APS COLLEGE OF ARTS AND SCIENCE

N.R. COLONY, BENGALRU- 560019

Department of Mathematics

Programme Specific outcomes of B.Sc., Mathematics

PSO1. Distinguish between linear, nonlinear, partial and ordinary differential equations.

PSO2. By knowing the concept of limit of a function, they will use it to prove properties of continuous functions and the derivative of a function

PSO3. Expound upon the concept of Riemann integrability.

PSO4. Demonstrate when a binary algebraic structure forms a group and learn group properties.

PSO5. Treat special types of rings such as Euclidean domain and Principal Ideal domain.

PSO6. Ability to work within vector spaces and vector space properties

PSO7. Ability to compute Eigen values and vectors.

PSO8. Ability to understand the linear transformations and mapping properties

PSO9. Evaluate Line integral, Surface integral and Volume Integrals using Divergence, Green's and Stroke's Theorems

PSO10. Calculate a definite integral using an appropriate numerical method and find roots of functions

PSO11. Knowing the concept of numerical methods they can solve interpolation, differentiation, integration and use it to various mathematical operations.

PSO12. Solve linear and nonlinear equations and differential (numerical methods)

PSO13. Understand the role of computation as a tool in real world problem solving

PSO14. Ability to utilize transform methods to find solutions of problems (heat equation and wave equation).

Course Outcomes for B.Sc., Mathematics

B.Sc., 1st semester

- **ALGEBRA – I, Differential Calculus, Integral Calculus and Analytical Geometry Of Three Dimensions**

After the completion of the course, Students will be able to

CO1. Finding the Row reduced ecolon and Normal form of a square matrix.

CO2. Solve the matrix equation Ax = b using row operations and matrix operations.

CO3. Finding consistency of a linear equations by using matrix method.

CO4. Find the characteristic equation, eigenvalues and vectors for matrix.

CO5. Solving Differentiation of Nth term of the functions

CO6. Solving Leibnitz problems and its applications

CO7. Solving Partial differentiation.

CO8. Solving Total derivative, Jacobians and properties of Jacobians

CO9. Solve Reduction formulae for $\int sin^n(x)dx$,

$\int cos^n(x)dx$, $\int cosec^n(x)dx$, $\int sec^n(x)dx$, $\int tan^n(x)dx$, $cot^n(x)d$

CO10. Solve the problems of lines in three dimension, planes, spheres, and cylinders and how geometry is related to algebra by using their algebraic equations.

B.Sc., 2nd Semester

- **Group Theory, Differential Calculus, Integral Calculus and Differential equations – I**

After the completion of the course, Students will be able to

CO1. Understanding the importance of group properties working with number systems.

CO2. Generate groups given specific conditions.

CO3. Investigate symmetry using group theory.

CO4. Identify the various algebraic structures with their corresponding binary operations.

CO5. Generalize the groups on the basis of their orders, elements, order of elements and group relations

CO6. Compute the possible subgroups of given group of specific orders and will recognize them.

CO7. Determine Polar coordinates, Angle of intersection of curves.

CO8. Analysing Polar sub tangent and polar subnormal perpendicular from pole to the tangent, Pedal equations in various forms.

CO9. Trace the Curves.

CO10. Finding Area, Volume of revolution in various forms.

CO11. Find Solutions to ODE of first order and degree, Linear equations, Bernoulli equations and exact equations.

CO12. Analyse orthogonal trajectories in Cartesian and Polar forms.

B.Sc., 3rd Semester

- **Groups, Sequences and series of Real Numbers and Differential Calculus:**

On successful completion of the course students will be able to

CO1. Demonstrate when a binary algebraic structure forms a group.

CO2. Determine possible subgroups of a group and identify normal subgroups of a group

CO3. Explain group and subgroup orders using Lagrange's theorem.

CO4. Identify cyclic subgroups and their generators.

CO5. Determine if an infinite sequence is bounded.

CO6. Determine if an infinite sequence is monotonic.

CO7. Determine if an infinite sequence is convergent or divergent.

CO8. Find the sequence of partial sums of an infinite series.

CO9. Determine if a geometric series is convergent or divergent.

CO10. Find the sum of a convergent geometric series.

CO11. Determine if an infinite series is convergent or divergent by selecting the appropriate test from the following: (a) test for divergence; (b) integral test; (c) p-series test; (d) the comparison tests; (e) alternating series test; (f) absolute convergence test; (g) ratio test; and (h) root test.

CO12. Determine if an infinite series converges absolutely or conditionally.

CO13. Find the Maclaurin and Taylor series expansions of given functions

CO14. Calculate the limit of a function at a point numerically and algebraically using appropriate techniques including L'Hospital's

B.Sc., 4th Semester

- **Algebra –IV, Fourier Series, Laplace Transforms and Differential equations –II**

CO1. Analyse Normal subgroups, Quotient group, Homomorphism and Isomorphism of groups properties related to isomorphism-Permutation group (Cayley's theorem).

After the completion of the course students will be in a position to solve

CO1. Initial and Boundary value problems

CO2. Solutions to applications in Fourier Transforms and Finite Fourier transforms

CO3. Find solutions of differential equations by applying Laplace Transform

CO4. Recognize the different methods of finding Laplace transforms and Fourier transforms of different functions.

CO5. Apply the knowledge of Laplace Transforms, Fourier. Transforms, and Finite Fourier transforms in finding the solutions of differential equations

CO6. Find solutions of Initial value problems and boundary value problems.

CO7. Distinguish between linear, nonlinear, partial and ordinary differential equations.

CO8. Recognize and solve a homogeneous differential equation.

CO9. Recognize and solve a linear differential equation by use of an integrating factor

CO10. Make a change of variables to reduce a differential equation to a known form.

CO11. Find particular solutions to initial value problems.

CO12. Solve basic application problems described by first order differential equations.

CO13. Identify ordinary and singular points.

CO14. Solve few types' differential equations that arise in several branches of science.

B.Sc., 5th Semester

- **Rings, Integral domains, Fields, Numerical methods, Differential Calculus of Scalar -Vector fields and Line , Multiple integrals and Integral theorems**

After completing the course, students will able to

CO1. Analyze and demonstrate examples of ideals and quotient rings

CO2. Use the concept of isomorphism and homomorphism for rings

CO3. Assess properties implied by the definitions of rings and modules

CO4. Confidently apply algebraic concept.

CO5. Approximate a function using an appropriate numerical method.

CO6. Solve a linear system of equations using an appropriate numerical.

CO7. Calculate a definite integral using an appropriate numerical method.

CO8. Memorize definition of directional derivative and gradient and illustrate geometric meanings with the aid of sketches.

CO9. Memorize theorem relating directional derivative to gradient and reproduce proof.

CO10. Calculate directional derivatives and gradients.

CO11. Apply gradient to solve problems involving normal vectors to level surfaces

CO12. Compute double integrals, applications to area and volume, Green‟s thm in the plane and the change of variables in double integrals.

CO13. Calculate line integrals along piecewise smooth.

CO14. Calculate the fundamental theorem of line integrals.

CO15. Using Green's theorem they can analyse the line integrals along simple closed contours on the plane.

CO16. By Applying Stokes' theorem they can compute line integrals along the boundary of a surface.

CO17. Using Stokes' theorem they can analyse physical interpretation of the curl of a vector field.

CO18. Using the divergence theorem they can analyse physical interpretation of the divergence of a vector field.

B.Sc., 6th Semester

Linear Algebra, Partial Differential Equations and Complex Analysis

After completing this course student will be able to

CO1. Use the concept of basis and dimension of vector spaces linear dependence and linear independence, to solve problems.

CO2. Use the concept of inner product spaces to find norm of vectors, distance between vectors, and check the orthogonality of vectors, to find the orthogonal and orthonormal basis.

CO3. Apply the properties of linear transformations to linearity of transformations, kernel and rank of linear transformations, inverse transformations to solve the problems of matrix transformations, change of basis.

CO4. Solve examples on Charpit‟s method

CO5. Solve wave equations, heat equations, boundary value problems, Laplace equations, Cauchy problem for different regions.

CO6. Classify the various second order partial differential equations.

CO7. Complex numbers will provide a satisfying extension of the real numbers, learn techniques of Complex Analysis that make practical problems easy (Eg.Graphical rotation and scaling as an example of Complex multiplication).

CO8. To convert from polar coordinates to rectangular coordinates and vice-versa

CO9. Easily describe domains and compute limits in the complex plane.

CO10. To verify analyticity of functions.

CO11. To use the Cauchy-Riemann equations to obtain the derivative of complex functions

CO12. To Use line and contour integration to evaluate integrals.

Department of Chemistry

Program Specific Outcome: B.Sc Chemistry

SL.NO	Programme Specific Outcome of B.Sc (Chemistry)
PSOS1	Gain the knowledge of chemistry through theory and practical, and understand the good laboratory practices and safety.
PSOS2	Understand the fundamental concept, Principles and Processes underlying the academic field of Chemistry, Its different subfields and its linkages with related disciplinary area.
PSOS3	Recognize and appreciate the importance of the Chemical Sciences and its application in Academic, Industrial, Economics, Environmental and Social context.
PSOS4	Procedural knowledge that creates different types of Experts in the field of Chemistry and related fields like Pharmaceuticals, Chemical industry, Teaching, Research, Environmental Monitoring, Product quality, Food productions, Cosmetics.
PSOS5	To Understand the basic concepts in production Agriculture.
PSOS6	To Understand the factors which influencing for Food Security.
PSOS7	Describe the differences between Macro Nutrients and Micro Nutrients, calories, cholesterol, carbohydrate etc.....
PSOS8	The study of Industrial Chemistry helps to student to prepare themselves for professional participation in various chemical industries.
PSOS9	Understanding of the basic biological and pharmaceutical interaction by using both natural products and total synthesis of bioactive molecules.
PSOS10	To understand the key features of Coordination compound including the variety of structures , oxidation numbers ,electronic configurations, coordination number ,ligands, chelates, bonding ,stability of complexes.
PSOS11	To be able to recognize the types of isomers in coordination compounds, familiar with some applications of coordination compounds.
PSOS12	An over view of Mechanical and important properties of polymer, helps for student to realize the important of polymers.
PSOS13	Student will gain an understanding of the fundamental uniqueness of the chemical and physical properties of Nano-material’s and their impact in science, engineering, medicine and the Environment.
PSOS14	Study the interdisciplinary nature of Nano-science.
PSOS15	Identify the types of Isomerism in Organic compound, to Identify and classify Chiral centres and explain the physical and chemical consequences of Chirality.
PSOS16	Classify the Organic compounds by its structure, uses, and IUPAC nomenclatures.

PSOS17	To study the synthesis of Heterocyclic compounds, Terpenoids, Steroids.
PSOS18	Explain the structures of Bio molecules like CARBOHYDRATES, PROTEIN....
PSOS19	To correlate the Optical and Magnetic properties of Lanthanide and Actinides.
PSOS20	Calculate the Morality and Normality of solution of various concentrations.
PSOS21	Apply the principles of Beer Lambert law in their daily life and understand the scientific phenomenon in reaction mechanisms.
PSOS22	To learn the periodic properties of the different groups of compounds.
PSOS23	To know the different definitions of Acid & Base, Predict the reaction between Acid & Base.
PSOS24	To know the reagents that causes selective and complete reduction.
PSOS25	Understand the various Radio analytical methods for learning the reaction rates, the age of the materials, To develop traces for various Organs and Tissues.
PSOS26	To obtain the detailed knowledge about atomic absorption spectroscopy for study the different configurations of molecules.

Department of Chemistry

Course outcomes: B.Sc Chemistry

I SEM B.SC

SL.NO	Course outcomes
CO1	Define the Organic acids and bases.
CO2	Distinguish between the Geometrical and Optical isomerism.
CO3	Improve their theoretical knowledge about chemical reaction which is carried out by light.
CO4	Compare between the elimination reaction, substitution reaction, and addition reaction.
CO5	To learn the method to minimize the error in the laboratory practices.
CO6	Have the knowledge of rules of differentiation and Integration.
CO7	Solve the numerical problems on viscosity and surface tension by Drop number method equation.
CO8	Understand the Laws of Photo Chemistry, Calculate the Morality and Normality of solution of various.
CO9	Review of Raoult's law of dilute solution, ideal and non ideal solutions. Study the concepts of Joule Thomson effect and its application.
CO10	Explain the atomic theory of matter, composition of the

	atom, which defines the identity of a given element.
CO11	Explain the relative sizes, masses and charge of the proton, neutron and electron and their assembly to form different atoms.
CO12	Define the term Ionization, atomic radii, mass number.
CO13	Use the Periodic table to rationalize similarities and differences of elements, including physical and chemical properties and reactivity.
CO14	Predict common ionic charges of group 1, 2, 3...etc elements based on position in the periodic table.
CO15	Predict the products of reactions of alkanes, alkenes, alkynes and describes the mechanisms showing how the products are formed.
CO16	Identify the conformation effects in Organic compounds.
CO17	Facilitate the Lerner to make solutions of various molar concentrations. This may include the concepts of the mole, converting moles to grams and grams to mole.
CO18	Helps to making different molar concentrations.
CO19	Student can able to define the term concentration, Calculate the Morality and Normality of solution of various concentration
CO20	Accumulate skills for scientific research work and agricultural works in the future.
CO21	Explain the theoretical principles important applications of classical analytical methods within titration.
CO22	Performing classical analytical experiments and make observations and assessments of important factors that could affect the analytical results.
CO23	Be familiar with calculations in analytical chemistry, be able to calculate titration errors for method evaluation and perform statistical evaluation of results from classical, instrumental, chemical experiments and analysis.
CO24	To learn depth knowledge about liquid states.
CO25	To learn the Maxwell Boltzmann and Bohr's, Einstein theory of comparison and applications to know about the partition function.

II SEM B.Sc

SL.NO	COURSE OUT COME
CO1	To learn about various methods of preparation and application of hydrocarbons.

CO2	To learn the reactivity pattern of conjugated and aromatic molecules.
CO3	Describe molecular structure and bonding in aromatic molecules
CO4	Identify compounds in which resonance is important, Predict the effects of resonance on stability of compounds and reactive intermediates and draw resonance structures.
CO5	Identify conjugated pi system and explain the effects of conjugation on molecular structure and reactivity.
CO6	Describe mechanisms for substitution and elimination reactions, and predict the effect of Nucleophiles, leaving group and solvent on the relative rates of SN1 vs SN2 reaction and E1 vs E2 reactions, as well as on the relative rates of substitution versus elimination reaction.
CO7	Recognise the importance of the quantum chemistry and quantization of energy.
CO8	Explain atomic structure and the application of the concepts of quantization of energy of different orbitals.
CO9	Explain how the absorption of energy by the molecules produces spectra which help in structure determination and Identification of the molecules, and how this energy can initiate the photo chemical reactions.
CO10	The bonding fundamentals for both ionic and covalent compounds, including electronegativity, bond distances and bond energies using Molecular orbital diagrams and thermodynamic data.
CO11	Predicting geometries of simple molecules, the bonding models, structures, reactivity and applications of ozone, hydrides.
CO12	To understand the mechanism of alkyl halides.
CO13	To understand the structure and bonding in conjugated and aromatic system, compare between E1 and E2 reaction.
CO14	Discuss kinetics, mechanism, stereochemistry of SN1 and SN2 reaction.
CO15	Derive Schrödinger's wave equation.
CO16	Understand De Broglie's hypothesis and uncertainty principle.
CO17	To correlate the optical and magnetic properties of lanthanides and actinides.
CO18	To obtain an outline about elimination reactions and rules used to study elimination reactions.

SL.NO	COURSE OUTCOME
CO1	Apply the steady state hypothesis to obtain the rate equation.
CO2	Describe the three laws of thermodynamics and their development.
CO3	Recognise the forces which drive the chemical reactions in the forward and backward and the concepts of the interchange of energy in a system.
CO4	State and apply the laws of thermodynamics, Perform calculations with real and ideal gases
CO5	Design the practical engines by using thermodynamic cycles.
CO6	Predict chemical equilibrium and spontaneity of reaction by using thermodynamic principles.
CO7	The derivation of rate equation.
CO8	The use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics.
CO9	Differentiate between natural and manmade polymers.
CO10	To understand the limitation and uses of models for the solution of applied problems involving chemical thermodynamics and kinetics.
CO11	Explain polymerization methods and understand polymerization kinetics and its uses.
CO12	Identify the repeated units in the particular polymer.
CO13	Describe the role of rubber toughening in improving the mechanical properties of polymers.
CO14	To study the concepts of thermodynamic probability.
CO15	Student will gain an understanding of 1) Application of mathematical tools to calculate thermodynamics.2) The relationship between microscopic properties of molecules with macroscopic thermodynamic observables.

IV SEM B.Sc

SL.NO	COURSE OUTCOME
CO1	Derive the relations between thermodynamics quantities and Interpret phase diagrams.
CO2	Explain the phase equilibrium in terms of chemical potentials.

CO3	Explain how phase equilibrium helps in understanding the formation of various materials, allotropic forms of different substances.
CO4	Recognise the impact of Green Chemistry on human health and environment.
CO5	Demonstrate the knowledge of the principles of green chemistry which they can apply to a range of work places for a safer, less toxic and healthier environment.
CO6	The basic knowledge of nuclear structure, stable and unstable nuclei, Nuclear reaction, and different modes of radioactive decay and also methods for measurements of radioactivity.
CO7	To understand the fundamental concepts of radio chemistry or radiation chemistry and its applications.
CO8	Skills in the handling and measuring of radioactive material.
CO9	Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO10	Appreciate the ethical, cross- cultural, historical context of environmental issues and the links between human and natural systems.
CO11	Apply the systems concepts and methodologies to analyze and understand interactions between living things and environmental process.
CO12	Define the importance of phase diagrams in the field of material science and engineering.
CO13	Explain the basic definitions and terms in a phase diagram.
CO14	Define phase equilibrium concepts, degree of freedom and phase rule concepts.

V SEM B.Sc (Paper VI-Physical Chemistry)

SL.NO	COURSE OUTCOME
CO1	To learn about the mean Ionic activity and mean ionic activity coefficient and concepts of ionic strength.
CO2	To understand the Nernst Equation and Kohlraush's law and its applications.
CO3	To know the concepts of Debye Huckel theory of strong electrolytes, Debye Huckel Bronsted equation.
CO4	To provide the physical basis for Debye-Huckel theory.
CO5	Apply the principles of electrochemistry to conductance, Voltaic and electrolytic systems.

CO6	To familiarize with the concepts of electrode and electrolyte interfaces, Polarisation.
CO7	To learn the Einstein theory of transition probability and rotation spectroscopy.
CO8	To know about the Vibrational Spectroscopy, Vibrational coupling overtones, Fermi resonance, Raman spectroscopy.
CO9	To know the detail study of IR and Mass Spectroscopy and its application.
CO10	Explain the origin of K_{eq} and apply these concepts to ideal and real solution of electrolytes and non electrolytes and to colligative properties.
CO11	Manipulate the gas laws to describe real and ideal gas behaviour.
CO12	Explain the use of electrical energy for initiating chemical reactions can be utilized to produce electrical energy and basic principle used in the formation of cells and batteries.
CO13	Students learn depth concepts about electrochemistry.
CO14	To understand the IR Spectroscopy in organic structure determination.
CO15	To learn about the optical rotatory dispersion and its applications.
CO16	Describes the properties of metals, insulators, and semiconductor.
CO17	Calculate the Dipole moment of different polar and non polar compounds.
CO18	Distinguish the compounds in to paramagnetic, diamagnetic and ferromagnetic depends upon the properties of compound.
CO19	To define the Hooke's law, Wave number, force constant.
CO20	Explain the different types of current obtained in the Dropping .Mercury electrode and its application.

VI SEM B.Sc (Paper-VII-Inorganic Chemistry)

SL.NO	COURSE OUTCOME
CO1	Recognise the role played by transition metal complexes in Inorganic chemistry.
CO2	Describe the structure and bonding theories, electronic and magnetic properties of the Transition metal complexes and their kinetics studies.
CO3	Explain the theories of bonding in coordination compounds

	and their experimental behaviour.
CO4	Recognise and explain the interaction of metal ions with biological ligands.
CO5	Explain the role of Inorganic substances in the living system and use of metal ions in Medicinal Therapy and diagnosis.
CO6	Describe bonding models that can be applied to a consideration of the properties of transition metal compounds.
CO7	The student's familiar about the Inorganic Halogen Compounds, coordination compounds and Transition elements.
CO8	Predicting the Geometry of simple molecules.
CO9	Nano-science concepts help to find the historical evolution and current revolution that is Nano-science.
CO10	Understand the futuristic concepts like Nano-robots, Nano-rockets and fantastic voyage like-Submarines. These objectives are packaged with discussion sessions designed to enforce out of the box thinking skills, Team work and communication
CO11	Students are aware about the Nano-therapeutics and Nano-toxicity.
CO12	Identify the special nature of Refractories, Abrasives, and ceramics.
CO13	Explains the advantages, constituents and significance of gaseous fuels.
CO14	List out the applications of explosives and propellants, paint, varnishes and fuels.
CO15	Differentiate the essential and trace elements in the biological system.
CO16	Know how Trace elements are involved in basic function of the body.
CO17	Evaluate the applications of metal bio molecules as metallo therapeutics agents.
CO18	Recognize the contribution of chemistry of metal molecules to the development of chemistry and other related field.

Department of chemistry
COURSE OUTCOME (Cos) V sem BSc
ORGANIC CHEMISTRY- PAPER-V

CO1	Explains about the stereochemistry of Organic Compounds.
CO2	To study preparation & chemical properties of Amines.
CO3	Gives the information of Heterocyclic compounds.
CO4	To learn about Carbohydrates, classifications & its Structures.
CO5	Gives the detail information about the occurrence, structural elucidation of terpenes, synthesis & some Structures.
CO6	To know the general characteristics, structures synthesis of Alkaloids
CO7	Detail knowledge of about UV , IR, NMR spectroscopy & basic principles of Organic compounds..
CO8	To study the synthesis of DYES ,
CO9	To understand about chemical treatment by using different drugs ,synthesis, Structures & uses of some drugs based on treatment.
CO10	Explains the basic information about Green Chemistry.

Department of Chemistry

COURSE OUTCOMES (Cos) V sem BSc chemistry

BIOCHEMISTRY PAPER-VIII

CO1	Information about Contributions of scientist, Elemental and biochemical composition of living organism & About the Role of water in biochemical system.
CO2	To study of Monosaccharide's, Amino sugars, Sugar acids, Sugar phosphates. Structure and biological importance of Oligosaccharides, polysaccharides Fatty acids.
CO3	Gives the information Structures and properties of triglycerides Saponification Number, iodine number, Rancidity & Biological importance Phosphoglycerides, Liposomes & its applications structure & biological importance of Lecithin Cephalic .
CO4	To learn about Cholesterol, Sphongolipids, amino acids, proteins.
CO5	To Understand the interactions Proteins & Nucleic acid. Nucleotides & Nucleosides Biological roles of DNA& RNA.
CO6	Detail study of Hormones insulin & glucagon in glucose Haemostasis, Mediators of hormone action
CO7	Gives the knowledge of Interaction of radiation with Matter origin of Molecular spectra.
CO8	Gives the relationship between Internuclear distance & Moment of inertia.
CO9	Explains about Hooke's law, zero point energy, Wave number, Force constant, Degree of Freedom
CO10	Explains about Advantages of Raman spectroscopy. Concept of Polarisibility, stokes & antistokes selection rules
CO11	Describes about Voltammetry at a dropping Mercury electrodes(DME), Types of current, Half wave potential.
CO12	It understands the experimental set up of Voltammetry, Quantitative analysis.

APS COLLEGE OF ARTS AND SCIENCE

N.R. COLONY, BENGALRU- 560019

Department of Botany

Programme Specific outcomes of B.Sc., Botany

PSO1. Critically evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenetic level.

PSO2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field of Plant Identification.

PSO3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.

PSO4. Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.

PSO5. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.

PSO6. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

PSO7. Students will be able to apply fundamental mathematical tools (statistics, calculus) and physical principles (physics, chemistry) to the analysis of relevant biological situations.

PSO8. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and from other forms of life.

PSO9. Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped plant morphology, physiology, and life history.

PSO10. Students will be able to explain how Plants function at the level of the gene, genome, cell, tissue, Flower development. Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and mode of life cycle followed by different forms of plants.

PSO11. Students will be able to explain the ecological interconnectedness of life on earth by tracing energy and nutrient flow through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

PSO12. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

Course Outcomes for B.Sc., Botany

1st semester B.Sc.,

- **Introduction to Microbiology , Viruses , Bacteria , cyanobacteria and Phycology**

On completion of the course, students are able to:

CO1. Understand the general characters, classification and economic importance of Viruses.

CO2. Study the general characters of Mycoplasma.

CO3. Study the general characters, classification and economic importance of Bacteria.

CO4. Study the general characters, classification and economic importance of Algae.

CO5. Know the general characters, classification and economic importance of Fungi.

CO6. Understand the diversity among Algae.

CO7. Know the systematic, morphology and structure, of Algae.

CO8. Understand the life cycle pattern of Algae.

CO9. Understand the useful and harmful activities of Algae.

CO10. Understand the Biodiversity of Fungi

CO11. Know the Economic Importance of Fungi

2nd semester B.Sc.,

- **Mycology, Plant pathology, Bryophytes and Plant Anatomy**

On completion of the course, students are able to:

CO1. Study fundamentals of plant Pathology

CO2. Study the classification of plant diseases

CO3. Study seed pathology

CO4. Study air borne pathogens, methods and application

CO5. Study Koch's Postulates

CO6. Study the following diseases with respect to causal organism, symptoms disease cycle and disease management.

CO7. Study black stem rust of wheat,

CO8. Study grain smut of jowar,

CO9. Study ergot of bajara ,

CO10. Study wilt of Pigeon pea,

CO11. Study yellow vein mosaic of bean,

CO12. Study late blight of potato,

CO13. Study little leaf of brinjal,

CO14. Study black rot of onion,

CO15. Study Tikka disease of groundnut,

CO16. Study damping off of mustard,

CO17. Study Grassy shoot of sugarcane,

CO18. Study Downy mildew of grapes,

CO19. Study Angular leaf spot of cotton,

CO20. Study Citrus canker,

CO21. Study Powdery mildew of rose,

CO22. Study Rust of Euporbia,

CO23. Study Cercospra on Albizzia fruits.

CO24. Study general characters and classification of bryophytes,

CO25. Study ofMarchantia and Funaria.

3rd semester B.Sc.,

- **Pteriodophytes, Paleobotany, Environmental Biology and phytogeography**

On completion of the course, students are able to:

CO1. Know the scope and importance of the discipline.

CO2. Understand plant communities and ecological adaptations in plants.

CO3. Learn about conservation of biodiversity, Non-conventional Energy and Pollution.

CO4.Discover botanical regions of India and vegetation types of Maharashtra.

CO5.Understand Bioremediation, Global warming and climate change.

CO6.To bring investigation of palaeobotanical study in India.

CO7. Know, scope and application of Palaeobotany.

CO8. Know types of fossils, geological time scale.

CO9. Know the biotic and abiotic components of ecosystem.

CO10. Food chain & food web in ecosystem.

CO11. Understand diversity among various groups of plant kingdom.

CO12. Understand plant community & ecological adaptation in plants.

CO13. Scope, importance and management of biodiversity.

CO14. The students will learn about the structure and reproduction of certain selected species of pteridophytes and Gymnosperms.

CO15. Earn few representatives of fossil forms

CO16. The students will understand the relationship of complementary metabolic pathways such as photosynthesis in energy acquisition

4th semester B.Sc.,

- **Gymnosperms and Embryology of Angiosperms**

CO1. Study salient features of gymnosperms, morphology and anatomy of Cycas, Pinus, Gnetum.

CO2. Study fossils, fossilization, Lyginopteris, geological time scale

CO3. Study utilization of plants

CO4. Study the salient features, origin and evolution of Angiosperm.

CO5. Study systems of classification.

CO6. Study taxonomy in relation to anatomy, embryology, palynology, ecology and cytology.

CO7. Study the concept of binomial nomenclature and its advantages.

CO8. Understand concept of genus and species.

CO9. Understand about herbaria and botanical garden.

CO10. Study the following families, salient features, common examples and economic importance.

CO11. Study general character and classification of Pteridophytes ,

CO12. Study types of tissue, meristematic, permanent, epidermal and histological organization of root and stem apices.

CO13. Understand the primary structure of dicot and monocot root, stem and leaf.

CO14. Understand the secondary growth in root and stem of dicot.

CO15. Study the wood anatomy and periderm structure and function.

CO16. Study the structure of anther, microsporogenesisand development of male gametophyte.

CO17. Study the structure of ovule, megasporogenesis and female gametophyte.

CO18. Study the pollination mechanism, types and agencies.

CO19. Study double fertilization and its significance,

CO20. Study development of dicot embryo

CO21. Study structure, development and types of endosperm.

CO22. Study structure of dicot and monocot seed

APS COLLEGE OF ARTA AND SCIENCE.

Department of Zoology.

Couse outcome of B.Sc., Zoology 2018-19.

I semester.

Paper-1: Non-Chordata part I

CO1: Understands the world non-chordate fauna that surrounds us.

CO2: Explain the sequence of progression of animal architecture.

CO3: Illustrate general characters of Phylum Protozoa to Annelids up-to classes with examples with taxonomic keys.

CO4: Differentiate the physiological and anatomical uniqueness of invertebrate phyla through type study.

CO4: Evaluates various theoretical prospective in understanding locomotion in Protozoans.

CO5: Describes Conjugation in *Paramecium caudatum*

CO6: To understand the mode of nutrition in Protozoans.

CO7: Describe the various types of canal system in Poriferans.

CO8: Explain the polymorphism in Halistema.

CO9: Understands the various internal systems like Digestive system, nervous system, respiratory systems and reproductive with the help of charts.

CO10: Evolution of non-chordate fauna.

CO11: To increase awareness for the health in students.

CO12: In depth study of various parasites in parasitology.

II semester.

Paper-II: Non-Chordata part II.

CO1: Illustrate general characters of Phylum Arthropoda to Echinodermata up-to classes with examples with taxonomic keys.

CO2: explain the systematic position, unique features, affinities with Annelids & Arthropods of Peripatus.

CO3: Describe the external morphology of Prawn.

CO4: Gain knowledge about metamorphosis.

CO5: Explain the sense organs & respiratory organs in Arthropods.

CO6: Describe the morphology & anatomy of Unio.

CO7: Explain the larval forms of Echinodermata.

CO8: Analyze the affinities & systematic position of Hemichordata.

CO9: Understands concepts of sericulture.

CO10: Gain knowledge about Apiculture.

CO11: Understand the concepts Prawn Fisheries.

CO12: Gain the insight and economical importance of Pearl culture.

CO13: Explain the economic importance of leech & earthworm.

APS COLLEGE OF ARTA AND SCIENCE.

Department of Zoology.

Programme Specific Outcomes of B.Sc., Zoology – 2018-19

(I & II Semester)

PSO1: Identify various Non-Chordate fauna using taxonomic keys.

PSO2: Describe the asexual & sexual reproduction in various Non-Chordate fauna.

PSO3: Explain the morphological structures of various Non-Chordate fauna.

PSO4: Analyze the direct & indirect development, growth in Non-Chordate fauna.

PSO5: Understand various anatomical structures & functions of internal systems.

PSO6: To interpret the evolution of Non-Chordata.

PSO7: Understand parasitic adaptations, diseases caused, life-cycle & treatment of Non-chordates.

PSO8: Gain knowledge about economically important Non-Chordates & their culture techniques.

Department of B.SC Physics

Course Outcome

I SEM B.SC (Physics) paper I. Phy T 101

Mechanics –I and Thermodynamics

Co.1 -Understand the Newton laws of motion.

Co.2 -Understand various types of forces, gravitation force, friction, etc.

Co.3 -Understand Newton's law of universal gravitation.

Co.4 -Understand the kinetic theory of gases, Maxwell's- Boltzmann distribution law.

Co.5 –To know the behaviour of real gases.

Co.6 -Understand the concept of Thermodynamics and three laws.

Co.7 -Understand the heat engine and their uses.

Co.8 -Analyses of zeroth law of Thermodynamics and entropy.

Co.9 -Understand work energy and their relation.

Co.10 -Understand black body radiation.

Co.11 -Understand solar constant and estimation of surface temperature of the sun.

II SEM B.SC PHY T201.

Mechanics –II Heat and Thermodynamics

Co.1 -Understand differential equation of simple harmonic motion and its solution.

Co.2 -Understand concept of resonance coupled oscillators.

Co.3 -To describe the concept of stress/strain and its relation to force/displacement.

Co.4 -To know the effect of force during static conditions, shear force and bending moments.

Co.5 -Understand rotational motion of rigid bodies, moment of inertia, and conservation of angular momentum.

Co.6 -Understand the thermo dynamical potentials and their relations.

Co.7 -Understand the methods of production of low temperature and its use.

Co.8 -Understand the true nature of Newtonian mechanics and Lorentz transformation equations.

Co.9 -To introduce students to the concept of special relativity and applications to physical sciences.

III SEM B.SC PHY T301.

Electricity and Magnetism

Co.1 -Understand the concept of voltage and current source.

Co.2 -Electric field electrical potential magnetism.

Co.3 -Understand various network theorems.

Co.4 -Definition of the magnetic field, magnetic flux, calculation magnitude and direction of the magnetic field.

Co.5 -Understanding of ballistic galvanometer.

Co.6 -Know about the Direct current and its circuit.

Co.7 -Know about the alternating current and its circuit.

Co.8 -Understand scalar and vector field's fundamental theorem for divergence and curl.

Co.9 -Study the laws of thermo electricity, seebeek effect, peltier effect and Thomson effect.

Co.10 -Understand the applications of thermoelectricity.

IV SEM B.SC PHY T401.

Laser, Optics and Fourier Series.

Co-1. Know the history of LASERS and its basic concepts

Co-2. Understand the basic principle and working of different types of lasers.

Co-3. Know the applications of lasers in various fields

Co-4. Understand the characteristics of LASERS.

Co-5. Study the applications in various fields.

Co.6 -Study the theory and expt of interference using air wedge and Newton's sing.

Co.7 -Study the theory and expt part of diffraction by Fresnel's and fraunhoffer methods.

Co.8 -Study the theories for production of polarization of light.

Co.9 -Study the Fourier series to sine, square, saw tooth waves

Co.10 -Understand the basic concepts of optical fibres.

Co.11 -Understand the application part of optical fibres into communication system.

V SEM B.SC PHY T501.

Statistical physics, quantum mechanics-I Atmospheric physics and Nano-materials.

Co.1 -Understands how statistics of the microscope world can be used to explain the thermal features of the macroscopic world.

Co.2 -Understand Bose Einstein and Fermi Dirac statistics.

Co.3 -Establish connection between statistics and thermo-dynamics.

Co.4 -Understand of importance of quantum mechanics compared to classical mechanics at microscope level

Co.5 -Understand De. Broglie hypothesis and uncertainly principle.

Co.6 -Understand the concept of wave packet. Group velocity particle velocity.

Co.7 -Understand basic of Nano-science and Nano-technology.

Co.8 -Understand quantum dots. Nanowires, nano science.

Co.9 -Understand the application of Nano-science.

Co.10 -Understand the fixed gases and variable gases, green house effect, cyclones, erosion of river banks.

V SEM B.SC PHY T503.

Solid state physics, Astro-physics and semiconductor physics.

Co-1. Know the principles of structures determination by diffraction.

Co-2. To understand the principles and techniques of x-rays diffraction.

Co-3. Know the fundamental principles of semiconductors and be able to estimate the charge carrier mobility and density.

Co-4. Understand the definition of understand the stellar classification H.R diagram.

Co.5 -Understand surface or effective temperature and colour of a star.

Co.6 -To learn about the electronic component like Diode, Transistor etc.

Co.7 -Analyse the relationship between semiconductor devices and understand the applications of semiconductor devices.

IV SEM B.SC PHY T 601.

Atomic, molecular and nuclear physics.

Co-1. To know the Ruther ford experiment of atom.

Co-2. To understand molecular spectra of atom.

Co-3. To study the Raman spectra.

Co-4. To study the Zeeman Effect.

Co-5. To understand the quantum numbers.

Co-6. Know the properties of nucleus like binding energy magnetic dipole moment etc.

Co-7. To understand the concept of radio activity and decays.

Co-8. To study achievement of nuclear models of physics and its limitations.

Co-9. To give an extended knowledge about nuclear reactions such as nuclear fission and fusion.

Co-10. To understand the basic concepts of particle physics.

IV SEM B.SC PHY T 603.

Electronics, Magnetic materials, Dielectrics and Quantum Mechanics

Co-2. Derive Schrödinger's time dependent and independent equations.

Co-3. Solve the problems using Schrödinger's steady state equation.

Co-4. Get knowledge of rigid rotator.

Co-5. Understand different operator in Quantum mechanics.

Co-6. Understand the fundamental of codes and number system.

Co-7. Understand the binary arithmetic login, Boolean function.

Co-8. Perform the procedures into application.

Co-9. Understand OPAMPS, Feedback concepts, OPAMP oscillators.

Co-10. Understand magnetic properties of Para, Dia- ferromagnetic material

Co-11. Understand dielectrics, clausius –mosotti equation, piezo electric effect.

Department of Physics.

Programme Specific Outcomes B.SC Physics.

Department of Physics.	After successful completion of three year degree program in physics a student should be able to..
Programme Specific Outcomes	Psos-01. Demonstrate, solve and an understanding of major concepts in all disciplines of physics. Psos -02. Solve the problem and also think methodically, independently and draw a logical conclusion. Psos -03. Employ critical thinking and also think scientific knowledge to design, carry out record and analyze the result of physics experiments. Psos -04.To understand the concept and significance of the various physical phenomena. Psos -05.To define the basic laws involved in physics. Psos -06. Identify their area of interest in academic and R & D. Psos -07.Understand the depth knowledge of various subjects of physics. Psos -08.Perform job in various fields through science education, banking, business and public services.

❖ Programme Outcomes

Bachelor of Science (B.Sc.,) offers theoretical and practical knowledge about different areas. These subject areas includes Physics, Chemistry, Mathematics, Botany and Zoology.

This programme course is most beneficial for students who have a strong interest and background in Science. The Course is also beneficial for students who wish to pursue multi and inter- disciplinary science Careers in future

Following are the various programme outcomes:

PO1. By understanding pure science by theoretical and practical knowledge Students can get many opportunities in various fields.

PO2. After B.Sc., students can join for M.Sc., and further can do some research oriented works

PO4. After higher studies students can join as scientist and can even look for professional job oriented courses.

PO5. This Course also offers opportunities for serving in Indian Army, Indian Navy, and Indian Air force as officers

PO6. Students after this course have the option to join Indian Civil Services as IAS, IFS etc.,

PO7. Science graduates can go to serve in industries or may opt for establishing their own industrial unit.

PO8. Apart from the research jobs, students can also work or get jobs in marketing, Business and other technical fields. Science graduates also recruited in the bank sector to work as customer service executives.

PO9. Students can also find employment in government sectors.