 7.	Discuss Environmental Kuznets's Curve, Pollution Control Policies: Command and Control Approach, Incentive-based approach: Taxes, Liability Law and tradable permits
CO 8.	Evaluate Global Environmental Issues: Climate Change – Implications and mitigation and understanding Environmental Valuation Methods

Course Outcomes (COs)

B.A. Statistics Part-I

P1: Probability Theory

The learners will be able to:

CO 1.	Define probability and outline its basic properties
CO 2.	Calculate probability for various types of events
CO 3.	Develop problem-solving skills
CO 4.	Identify the type of statistical situation to which different distributions can be applied

P2: Descriptive Statistics

The learners will be able to:

CO 1.	Summarise data through statistical measures
CO 2.	Depict data through graphs, charts, and tables
CO 3.	Organise data in a meaningful way
CO 4.	Identify characteristics within data, viz. shape, spread, and central values, make comparisons, draw conclusions, and comment on findings
CO 5.	Explore the relationship between variables
CO 6.	Analyse the concept of Interpolation and Extrapolation of data
CO 7.	Analyse and evaluate statistical data

Course Outcomes (COs)

B.A. Statistics Part-II

P3: Statistical Inference

The learners will be able to:

CO 1.	Explain and analyse sampling in various distributions, that is Binomial, Poisson, and Normal Distribution
CO 2.	Apply statistical knowledge to make informed decisions in research, data analysis, and hypothesis testing
CO 3.	Describe the concepts of the Theory of Estimation and distinguish various types of estimation, know the properties of estimators and the construction of point and interval estimators
CO 4.	Develop practical proficiency in both parametric and non-parametric statistical techniques for drawing meaningful inferences from data

P4: Statistical Application in Society and Industry

The learners will be able to:

CO 1.	Interpret and analyse demographic data to measure and compare mortality and fertility rates using life tables
CO 2.	Compute and analyse different types of index numbers using various methods for price, quantity, and value comparisons
CO 3.	Identify trends and seasonal fluctuations in data, employing different models to predict future patterns
CO 4.	Describe principles of statistical quality control and construct control charts for maintaining product and process quality
CO 5.	Apply statistical knowledge across diverse fields such as demographics, economics, and quality control to support data-driven decisions

Course Outcomes (COs)

B.A. Statistics Part-III

P5: Sample Survey

The learners will be able to:

CO 1.	Design and conduct effective surveys, including selecting samples and creating good survey questions
CO 2.	Explore different ways to select samples, like simple random sampling, stratified sampling, and cluster sampling
CO 3.	Estimate population parameters using survey data and different estimation methods
CO 4.	Identify and minimise errors and biases in surveys to improve data quality and the accuracy of results
CO 5.	Apply survey methods to real-world problems in various fields such as market research, social science, and public policy

P6: Design of Experiment and Computational Techniques

The learners will be able to:

CO 1.	Plan and conduct experiments with control and randomisation to obtain reliable results
CO 2.	Analyse data using statistical methods like ANOVA, regression, and hypothesis testing
CO 3.	Interpret results from experiments and effectively report findings, through data visualisation and interpretation
CO 4.	Use statistical software and computational techniques to manage, analyse, and interpret experimental data efficiently
CO 5.	Apply experimental design and computation techniques in real-world scenarios like scientific research, industry, and product testing

Course Outcomes (COs)

B.A. Geography Part-I

P1: Physical Geography

The learners will be able to:

CO 1.	Identify and recall key concepts of physical geography, including landforms, climate types, and geological processes
CO 2.	Demonstrate an understanding of the cause-and-effect relationships in physical geography, explaining how various processes contribute to the formation of landscapes and climate patterns
CO 3.	Elaborate the fundamental principles and processes governing oceanography, including the dynamics of ocean currents, the role of oceanography in climate regulation, and the interactions between marine ecosystems
CO 4.	Apply principles of physical geography to analyse real-world scenarios, such as the impact of natural disasters on human settlements and the influence of physical geography on biodiversity
CO 5.	Analyse geographic data, maps, and satellite imagery to interpret spatial patterns and draw conclusions about the interactions between physical and human phenomena
CO 6.	Critically evaluate the environmental impact of human activities on different physical landscapes and propose sustainable solutions based on their understanding of physical geography

P2: Rajasthan Geography

The learners will be able to:

CO 1.	Outline geographical features of Rajasthan, including its geological structure, rivers and drainage system, deserts, and prominent landmarks
CO 2.	Examine the climatic conditions and natural resources of Rajasthan, and evaluate how these factors influence the state's agriculture, economy, and culture
CO 3.	Analyse the impact of water scarcity on different regions of Rajasthan, check desertification and propose sustainable solutions for water management
CO 4.	Summarise the historical evolution of settlement patterns in Rajasthan, examining how geography has influenced the distribution of cities, towns, and rural areas
CO 5.	Critically evaluate the environmental conservation policies, special development programmes and initiatives in Rajasthan, considering their effectiveness in preserving the state's unique biodiversity

Course Outcomes (COs)

B.A. Geography Part-I

Practical

The learners will be able to:

CO 1.	Apply basic cartographic skills, including map reading, scale interpretation, and understanding the legend
CO 2.	Interpret and create insightful one-dimensional graphs, enhancing data representation
CO 3.	Depict atmospheric features, refining meteorological analysis for a comprehensive understanding
CO 4.	Demonstrate mastery in representing relief, with focus on interpreting contours
CO 5.	Demonstrate expertise in generating profiles using serial, projected, and superimposed techniques

Course Outcomes (COs)

B.A. Geography Part-II

P3: Resource Geography

The learners will be able to:

CO 1.	Identify key natural resources, including minerals, energy sources, water bodies, and agricultural lands, along with their distribution across different regions
CO 2.	Demonstrate an understanding of the factors influencing the distribution and utilisation of natural resources, including geological processes, climate, and human activities
CO 3.	Apply principles of resource management to analyse case studies related to sustainable development, exploring ways to balance resource utilisation with environmental conservation
CO 4.	Analyse the impact of resource extraction and utilisation on local and global economies, ecosystems, and communities, considering both positive and negative effects
CO 5.	Critically evaluate policies and strategies for resource conservation and sustainable development, assessing their effectiveness and proposing improvements
CO 6.	Identify key natural resources, including minerals, energy sources, water bodies, and agricultural lands, along with their distribution across different regions

P4: Human Geography

The learners will be able to:

CO 7.	Enumerate key concepts in human geography, including population dynamics, migration patterns, cultural landscapes, and urbanisation
CO 8.	Demonstrate an understanding of the theories and models that explain human spatial patterns, such as the demographic transition model, urban models, and cultural diffusion
CO 9.	Apply demographic analysis techniques to interpret population pyramids, migration trends, and other demographic data, making connections to real-world scenarios
CO 10.	Analyse the impact of globalisation on cultural, economic, and social processes, examining how it has influenced cultural identities, trade patterns, and urbanisation
CO 11.	Critically evaluate the role of human geography in addressing contemporary global challenges, such as environmental sustainability, social inequality, and geopolitical conflicts

Course Outcomes (COs)

B.A. Geography Part-II

Practical

The learners will be able to:

CO 1.	Define cartography and its principles for comprehensive spatial mapping insights
CO 2.	Draw two-dimensional diagrams for effective representation and spatial communication insights
CO 3.	Analyse traffic flow diagrams for efficient urban transportation planning insights
CO 4.	Evaluate isochronic charts for analysing travel time and transportation planning
CO 5.	Review and create thematic maps for insights into spatial patterns and relationships

Course Outcomes (COs)

B.A. Geography Part-III

P5: World Geography

The learners will be able to:

CO 1.	Identify the locations of continents, major countries, capitals, and geographic features across the world
CO 2.	Demonstrate an understanding of global patterns and trends in population distribution, cultural diversity, and economic development
CO 3.	Analyse the impacts of global issues such as climate change, migration, and geopolitical conflicts on different regions
CO 4.	Analyse the spatial organisation of global trade, migration patterns, and geopolitical events, examining the interconnections of regions and countries
CO 5.	Critically evaluate the role of international organisations and policies in addressing global issues, considering their impact on social, economic, and environmental aspects

P6: Geography of India

The learners will be able to:

CO 1.	Identify the major physical features of India, including mountain ranges, rivers, and climate zones
CO 2.	Demonstrate an understanding of the cultural diversity in India, including language, religious practices, and traditional customs
CO 3.	Apply geographical knowledge to analyse the regional variations in economic development, agriculture, and urbanisation in India
CO 4.	Analyse the impact of human activities on the environment in different regions of India, examining issues such as deforestation, water scarcity, and pollution
CO 5.	Critically evaluate the effectiveness of government policies and initiatives in addressing geographical challenges in India, considering their impact on social, economic, and environmental aspects

Course Outcomes (COs)

B.A. Geography Part-III

Practical

The learners will be able to:

CO 1.	Examine the principles of cartography for comprehensive spatial mapping insights
CO 2.	Create three-dimensional diagrams for effective representation and spatial communication insights
CO 3.	Demonstrate an understanding of different map projections, their characteristics, and the distortions inherent in each type
CO 4.	Apply map projection techniques to create maps that effectively represent specific geographical regions, considering the purpose and audience of the map
CO 5.	Demonstrate an understanding of the principles and techniques of plane table surveying and clinometer surveying, including the use of the instrument, basic surveying calculations, and the importance of accurate field notes