

**Dr. Ambedkar College of Arts, Commerce and Science,  
Chandrapur**

**Faculty of Science and Technology**

**Course Outcomes**

**DEPARTMENT OF PHYSICS**

**B.SC. SEMESTER - I**

**Course title: Paper I (Mechanics and Relativity)**

**Course Code: USPHT01**

After successful completion of the course, students will be able to:

1. Understand the laws of motions and its applications.
2. Distinguish centre of mass and centre of gravity.
3. Distinguish elastic collision and inelastic collisions with transfer of energy.
4. Have a thorough knowledge of rotational dynamics, non-inertial systems.
5. Understand relative motion and theory of relativity.

**B.SC. SEMESTER - I**

**Course Title: Paper II (Gravitation, Oscillation and Properties of Matter) Course Code: USPHT02**

After successful completion of the course, students will be able to:

1. Understand concept of gravitation and planetary motion.
2. Have a knowledge of different types of oscillations.
3. Understand the concept of elasticity and different types of elastic moduli & their Inter-relations.
4. Have the knowledge of Streamline flow and Turbulent Flow and Bernoulli's Theorem and its applications
5. Understand the concept of surface tension and its molecular interpretation.
6. Do oral and written scientific communication and will prove that they can think critically and work independently.

**B.SC. SEMESTER - I**

**PHYSICS LAB I:**

**Course Code: USPHP01**

1. Students will have good laboratory skills, enabling them to take observations and measurements in a physics laboratory and analyze the results to draw valid conclusions.
2. Students will learn the use various apparatus to take the measurements up to the marks.

### **B.SC. SEMESTER - II**

#### **Course Title: Paper I (Vector Analysis and Electrostatics) Course Code: USPHT03**

After successful completion of the course, the students will be able to:

1. Have a sound knowledge of vectors and its application to solve the various problem of motion in physics.
2. Understand the Electric Field and Potential, Electrical circuits and be able to apply this knowledge to analyze a variety of physical phenomena.
3. They can use this knowledge in daily life.

### **B.SC. SEMESTER - II**

#### **Course Title: Paper II (Magnetostatic and Electromagnetic waves) Course Code: USPHT04**

After successful completion of the course, the student is expected to:

1. Understand effect of electric field, Magnetic field, magnetic properties of materials and will able to distinguish them.
2. Have the knowledge of magnetic induction, transformer and their application in daily life.
3. They can understand the propagation of light wave as a electromagnetic wave.
4. They will be able to understand DC and AC electric current and apply to various circuit.

### **B.SC. SEMESTER - II**

#### **PHYSICS LAB II:**

#### **Course Code: USPHP02**

1. Students will acquire good laboratory skills to connect various components in circuit.
2. Students will learn the use various apparatus to take the measurements up to the marks.
3. Student will able to take observations and measurements in a physics laboratory and analyze the results to draw valid conclusions.

### **B.SC. SEMESTER - III**

#### **Course Title: Paper I (Thermal Physics)**

#### **Course Code: USPHT05**

After successful completion of the course, the student is expected to:

1. Have a thorough knowledge of Thermal physics and be able to study of different the thermal phenomenon.
2. Understand the laws of thermodynamics to solve the various problem.
3. Realize the importance of Thermo dynamical functions and applications of Maxwell's relations.

### **B.SC. SEMESTER - III**

**Course Title: Paper II (Radiation and Statistical Physics) Course Code: USPHT06**

The completion of this course will enable the students to:

1. Understand the Thermal Radiation laws.
2. Study statistical basis of thermodynamics.
3. Understand the concept of different statistics.
4. Familiarize in depth about statistical distribution and have basic Ideas about Maxwell- Boltzman, Bose-Einstein and Fermi- Dirac Statistics and their applications

### **B.SC. SEMESTER - III**

#### **PHYSICS LAB III:**

**Course Code: USPHP03**

1. Students will acquire good laboratory skills to handle the thermal problem.
2. Student will able to take observations and measurements in a physics laboratory and analyze the results to draw valid conclusions.
3. Students will understand experimentally the concept of statistical physics.

### **B.SC. SEMESTER - IV**

**Course Title: Paper I (Wave, Acoustics and Laser) Course Code: USPHT07**

After successful completion of the course, the students will be able to:

1. Understand basic concept of sound waves.
2. Distinguish audible, ultrasonic and infrasonic waves.
3. Use the mathematical treatment to show various form of waves.
4. Differentiate noise and music, understand the characteristics of musical sound and requirement of good auditorium.
5. Understand and explain the principles and design considerations of various (solid state, gas and semiconductor) lasers, modes of their operation and areas of their application.

### **B.SC. SEMESTER - IV**

**Course Title: Paper II (Optical Physics)**

**Course Code: USPHT08**

The completion of this course will enable the students to:

1. To have a thorough knowledge about Geometrical optics, wave optics, wave motion, and apply the above knowledge to analyze various aspects of a physical phenomenon.
2. Familiar with phenomenon of interference, diffraction and polarization.

3. Understand the applications of interference and diffraction.
4. Understand the applications of interference in design and working of interferometers.

### **B.SC. SEMESTER - IV**

#### **PHYSICS LAB IV:**

##### **Course Code: USPHP04**

1. Students will observe the phenomenon of the interference and diffraction in the laboratory.
2. Student will able to take observations and measurements in a physics laboratory.
3. They can find out the refractive index of various transparent material.

### **B.SC. SEMESTER - V**

#### **Course Title: Paper I (ELEMENTS OF MODERN PHYSICS) Course Code: USDSEPHT09**

After successful completion of the course, the students will be able to:

1. Understand Failures of Classical theories and concept of quantum mechanics.
2. Derive Schrodinger's wave equations & solve them and apply them to one dimensional infinitely rigid box; Quantum mechanical scattering and tunnelling in one dimension.
3. Have a basic knowledge of nucleus, its size, shape, binding energy, etc.
4. Understand phenomenon of radioactivity and emission of alpha, beta and
5. gamma rays from radioactive substance and Law of radioactive decay.
6. Understand the phenomenon of fission on the basis of liquid drop model and a fusion.

### **B.SC. SEMESTER - V**

#### **Course Title: Paper II (SOLID STATE PHYSICS) Course Code: USDSEPHT10**

After successful completion of the course, the students will be able to :

1. Understand the different types crystal structures in solid, Lattice Translation Vector, Lattice with a Basis, Periodicity in crystal. Unit Cell, Miller Indices, Reciprocal Lattice, Types of Lattices, Brillouin Zones and Diffraction of Crystal, Bragg's Law, Bragg's X-ray spectrometer.
2. Familiar with Dia-, Para-, Ferri- and Ferromagnetic Materials and understand the Classical Langevin theory of Diamagnetism, Quantum Mechanical Treatment of Paramagnetism and Weiss's Theory of Ferromagnetism.
3. Able to know three electric vectors E, D and P. and understand Claussius-Mossotti Equation, its molecular interpretation and limitations and Classical Theory of Electric Polarizability.
4. Familiar with elementary band theory and understand Kroning Penny model, Hall Effect, Fermi level and Fermi energy.
5. Understand the phenomenon and theory of superconductivity and types of superconductors.

## **B.SC. SEMESTER - V**

### **PHYSICS LAB V:**

**Course Code: USDSEPHP05**

1. Students will be able to take observations / measurements in a physics laboratory and to analyze its results.
2. Students will acquire the skills to take measurements with accuracy and handle the instruments carefully.

## **B.SC. SEMESTER - VI**

**Course Title: Paper I ( NUCLEAR & PARTICLE PHYSICS) Course Code : USDSEPHT13**

After successful completion of the course, the students will be able to :

1. Know the general properties of nuclei such as its size, mass, charge density, packing fraction, mass defect and binding energy.
2. Understand the nuclear models such as liquid drop model, Fermi gas model and shell model and concepts of nuclear force.
3. Familiar with nuclear reactions, its types, Conservation Laws, Endoergic and exoergic reactions, Q-value, reaction rate and interaction of Nuclear Radiation with matter.
4. Know Detector for Nuclear Radiations such as Wilson chamber, Ionisation chamber, Proportional counter, GM counter, Scintillation counter and photo-multiplier tube (PMT) and Particle Accelerators such as Vande Graaff generator, Linear accelerator, Cyclotron, Synchro-cyclotrons.

## **B.SC. SEMESTER - V**

**Course Title: Paper II ( DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION)**

**Course Code : USDSEPHT14**

The completion of this course will enable the students to:

1. Understand difference between Analog and Digital Circuits, binary, decimal, hexadecimal number systems, and their inter conversion, Binary Addition, Binary Subtraction using 1's and 2's Complement Method, Binary codes 8421 and EX-3 code, De Morgan's Theorems, Boolean Laws.
2. Design of different logic gates, Half and Full Adders, Half and Full Subtractor
3. Familiar with Semiconductor Devices and Applications such as LED and Photocell, Half-wave Rectifier, Full-wave Rectifier and bridge Rectifier, Calculation of Rectification Efficiency, Ripple Factor and Regulation, L-section and  $\pi$ -section filter, Zener diode, its characteristics and Voltage Regulation .
4. Know construction and working of n-p-n and p-n-p Transistors, their characteristics in CB and CE configuration, Current gains  $\alpha$  and  $\beta$  and relation between  $\alpha$  and  $\beta$ , CE amplifier and its graphical analysis, different voltage amplifiers.

5. Understand the construction, working and characteristics of operational amplifiers and applications of OP AMP as Inverting and Non-inverting Amplifiers, Adder, Subtractor, Differentiator, Integrator and Zero Crossing Detector.

### **B.SC. SEMESTER - V**

#### **PHYSICS LAB VI:**

**Course Code: USDSEPHP06**

1. Students will be able to construct the various circuits of logic gates, HA, FA, FF and counters and verify their truth tables.
2. Students will have a good laboratory skills to design the logic circuits to prove the experimental and theoretical concepts.

### **M. SC. PHYSICS SEMESTER-I**

**Course Title: Paper I (Mathematical Physics)**

**Course Code: PSCPHYT01**

On successful completion of this course students will be able

1. To learn about Gradient, Divergence and Curl in orthogonal curvilinear and their typical applications in physics.
2. To study the Fourier series, Fourier integral and Fourier transforms Convolution theorem, Parseval's identity and applications to the solution of differential equations.
3. To learn about special type of matrices that is relevant in physics and then learns about tensors.
4. To study about Cayley Hamiltonian theorem, Eigen vector and Eigen value problems, diagonalization and complete orthonormal sets of functions.
5. To study different ways of solving linear differential equations and familiarized with various special functions-Laguerre, Hermite, Legendre Polynomials, special Bessel's.

### **M. SC. PHYSICS SEMESTER-I**

**Course Title: Paper II (Complex Analysis and Numerical Methods)**

**Course Code: PSCPHYT02**

On successful completion of this course students will be able

1. To learn about Complex Numbers and Geometrical representations of the sum, difference, product and quotient of Complex Number, Cauchy Riemann Conditions, Analytic functions, Multiply connected regions, Cauchy Theorem, Cauchy Integration formula, Derivatives.

2. To understand the basic concepts of singularities such as poles, branch points, Calculus of Residues-Residues Theorem, Cauchy Principle value, Pole Expansion of Meromorphic Functions, Product expansion of entire Functions.
3. To understand the methods for determination of zeros and linear and non-linear single variable algebraic and transcendental equations.
4. To learn Lagrange's interpolation, Divided differences, Numerical integration, trapezoid rule, Simpson's 1/3rd rule, Simpson's 3/8th rule, Linear least squares, Euler and Runge Kutta methods.

### **M.SC. PHYSICS SEMESTER-I**

**Course Title: Paper III (Electronics)**

**Course Code: PSCPHYT03**

On successful completion of this course students will be able

1. To learn about Semiconductor discrete devices and Opto-electronic devices and their characteristics.
2. To study the applications of semiconductor devices in linear and digital circuits, Feedback in amplifiers and oscillators, TTL and CMOS gates.
3. To study Digital integrated circuits - NAND and NOR gates, X-OR gate, Half and full adder, Flip-Flops, Multivibrators, shift registers, counters, A/D and D/A converters, Operational amplifier and its applications.
4. To understand the basic concepts of communication electronics- Modulation and demodulation, fundamentals of optical communication and microwave oscillators.

### **M.SC. PHYSICS SEMESTER-I**

**Course Title: Paper IV (Electrodynamics-I)**

**Course Code: PSCPHYT04**

On successful completion of this course students will be able

1. To learn about Electrostatics: Coulomb's law, Gauss's law and its differential form, Dirac delta function, electric field and potential, Poisson and Laplace equations.
2. To understand the boundary value problems and study the Uniqueness theorems, Green's theorem, method of separation of variables (Cartesian, spherical and cylindrical coordinates).
3. To gain the knowledge about Magnetostatics: to realize the importance and application of Biot-Savarts Law and Ampere's law, understand the relevance of vector potential, magnetic field, magnetic moment and magnetic shielding.

4. To understand of Maxwell's equations and time varying fields. Have grasped the idea of scalar and vector potential, Gauge transformation and Poynting's theorem.
5. To use Maxwell equations in different forms and different media and describe the propagation of electromagnetic waves through different media.

## **M. SC. PHYSICS SEMESTER-I**

### **Course Title: Practical-I & II**

### **Course Code : PSCPHYP01 & P02**

On successful completion of this course students will be able

1. To learn various experimental and computational tools thereby developing analytical abilities to address real world problems.
2. To study the practicals in computational physics using C++ language, Analyze the outcome of the algorithm/program graphically which will give a new experience to the students in the field of computer simulations.
3. To acquire experience of handling and building electronics circuits. Students will have hand on experience of Digital electronics experiments Amplifiers, diodes, various logic gates, flip-flops and multivibrator, counters.
4. To Assess possible causes of discrepancy in practical experimental observations, results in comparison to theory.
5. To delivered Seminars on recent topics related to Physics

## **M. SC. PHYSICS SEMESTER-II**

### **Course Title: Paper-I (Quantum Mechanics - I)**

### **Course Code: PSCPHYT05**

On successful completion of this course students will be able

1. To understand and explain the differences between classical and quantum mechanics.
2. To understand the central concepts and principles in quantum mechanics, such as the Schrodinger equation, the wave function and its statistical interpretation, the uncertainty principle, stationary and non-stationary states, time evolution of solutions, as well as the relation between quantum mechanics and linear algebra including understanding of elementary concepts in statistics, such as expectation values and variance. They will master the concepts of angular momentum and spin, as well as the rules for quantization and addition of these. Hence they will be able to solve the complex systems by approximation method.



3. To study the importance and implication of vector spaces, Dirac ket bra notations, Eigen value problem.
4. To better understand the mathematical foundations of spin and angular momentum for a system of particles.
5. To solve Schrodinger equation for various QM systems using approximate methods.

### **M. SC. PHYSICS SEMESTER-II**

**Course Title: Paper-II (Statistical Physics)**

**Course Code: PSCPHYT06**

On successful completion of this course students will be able

1. To study the fundamentals of classical statistical mechanics and Gibbs Paradox, Ensembles, partition function, free energy and connection with thermodynamic quantities.
2. To study the fundamentals of quantum statistical mechanics- MB, BE and FD statistics.
3. To understand the concepts of Ideal Fermi system, Free electrons in metals as fermions, Electronic specific heat.
4. To have ideas about Phase transition, Landau theory, Brownian motion, Langevin theory, and Weiss theory of ferromagnetism.

### **M. SC. PHYSICS SEMESTER-II**

**Course Title: Paper-III (Classical Mechanics)**

**Course Code: PSCPHYT07**

On successful completion of this course students will be able

1. To understand the Lagrangian and Hamiltonian approaches in classical mechanics.
2. To learn about Conservation theorems and symmetry properties, Canonical transformations, Poisson brackets and Poisson theorems, Hamilton-Jacobi Theory.
3. To study the Central force motion, reduction to one body problem, Rutherford scattering in laboratory.
4. To understand the Rigid body dynamics, Euler's theorem.
5. To learn about moment of inertia tensor, eigen values and principal axis transformation, non-inertial frames and Pseudo forces.

### **M.SC. PHYSICS SEMESTER-II**

**Course Title: Paper-IV (Electrodynamics-II)**

**Course Code: PSCPHYT08**

On successful completion of this course students will be able

1. To gain a clear understanding of scalar and vector waves, Stoke's parameters, reflection and refraction of plane waves, Fresnel polarization on reflection and refraction, propagation in dielectric films.
2. To get clear understanding about symmetries of Maxwell's equations: Lorentz transformation, covariance of electrodynamics, Lorentz gauge condition, equation of continuity, tensor and its transformation, relativistic field theory, Lagrangian for EM field, conservation laws and conformal invariance.
3. To have a clear understanding about motion of charge in EM fields, electric dipole, quadruple and magnetic dipole radiation, half wave and full wave antenna. To study the Lienard-Wiechert potentials, Larmor's formula.
4. To understand the wave guides: cylindrical cavities, field on the surface and within a hollow metallic conductor, TE, TM, TEM modes in rectangular and cylindrical wave guides, Bremsstrahlung: virtual quanta and synchrotron radiation.

## **M. SC. PHYSICS SEMESTER-II**

**Course Title: Practical-III & IV**

**Course Code: PSCPHYP03 & P04**

On successful completion of this course students will be able

1. To handle specific electronic equipment's like CRO, function generators etc.
2. To hand on experience of Hall coefficient, Curie temperature, B-H curve,  $e/m$  by Thomson method, Planck's constant, Stefan's constant, dielectric constant, and magnetic susceptibility by Gouy's balance.
3. To design and perform scientific experiments, Bifilar pendulum, BG energy using four probe method, study of line emission spectra, thermistor characteristics, Newton's rings experiment.
4. To acquire the appropriate data accurately and keep systematic record of laboratory activities, Interpret findings using the correct physical scientific framework and tools.
5. To evaluate possible causes of discrepancy in practical experimental observations, results in comparison to theory.
6. To delivered Seminars on recent topics related to Physics.

## **DEPARTMENT OF CHEMISTRY**

**B.SC. SEMESTER - I**

**Course Title: I: Paper I (INORGANIC)**

**CHEMISTRY) Outcomes:**

1. Students will properly understand the structure of atom, variations of its periodic properties.
2. They will be able to understand theory of formation of covalent bond, concept of hybridization and molecular orbital theory.
3. They can understand comparative study of s-block elements and comparative study of p-block elements with regards to various properties
4. Students will have a thorough knowledge of (A) Hydrogen Bonding (B) Chemistry of Noble gas (C) Theory of Volumetric Analysis.

**B.SC. SEMESTER - I****Core II: Paper II (Organic Chemistry) Outcomes:**

1. The student should understand Fundamentals of Organic Chemistry such as Physical Effects, Electronic Displacements, Structure, shape and reactivity of organic molecules, Types of Reactions, Strength of organic acids and bases
2. They will come to know basic concept of stereochemistry.
3. The students will thoroughly understand preparation, properties and reactions of aliphatic hydrocarbons and aromatic hydrocarbons.

**B.SC. SEMESTER - I**  
**CHEMISTRY LAB I:**

**Outcomes:**

1. Students will have good laboratory skills, enabling them to handle apparatus and chemicals with precaution to avoid laboratory accidents.
2. Students will learn experiments on volumetric analysis and qualitative analysis.

**B.SC. SEMESTER - II**

**Course Title: Paper I (ORGANIC CHEMISTRY) Courses Outcomes:**

1. The students will thoroughly understand preparation, properties and reactions of alkyl halides, aryl halides, alcohols, phenols, aliphatic and aromatic ethers, aldehydes and ketones.
2. They will understand nomenclature, structure, bonding and physical properties of carboxylic acid and their derivatives.
3. This knowledge can help them to understand organic chemistry properly.

**B.SC. SEMESTER - II**

**Core II: Paper II (PHYSICAL CHEMISTRY)**

**Courses Outcomes:**

1. Students will learn mathematical concepts necessary to understand physical chemistry throughout.
2. They will understand basic knowledge of ionic equilibrium phenomena.
3. They will understand thermodynamics, thermochemistry.
4. They can understand thoroughly states of matter such as solid state with regard to crystallography, liquid state with its properties and gaseous state with concerning to ideal and real gas.

**B.SC. SEMESTER - II**

**CHEMISTRY LAB II:**

1. Students will know methods of purification of impure organic compounds.
2. Students will develop the skill of preparation of organic compounds.
3. Students will be able to verify theoretical knowledge experimentally.

**B.SC. SEMESTER - III**

**Course title: Paper I (INORGANIC CHEMISTRY) Courses Outcomes:**

1. Students will have a thorough knowledge of classification, structure, preparation, and properties of hydrides of Boron, Iodine interhalogen compounds, oxy acids of sulphur and
2. Students will know Ionic structures, radius ratio effect & coordination number of ionic solids. Also they will understand metallic bonding, concept of acids and bases.

3. Students will understand chemistry of first, second, third transition series, lanthanides and actinides

### **B.SC. SEMESTER - III**

#### **Core II: Paper II (PHYSICAL CHEMISTRY)**

##### **Courses Outcomes:**

1. Students will understand the Phase equilibria and theory of liquid-liquid mixtures.
2. They will be able to study and understand properly thermodynamics, Chemical kinetics, colligative properties, and magnetic properties.

### **B.SC. SEMESTER - III**

#### **CHEMISTRY LAB III:**

1. Students will acquire good laboratory skills to semi micro qualitative analysis of inorganic salt mixture containing two acid and two basic radicals.
2. Students will understand experimentally the concept of phase equilibria, colligative properties and chemical kinetics.

### **B.SC. SEMESTER - IV**

#### **Course Title: Paper I (INORGANIC CHEMISTRY) Courses Outcomes:**

1. Students will be able to understand basic concept of co-ordination chemistry, theory of soft and hard acid and base, and principle involved in extraction of elements.
2. They can study crystal field theory as Metal Ligand Bonding In Transition Metal Complexes
3. They can understand Electronic Spectra of Transition Metal Complexes, Thermodynamic And Kinetic Aspect of Metal Complexes
4. They can understand Colorimetry and Spectrophotometry.

### **B.SC. SEMESTER - IV**

#### **Core II: Paper II (ORGANIC CHEMISTRY)**

##### **Courses Outcomes:**

1. Students will have a thorough knowledge about Synthesis, structure and chemical reaction of Nitro Compound, Amino compounds, Diazonium salt, Heterocyclic Compounds, organo metallic compounds, Amino Acids, Peptides and Proteins, Carbohydrates and Synthetic Dyes and Drugs.

### **B.SC. SEMESTER - IV**

#### **CHEMISTRY LAB IV:**

1. Students will be able to prepare some complex compounds.
2. Student will be able to handle Colorimeter/spectrophotometer properly and can perform practicals
3. Students will be able for quantitative estimation of elements in solution gravimetrically.

### **B.SC. SEMESTER - V**

**Course Title : Paper I (ORGANIC CHEMISTRY) Course Code :USC DSE ChT 09**

#### **Courses Outcomes:**

1. Students will understand Nuclear Magnetic Resonance (NMR) spectroscopy
2. Students will be able to understand Organic Synthesis via Enolates
3. Students will study thoroughly Polymers, Polymerization reactions, Fibres.
4. Students will understand properly Green Chemistry and Technology for sustainable development

### **B.SC. SEMESTER - V**

**Course Type : Paper II ( Physical Chemistry) Course Code:-USC DSE ChT10**

#### **Courses Outcomes:**

1. Students will understand complete theory of Electrochemistry through electrical transport, types of reversible electrodes, Galvanic cells, irreversible & reversible cells, Concentration cells with & without transference
2. Students will understand basic concept of quantum mechanics.

### **B.SC. SEMESTER - V**

**Course Type: Skill Enhancement Course Paper-III (Pharmaceutical Chemistry) Courses Outcomes:**

1. Students will understand thoroughly concepts of the Pharmaceutical Chemistry regarding Drugs & Pharmaceuticals.

### **B.SC. SEMESTER - V**

**Course Type: CHEMISTRY LAB V**

**Course Code: USC DSE ChP 05, 06**

1. Students will develop skill of
  - A. Identification of organic compound on the basis of NMR data.
  - B.
    - I. Estimation of hydroxyl number of a polymer using colorimetric method.
    - II. Estimation of the amount of HCHO in the given solution by sodium sulphite method.
  - C.
    - I. Preparation of nylon 66.
    - II. Preparation of urea-formaldehyde resin.
  - D. Green chemistry synthesis of organic compound by using micro wave technic.
2. Students will develop skill of handling and understand the proper working of Potentiometer and Conductometer through experiments.

3. Students will develop skill Preparation analysis of Aspirin, magnesium bisilicate (Antacid), Paracetamol to perform analytical method validation of Paracetamol in pure and tablet form by using UV spectrophotometric method.

### **B.SC. SEMESTER - VI**

**Course Type : Paper I (INORGANIC**

**CHEMISTRY) Course Code: ..USC DSE ChT**

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1. Students will able to understand basic concept Qualitative and quantitative aspects of analysis,
2. Flame Photometry
3. Students can know Separation Techniques such as Chromatography, Ion- Exchange, Solvent
4. Extraction.
5. Students can understand Classification of Chemical fertilizer with example, its advantages and disadvantages, manures and compost and their advantages over chemical fertilizers
6. Students can understand theory of Organometallic Chemistry, nano materials, water pollution
7. water purification methods, Industrial waste management.

### **B.SC. SEMESTER - VI**

**Course Type :Core II: Paper II ( Physical**

**Chemistry) Corse Code:.....USC DSE ChT 14**

1. Students will understand thoroughly Photochemistry, Dipole Moment.
2. Students will understand basic concept of rotational, vibrational spectroscopy.
3. Students will gain thorough knowledge of Surface Chemistry, Colloidal Chemistry, And Nuclear Chemistry.

### **B.SC. SEMESTER - VI**

**Course Type : Skill Enhancement Course : Paper III (Analytical Clinical**

**Biochemistry) Course Code:**

1. Students will understand the structures, properties and functions of carbohydrates, lipids and proteins

### **B.SC. SEMESTER - VI**

**Course Type: CHEMISTRY LAB VI**

**Course Code: USC DSE ChP 09,10**

1. Students will study Ion Exchange Method and Chromatographic Separation of Binary Mixtures, verification of F, Q, and T test and rejection of data for acid base titration
2. Students will gain the knowledge of the analysis of soil and water analysis regarding some parameters by suitable methods.
3. Students will gain the handling skill of the instruments like colorimeter, Abbe's refractometer by doing practicals based on them. They will also gain the practical knowledge of as adsorption and CMC

4. Students will study Identification and estimation of the
  - a. Carbohydrates – qualitative and quantitative.
  - b. Lipids – qualitative.
  - c. Determination of the iodine number of oil.
  - d. Determination of the saponification number of oil.
  - e. Determination of cholesterol using Liebermann- Burchard reaction.
  - f. Proteins – qualitative.
  - g. Isolation of protein.
  - h. Determination of protein by the Biuret reaction.
  - i. Determination of nucleic acids

#### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title : Paper I (Inorganic**

**Chemistry) Course Code : PSCChT01**

1. Learns the fundamentals of Stereochemistry and Bonding in Main Group Compound,
2. Metal – Ligand Bonding, Metal – Ligand Equilibria in Solution
3. Study the Metal – Ligand Equilibria in Solution
4. Understand details of Cluster.
5. Learn Metal-Metal bonds, Isopoly, Heteropoly acids and their anions

#### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title : Paper II (Organic**

**Chemistry) Course Code : PSCChT02**

1. Study Nature and Bonding in Organic Molecule, Synthetic applications of enamines and imines anions in organic synthesis, phase transfer catalysis, crown ethers and graphene.
2. Appreciates the fundamentals Stereochemistry , Reactive Intermediates
3. Understands the background of Reaction mechanism: Structure and Reactivity
4. Learn Aliphatic nucleophilic substitution, Aromatic electrophilic substitution, Aromatic Nucleophilic Substitution.

#### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title : Paper III (Physical**

**Chemistry) Course Code : PSCChT03**

1. Gains the information of FORMULATION OF QUANTUM MECHANICS
2. Understands the CLASSICAL THERMODYNAMICS
3. Learn PHASE EQUILIBRIA
4. Learns the CHEMICAL KINETICS, Photochemistry and Catalysis.



### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title : Paper IV (Analytical Chemistry)**

**Course Code : PSCChT04**

1. Introduction to analytical chemistry and statistical analysis
2. Estimates the separation techniques
3. Study Classical methods of analysis
4. Study Optical methods of analysis

### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title : Practical-I (Inorganic Chemistry)**

**Course Code : PSCChP01**

1. Preparation of Inorganic Complexes and their characterization by: Elemental analysis and physico-chemical methods (Electronic and IR Spectra, magnetic susceptibility measurements, Thermal analysis and Molar conductance studies).
2. Quantitative Analysis: Separation and determination of two metal ions from the alloys involving : Volumetric, Gravimetric and Spectrophotometric methods

### **M.SC. CHEMISTRY SEMESTER-I**

**Course Title: Practical-II (Organic Chemistry)**

**Course Code : PSCChP02**

1. Qualitative Analysis Separation, purification and identification of the mixture of two organic compounds (binary mixture with two solid, one solid one liquid and two liquids) using chemical methods or physical techniques.
2. Understands the method of organic preparation

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title : Paper V (Inorganic Chemistry) Course Code : PSCChT05**

1. Learn the Electronic spectra of Transition Metal complexes, Magnetic Properties of Transition Metal complexes
2. Study Reaction mechanism of Transition Metal Complexes-II
3. Understand Structure and bonding, vibrational spectra of metal carbonyls
4. Gain the knowledge of Nitrosylating agents for synthesis of metal nitrosyls,
5. vibrational spectra and X-ray diffraction studies of transition metal nitrosyls for
6. bonding and structure

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title :Paper VI (Organic Chemistry) Course Code : PSCChT06**

1. Study Addition to carbon-carbon multiple bond, Addition to carbon-hetero atom
2. multiple bond
3. Understand Mechanism of molecular rearrangement, Free radical reactions-I
4. Learn Free radical reactions-II
5. Study Elimination reactions , understand Green chemistry

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title : Paper VII (Physical Chemistry) Course Code : PSCChT07**

1. Study the application of quantum mechanics Electronic structure of atoms, Hybridization
2. Gains the knowledge of thermodynamics
3. Understand Solid state chemistry
4. Enlightens the knowledge about Nuclear Chemistry

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title : Paper VIII (Analytical Chemistry) Course Code : PSCChT08**

1. Understand Sampling and quantification
2. Gains the procedure for Modern separation techniques
3. Study Optical methods of analysis
4. Learn Electrochemical methods of analysis

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title :Practical-IV (Physical Chemistry) Course Code : PSCChP04**

1. Study the experiments related to thermochemistry and phase equilibria
2. Study the experiments base on thermodynamics and Chemical kinetics

### **M.SC. CHEMISTRY SEMESTER-II**

**Course Title : Practical-V (Analytical Chemistry) Course Code : PSCChP05**

1. Study Classical methods such as Volummetry, Gravimetry
2. Study Gravimetric estimation,
3. Understand Chromatographic separation techniques, Analysis of sample by Instrumental Electroanalytical techniques such as

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title : Paper IX (Spectroscopy)**

**Course Code :PSCChT09**

1. Study Symmetry properties of molecules and group theory
2. Understand Mass spectrometry, Mossbauer spectroscopy
3. Gains the importance of Microwave spectroscopy, ESR spectroscopy
4. Learn Infrared spectroscopy, Raman Spectroscopy

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title: Paper X (Special I-Organic Chemistry) Course Code: PSCChT10**

1. Study Photochemistry
2. Understand Pericyclic Reactions
3. Learn Oxidation, Reduction Reactions
4. Gains knowledge of Chemistry of P, S, Si, B, and Ti compounds

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title: Paper XI Special II- (Organic Chemistry)**

**Course Code: PSCChT11**

1. Study Classification, nomenclature, occurrence, isolation, general methods of structure determination of Terpenoids, Porphyrins:
2. Learn Classification, nomenclature, occurrence, isolation, general methods of structure determination Alkaloids, Prostaglandins
3. Study Classification, nomenclature, occurrence, isolation, general methods of structure determination teroids, Plant Pigments
4. Understand Carbohydrate, Amino acids, protein and peptides

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title: Paper XII (Elective- Polymer Chemistry)**

**Corse Code: PSCChT12**

1. Introduction to polymers
2. Understand Molar mass and its determination
3. Study Physical characteristics of polyemers
4. Learn Commercial polymers

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title : Practical-VII (Organic Chemistry Special) Course Code: PSCChP07**

1. Study Quantitative Analysis
2. Learn Isolation of Organic Compounds from Natural Source
3. Qualitative analysis Separation of the components of a mixture of three organic compounds (three solids, two solids and one liquid, two liquids and one solid, all three  
a. liquids and identification of any two

**M.SC. CHEMISTRY SEMESTER-III**

**Course Title : Practical VIII–Elective (Polymer Chemistry) Course Code : PSCChP08**

1. Study Synthesis of polymers
2. Follow Characterization of polymers
3. Understand Purification and fractionation of polymer , Magnetic and electrical properties of polymers
4. Learn Thermal analysis and degradation of polymers
5. Study Dielectric behavior of polymers and Kinetics of polymerization

**M.SC. CHEMISTRY SEMESTER-IV**

**Course Title : Paper XIII (Spectroscopy)**

**Course Code : PSCChT13**

1. Study Ultraviolet and visible spectroscopy, Photoelectron spectroscopy
2. Learn Nuclear magnetic Resonance Spectroscopy
3. Follow Application of NMR spectroscopy
4. Understand Diffraction techniques

**M.SC. CHEMISTRY SEMESTER-IV**

**Course Title : Paper XIV (Special I-Organic Chemistry) Course Code : PSCChT14**

1. Study of Carbanions in organic Chemistry, Organometallic reagents -I
2. Understand Organometallic reagents-II, Transition metals in organic synthesis
3. Gains the potential about Advanced Stereochemistry
4. Learn Designing the synthesis based on retrosynthetic analysis

**M.SC. CHEMISTRY SEMESTER-IV**

**Course Title : Paper XV (Special II-Organic Chemistry) Course Code : PSCChT15**

1. Learn Enzyme chemistry, Co-Enzyme Chemistry
2. Study Heterocycles, Benzofused heterocycles, Diazines
3. Understand Nucleic Acids, Lipids, Vitamins

4. Gains the importance of Dyes, Polymer chemistry

#### **M.SC. CHEMISTRY SEMESTER-IV**

**Course Title: Paper XVI (Elective- Polymer Chemistry)**

**Course Code: PSCChT16**

1. Understand Polymerization
2. Study Techniques of polymerization
3. Follow Characterization of polymers
4. Gain the importance of Specific polymers- Biomedical polymers, Inorganic polymers,
5. Coordination polymers

#### **M.SC. CHEMISTRY SEMESTER-IV**

**Course Title: Practical-X (Organic Chemistry Special)**

**Course Code: PSCChP10**

1. Quantitative Analysis based on classical and instrumental technique
2. Determine Structure of organic compounds on the basis of spectral data

#### **M.SC. CHEMISTRY SEMESTER-IV**

**Course Title: Practical-XI Project**

**Course Code: PSCChP11**

1. Enters in the first step of research aptitude
2. Visualizes the steps of project work presentation
3. Develop research skill for further research

### **DEPARTMENT OF COMPUTER SCIENCE**

#### **B.SC. SEMESTER – I**

**Course Title: Paper –I: Information and Communication Technology**

**Course Code: USCST01**

After successful completion of the course, students will be able to:

1. Handle and understand the Computer & IT.
2. Learn and understand the different Number systems and codes.
3. Distinguish between Input, Output and Storage Devices.

4. Understand the Windows Operating System and operate to solve the different tasks.
5. Understand the different Networks types and its topology

### **B.SC. SEMESTER – I**

**Course Title: Paper –II: PROGRAMMING TECHNIQUES & INTRODUCTION TO ‘C’**

**Course Code: USCST02**

After successful completion of the course, students will be able to:

1. Comparative study the different types of computer languages.
2. Study of programming tools such as algorithm, flowcharts.
3. Details study of C-Character Set and Keyboards, Constants and Variables, Data types.
4. Study of Type Casting, Operators and Expressions.
5. Understand conditional statements of C Language.
6. Understand looping statements of C Language. For, while, do-while.

### **B.SC. SEMESTER – I**

**Computer Science Lab I:**

**Course Code: USCSP01**

1. Students will have good laboratory skills, enabling them to write Algorithms, flowcharts and write the programs in computer programming language “C”.
2. Students will debugging and execute the programs.
3. Students will learn to handle the Computer.

### **B.SC. SEMESTER – II**

**Course Title: Paper –I: OPERATING SYSTEM &**

**LINUX Course Code: USCST03**

After successful completion of the course, students will be able to:

1. Study the different type of operating systems used in computer and their applications.
2. Study the Operating System Structure.
3. Study the UNIX operating system and different commands used in unix OS.
4. Able to write the programs is shell script.

### **B.SC. SEMESTER – II**

**Course Title: Paper –II: STRUCTURED PROGRAMMING WITH ‘C’**

**Course Code: USCST04**

After successful completion of the course, students will be able to:

1. Understand the array & write programs on arrays.
2. Study the different string library functions.
3. Understand use structure and union using different programs.
4. Differentiate the standard library and user defined functions and their structures.

5. Comparative study of storages classes.
6. Understand the concept of pointer and file.

### **B.SC. SEMESTER – II**

#### **Computer Science Lab II:**

**Course Code: USCSP02**

1. Students will have good laboratory skills, enabling them to write Algorithms, Flowcharts and write the programs using arrays, structure and unions in computer Programming language “C”.
2. Write Algorithms, flowcharts and write the programs using pointer and file handling.
3. Students will debugging and execute the programs.

### **B.SC. SEMESTER – III**

**Course Title: Paper –I: DATABASE MANAGEMENT AND SYSTEM ANALYSIS**

**Course Code: USCST05**

After successful completion of the course, students will be able to:

1. Study the Database Environment and data models.
2. Understand the different normal forms and their uses.
3. Understand the system and study the system life cycle.
4. Study the System Analysis, Information Gathering Tools and Tools of Structure Analysis.
5. Study the System Design & Implementation.

### **B.SC. SEMESTER – III**

**Course Title: Paper II: OBJECT ORIENTED PROGRAMMING WITH C++**

**Course Code: USCST06**

After successful completion of the course, students will be able to:

1. Understand the concept of function used in C++.
2. Study and implementation of classes and objects using programs.
3. Understand the concepts of Constructors, Destructors, Operators Overloading and Inheritance.
4. Understand the concepts of Pointers Virtual & Friend functions and file handling

### **B.SC. SEMESTER – III**

#### **Computer Science Lab III:**

**Course Code: USCSP03**

1. Students will have good laboratory skills, enabling them to write the programs using C++ Computer Programming Language.
2. Students will debugging and execute the programs.

### **B.SC. SEMESTER – IV**

**Course Title: Paper –I: ALGORITHM & DATA STRUCTURES**  
**Course Code: USCST07**

After successful completion of the course, students will be able to:

1. Study different techniques used in data structure such as sorting, searching, merging, stack and their presentation in memory.
2. Study the recursion and queues and their applications.
3. Study the linked lists and their applications.
4. Study the Tree and Graphs

#### **B.SC. SEMESTER – IV**

**Course Title: Paper –II: VISUAL BASIC & INTRODUCTION TO .NET**

**Course Code: USCST06**

After successful completion of the course, students will be able to:

1. Understand the concept of Integrated Development Environment (IDE), Programming Constructs and Control flow statement. And implement using programs in VB.
2. Study and implementation of Visual Basic Control, ActiveX Control and Procedure in VB.
3. Study and implementation of Interface, Array and ActiveX Data Object
4. Study the introduction to .NET and implementation of Visual Studio.NET Interface, Array and ActiveX Data Object.

#### **B.SC. SEMESTER – IV**

**Computer Science Lab IV:**

**Course Code: USCSP04**

1. Students will have good laboratory skills, enabling them to write the programs using Visual basic and .NET.
2. Students will debugging and execute the programs.

#### **B.SC. SEMESTER – V**

**Course Title: Paper I: E-Commerce & Web Designing**

**Course Code:**

1. Introduction to E-commerce.
2. History of HTML and basics of HTML with environment.
3. Study of different tags and frames used in HTML.
4. Study of different controls and concept of CSS.

#### **B.SC. SEMESTER – V**

**Course Title: Paper II: Database Programming with Oracle**

**Course Code:**

1. Detail study of RDBMS and its concepts.
2. Study of various elements of SQL and its commands.
3. Practical demonstration of operations on table, functions and database objects.



4. Elaborative concepts of cursor and exception handling.

### **B.SC. SEMESTER – VI**

#### **Course Title: Paper I: CORE JAVA**

#### **Course Code:**

1. History of java programming language and its basics with JDK environment.
2. Practical demonstrations with classes and objects.
3. Study of exception handling and multithreading.
4. Programming with applets and toolkit of java.

### **B.SC. SEMESTER – VI**

#### **Course Title: Paper II: DATA COMMUNICATION WITH CLOUD COMPUTING**

#### **Course Code:**

1. Study of data transmission protocols.
2. Introduction to Networking concepts.
3. Overview of the architecture of cloud computing techniques.
4. Different types of clouds and their comparative study.

<b>M. Sc. Computer Science - I Semester - I</b>	
<b>1. Course Title:</b>	
<b>Paper – I: ADVANCED JAVA</b>	
<b>Course Code: PSCSCT01 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Learn advanced Java and able to develop enterprise level web applications.
CO2.	Understand the advanced programming concepts of JAVA.
CO3.	Understand the server side script writing features supported by Java.
CO4.	Know about complex data objects and its elements using Java Beans.
CO5.	Learn Java programming language which can be utilized to develop windows and internet based software solutions.
CO6.	Able to understand and apply the knowledge of object-oriented principles, applets, GUI for scientific and business oriented applications.
<b>2. Course Title:</b>	
<b>Paper – II: DISCRETE MATHEMATICS</b>	
<b>Course Code: PSCSCT02 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	An ability to use mathematically correct terminology and notation.
CO2.	Having skill to construct correct direct and indirect mathematical proofs.
CO3.	Understanding and able to use division into cases in a proof.
CO4.	Able to use counter examples.
CO5.	Apply logical reasoning to solve a variety of problems.

<b>3. Course Title:</b>	
<b>Paper – III: DATA WAREHOUSE AND SQL</b>	
<b>Course Code: PSCSCT03 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Understand data warehouse architectural strategies.
CO2.	Recognize whether a data mining solution is a feasible alternative for a specific problem.
CO3.	Able to understand how data warehousing can be employed and applied to solve real problems.
CO4.	An ability to apply basic statistical to evaluate the results of data mining models.
CO5.	Develop a comprehensive understanding of how several data mining techniques can be applied to solve problems.
CO6.	Understand the common designs and structures of warehouse systems.
<b>4. Course Title:</b>	
<b>Paper - IV: SCRIPTING LANGUAGE &amp; INFORMATION RETRIEVAL</b>	
<b>Course Code: PSCSCT04 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Demonstrate genesis and diversity of information retrieval situations for text and hyper media.
CO2.	Describe hands-on experience store and retrieve information from www using semantic approaches.
CO3.	An ability to apply and creating of webpage.
CO4.	Understand the concepts and objectives of HTML, Java Script and VB Script.
CO5.	Analyze the performance of information retrieval using advanced techniques such as classification, clustering and filtering over multimedia.
<b>5. Course Title:</b>	
<b>PRACTICAL – I: Practical based on PSCST01</b>	
<b>Course Code: PSCSCP01 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to create basic programs in programming language JAVA.
CO2.	Understand the programs on user interface applet.
CO3.	Capable to perform the program to read the contents from given URL.
CO4.	Able to read the contents of one file and copied to another using JAVA.
CO5.	Knowledge of programming in various aspects of discrete mathematics using C++ for example union, intersection and difference of sets and matrix manipulation.
<b>6. Course Title:</b>	
<b>PRACTICAL – II: Practical based on PSCST03 &amp; PSCST04</b>	

<b>Course Code: PSCSCP02 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Understand the practical part related with SQL and PL/SQL.
CO2.	Study of various programs based on scripting language.
CO3.	Practical demonstration on illustrate Client-Server Program using VBScript.
CO4.	Elaborative concepts of JavaScript program to illustrate the different properties of Document Object.
CO5.	Able to write and understand Java Script Program to Create a Dynamic Web Page and also program to Generate User ID at Runtime.
<b>7. Course Title: Seminar</b>	
<b>Course Code: PSCSCS01 (Ability Enhancement) Credit: 1</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to prepare the power point presentation on any topic to deliver the seminar.
CO2.	An ability to present the paper in the State, National and International Conferences.
CO3.	Understand to make the report or document on any topic of their related area.
CO4.	Able to present within a short duration about huge information.
CO5.	Understanding the concepts of performing shortest report.
<b>M. Sc. Computer Science – I Semester-II</b>	
<b>1. Course Title:</b>	
<b>PAPER – I : Theory of Computation &amp; System Programming</b>	
<b>Course Code: PSCSCT05 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Understand the fundamental framework of language processor.
CO2.	Know about the scanning and parsing phases of compilation.
CO3.	Learn about the design specifications of macros and its advanced facilities.
CO4.	Study of different controls and concept of Theory of Computation.
CO5.	Understand the working principles of linkers and loaders.
<b>2. Course Title:</b>	
<b>PAPER – II: VB.NET</b>	
<b>Course Code: PSCSCT06 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Learn to design a graphical user interface in Visual Basic.NET implementing basic controls including text boxes, labels, list boxes, buttons, radio buttons and checkboxes etc.
CO2.	Designing the algorithm, write, document, debug and test the code for event procedures and sub procedures of a Visual Basic application incorporating elementary coding constructs.
CO3.	To Read, analyze and explain introductory level of Visual Basic code.

CO4.	Able to design windows application.
CO5.	Able to connect with different databases with the application.
<b>3. Course Title:</b>	
<b>PAPER - III: Web Technologies</b>	
<b>Course Code: PSCSCT07 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to create web-based applications and database driven website.
CO2.	To De-bug PHP code and fix database problems.
CO3.	To Deploy a local web server and local install of a database.
CO4.	An ability to acquire programming skills in core Python.
CO5.	To develop the skill of designing Graphical user Interfaces in Python.
CO6.	Able to acquire skills in handling of various operations on data in Python.
<b>4. Course Title:</b>	
<b>PAPER - IV: Software Engineering</b>	
<b>Course Code: PSCSCT08 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to apply the concepts of software engineering which is essentially important while working on big modules and or projects.
CO2.	Understand software process framework, requirement modeling approaches, software design, and software quality.
CO3.	Understand the concept of system and able to analyses its feasibility study.
CO4.	Able to apply software metrics and software testing.
CO5.	Recognize the need for and ability to engage in continuing professional development.
CO6.	Able to solve software problems and command on system software knowledge, use of technology with innovative ideas.
<b>5. Course Title:</b>	
<b>PRACTICAL – I: Practical based on PSCST06</b>	
<b>Course Code: PSCSCP03 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Knowledge of using Visual Studio IDE to design basic application.
CO2.	Able to develop GUI Application using Form Controls and its events.
CO3.	Apply Object Oriented concepts and also use Data Binding in GUI Application.
CO4.	To handle interaction of two forms using VB.NET.
CO5.	Use Data access controls to store data in Database and retrieve it.
<b>6. Course Title:</b>	
<b>PRACTICAL – II: Practical based PSCST07</b>	
<b>Course Code: PSCSCP04 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Expertise to any kind of work with web technologies using PHP, HTML and

	Python.
CO2.	An ability to perform sending Mail from PHP Script.
CO3.	Performing program to create a table in mysql database using PHP.
CO4.	Able to perform mathematical operations on data using Python.
CO5.	Gaining knowledge of decision making platform based on Python.
<b>7. Course Title: Seminar</b>	
<b>Course Code: PSCSCS02 (Ability Enhancement) Credit: 1</b>	
<b>Course Outcomes (COs)</b>	
CO1.	An ability to teach subjects geared to personal growth.
CO2.	To bring new ideas and apply new tactics the students might not have known about before while preparation to present the Seminar.
CO3.	Boosts up the proficiency in Verbal Communication.
CO4.	Acquirement of Knowledge in a Particular Field of Computer Science and IT.
CO5.	Gets encouragement and motivation approach towards innovations in subject area and research.
<b>M. Sc. Computer Science – II Semester-III</b>	
<b>1. Course Title:</b>	
<b>Paper – I: Software Testing Tools and Methodology</b>	
<b>Course Code: PSCST09 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	To understand different software testing techniques and strategies.
CO2.	An ability to apply specific (automated) unit testing method to the software.
CO3.	To distinguish characteristics of structural testing methods.
CO4.	Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.
CO5.	To analyze the functional and system testing methods
CO6.	An Ability to learn about the transaction flow testing.
<b>2. Course Title:</b>	
<b>Paper – II: Soft Computing Techniques</b>	
<b>Course Code: PSCST10 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Implement, evaluate and compare solutions by various soft computing approaches for finding the optimal solutions.
CO2.	Develop intelligent systems leveraging the paradigm of soft computing techniques.
CO3.	Recognize the feasibility of applying a soft computing methodology for a particular problem
CO4.	Design the methodology to solve optimization problems using fuzzy logic, genetic algorithms and neural networks.
CO5.	Design hybrid system to revise the principles of soft computing in various

	applications.
<b>3. Course Title:</b>	
<b>Paper – III: Research Methodology And Operational Technique</b>	
<b>Course Code: PSCST11 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Analyze research related information and understand research problem formulation and also able to perform sample design with writing.
CO2.	Understanding the nature of problem to be studied and identifying the related area of knowledge for research.
CO3.	Follow research ethics and ability to implement the specific research method for the selected problem.
CO4.	An ability to write and present the research paper in the Conferences.
CO5.	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept and creativity.
<b>4. Course Title:</b>	
<b>Paper – IV: C#.NET</b>	
<b>Course Code: PSCST12 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Understanding programming concepts in .Net Framework and also able to create website using ASP.Net Controls.
CO2.	Able to understand the Distributed Application using C#.
CO3.	Acquired knowledge of C#.Net Programming.
CO4.	Create user interactive web pages using ASP.Net.
CO5.	Create simple data binding applications using ADO.Net connectivity.
<b>5. Course Title:</b>	
<b>PRACTICAL – I: Practical based on PSCST09 &amp; PSCST10</b>	
<b>Course Code: PSCSP05 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Compute soft computing techniques using Mat Lab.
CO2.	Identify the problem given and find its solution using various algorithm design techniques.
CO3.	Implement algorithm design techniques such as different operations on fuzzy sets, linguistic variable, fuzzy intersections and fuzzy union problems.
CO4.	Implement neural network algorithm for various applications like Properties of single neuron theoretical model of neuron, binary model of neuron and essential vector operations.
CO5.	Compare and contrast the performance of various algorithms for same problem such as Genetic Algorithm, Genetic algorithm in problem solving and Biological terminology of genetic algorithm.
<b>6. Course Title:</b>	
<b>PRACTICAL – II: Practical based on PSCST11 &amp; PSCST12</b>	
<b>Course Code: PSCSP06 (Core Lab) Credit: 4</b>	

<b>Course Outcomes (COs)</b>	
CO1.	Ability to compute entire practical based C#.NET.
CO2.	Knowledge of performing programs using conditional statements and loops using c#.
CO3.	Understanding object oriented programs with C#.
CO4.	Capable to perform programs on using different controls with C#.
CO5.	An ability to perform and understand programs using ASP.NET server controls and database programs with ASP.NET and ADO.NET.
<b>7. Course Title: Seminar</b>	
<b>Course Code: PSCSS03 (Ability Enhancement) Credit: 1</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to boosts up confidence and fluency while interacting verbally.
CO2.	Ability to present students in front of gathered audience boosts the confidence of the students preparing them precisely for interviews and group discussions.
CO3.	This activity makes skill to enhance in verbal communication while expressing them.
CO4.	Able to learn on their own which boost their confidence, performance and productivity.
CO5.	Ability to make eminent personalities in future by these basic steps of such activities.
<b>M. Sc. Computer Science – II Semester-IV</b>	
<b>1. Course Title:</b>	
<b>Paper – I: Android Application Development</b>	
<b>Course Code: PSCST13 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Getting knowledge of Android platform.
CO2.	Understand both the basic and advanced concepts of Android's Development Environment.
CO3.	Able to install and configure Android Studio.
CO4.	Ability to understand very well about entire concept of Networking and Web Services.
CO5.	Creating Graphics, Animations with Android's Graphics API and Multimedia
<b>2. Course Title:</b>	
<b>Paper – II: Digital And Cyber Forensics</b>	
<b>Course Code: PSCST14 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	An ability to communicate effectively the results of a computer, network, and/or data forensic analysis verbally, in writing, and in presentations to both technical and lay audiences.
CO2.	Able to conduct digital investigations of cybercrimes.
CO3.	Able to apply a solid foundational grounding in computer networks, operating systems, file systems, hardware, and mobile devices for digital investigations.

CO4.	Capable to protect the computer network resources from unauthorized activity.
CO5.	Able to identify and document potential security breaches of computer data and suggest violations of legal, ethical, moral, policy, and/or societal standards.
<b>3. Course Title:</b>	
<b>Paper – III: Web Designing Using Asp .Net</b>	
<b>Course Code: PSCST15 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Understand the Web Application basics.
CO2.	Able to configure and deploy Web Application.
CO3.	Ability to design web application with variety of controls.
CO4.	Capable to perform various web services and access the data using inbuilt data access tools.
CO5.	Able to use Microsoft ADO.NET to access data in web Application and also Develop secured web application.
<b>4. Course Title: Project</b>	
<b>Course Code: PSCST16 (Core Course) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	On successful completion of the course students will be able to demonstrate a sound technical knowledge of their selected project topic.
CO2.	Prepares students to accept and meet challenges in the real world, mirroring what professionals do every day.
CO3.	Able to design engineering solutions to complex problems utilizing a systems approach.
CO4.	Understand very well about problem identification, formulation and solution.
CO5.	Learn to apply the knowledge gained through various courses in solving a real life problem.
CO6.	Communicate with different social areas to understand social problems besides that contacting engineers and the community at large in oral forms to build the project.
CO7.	Demonstrate the knowledge, skills and attitudes of a professional Computer technician.
CO8.	Project-based learning connects students to the real world.
<b>5. Course Title:</b>	
<b>PRACTICAL – I: Practical based on PSCST13 &amp; PSCST14</b>	
<b>Course Code: PSCSP07 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Compute practical's based on Android Application.
CO2.	Able to perform program which will shows you how to run any video file.
CO3.	Knowledge of program which allows you to set an image as wallpaper.
CO4.	Ability to perform program which enables you to draw an image using bitmap class object.
CO5.	Design and develop User Interfaces for the Android platform.
<b>6. Course Title:</b>	



<b>PRACTICAL – II: Practical based PSCST15</b>	
<b>Course Code: PSCSP08 (Core Lab) Credit: 4</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to compute practical's based on Based on Web designing using ASP.NET.
CO2.	Ability to design web application with different validations.
CO3.	Knowledge of authentication and authorization in asp.
CO4.	Capable to deployment and publishing web sites.
CO5.	Design web application for uploading files on web.
<b>7. Course Title: Seminar</b>	
<b>Course Code: PSCSS04 (Ability Enhancement) Credit: 1</b>	
<b>Course Outcomes (COs)</b>	
CO1.	Able to create learning environment different and unique from classrooms, students learn more effectively and efficiently.
CO2.	An ability to talk and learn about any topic will encourage the students to explore new areas relevant to the topic.
CO3.	Students encourage new ways of thinking and learning.
CO4.	Create skill of making power point presentation and talk on the topic which has been selected.
CO5.	Able to create golden opportunity of personality development in students by seminar activity.
<b>Subject Code Details:</b> In Course Code 1 <sup>st</sup> Letter (U): Represent it a Under Graduate Course 2 <sup>nd</sup> Letter (S): Represent it is Science Faculty Next 3 Letters (CSC): Represent the subject Computer Science Next Letter (P): P: Represents Practical/Project Next Letter (S): S: Represent Seminar Last two letter: Represent Paper No. for Example 01 Represent Paper No. 1	

## DEPARTMENT OF ELECTRONICS

### B.SC. SEMESTER – I

**Course Title: Paper-I (Network Analysis and Digital Fundamentals)**

**Course Code: (USELT01)**

On completion of the course, students are able to:

1. Apply concepts of electric network topology, nodes, branches, loops to solve circuit problems Including the use of computer simulation.
2. Understand the basic concepts of various network Theorems.

3. Learn the various parameters and their interrelationship, able to solve numericals with series, cascade, parallel connection using two port parameters.

4. Understand basic digital electronic systems
5. To learn function of basic digital circuits and use of transistors to create logic gates in order to perform Boolean logic.
6. To learn different theorems for simplification of basic Digital electronics circuits.
7. Student understand symbols, Truth tables, Boolean equations, & working principle.

### **B.SC. SEMESTER – I**

#### **Course Title: Paper-II (Semiconductor Diodes and Analog Electronics) Course Code: (USELT02)**

On completion of the course, students are able to:

1. Know various semiconductor diodes and their characteristics
2. Know the various types of Rectifies and their advantages and disadvantages.
3. Know the various transistors and their input output characteristics
4. Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
5. Know the concept of feedback amplifier and their characteristics.
6. Design the different oscillator circuits for various frequencies

### **B.SC. SEMESTER – II**

#### **Course Title: Paper-I (Unipolar Devices and Linear Integrated Circuits) Course Code: (USELT03)**

On completion of the course, students are able to:

1. Understand various Unipolar Devices like UJT, MOSSFET
2. Understand the fundamentals and areas of applications for the integrated circuits.
3. Analyze important types of integrated circuits.
4. Understand requirement of Operational Amplifier and Block diagram of Operational Amplifier
5. Understand various parameters of Operational Amplifier
6. Understand various linear and Nonlinear applications of Operational Amplifier

### **B.SC. SEMESTER – II**

#### **Course Title: Paper-II (Digital Integrated Circuit) Course Code: (USELT04)**

On completion of the course, students are able to:

1. Understand combinational and logical digital circuits and their differences.
2. Students will be introduced to Flip-flop, shifts register, counters for data Processing circuits.
3. To learn symbol, working principle of basic Digital electronics circuits for data processing application.
4. At the end of this course, students should be able to recognize and analyze the basic digital circuits.

### **B.SC. SEMESTER – III**

**Course Title: Paper-I (Power Amplifier, Oscillators and Power Supplies) Course Code: (USELT05)**

On completion of the course, students are able to:

1. To understand Basic Analog Circuits and their applications using Active Devices
2. To learn basic function of single stage amplifier, multistage amplifier and power Amplifier and their working principle.
3. To understand basic construction of feedback circuits and their application in Oscillators
4. Understand basic amplifier and oscillator circuits and their application in analog circuits.
5. To learn and design various regulated and unregulated Power supplies.

### **B.SC. SEMESTER – III**

**Course Title: Paper-II  
Microprocessor Course Code:  
(USELT06)**

On completion of the course, students are able to:

1. To understand the basic architecture of 8- bit microprocessors.
2. Able to write programs on 8085 microprocessor based systems.
3. Identify the addressing modes of an instruction.
4. Develop programming skills in assembly language.

### **B.SC. SEMESTER – IV**

**Course Title: Paper-I Communication  
Electronics Course code: (USELT07)**

On completion of the course, students are able to:

1. Understand different blocks in communication system and how noise affects communication using different parameters.
2. Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications.
3. Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes.
4. Identify different radio receiver circuits and role of AGC.
5. Basic concept of mobile communication System
6. Understand idea of GSM, CDMA, TDMA and FDMA technologies, GPS navigation system.

### **B.SC. SEMESTER – IV**

**Course Title: Paper-II (Interfacing, PPI devices and Microcontroller)  
Course Code: (USELT08)**

On completion of the course, students are able to:

1. Understand interfacing various Input and Output devices with 8085 Microprocessor.
2. Get Knowledge of various PPI Devices used in Microprocessor.
3. Ability to differentiate microprocessor and microcontroller
4. Draw and describe architecture of 8051 microcontroller
5. Write assembly language program for microcontrollers.
6. Design microcontroller based system for various applications

### **B.SC. SEMESTER – V**

#### **Course Title: Paper-I (Electronic Instrumentation) Course Code: (USELT09)**

On completion of the course, students are able to:

1. Learn various measuring Instruments like voltmeter, ammeter, ohmmeter and various dc bridges.
2. Understand the detailed block diagram of CRO
3. Understand the detailed applications of CRO for the measurement of Phase, frequency and phase.
4. Understand the concept of Transducers.
5. Understand the various types of Transducers.

### **B.SC. SEMESTER – V**

#### **Course Title: Paper-II (C-Programming-I) Course Code: (USELT10 DSE-01)**

On completion of the course, students are able to:

1. Understand basic of the programming language
2. Able to switch any other programming language
3. Able to write C program for simple real life applications using structures.

### **B.SC. SEMESTER – VI**

#### **Course Title: Paper-I (Photonic Devices and Power Electronics) Course Code: (USELT11 DSE-02)**

On completion of the course, students are able to:

1. Understand power semiconductor devices used in industries.
2. Understand the construction and working of different power semiconductor devices
3. Analyze various triggering circuits used for different semiconductor devices
4. Design power electronic circuit for real time application like rectifier and convertor etc.
5. Recognize the role power electronics play in the improvement of energy usage efficiency and the applications of power electronics in emerging areas.

### **B.SC. SEMESTER – VI**

#### **Course title: Paper-II**

**Course Code: (USELT12 DSE-03)**

On completion of the course, students are able to:

1. Understand the fundamentals of C programming.
2. Choose the loops and decision making statements to solve the problem.
3. Implement different Operations on arrays.
4. Use functions to solve the given problem.
5. Understand pointers, structures and unions.
6. Implement file Operations in C programming for a given application

**M. Sc. ELECTRONICS****Materials Research****Methods:**

On successful completion of this course the student are enabled with the Knowledge in Materials Research, Material Characterization.

**Biomedical Electronics**

After the successful completion of the course the student should have a throughout knowledge in Biomedical Electronic. He can handle various Instruments in Medical like ECG, EEG, EMG, Ultrasonography and many medical Instruments

**Embedded System**

On successful completion of this course the students should have the practical knowledge in Embedded system. He can design Microcontrollers and Microprocessors

**Fuzzy Logic and Artificial Neural Network**

On successful completion of this course the students can developed his logic. FuzzyLogic is used When one wants to deal with uncertainty of non-statistical kind. To capture humanistic understanding of processes and to develop a formal way to that. Fuzzy Logic is a decision making system

**‘C’ Programming**

This course aims to develop an understanding of the conceptual framework of Programming in C, C++. After the successful completion of the course the student acquires the knowledge in the Programming skill and decision making.

**Virtual Instrumentation**

On successful completion of this course the students provides knowledge on design of process control by using virtual instrumentation techniques. He acquires knowledge in process analysis by VI

**Project Work & Viva-Voce**

This gives practical exposure in the Project work, knowledge which will equip the students in Research work.

## **B.SC. SEMESTER – I**

### **Course Title: Paper – I (Microorganism, Algae, Fungi and Plant Pathology)**

#### **Outcomes:**

1. On completion of course students are able to understand:
2. Compare the relationships among plants and microbes
3. Know about viruses, mycoplasma, bacteria & cyanobacteria
4. Understand the diversity among Algae.
5. Study of cryptogams and phanerogams and its diversity
6. Know about the systematics, morphology, structure, economic importance of algae & fungi.
7. Compare viral, bacterial & fungal symptoms on plants
8. Know the prevention and control measures of plant diseases and its effect on economy of crops

## **B.SC. SEMESTER – I**

### **Course Title: Paper – II (Bryophyta, Pteridophytes, Gymnosperms & Paleobotany Outcomes:**

On completion of the course, students are able to understand

1. Learn about general character, classification and economic importance of the Bryophytes, Pteridophytes and Gymnosperms
2. Know the taxonomic position, occurrence, thallus structure & reproduction of Bryophytes
3. Concept of hererospory and seed habit
4. Knowledge about geological time scale, process of fossilization and type of fossils
5. Understand fossil gymnosperm of Glossopteris & Cycadeoidea
6. Know about external morphology, anatomy and reproduction of the Cycadales & Coniferales

## **B.SC. SEMESTER – I**

### **BOTANY LAB - I**

1. Students have good laboratory skill of handling of instruments
2. Student got knowledge slide preparation, observation and drawing diagram
3. Students perform practicals as per laboratory exercises in different areas Bacteria, Algae, Fungi, Lichen, Plant pathology, Bryophyta, Pteridophytes, Gymnosperms & Paleobotany

## **B.SC. SEMESTER – II**

### **Course Title: Paper – I (Morphology and Anatomy of Angiosperms)**

#### **Outcomes:**

1. Learn about vegetative and reproductive morphology of Angiosperms
2. Understand root apical, shoot apical meristem and tissue system



3. Students know knowledge about primary and secondary structure of angiosperm plants
4. Differences about anomalous secondary structure of stem roots and leaf

### **B.SC. SEMESTER – II**

#### **Course Title: Paper – II (Taxonomy and diversity of Angiosperms)**

##### **Outcomes**

1. Understand about primitive angiosperms (Magnolia) & fossil angiosperms
2. knows about classification of angiosperms and herbarium technique
3. Student identify, classify and naming of angiosperm plants. herbarium techniques
4. Enable the students to identify dicot and monocot families
5. Students are able to know about characteristic of various plants and its classification

### **B.SC. SEMESTER – II**

#### **BOTANY LAB - II**

1. Understand good laboratory practices and safety.
2. Acquired knowledge of plants through practical work in fields as well as in laboratory
3. Students described families, identify, classify, and naming of plants.
4. Students acquire fundamental botanical knowledge through practical.
5. Students gain practically knowledge about vegetative, reproductive morphology of Angiosperms and anatomy
6. Students acquired skill about herbarium sheet.

### **B.SC. SEMESTER – III**

#### **COURSE TITLE: PAPER – I - REPRODUCTIVE BIOLOGY OF ANGIOSPERMS, PLANT GROWTH AND DEVELOPMENT**

##### **Outcomes:**

On completion of course students able to understand

1. Understand about the vegetative and reproductive taxonomic characters of plants
2. Know about types of pollination and structure of embryo sac.
3. Classify endosperm, monocot and dicot embryo and its development
4. Know seed dormancy & its method to break seed dormancy
5. Students understand growth and development of plants
6. Know about plant growth regulators and plant movements.
7. Understand knowledge about physiology of flowering, photoperiodism, phytochromes, senescence and abscission

### **B.SC. SEMESTER – III**

#### **COURSE TITLE: PAPER – II PLANT BIOCHEMISTRY AND PHYSIOLOGY**

**Outcomes:**

1. To understand the properties & role of Monosaccharides, Oligosaccharides and Polysaccharides.
2. Students know about properties, structure and uses of fatty acids
3. Learn classification of amino acids and proteins structure
4. Student should understand basics of enzymology
5. Students will have a thorough knowledge of nitrogen metabolism and mineral nutrition
6. Understand plant water relations, Ascent of sap, transpiration and phloem transport
7. They will learn about theories of absorption of solute in plants: Active absorption & Passive absorption
8. They will be able to understand Photosynthesis & Respiration

**B.SC. SEMESTER – III****BOTANY LAB - III**

1. Students will acquire good laboratory skills to handling the different equipment's regarding practical of reproductive biology of angiosperms, plants growth and development, plant biochemistry and plant physiology.
2. Students got knowledge practically about plants description, seed dormancy and germination of pollen tube, embryo and endosperm development.

**B.SC. SEMESTER – IV****COURSE TITLE: PAPER – I CELL BIOLOGY, GENETICS AND BIOTECHNOLOGY OUTCOMES:**

1. Students know about the eukaryotic cell cycle, mitotic and meiotic cell division and DNA
2. Learn plant tissue cultures and regeneration.
3. Study the phenomenon of dominance, laws of segregation, independent assortment of genes, Interaction of genes
4. Students understand linkages & its types, complete and incomplete, significance.
5. They learn about theories, crossing over and variation in chromosome
6. They know about structural changes in chromosome and mutagens
7. Genetic Engineering- tools and techniques of Recombinant DNA technology

**B.SC. SEMESTER – IV****COURSE TITLE: PAPER – II -PLANT ECOLOGY OUTCOMES:**

1. Summarize the environmental factors like climatic, edaphic factors and biotic factors CO.2. Understand ecosystem, biogeochemical cycles environmental pollution
2. Compare autecology and synecology
3. Student knows plant succession, causes and climax concept CO.5. Understand phytogeographic regions of India

#### **B.SC. SEMESTER – IV**

##### **BOTANY LAB - IV**

By the end of this course, the students will be able to:

1. Identify different stages of mitosis and meiosis, slide preparation, observation of slide
2. Students perform practicals as per laboratory exercises in the areas of genetics and ecology
3. Solve Mendel's law of inheritance by using color beads
4. To get acquainted with tools of genetic engineering, laboratory equipments, apparatus and instruments in biotechnology laboratory
5. Students acquired knowledge practically by performing practical regarding tissue culture like explants, callus formation & seedling formation and technique of anther culture.
6. Study natural habitats of plants and identify ecological characters of hydrophytes, xerophytes, epiphyte & parasite.

#### **B.SC. SEMESTER – V**

##### **COURSE TITLE: (DSE-I)- PAPER-I - ECONOMIC**

##### **BOTANY- I OUTCOMES:**

1. Know about the scope of Economic Botany
2. Understand about botanical description, cultivation and their uses of various, Cereals, Legumes and Pulses of crop plants.
3. Gain knowledge about various plants of vegetables, sugar, fruits and its economic use.
4. Compare about the oil yielding plants and wild edible fruit plants.
5. Understand the role of the plants in human welfare.
6. Students get to know about origin, distribution, botanical description, cultivation and uses of fibers and for age yielding plants

##### **LABORATORY EXERCISES:**

1. Students have good laboratory skill to handle the various instruments

2. Make use of live and preserved specimens, plant parts, charts, pictures and Photographs of Food, Pulses, Vegetable, Fruit, Oil, Fiber and Forage yielding plants
3. Students perform practical as per laboratory exercises in the area Economic Botany

#### **B.SC. SEMESTER – IV**

#### **COURSE TITLE: (DSE-I) - PAPER-II - ECONOMIC**

#### **BOTANY- II OUTCOMES:**

1. Understand concept, scope and importance of economic botany
2. Students get to know about origin, distribution, botanical description, cultivation and uses of spices, condiments and beverages
3. Acquire knowledge about the gum, rubber and dye
4. Know about the cultivation process and uses of timber yielding plants and bamboo
5. Gain knowledge about the various type of medicinal and aromatic plants.
6. Students are able to understand medicine, essential oil and bio-fuels found in plants and used in human welfare

#### **LABORATORY EXERCISES:**

1. Students used of live or preserve specimens, plant parts, charts, pictures or photographs for study of plants.
2. Study economically important plants spices, condiments, beverages, gum, rubber, dye, timber, Bamboo, medicine, essential oil and bio-fuels
3. Perform biochemical tests for carbohydrates, proteins and fats
4. Demonstrate the technique for extraction of essential oil from *Citronella* oil (Lemon grass), plant material (Steam distillation)
5. Perform experiment procedures as per laboratory standards and demonstrate the technique for extraction of bio-fuel from *Jatropha curcus* plant material (Soxhlet Extraction Method)

#### **B.SC. SEMESTER – VI**

#### **COURSE TITLE: (DSE-II)- PAPER-I - PLANT**

#### **BIOTECHNOLOGY- I OUTCOMES:**

On completion of course students are able to understand:

1. Understand history about plant tissue culture.
2. Students get to know about the nutrient and hormone requirements in (MS, B5, and N6) media for tissue culture.
3. Understand concept about totipotency, differentiation, dedifferentiation, redifferentiation, regeneration, organogenesis, embryogenesis in the field of plant biotechnology.

4. Students know about various technique of tissue culture - Micropropagation, virus elimination, protoplast isolation, culture and fusion, Secondary metabolite production
5. Learn about the techniques of anther, pollen and ovary culture, production of haploids, triploids and hybrids, hardening of the tissue culture raised plants for field plantation, cryopreservation, germ plasm conservation

#### **LABORATORY EXERCISES:**

1. Students know about laboratory setup for plant tissue culture techniques.
2. Students to get acquainted with equipment's and instruments used in Plant Biotechnology laboratory.
3. Learn various sterilization methods employed in plant biotechnology laboratory.
4. Prepared Murashige and Skoog plant tissue culture medium.
5. To conduct surface sterilization and inoculation of different explants (leaf, nodal buds, seeds) from suitable plant for callus induction.
6. Demonstrate anther culture.
7. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of biotechnology

#### **B.SC. SEMESTER – VI**

#### **COURSE TITLE: (DSE-II) - PAPER-II - PLANT**

#### **BIOTECHNOLOGY- II OUTCOMES:**

On completion of course students are able to understand

1. Understand the principle and basic protocols for plant tissue culture Technique.
2. Students know about the direct methods of gene transfer (electroporation, microinjection, microprojectile bombardment, silicon carbide mediated)
3. Gain Knowledge about indirect method of gene transfer (*Agrobacterium*-mediated gene transfer and selection of transgenics)
4. Students aware about the biotechnological technique and its application for pest resistant, herbicide resistant plants, transgenic crops with improved quality traits (Golden rice), improved horticultural varieties (Moondust carnations)
5. Scientific knowledge about transgenic plants producing edible vaccines, biodegradable plastic, chloroplast transformation, biosafety concerns and ethics in the area of biotechnology.

#### **LABORATORY EXERCISES:**

1. Students demonstrate micro propagation from callus and explants.
2. Isolate and culture protoplasts.
3. Prepare suspension culture for secondary metabolite production.
4. Understand the different methods of direct gene transfer using models, charts, photographs, ppt, and video.

5. To Study steps involved in the production of Bt cotton, Golden rice through models, charts, photographs, ppt, video.
6. Students are able to understand the production of biodegradable plastic using models, chart, photographs, ppt, video.

### **M.SC. BOTANY SEMESTER I**

**Course Title: Paper I (Microbiology, Algae and Fungi)**

**Course Code: PSCBOTT01**

After successful completion of the course, students will be able to:

1. Understand history, structure and life cycle microorganism like Bacteria, Virus, Archaeobacteria and Eubacteria which is in daily life.
2. Know the diversity, systematics, structure, life cycle pattern, evolutionary trends, useful and harmful aspects of Algae and Fungi which create in research activities of subject.
3. Understand the Bacterial, Fungal and Viral diseases of plant and their control measure which is Use in their daily life.

### **M.SC. BOTANY SEMESTER I**

**Course Title: Paper II (Bryophytes and Pteridophytes)**

**Course Code: PSCBOTT02**

After successful completion of the course, students will be able to:

1. Understand the diversity, systematics, structure, life cycle pattern, evolutionary trends, uses and fossil history of Bryophytes.
2. Know the diversity, systematics, structure, life cycle pattern, evolutionary trends of Pteridophytes and Indian Pteridologist.

### **M.SC. BOTANY SEMESTER I**

**Course Title: Paper III (Gymnosperm and Paleobotany)**

**Course Code: PSCBOTT03**

After successful completion of the course, students will be able to:

1. Know the scope of Paleobotany, types of fossils, its role in global economy and geological timescale.
2. Understand the various fossil genera representing different fossil groups and their evolutionary trends.
3. Know the diversity, systematics, structure, life cycle pattern, evolutionary trends of
4. Gymnosperm.

### **M.SC. BOTANY SEMESTER I**

**Course Title: Paper IV (Cytology and Genetics)**

**Course Code: PSCBOTT04**

After successful completion of the course, students will be able to:

1. Know the Medels law and chromosomal theory of inheritance, genetic inheritance in plants.

2. Understand molecular structure of chromosome and chromatin organization.
3. Differentiate the structural and numerical changes in chromosome.
4. Learn the mutation and its role in crop improvement and epigenetics.

## **M.SC. BOTANY**

### **SEMESTER I BOTANY**

#### **PRACTICAL: I**

##### **Course Code: PSCBOTP01**

1. Students can differentiate the morphological and anatomical structure of Algae, Fungi, Bryophytes and Pteridophyte.
2. Students learn the symptomology of some diseased plants and Identification of fungal culture.
3. Students take interest in the field collection of Algae, Fungi, Bryophytes, Pteridophyte.

## **M.SC. BOTANY**

### **SEMESTER I BOTANY**

#### **PRACTICAL: II**

##### **Course Code: PSCBOTP02**

1. Students can distinguish the morphological and anatomical structure of Gymnosperm.
2. Students learn the various fossils of gymnosperm and their permanent slides.
3. Students visit to fossiliferous localities and collection of specimen.

## **M.SC. BOTANY SEMESTER II**

### **Course Title: Paper V (Plant Physiology and Biochemistry)**

#### **Course Code: PSCBOTT05**

After successful completion of the course, students will be able to:

1. Distinguish between the plant physiology like Photosynthesis and Respiration.
2. Know the importance of metabolism of Carbohydrates, Lipids, Amino acids, and Nitrogen.
3. Know the importance of the Sulfur and Phosphate assimilation of plant.
4. Understand Enzymology of plant.
5. Know the importance of solute transport and photo-assimilate translocation in plants.

## **M.SC. BOTANY SEMESTER II**

### **Course Title: Paper VI (Plant Development and Reproduction) Course Code: PSCBOTT06**

After successful completion of the course, students will be able to:

1. Differentiate the plant growth kinetics pattern of Shoot, Leaf, Root and Flower.
2. Understand the structure of Male Gametophyte, Female Gametophyte and mechanism Pollen-Pistil interaction and Fertilization.
3. They acquire the thorough knowledge of Seed development, Fruit growth, Germination and dormancy of

seed.

4. Differentiate the mechanism of Senescence and Programmed Cell Death.

### **M.SC. BOTANY SEMESTER II**

**Course Title: Paper VII (Cell and Molecular Biology-I)**

**Course Code: PSCBOTT07**

After successful completion of the course, students will be able to:

1. Know the structure and function of Cell wall, Plasma membrane and Plasmodesmata.
2. Understand the ultra structure and function of various Cellular organelles, Cell shape and motility.
3. Know the ultra structure of Nucleus, forms of DNA and DNA replication in prokaryotic and eukaryotic cell.
4. Understand the Molecular biology of stress responses.

### **M.SC. BOTANY SEMESTER II**

**Course Title: Paper VIII (Angiosperm-I)**

**Course Code: PSCBOTT08**

After successful completion of the course, students will be able to:

1. Know the Angiosperm morphology, floral symmetry and evolution of floral organ.
2. Understand the Angiosperm Taxonomy like Taxonomic evidences and Taxonomic tools.
3. Take interest in the Biosystematics for plant identification.

### **M.SC. BOTANY**

**SEMESTER II BOTANY**

**PRACTICAL: III**

**Course Code: PSCBOTP03**

1. Know the importance of the Enzyme activity and Carbohydrate, Chlorophyll, Protein content.
2. Students can distinguish the Anatomical detail of various parts of plant like Root, Stem and Leaf.
3. Students can acquire the practical knowledge of Gametogenesis, pollen tube germination and Pollen-Pistil interaction.
4. Students know the different type of endosperm, embryo sac and method of breaking seed dormancy practically.

### **M.SC. BOTANY**

**SEMESTER II BOTANY**

**PRACTICAL: IV**

**Course Code: PSCBOTP04**

1. Students can take interest in isolation of salivary gland chromosome, isolation of cell organelles like Chloroplast and Mitochondria practically.
2. Students can take interest in the flagellary staining, isolation of DNA and structure of cell.
3. Students know the differentiate the floral symmetry and differentiate the dicot and monocot flower.
4. Students can acquire the practical knowledge of the variation in stamens and carpel's, placentation and floral adaptation for pollination.



5. Students learn the anatomical, embryological, palynological, cytological feature of various taxa practically.

### **M.SC. BOTANY SEMESTER III**

**Course Title: Paper IX (Plant**

**Ecology) Course Code: PSCBOTT09**

After successful completion of the course, students will be able to:

1. Differentiate the Vegetation organization and Vegetation development .
2. Use Knowledge of Ecosystem organization and Air, Water, Soil Pollution in daily life.
3. Know the importance of Climate change and Ecosystem stability for healthy life on earth.

### **M.SC. BOTANY SEMESTER III**

**Course Title: Paper X (Cell and Molecular Biology-II)**

**Course Code: PSCBOTT10**

After successful completion of the course, students will be able to:

1. Know the Structure and function of Ribosome and mechanism of Transcription and Translation.
2. Understand the Gene structure and mechanism of gene expression and Protein sorting.
3. Differentiate the Genome organization in prokaryotic and eukaryotic organism.
4. Understand the Genetic recombination, genetic mapping, cell cycle and apoptosis at molecular
5. level.
6. Acquire through knowledge of the Signal transduction and Techniques in cell biology.

### **M.SC. BOTANY SEMESTER III**

**Course Title: Paper XI (Paleobotany-I)**

**Course Code: PSCBOTT11**

After successful completion of the course, students will be able to:

1. Know the importance of the science of Petrology, Geological time scale and Fossilization.
2. Know the types and techniques of fossil study.
3. Differentiate the fossil members of Pteridophyte.

### **M.SC. BOTANY SEMESTER III**

**Course Title: Paper XII (Basic Botany-I)**

**Course Code: PSCBOTT12**

After successful completion of the course, students will be able to:

1. Know the Diversity of cryptogams.
2. Understand the Diversity of phanerogams.
3. Know the morphology of angiosperm.
4. Understand the anatomy of angiosperm.

## **M.SC. BOTANY**

### **SEMESTER III BOTANY**

#### **PRACTICAL: V**

##### **Course Code: PSCBOTP05**

1. Students learn the distribution pattern of different plant species by Quadrate method practically.
2. Students take interest in the analysis of soil for CO<sub>3</sub>, NO<sub>3</sub> practically.
3. Students take interest in the analysis of water for BOD, COD, O<sub>2</sub>, and CO<sub>2</sub> practically.
4. Students can understand the adaptation of plant of Hydrophytic, Xerophytic and Halophytic zones through these plants practically.
5. Students learn the Isolation of nuclei and identification of histones by SDS-PAGE practically.
6. Students learn the isolation of Chloroplast and demonstration of two subunits of RUBISCO by SDS-PAGE.
7. Acquire knowledge of the in vitro transcription, translation and conjugation practically.
8. Students learn the presence of specific antigen by ELISA practically.
9. Students can isolate RNA and quantify it by spectrophotometric method.

## **M.SC. BOTANY**

### **SEMESTER III BOTANY**

#### **PRACTICAL: VI**

##### **Course Code: PSCBOTP06**

1. Students learn the different technique of study fossil and see different types of fossil practically.
2. Students see practically the different types of Pteridophyte fossil.
3. Students work on the Stratigraphy and Geological Maps of India.
4. Students know the importance of Geological time scale and see different types of rocks practically.

## **M.SC. BOTANY SEMESTER IV**

### **Course Title: Paper XIII (Plant Biotechnology)**

#### **Course Code: PSCBOTT13**

After successful completion of the course, students will be able to:

1. Acquire knowledge of the Recombinant DNA technology and Genetic engineering of plant.
2. Differentiate the Microbial genetic manipulation, Genomics and proteomics.
3. Know the importance of Plant tissue culture and transgenic production.
4. Have knowledge of the Bioinformatics, Database, Data analysis, prediction and submission tools
5. and their uses.

## **M.SC. BOTANY SEMESTER IV**

### **Course Title: Paper XIV (Angiosperms-II)**

#### **Course Code: PSCBOTT14**

After successful completion of the course, students will be able to:

1. Know the importance of the floral variation, evolution and affinities of different family.
2. Have through knowledge of the probable ancestors of angiosperm, speciation and extinction, IUCN

categories of threat.

3. Understand the Biological diversity concept and level, Endemism, Hot spot and local plant diversities and socioeconomic importance.

#### **M.SC. BOTANY SEMESTER IV**

**Course Title: Paper XV (paleobotany-II)**

**Course Code: PSCBOTT15**

After successful completion of the course, students will be able to:

1. Differentiate the fossils members of Gymnosperm.
2. Understand the formation of Deccan trap and Intertrap, age and its floristic composition in relation to Pteridophyte, Gymnosperm and Angiosperm.
3. Know the difference between Paleopalynology, Paleoecology and paleogeography.
4. Understand the Indian Gondwana- its stratigraphy and classification.

#### **M.SC. BOTANY SEMESTER IV**

**Course Title: Paper XVI (Basic Botany-II)**

**Course Code: PSCBOTT16**

After successful completion of the course, students will be able to:

1. Know the Plant physiology.
2. Understand the Ecology and evolution plant.
3. Understand importance of the Economic botany.
4. Know the importance of the Paleobotany.

#### **M.SC. BOTANY**

##### **SEMESTER IV BOTANY**

##### **PRACTICAL: VII**

**Course Code: PSCBOTP07**

1. Students take interest in studying the Growth characteristics of E.coli using plating method practically.
2. Students learn the Isolation of plasmid from E.coli practically.
3. Students learn the isolation of protoplast and determine its viability practically.
4. Students take interest in the preparation of media for plant tissue culture.
5. Students learn to write the description of locally available families.
6. Students learn to use the location of key characters and preparation of keys at generic and family level practically.
7. Students use the floras for identification of plants.
8. Students know the Deccan Intertrappean flora of India. Pteridophytes, Gymnosperm and Angiosperm-

flowers and fruits.

9. Students know the important features of spores and pollen morphology by maceration technique.

**M.SC. BOTANY**

**SEMESTER IV BOTANY**

**PRACTICAL: VIII**

**Course Code: PSCBOTP08**

1. Students do their Project work and acquire the skill of taking observation in the field which develop their critical thinking.

## **DEPARTMENT OF MATHEMATICS**

### **B.SC. SEMESTER – I**

**Course Title: Paper I (Differential and Integral Calculus) Course Code: USMT-01**

This course will enable the students to:

1. State theorems on limits and continuity.
2. State and prove Mean value theorem.
3. Know statement of Roll's theorem and its proof.
4. Recognize Beta and Gamma function and its properties.
5. Recognize and solve double integration and its properties

### **B.SC. SEMESTER – I**

**Course Title: Paper II (Differential Calculus and Trigonometry) Course Code: USMT-02**

This course will enable the students to:

1. Acquire the basic knowledge of Partial differentiation, Differential and Chain rule
2. Familiarized with Homogeneous function, Euler's theorem and Taylor's theorem for function of two variable.
3. Distinguish between tracing of curves and tracing of curves in Cartesian form.
4. Understand how to prove De Moivre's theorem and its application.
5. Understand the Circular and Hyperbolic function.
6. Appreciate the beauty of the  $C + iS$  method

### **B.SC. SEMESTER – II**

**Course Title: Paper I (Ordinary Differential Equation and Difference Equation )  
Course Code: USMT-03**

This course will enable the students to:

1. Understand basic properties of differential equations, Orthogonal trajectories, Linear differential equations.
2. Apart from this the students will able to solve ODE by Transformation of the equation by changing the dependent variable/ the independent variable.

3. Solution by operators of nonhomogeneous linear differential equations.
4. Understand formation of Difference equation, Order of difference equation and homogeneous linear equation with constant coefficient.

### **B.SC. SEMESTER – II**

**Course Title: Paper II (Partial Differential Equation)**

**Course Code: USMT-04**

This course will enable the students to:

1. Apply a range of techniques to solve first & second order partial differential equations.
2. Learn solution of homogeneous partial differential equation with constant coefficients .
3. Know solution of Non-homogeneous partial differential equation and equation reducible to linear partial differential equation with constant coefficient.
4. Learn classification of second order partial differential equation.

### **B.SC. SEMESTER – III**

**Course Title: Paper I (Real Analysis)**

**Course Code: USMT-05**

This course will enable the students to:

1. Understand many properties of the real line  $\mathbb{R}$  and learn to define sequence in terms of functions from  $\mathbb{R}$  to a subset of  $\mathbb{R}$ .
2. Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
3. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
4. Learn some of the properties of Riemann integrable functions, and the applications of the fundamental theorems of integration

### **B.SC. SEMESTER – III**

**Course Title: Paper II (Set Theory And Laplace Transform)**

**Course Code: USMT-06**

This course will enable the students to:

1. Learn basic facts about the cardinality of a set.
2. Know Dirac delta function, Laplace transforms and its properties.
3. Solve ordinary differential equations using Laplace transforms.
4. Know Convolution theorem and solution of differential equation and partial differential equations.

### **B.SC. SEMESTER – IV**

**Course Title: Paper I (Algebra )**

**Course Code: USMT-07**

The course will enable the students to:

1. Recognize the mathematical objects called groups.
2. Link the fundamental concepts of groups and symmetries of geometrical objects.
3. Explain the significance of the notions of cosets, normal subgroups, and factor groups
4. Analyze consequences of Lagrange's theorem.
5. Learn about structure preserving maps between groups and their consequences
6. Recognize and use the Sylow theorems to characterize certain finite groups.

**B.SC. SEMESTER – IV****Course Title: Paper II (Elementary Number Theory )****Course Code: USMT-08**

This course will enable the students to:

1. Learn about some important results in the theory of numbers including the prime number theorem, Chinese remainder theorem, Wilson's theorem and their consequences.
2. Learn about Congruence. properties of congruence, Chinese remainder theorem and Goldbach conjuncture.
3. Familiarize with modular arithmetic and find primitive roots of prime and composite numbers.

**B.SC. SEMESTER – V****Course Title: Paper I ( Linear Algebra )****Course Code: DSC-I**

After successful completion of course, a student will be able to:

1. Recognize the concepts of the terms span, linear independence, basis, and dimension, and apply these concepts to various vector spaces and subspaces.
2. Analyze finite and infinite dimensional vector spaces and subspaces over a field and their properties, including the basis structure of vector spaces.
3. Use matrix algebra and the related matrices to linear transformations.
4. Compute and use eigenvectors and eigenvalues.
5. Compute inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization.

**B.SC. SEMESTER – V****Course Title: Paper II ( Special relativity-  
I) Course Code: DSC-IV**

After successful completion of course, a student will be able to:

1. Understand the basic elements of Newtonian mechanics including Michelson-Morley experiment and

geometrical interpretations of Lorentz transformation equations.

2. Learn about postulates of special relativity theory.
3. Analyze Study 4-dimensional Minkowskian space-time and its consequences.
4. Understand equations of motion as a part of relativistic mechanics.
5. Recognize geometrical representation space time, four vectors and four tensors in Minkowskin space time.

### **B.SC. SEMESTER – VI**

**Course Title: Paper I (Complex Analysis and Vector Calculus) Course Code: DSC-VI**

After successful completion of course, a student will be able to:

1. Working knowledge of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
2. Analyze harmonic function and Mobius transformation.
3. Apply complex integration, Cauchy's integral theorem and Cauchy's integral formula.
4. Determine gradient, divergence and curl.
5. Know about Green, Gauss and Stokes theorem and problem based on these.

### **B.SC. SEMESTER – VI**

**Course Title: Paper II ( Special relativity - II) Course Code: DSC-VIII**

After successful completion of course, a student will be able to:

1. Understand basic properties of Tensor analysis
2. Realize importance of Christoffels symbols, Transformation Christoffels symbols ,covariantderivatives and Geodesics and curvature, Ricci, Einstein tensor
3. Apply various tests to determine Relativistic Mechanics.
4. Analyze propogation of electric and magnetic field strength.
5. Understand Maxwell's equation in vacuum, The electromagnetic field tensor Maxwell's equation in tensor form.

### **M.SC. MATHEMATICS**

**SEMESTER – I COURSE TITLE:**

**ALGEBRA-I**

**COURSE CODE: PSCMTHT01**

Upon completion of this course, the student will be able to:

1. The concept of permutation group, group of symmetry, dihedral group, automorphisms, conjugacy and G-Sets.
2. Students will observe how so much theory can be developed from just a few simple axioms that define group



and ring.

3. They will understand the importance of normal series, solvable groups, nilpotent groups, cyclic decomposition of permutation groups, alternating groups.
4. Knowledge of this course can help students to read field theory, another basic concept of Modern algebra, in the next semester

## **M.SC. MATHEMATICS**

### **SEMESTER – I COURSE TITLE:**

#### **REAL ANALYSIS-I COURSE**

#### **CODE: PSCMTHT02**

Upon completion of this course, the student will be able to:

1. Understand basic properties of uniform convergence and continuity, uniform convergence and integration, uniform convergence and differentiation, The Stone-Weierstrass theorem.
2. Know contraction principle. The inverse and implicit function theorem, the rank theorem.
3. They will understand the topological manifolds, differential manifolds, real projective space, Grassman manifolds, differentiable functions and mapping.
4. Recognize the rank of mapping, immersion, sub manifolds, lie groups and examples of Lie groups.

## **M.SC. MATHEMATICS**

### **SEMESTER – I COURSE**

#### **TITLE: TOPOLOGY-I COURSE**

#### **CODE: PSCMTHT03**

After completing this course, the student will be able to:

1. Understand countable and uncountable sets, examples and related theorem, cardinal numbers and related theorems, Topological spaces and examples
2. Discuss open set and limit point, derived sets, closed set and closure operators, interior, exterior and boundary operators, bases and relative topologies.
3. Study connected sets and components, compact and countably compact spaces, continuous functions and homeomorphisms.
4. Recognize the axioms of countability, separability, regular and normal spaces.

## **M.SC. MATHEMATICS SEMESTER – I**

### **COURSE TITLE: LINEAR ALGEBRA AND DIFFERENTIAL**

#### **EQUATIONS COURSE CODE: PSCMTHT04**

1. Define Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.
2. Discuss the linear transformations, rank, nullity.
3. Find the characteristic equation, eigen values and eigen vectors of a matrix.

4. To know homogeneous linear system, A non-homogeneous equation, higher order system, the primary decomposition, The S+N decomposition, Nilpotent canonical forms.
5. To Learn Jordan and real canonical forms, canonical forms and differential equations, Higher order linear equations on function spaces, Hyperbolic flows, Generic properties of operators, Significance of genericity.

**M.SC. MATHEMATICS SEMESTER – I**

**COURSE TITLE: NUMERICAL**

**ANALYSIS COURSE CODE:**

**PSCMTHT05**

Upon completion of this course, the student will be able to:

1. Understand the errors, source of error and its effect on any numerical computations and also analysis the efficiency of any numerical algorithms.
2. Learn how to obtain numerical solution of nonlinear equations using bisection, secant, Newton and fixed-point iterations methods and convergence analysis of these methods.
3. Solve linear and nonlinear systems of equations numerically.
4. Apply numerical methods to find eigen value and eigen vectors.
5. Handle the functions and data set using interpolation and least square curves.
6. Evaluate the integrals numerically.
7. Learn how to solve initial and boundary value problems numerically.

**M.SC. MATHEMATICS SEMESTER –**

**II COURSE TITLE: ALGEBRA -II**

**COURSE CODE: PSCMTHT06**

Upon completion of this course, the student will be able to:

1. Understand the concepts of unique factorization domains, Principal ideal domains, Euclidean domains, polynomial rings over unique factorization domains.
2. Understand irreducible polynomials and Eisenstein criterion, adjunction of roots, normal extensions and multiple roots.
3. Understand the concepts of fundamental theorem of Galois theory and fundamental theorem of algebra.
4. Find the roots of unity and cyclotomic polynomials, cyclic extensions, polynomials solvable by radicals, Ruler and compass constructions.

**M.SC. MATHEMATICS**

**SEMESTER – II COURSE TITLE:**

**REAL ANALYSIS -II COURSE**

**CODE: PSCMTHT07**

Upon completion of this course, the student will be able to:

1. Understand how Lebesgue measure on  $\mathbb{R}$  is defined, Littlewoods three principles.
2. Understand basic properties are measurable functions,

3. Understand convex function, Riesz-Fischer theorem, bounded linear functions on  $L_p$ - spaces.
4. Know the basic convergence theorems for the Lebesgue integral,
5. Understand the compact metric spaces, Baire category theorem, Arzela Ascoli theorem, Locally compact spaces, Sigma compact spaces.

### **M.SC. MATHEMATICS**

#### **SEMESTER – II COURSE**

#### **TITLE: TOPOLOGY-II COURSE**

#### **CODE: PSCMTHT08**

After completing this course, the student will be able to:

1. Understand Urysohn's lemma, Tietze extension theorem, Compactness for metric spaces, properties of metric spaces.
2. Know quotient topology, Nets and filters.
3. Study product topology.
4. Understand locally finite topological spaces, paracompact spaces, Urysohn's metrization theorem.

### **M.SC. MATHEMATICS SEMESTER –**

#### **II COURSE TITLE: CLASSICAL**

#### **MECHANICS COURSE CODE:**

#### **PSCMTHT09**

After completing this course, the student will be able to:

1. Understand Variational Principle.
2. Analyze the Derivation of Lagrange's Equations from Hamilton's Principle and Extension of Hamilton's Principle to Non-holonomic Systems.
3. Study the concept of the Legendre transformations and the Hamilton equation of motion, the Hamiltonian formulation of relativistic mechanics
4. Understand the principle of least action.
5. Understand the equation of canonical transformation and examples of canonical transformation, Poisson bracket and other canonical invariants.
6. Know the equation of motion, Infinitesimal canonical transformation and conservation theorem in the Poisson bracket formulation.

### **M.SC. MATHEMATICS SEMESTER –**

#### **II COURSE TITLE: DIFFERENTIAL**

#### **GEOMETRY COURSE CODE:**

#### **PSCMTHT10**

After completing this course, the student will be able to:

1. Understand the definition of surface, curves on a surface, helicoids Intrinsic properties, Geodesics.
2. Learn to normal property of geodesics, existence theorems, geodesics curvature. Gauss Bonnet theorem.
3. Understand second fundamental form, principle curvature, lines of curvature.

4. Know compact surfaces whose points are umbilics, Gaussian or mean curvature, two dimensional Riemannian manifolds.

**M.SC. MATHEMATICS SEMESTER –  
III COURSE TITLE: COMPLEX  
ANALYSIS**

**Core Paper-XI**

After completing this course, students are expected to be able to:

1. Understand impossibility of ordering complex number, Extended Complex numbers and stereographic projection. Properties and example of Analytic function.
2. Know analytic function as mappings, Mobius transformation, power series representation of analytic function.
3. Study Cauchy 's theorem and integral formula the homotopic version of cauchy's theorem and simple connectivity, counting zero's , Goursat's theorem and classification of singularities.
4. Know the maximum principle Schwarz's lemma, Convex function and Hadamard's three circles theorem, Phragmen-lindel of theorem .

**M.SC. MATHEMATICS SEMESTER –  
III COURSE TITLE: FUNCTIONAL  
ANALYSIS**

**Core Paper- XII**

After completing this course, the student will be able to:

1. Understand normed spaces, Banach spaces , properties of normed spaces, finite dimensional normed spaces and subspaces, compactness in finite dimension, bounded and continuous linear operators.
2. Know linear functional, normed spaces of operators, dual spaces, inner product space, properties of inner product spaces, Hilbert space orthonormal sets and sequences .
3. Understand representation of functionals on Hilbert spaces, reflexive spaces.
4. Study category theorem, uniform boundedness theorem, strong and weak convergence, convergence of sequences of operators and functionals .

**M.SC. MATHEMATICS SEMESTER –  
III COURSE TITLE: MATHEMATICAL  
METHODS**

**Core Paper- XIII**

After completing this course, the student will be able to:

1. Study fourier integral theorem, Fourier theorem, Fourier cosine and sine transform, solution of partial differential equation by means of Fourier transform.
2. Understand the calculation of Laplace transform of some elements function, the convolution of two functions inverse formula for the laplace transform.

3. Solve ordinary differential equation by laplace transform.
4. Study finite Fourier transform, Finite sturm-Liouville transform, generalized finite Fourier transform.
5. Understand finite Hankel transform, finite Legendre transform, and finite Mellin transform.

**M.SC. MATHEMATICS**

**SEMESTER – III COURSE TITLE:**

**GENERAL RELATIVITY-I CORE**

**ELECTIVE PAPER- XIV**

After completing this course, the student will be able to:

1. Understand the tensor formula, Riemannian geometry, curvature tensor.
2. Learn about the principle of covariance, the principle of equivalence, geodesic principle.
3. Study Newton's equations of motion as an approximation geodesic equations.
4. Understand gravitational field equations in free space.
5. Find Weyl's solution of linearized field equations, Interior Schwarzschild's solution.

**M.SC. MATHEMATICS SEMESTER –**

**III COURSE TITLE: OPERATIONS**

**RESEARCH I FOUNDATION PAPER--**

**XV**

After completing this course, the student will be able to:

1. Study simplex method, theory of simplex method, duality, dual simplex method.
2. Understand the mathematical tools that are needed to solve optimization problems.
3. Solve transportation and assignment problems.
4. Study dynamic programming.
5. Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes.

**M.SC. MATHEMATICS**

**SEMESTER – IV COURSE**

**TITLE: DYNAMICAL SYSTEMS**

**CORE PAPER XVI**

After completing this course, students are expected to be able to

1. Understand dynamical systems and vector fields, the fundamental theorem, the flow of a differential equation.
2. Learn nonlinear sink, gradient and inner product.
3. Study limit sets, the Poincare Bendixson theorem and its application.
4. Know asymptotic stability of closed orbit.

**M.SC. MATHEMATICS SEMESTER – IV**

**COURSE TITLE: PARTIAL DIFFERENTIAL EQUATIONS CORE PAPER -XVII**

After completing this course, students are expected to be able to

1. Study first order partial differential equations in two independent variables and the Cauchy problems.
2. Understand classification of second order partial differential equations.
3. Study the diffusion equation and parabolic differential equations.
4. Know wave equation and its application.

**M.SC. MATHEMATICS SEMESTER – IV COURSE TITLE: INTEGRAL EQUATIONS CORE PAPER -XVIII**

After completing this course, students are expected to be able to

1. Learn preliminary concept of integral equations.
2. Study Fredholm equation.
3. Obtain solutions of integral equations with Green's function type kernels.
4. Know types of Volterra equations.
5. Understand approximate methods of solutions for linear integral equations.

**M.SC. MATHEMATICS SEMESTER – IV COURSE TITLE: GENERAL RELATIVITY -II CORELECTIVE PAPER -XIX**

After completing this course, students are expected to be able to

1. Understand static cosmological models of Einstein and de sitter and their derivation its properties.
2. Study cosmological principle.
3. Know density and pressure of the present universe.
4. Realize galaxy count.

**M.SC. MATHEMATICS SEMESTER – IV COURSE TITLE: OPERATIONS RESEARCH -II FOUNDATION PAPER -XX**

Upon successful completion of this course, the student will be able to:

1. Understand integer programming.
2. Study queuing theory and sequencing
3. Understand non-linear programming.
4. Study quadratic programming, fraction programming and goal programming.

## **DEPARTMENT OF ZOOLOGY**

### **B.SC. SEMESTER – I**

**Course Title: Paper I (Animal diversity of non-chordate) Course Code: USZOT01**

After successful completion of the course, students will be able to:

1. Understand the general characters and classification up to classes of phylum Protozoa to Annelida.
2. Distinguish Locomotory organs, locomotion, Nutrition and Reproduction in Protozoa.

3. Understand the structure and Life history of Obelia, Taenia solium, Ascaris lumbricoides .
4. Have a detailed knowledge of systems i.e. Digestive, Nervous and Reproductive system of Hirudinaria.
5. Understand the concept of Canal system in Sycon.

### **B.SC. SEMESTER – I**

**Course Title: Paper II (CELL BIOLOGY) Course Code: USZOT02**

After successful completion of the course, students will be able to:

1. Understand the concept of Cell theory, Protoplasmic theory, and Organismal theory and distinguish the Prokaryotic and Eukaryotic cell.
2. Have a detailed knowledge of cell organelles (Nucleus, Mitochondria, Endoplasmic reticulum, Golgi complex, Lysosomes, and Ribosomes).
3. Understand the occurrence, position and morphology, Ultrastructure, Composition and function of Nuclear membrane, nuclear pore complex.
4. Have the knowledge of Structure and type of Chromosomes.
5. Understand the concept of Cell cycle and their different phases i.e. Mitosis and meiosis.

### **B.SC. SEMESTER – I**

#### **ZOOLOGY LAB - I**

**Course Code: USZOP01**

1. Students will have good laboratory skills, enabling them to take observations and
2. measurements in a zoology laboratory and analyze the results to draw valid conclusions.
3. Students will adopt the skill of draw the neat and clean well labeled diagram.

### **B.SC. SEMESTER – II**

**Course Title: Paper I (ANIMAL DIVERSITY OF NON-CHORDATE)**

**Course Code: USZOT03**

After successful completion of the course, the students will be able to:

1. Have a detailed knowledge of general characters and classification upto the classes of the phylum Arthropoda to Hemichordata.
2. Distinguish the external morphology, digestive system, nervous system, Reproductive system of Periplaneta and Pila.
3. Have the detailed knowledge of Regeneration and Autotomy in Echinoderm
4. Understand the concept of pearl formation.

### **B.SC. SEMESTER – II**

**Course Title: Paper II (Genetics and Evolution)**

**Course Code: USPHT04**



After successful completion of the course, the student is expected to:

1. Understand the concept of Genetics in detailed.
2. Have the knowledge of Syndrome and their symptoms, concept of the gene mutation.
3. They get information about the major events in History of life and their related theory, and the evidence of Evolution.
4. They will be able to understand processes of the evolutionary changes.

### **B.SC. SEMESTER – II**

#### **ZOOLOGY LAB – II**

**Course Code: USPHP02**

1. Students will acquire good laboratory skills to perform the experiment of Genetics.
2. Students will learn the use various apparatus to take the measurements up to the marks.
3. Student will able to take observations of the different picture of Adaptive radiation and different type of Evolution.

### **B.SC. SEMESTER – III**

**Course Title: Paper I (ANIMAL DIVERSITY AND COMPARATIVE ANATOMY)**

**Course Code: USCZOT05**

After successful completion of the course, the student is expected to:

1. Have the detailed knowledge of the general characters and classification up to the order of the phylum Urochordata, Amphibia, Reptilia, Aves and Mammals.
2. Understand the Osmoregulation and Accessory respiratory organ of the fish..
3. realize the importance of the snake venom and the uses in the medical industry
4. Understand the whole concept of the comparative anatomy.

### **B.SC. SEMESTER – III**

**Course Title: Paper II (PHYSIOLOGY AND BIOCHEMISTRY- I)**

**Course Code: USCZOT06**

The completion of this course will enable the students to:

1. Understand the concept of the Metabolism.
2. Study the general properties and classification of enzymes.
3. Understand the concept of Nutrition and Digestion and the structure and function of the digestive gland.
4. Study the Mechanism of Respiration, Respiratory pigment and their type, distribution and properties.
5. Have the detailed of the Respiratory disorders and effect of smoking.

### **B.SC. SEMESTER – III**

#### **ZOOLOGY LAB – III**

**Course Code: USZOP03**

1. Students will acquire good laboratory skills to handle and focus the microscope.

2. Student will able to take Anatomical observation and skeleton of the Rabbit and fowl.
3. Students will adopt the skill of permanent stained micro preparation. SEMESTER-IV

#### **B.SC. SEMESTER – IV**

**Course Title: Paper I (Developmental Biology)**

**Course Code: USCZOT07**

After successful completion of the course, the students will be able to:

1. Understand basic concept of Early Development.
2. They will get detailed knowledge about the Frog and Chick Embryology.
3. Get detailed information about the concept Mammalian development.
4. Differentiate Spermatogenesis and Oogenesis; understand the structure of Sperm and Ovum.
5. Understand and explain the Whole concept of In-vitro Fertilization.

#### **B.SC. SEMESTER – IV**

**Course Title: Paper II (Physiology and Biochemistry-II)**  
**Course Code: USCZOT08**

The completion of this course will enable the students to:

1. Have knowledge about the whole concept of the Excretion and apply the above knowledge in our daily life.
2. Understand the Concept of Endocrinology and Reproduction.
3. Get detailed information of Nerves and muscles physiology.
4. Understand the whole concept of the Circulatory system of Human body.

#### **B.SC. SEMESTER – IV**

**ZOOLOGY LAB – IV**

**Course Code: USZOP04**

1. Students will observe the slides of Frog and Chick embryology.
2. Student will able to take observations and measurements in a zoology laboratory.
3. They adopt the skill of Permanent stained Micro preparation.

#### **B.SC. SEMESTER – V**

**Course Title: Paper I (PARASITOLOGY)**

**Course Code: USCZOT09**

After successful completion of the course, the students will be able to:

1. Understand the concept of the Parasitism, life cycle, pathogenicity and treatment.
2. Establish connection between parasites in our daily life.
3. Understand the concept of the parasites which is responsible for the diseases found in our daily life.

4. Study the Zoonotic diseases and pathogenicity and vectors as disease transmitters.

#### **B.SC. SEMESTER – V**

**Course Title: Paper II (AQUATIC BIOLOGY) Course Code: USCZOT12**

After successful completion of the course, the students will be able to:

1. Understand the different types of the Zones and applications in various fields.
2. Understand the concept and identification of Zooplankton.
3. Have the detailed knowledge of the physic-chemical characters of the different types the lakes.
4. Understand the concept of the Adaptation of deep sea organism..

#### **B.SC. SEMESTER – V**

**ZOOLOGY LAB V:**

**Course Code: USCZOP08**

1. Students will have a thorough laboratory skills enabling them to take observations and measurements in a zoology laboratory and to analyze its results.

#### **B.SC. SEMESTER-VI**

**Course Title: Paper I (Medical Diagnostics) Course Code: SEC**

After successful completion of the course, the students will be able to :

1. Know the Blood composition and detailed information about the Blood group.
2. Get the detailed information about the Physical characteristics and Constituent of urine.
3. Get the information about the Disease Tuberculosis and Hepatitis and their causes, types, symptoms, diagnosis and prevention.
4. Know the concept of the types of tumours and Medical imaging.

#### **B.SC. SEMESTER-VI**

**Course Title: Paper II (Public health and Hygiene) Course Code: 6S-PHY 602**

The completion of this course will enable the students to:

1. Understand the importance of the personal, community health, Environmental Hygiene and government and its policies for public health.
2. Know the concept of the TB, Polio, diphtheria, tetanus, MMR, Diarrhoea, Typhoid and Vaccination and sterilization programmes...
3. Understand need of social programmes i.e. Family planning, child obesity, malnutrition.
4. Familiar with Hygiene education in communities and their importance.

## **B.SC.**

### **SEMESTER-VI ZOOLOGY LAB**

#### **VI:**

#### **Course Code: SEC**

1. Students will have a good laboratory skills, enabling them to take observations in a zoology laboratory.
2. Students will be able to prepare the chart or posters related to health.

### **M.SC. ZOOLOGY SEMESTER - I**

#### **Course Title: Structure and function of Invertebrates**

Upon completion of this course, the student will be able to:

1. Understand the concept of Ultrastructure of protozoan, locomotory organ, Polymorphism and metamorphosis..
2. Student will able to explain the Reproductive system of Dugesia, Fasciola, Taenia and Ascaris, and formation, Evolution and significance of coelom..
3. They will understand the structure, affinities and taxonomic position of Peripatus, Neopilina and Respiratory organ in Arthropoda...
4. Students will get the detailed knowledge about the water vascular system, Metamorphosis and phylogenetic significance in Echinodermata.

### **M.SC. ZOOLOGY SEMESTER - I**

#### **Course Title: General Physiology**

Upon completion of this course, the student will be able to:

1. Understand the whole concept of Enzymes, Respiratory pigment, Neurotransmitters, Colour change mechanism.
2. They will able to do the comparative study of the term Thermoregulation and Osmoregulation..
3. They will understand the Myogenic and neurogenic heart, Digestion and absorption of carbohydrate, protein and Lipids.
4. They will get the detailed knowledge about the hydro mineral metabolism, Cerebrospinal
5. fluid, mechanism of reflex action and Physiology of environmental stress and strain..

### **M.SC. ZOOLOGY SEMESTER - I**

#### **Course Title: Cell Biology and Genetics**

After completing this course, the student will be able to:

1. Understand and discuss the topic Structural organization and function of Cell organelles, cell division and cell cycle.
2. Able to explain and give demonstration of the topic Cell signaling, Cellular communication and disease Cancer..

3. Solves the problems based on the Mendelian, non- Mendelian inheritance and get the knowledge on the topic Mutation.
4. Know the detailed concept about Structural and numerical alteration of chromosomes, microbial genetics and human genetics..

### **M.SC. ZOOLOGY SEMESTER - I**

#### **Course Title: Advanced Reproductive Biology**

1. Define the various methods of asexual and sexual reproduction in protozoa, Regeneration in Hydra, Digestion and Annelid worms. Metamorphosis and mechanism of vitellogenesis in Insect.
2. Discuss the Spermatogenesis and oogenesis, cytological and , molecular event of fertilization..
3. Get detail knowledge about the Male accessory sex gland in mammals, Semen and Pheromones and sexual behavior in mammals.
4. Understand the neurohormonal control of fish reproduction and mechanism of vitellogenesis ,molecular induction and organizer concept.
5. Give demonstration and presentation on the topic Cryopreservation of gametes, embryo and test-tube baby and discuss about the In-vitro fertilization and its significance.

### **M.SC. ZOOLOGY SEMESTER - I**

#### **ZOOLOGY LAB I:**

1. Students will have good laboratory skills, enabling them to take observations and
2. Measurements in a zoology laboratory and analyze the results to draw valid.
3. Students will adopt the skill of draw the neat and clean well labeled diagram.
4. Developed the Practical skill based on the Cell biology, Genetic and Advanced Reproductive biology.

### **M.SC. ZOOLOGY SEMESTER - II**

#### **Course Title: Structure and Function of Vertebrates.**

Upon completion of this course, the student will be able to:

1. Understand the origin and ancestry of Chordate, General organization and affinities of Cephalochordata and Dipnoi...
2. Learn and discuss organ and mechanism of respiration in Pisces and Amphibia , Appendicular skeleton in Amphibia, Reptilia, Aves and Mammals.
3. Get the knowledge Evolution of urinogenital organ in vertebrates, origin of birds.
4. Understand the concept of comparative anatomy of the brain invertebrates.
5. Give the demonstration on the Evolution of heart in vertebrates and sense organ in vertebrates, Evolution of Man.

## **M.SC. ZOOLOGY SEMESTER - II**

### **Course Title: Comparative Endocrinology**

Upon completion of this course, the student will be able to:

1. Understand the concept of Hormones and function in Coelenterata , Helminths and Echinodermata, Neurosecretory system in Annelida and Neuroendocrine system in Mollusca. .
2. Understand Endocrine control of metamorphosis , reproduction and colour change mechanisms in Crustacea and in Insect and also get information about Cephalic neuroendocrine system in insect.
3. Able to give the demonstration structure , hormones and function of Pineal organ, Pituitary gland and Thyroid gland with the help of Chart.
4. Give the presentation on the topic Parathyroid Ultimobranchial glands their structures, hormones and regulatory mechanisms , Understand the structure ,function and Hormones of Adrenal gland .

## **M.SC. ZOOLOGY SEMESTER - II**

### **Course Title: Molecular Biology and Biotechnology**

Upon completion of this course, the student will be able to:

1. Able to define the concept Cot ½ and Rot ½ , DNA replication , DNA damage and repair, mismatch repair, recombination repair , double strand break repair and transcript coupled repair.
2. Understand Eukaryotic and prokaryotic transcription, Regulation of transcription Translation and mobile DNA element.
3. Get information about the Antisense and ribozymes technology , Isolation and sequencing of DNA, splicing and cloning and Hybridization techniques.
4. Get information about Medical biotechnology, application of restriction fragment length polymorphism in forensic science , Agricultural biotechnology .
5. Understand the Immunobiotechnology- Hybridoma technology and monoclonal antibodies and Industrial and environmental biotechnology..

## **M.SC. ZOOLOGY SEMESTER - II**

### **Course Title: Advanced Developmental Biology**

After completing this course, the student will be able to:

1. Understand the Implantation in Mammals, Foetal membrane, placenta and metamorphosis in Amphibia.
2. Know Regeneration in Vertebrate ,Apoptosis ,Ageing and polymorphism.
3. Get information about multiple ovulation and embryo transfer technology, embryonic sexing ,cloning and cloning of animals by nuclear transfer.
4. Understand the concept of Immunocontraception , classical contraceptive techniques, Anti-androgen and anti-spermiogenic compound and role of mutant and transgenic in Human welfare.

## **M.SC. ZOOLOGY SEMESTER - II**

### **ZOOLOGY LAB I:**

1. Students will have good laboratory skills, enabling them to take observations and
2. Measurements in a zoology laboratory and analyze the results to draw valid.
3. Students will adopt the skill of draw the neat and clean well labeled diagram.
4. Able to tell in detailed general characters and classification of specimen of Vertebrate.

## **M.SC. ZOOLOGY SEMESTER - III**

### **Course Title: Parasitology and Immunology**

After completing this course, the student will be able to:

1. Understand the life cycle , mode of transmission, infection and treatment of Vibrio cholera and clostridium titani , Yersinia pestis, Influenza and H1 N1 viruses , Dengue and Hepatitis .
2. Get the information about life cycle , modes of transmission , infection and treatment of Trypanosoma and Entomoeba, Leishmania, Malaria, Wuchereria and Trichinella. And Toxins and antitoxins.
3. Understand the concept Immune system , cells and organs of immune system, Major histocompatibility complex , complement system.
4. Understand the cytokine receptors, hypersensitivity reactions their type, mechanism
5. Know the Transplantation immunology and Tumour immunology and RIA and ELISA immunotechniques.

## **M.SC. ZOOLOGY SEMESTER - III**

### **Course Title: Special group- AQUACULTURE-I (FRESH WATER AQUACULTURE)**

After completing this course, the student will be able to:

1. Understand the concept of aquaculture- definition, importance and present status of India.
2. Learn to normal property of pond –soil, chemical condition and Ecosystem.
3. Understand the detail information of Fish breeding in wet and dry bundhs.
4. Know the Hatching techniques and types of hatcheries.

## **M.SC. ZOOLOGY SEMESTER - III**

### **Course Title: AQUACULTURE-II (AQUACULTURE AND RURAL DEVELOPMENT)**

After completing this course, students are expected to be able to:

1. Understand the concept of culturing zooplankton, prawn, crab, pearl, and oyster.
2. Know the development and advancement of aquaculture in India.
3. Study the breeding and care of fresh water aquarium fishes.
4. Know the role of FFDA in development of aquaculture in India.

### **M.SC. ZOOLOGY SEMESTER - III**

#### **Course Title: FOUNDATION –I (FRESH WATER FISHERIS)**

After completing this course, the student will be able to:

1. Understand the physic-chemical characteristics fresh water and construction of fish farm.
2. Know the brief outline of commercially important species of fresh water fishes and prawns and reverine fisheries.
3. Know the detailed information on fishery product and by product.
4. Study the fish seed production by chinese circular hatchery
5. Get information artificial feeds and their composition.

### **M.SC. ZOOLOGY SEMESTER - III**

#### **ZOOLOGY LAB-I:**

1. Students will have good laboratory skills, enabling them to take observations and knowledge.
2. Measurements in a zoology laboratory and analyze the results to draw valid in practical.
3. Students will adopt the skill of draw the neat and clean well labeled diagram.
4. Develop the Practical skill based on the practical gram positive and gram negative bacteria.

### **M.SC. ZOOLOGY SEMESTER - IV**

#### **Course Title: BIOTESCHNIQUES, BIOSTATISTICS , ETHOLOGY AND BIOINFORMATICS.**

After completing this course, the student will be able to:

1. Understand the Sterilization technique, Animal cell and tissue culture, basic principal of sedimentation and centrifugation.
2. Learn to solve the problems based on the Mean, mode and median and Probability , sampling its importance and example.
3. Understand the whole concept of Toxicology its scope Environmental toxicology and Toxicity test.
4. Understand the scope of bioinformatics, sequence alignment pair wise and multiple sequence alignment.
5. Get detailed information about the Biological databases and Phylogenetic analysis

### **M.SC. ZOOLOGY SEMESTER - IV**

#### **Course Title: Special group - AQUACULTURE –III (AQUACULTURE AND MANAGEMENT)**

After completing this course, students are expected to be able to

1. Study the whole concept of Pond management i.e. Pre-stocking and post- stocking management
2. Get the information about Nutritional requirement of culturable carps, transport of live fish seed, brood and food fish.
3. Study the different system of aquaculture i.e. Polyculture and integrated aquaculture.



4. Understand the concept Integrated fish farming, sewage fed fish culture , cold water fish culture , Extensive , intensive, semi-intensive and super – intensive culture..

#### **M.SC. ZOOLOGY SEMESTER - IV**

##### **Course Title: Special Group-Aquaculture- IV (FISH PATHOLOGY AND FISH GENETICS)**

After completing this course, the student will be able to:

1. Study the Biochemical composition and nutritional value of raw and preserved fish.
2. Understand the objective, principles and methods of Fish preservation.
3. Get detailed knowledge about the Fish decomposition, rigor mortis and fish spoilage.
4. Study the effect of water pollution on fishes and fish product and byproduct.
5. Get detailed information about the Fungal, bacterial and protozoan diseases.

#### **M.SC. ZOOLOGY SEMESTER - IV**

##### **Course Title: Applied Fresh Water fisheries**

After completing this course, students are expected to be able to

1. Get knowledge about the management of pond predators and their eradication , aquatic weeds and their control.
2. Know the Composition of fish farming, sewage fed fisheries and prawn culture.
3. Understand the Role of co-operative societies in fish marketing and fisheries extension services.
4. Able to give the presentation on the fresh water pearl culture and setting up of aquarium and its maintenance.

#### **M.SC. ZOOLOGY SEMESTER - IV**

##### **ZOOLOGY LAB-I:**

1. Students will have good laboratory skills, enabling them to take observations and knowledge.
2. Measurements in a zoology laboratory and analyze the results to draw valid in practical.
3. Students will adopt the skill of draw the neat and clean well labeled diagram.
4. Develop the Practical skill based on the practical gram positive and gram negative bacteria.