



Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Parner

Tal. Parner, Dist. Ahmednagar - 414 302 (Maharashtra)



Course Outcome

Faculty of Science

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Course Outcomes

1. B. Sc. Chemistry

F.Y.B. Sc.

CH-101: Physical Chemistry

After completion of the course students will be able to

- CO 1: Define laws and principles of energetics and equilibrium.
- CO 2: Explain the concepts of equilibrium and formulae
- CO 3: Make a list of mathematical formulae.
- CO 4: Solve numerical problems.

CH-102: Organic Chemistry

After completion of the course students will be able to

- CO 1: Give the chemical formulae, names and structures of chemical compounds.
- CO 2: Define isomerism, its types, Stereochemistry
- CO 3: Define Conformations, configurations and nomenclatures
- CO 4: Identify Functional group for aliphatic hydrocarbons
- CO 5: Write the reactions.

CH-201: Inorganic Chemistry

After completion of the course students will be able to

- CO 1: Define, atoms, molecules, particles.
- CO 2: Explain developments in atomic structure.
- CO 3: Learn the developments in Periodicity of Elements.
- CO 4: List the theories for chemical bonding and draw conclusions.
- CO 5: Draw a periodic table.

CH-202: Analytical Chemistry

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Give the chemical formulae.
- CO 3: List the methods of expressing concentrations.
- CO 4: Explain the methods of preparations of solutions.
- CO 5: Solve the problems.

CH-103 and CH-203: Laboratory Courses

After completion of the course students will be able to

- CO 1: Study MSDS sheet, handle chemicals, prepare the solutions.
- CO 2: Perform the experiment.
- CO 3: Learn the principle of experiment.
- CO 4: Perform the calculations.
- CO 5: Find conclusions.
- CO 6: Correlate theory with practicals.

S.Y.B.Sc.

CH-301: Physical Chemistry and Analytical Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: Define rate law and rate equation.
- CO 3: List the equations.
- CO 4: Give examples, solve problems.
- CO 5: Calculate errors.

CH-302: Inorganic and Organic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Learn the theories of bonding.
- CO 3: Make a list of examples and give names.
- CO 4: Solve the examples.
- CO 5: Functional group approach hydrocarbons.

CH-401: Physical and Analytical Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: List the equations.
- CO 3: Give examples, solve problems.
- CO 4: Learn the principles.

CH-402: Inorganic and Organic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Give the chemical formulae and structures of chemical compounds.
- CO 3: Write the reactions.
- CO 4: Identify Functional group for compounds.
- CO 5: Solve the reactions/problems.

CH-303 and CH-403: Laboratory Courses

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Perform the experiment.
- CO 3: Learn the principle of experiment.
- CO 4: Perform the calculations.
- CO 5: Find conclusions.
- CO 6: Correlate theory with practicals.
- CO 7: Write reports.

T.Y.B.Sc.**CH-501: Physical Chemistry- I**

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: List the equations.
- CO 3: Give examples, solve problems.
- CO 4: Learn the principles.

CH-502: Analytical Chemistry- I

After completion of the course students will be able to

- CO 5: Define the terms and concepts.
- CO 6: List the equations.
- CO 7: Give examples, solve problems.
- CO 8: Learn the principles.

CH-503: Physical Chemistry Practical - I

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Perform the experiment.
- CO 3: Learn the principle of experiment.
- CO 4: Perform the calculations.
- CO 5: Find conclusions.
- CO 6: Correlate theory with practicals.
- CO 7: Write reports.

CH-504: Inorganic Chemistry - I

- CO 1: Define the terms and principles.
- CO 2: Draw a periodic table.
- CO 3: Learn the theories of bonding.
- CO 4: Make a list of examples.
- CO 5: Learn the properties.
- CO 6: Solve the examples.

CH-505: Industrial Chemistry - I

- CO 1: Define the terms and principles.
- CO 2: Make a list of industries.
- CO 3: Learn the principles.
- CO 4: Solve the examples.
- CO 5: Learn the safety norms..
- CO 6: Manufacture of basic chemicals having household applications.

CH-506: Inorganic Chemistry Practical - I

After completion of the course students will be able to

- CO 1: Prepare the solutions.

- CO 2: Perform the experiment.
- CO 3: Learn the principle of experiment.
- CO 4: Perform the calculations.
- CO 5: Find conclusions.
- CO 6: Correlate theory with practicals.
- CO 7: Write reports.

CH-507: Organic Chemistry - I

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Give the chemical formulae and structures of chemical compounds.
- CO 3: Write the reactions.
- CO 4: Identify Functional group for compounds.
- CO 5: Solve the reactions/problems.
- CO 6: Suggest the mechanisms.

CH-508: Chemistry of Biomolecules

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Give the chemical formulae and structures of compounds.
- CO 3: Write the reactions.
- CO 4: Solve the reactions/problems.
- CO 5: Learn the functions
- CO 6: Make a list of molecules involved in the life of living organisms.

CH-509: Organic Chemistry Practical-I

After completion of the course students will be able to

- CO 1: Prepare solutions.
- CO 2: Find out quantities of reactants for reactions.
- CO 3: Write chemical equations.
- CO 4: Perform the experiments.
- CO 5: Use of microscale equipments.

CH-510 (A) : Introduction to Medicinal Chemistry

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concept of drugs and its delivery.
- CO 3: Make a list of drugs used.
- CO 4: Give the functions of drugs or medicines.
- CO 5: Learn of action.

CH-510 (B) : Polymer Chemistry

After completion of the course students will be able to

- CO 1: History of Polymers.
- CO 2: Polymerization and types of polymers.

CO 3: Important polymers and their applications.

CH-511 (A) : Environmental Chemistry

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the concept of environmental chemistry.

CO 3: List the chemicals causing environmental pollution.

CO 4: Make list water parameters.

CO 5: Identify the quality of water.

CO 6: Suggest methods/remedies to avoid/minimize pollution.

CH-511 (B) : Cheminformatics

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the concept of Cheminformatics.

CO 3: List the tools and softwares for searching structures and nomenclature.

CO 4: Applications in interpretations of the spectra of the compounds.

CH-601 : Physical Chemistry-II

After completion of the course students will be able to

CO 1: Define the terms and laws.

CO 2: List the equations.

CO 3: Learn the principles.

CO 4: Give examples, solve problems.

CO 5: Write electrochemical cells.

CO 6: Draw the crystal structures.

CH-602 : Physical Chemistry-III

After completion of the course students will be able to

CO 1: Define the terms and laws.

CO 2: List the equations.

CO 3: Learn the principles.

CO 4: Give examples, solve problems.

CO 5: Write equations.

CO 6: Draw the structures.

CO 7: Give the properties.

CH-603 : Physical Chemistry Practical-II

After completion of the course students will be able to

CO 1: Define the terms and laws.

CO 2: List the equations.

CO 3: Learn the principles.

CO 4: Give examples, solve problems.

CO 5: Write equations.

CO 6: Draw the structures.

CO 7: Give the properties.

CH-604 : Inorganic Chemistry -II

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the principles.

CO 3: Give examples, solve problems.

CO 4: Write equations.

CO 5: Draw the structures.

CO 6: Give the properties and suggest applications.

CH-605: Inorganic Chemistry -III

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the principles.

CO 3: Give examples, solve problems.

CO 4: Write equations.

CO 5: Draw the structures.

CO 6: Give the properties and suggest applications.

CH-606: Inorganic Chemistry Practical-II

After completion of the course students will be able to

CO 1: Prepare the solutions.

CO 2: Perform the experiment.

CO 3: Learn the principle of experiment.

CO 4: Perform the calculations.

CO 5: Find conclusions.

CO 6: Correlate theory with practicals.

CO 7: Write reports.

CH-607: Organic Chemistry-II

After completion of the course students will be able to

CO 1: Define the terms in spectroscopy and stereochemistry.

CO 2: Draw the structures.

CO 3: Identify the isomers.

CO 4: Learn the principles.

CO 5: Interpret the spectrum.

CH-608: Organic Chemistry-III

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Draw the structures.

CO 3: Learn the principles.

CO 4: Write the reactions or Suggest mechanisms.

CO 5: Make a list of different reagents.

CO 6: Classification of natural products.

CH-609: Organic Chemistry Practical-II

After completion of the course students will be able to

CO 1: Prepare the reagents and solutions.

CO 2: Perform the reactions.

CO 3: Apply the principles.

CO 4: Analyze the spectra.

CH-610 (A) : Chemistry of Soil and Agrochemicals

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Identify the types of soils, pesticides.

CO 3: Prepare list of methods.

CO 4: Perform the calculations.

CO 5: Find parameters.

CO 6: Suggest suitable fertilizers.

CH-610 (B) Introduction to Forensic Chemistry

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Identify the types of chemicals/compounds.

CO 3: Prepare list of chemicals and methods for analysis.

CO 4: Learn the principles.

CH-611(A): Analytical Chemistry-II

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the principles.

CO 3: Make list of equations.

CO 4: Suggest the method for analysis.

CH-611 (B): Chemistry of Cosmetics and Perfumes

After completion of the course students will be able to

CO 1: Define the terms.

CO 1: Learn the principles.

CO 2: Give applications of cosmetics.

CO 3: Learn the regulations for the cosmetic industry.

2. M. Sc. Organic Chemistry

M. Sc. I Chemistry

Semester-I

CHP-110, Physical Chemistry-I, Thermodynamics and Chemical Kinetics and Reaction Dynamics

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: Learn the concepts energy, orbitals, etc.
- CO 3: Solve the equations.
- CO 4: Solve the problems.
- CO 5: Apply the laws.

CHI-130, Inorganic Chemistry-I, Molecular Symmetry and Chemistry of Main Group Elements

After completion of the course students will be able to

- CO 1: Define the terms, laws and principles.
- CO 2: Learn the concepts.
- CO 3: Perform the symmetry operations and identify the symmetry elements.
- CO 4: Solve the problems.
- CO 5: List the elements, compounds and functions.
- CO 6: Draw the structures.
- CO 7: Give applications.

CHO-150, Organic Chemistry-I, Semester - I Basic Organic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Draw the structures.
- CO 3: Write equations.
- CO 4: List the reagents.
- CO 5: Identify isomers.
- CO 6: Suggest the use of reagents.

CHG - 190, General Chemistry-I, Theory Option-A: Introduction to Solid State of Matter

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Draw the structures.
- CO 3: List the equations.
- CO 4: Solve the problems.
- CO 5: Learn the principles.
- CO 6: Suggest methods.

CHG - 190, General Chemistry-I, Theory Option-B: Chemical Mathematics

After completion of the course students will be able to

- CO 1: Write equations.
- CO 2: Solve the equations.
- CO 3: Suggest the Functions
- CO 4: Solve the differential Equations

Option-C: Introduction to Chemical Biology

After completion of the course students will be able to

- CO 5: Define the terms.
- CO 6: Give the chemical formulae and structures of compounds.
- CO 7: Write the reactions.
- CO 8: Solve the reactions/problems.
- CO 9: Learn the functions
- CO 10: Make a list of molecules involved in the life of living organisms.

CHG-190, SECTION-II: Option-A: Inorganic Material Synthesis and Analysis

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Prepare the reagents and solutions.
- CO 3: Perform the experiment/ reactions.
- CO 4: Apply the principles.
- CO 5: Synthesis of materials.
- CO 6: Prepare / write reports.

Option - B: Chemical Biology-I Practical

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Prepare the reagents and samples.
- CO 3: Perform the experiment/ reactions.
- CO 4: Apply the principles.
- CO 5: Write/Prepare report.

CHP-107: Practical Course – I Synthesis of materials, Basic Practical Chemistry

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Prepare the reagents and samples.
- CO 3: Perform the experiment/ reactions.
- CO 4: Write/Prepare report.
- CO 1: Learn the safety techniques for the handling of chemicals.

Semester-II

CHP-210, Physical Chemistry-II, Molecular Spectroscopy and Nuclear Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: Learn the concepts.
- CO 3: Solve the equations.
- CO 4: Solve the problems/ interpret the spectra.
- CO 5: Apply the laws.
- CO 6: Learn the principles.

CHI-230, Inorganic Chemistry-II, Coordination and Bioinorganic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Preparation of microstate table.
- CO 3: Evaluate/Identify term symbols.
- CO 4: Draw the correlations diagram, Orgel diagram and structures.
- CO 5: Solve the problems.
- CO 6: Make a list of important metals in biology and physiology.
- CO 7: Suggest the functions in biology.

CHO - 250, Organic Chemistry-II, Photochemistry and Spectroscopy

After completion of the course students will be able to

- CO 1: Learn the reactions of functional groups
- CO 2: Write example, suggest the reagents and mechanism.
- CO 3: Identify the isomers.
- CO 4: Identify applications of spectroscopy.

CHG - 290, General Chemistry -II, SECTION-I: Theory, Option-A: Material Characterization Technique

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Learn the concepts.
- CO 3: Make a list of characterization techniques.
- CO 4: Interpret the spectra.

Option - B: Organometallic and Inorganic Reaction Mechanism

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Learn the concepts.
- CO 3: Suggest the names.
- CO 4: Suggest the mechanism.
- CO 5: List the types of reactions.

Option- C: Introduction to Chemical Biology-II

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concepts.
- CO 3: List the methods to solve the problems.
- CO 4: Identify the importance.
- CO 5: Give an interdisciplinary approach.

CHG-290, SECTION-II: Electrochemical Methods of Analysis

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Handle the instruments.
- CO 3: Perform the experiment/ reactions.
- CO 4: Write/Prepare report.
- CO 5: Learn the safety techniques for the handling of chemicals and equipments.

CHP-227: Practical Course-II Basic Practical Chemistry (Compulsory)

After completion of the course students will be able to

- CO 6: Prepare the solutions and perform the reactions.
- CO 7: Handle the instruments.
- CO 8: Write/Prepare report.
- CO 9: Learn the safety techniques for the handling of chemicals and equipments.
- CO 1: Synthesis of important inorganic materials and their characterizations.
- CO 2: Understanding of reaction kinetics in terms of the rate as well as energetics.
- CO 3: Use of techniques.

M.Sc. II Organic Chemistry

Semester-III

CHO – 350 Organic Reaction Mechanism and Biogenesis

After completion of the course students will be able to

- CO 1: Identify the functional groups and write reactions.
- CO 2: Learn the mechanism of reaction.
- CO 3: Give the rate equation.
- CO 4: Learn the biosynthesis of natural products and alkaloids

CHO-351 Structure Determination of Organic Compounds by Spectroscopic Methods

After completing the course students will be able to

- CO 1: Draw the structures.
- CO 2: Learn the principle.
- CO 3: Interpret the spectrum
- CO 4: Predict the reaction mechanism.
- CO 5: Apply the spectral methods.

CHO-352 Stereochemistry and Asymmetric Synthesis of Organic Compounds

After completing the course students will be able to

- CO 1:** Learn the principles, reactions and mechanism.
- CO 2:** Learn six membered rings
- CO 3:** Learn fused, bridged and polycyclic systems
- CO 4:** Apply stereochemistry,

CHO-353 (B): Designing Organic Synthesis and Heterocyclic Chemistry

After completing the course students will be able to

- CO 1:** Learn the basic strategies.
- CO 2:** Identify the target molecules.
- CO 3:** Apply the concept in the synthesis of natural product molecules
- CO 4:** Give the names the nomenclature, synthetic methods and reactivity and applications of heterocyclic compounds

CHO 354 Practical - I Solvent Free Organic Synthesis

After completing the course students will be able to

- CO 1:** Study MSDS sheet, handle chemicals, and prepare solutions.
- CO 2:** Use techniques.
- CO 3:** Learn Green Chemistry, Principles and applications of green chemistry
- CO 4:** Know the importance of Green Chemistry.
- CO 5:** Perform reactions independently.

Semester-IV

CHO-450: Chemistry of Natural Products

After completing the course students will be able to

- CO 1:** Identify the functional groups and write reactions.
- CO 2:** Learn the mechanism of reaction.
- CO 3:** Give the rate equation.
- CO 4:** Learn the biosynthesis of natural products and alkaloids
- CO 5:** Suggest examples.

CHO-451: Organometallic Reagents in Organic Synthesis

After completing the course students will be able to

- CO 1:** Define the terms and learn the concept.
- CO 2:** Prepare list of reagents.
- CO 3:** Use appropriate reagents.
- CO 4:** Suggest mechanism for organometallic reactions

CHO-452(A): Concepts and Applications of Medicinal Chemistry

After completing the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concept.
- CO 3: Learn the peptide synthesis in medicinal Chemistry.
- CO 4: Prepare list of drugs.
- CO 5: Suggest mechanism.
- CO 6: Make a list of drugs.

CHO-453: Practical-III, Section-I: Ternary Mixture Separation

After completing the course students will be able to understand

- CO 1: Prepare solutions and handle chemicals.
- CO 2: Identify the types of organic compounds.
- CO 3: Use of microscale equipments.
- CO 4: Apply the techniques.
- CO 5: Draw the conclusions.
- CO 6: Prepare reports.

Section-II: Carbohydrates Synthesis and Isolation Natural Product

After completing the course students will be able to understand

- CO 1: Prepare solutions and handle chemicals.
- CO 2: Identify the types of organic compounds.
- CO 3: Use of microscale equipments.
- CO 4: Apply the techniques.
- CO 5: Draw the conclusions.
- CO 6: Prepare reports.

Section-III: Project

After completing the course students will be able to understand

- CO 1: Select a problem.
- CO 2: Read literature and research articles.
- CO 3: Prepare solutions and handle chemicals.
- CO 4: Use of microscale equipments.
- CO 5: Apply the techniques.
- CO 6: Draw the conclusions.
- CO 7: Prepare reports.
- CO 8: Acquire the skills.

CHO-454: Practical-II: Convergent and Divergent Organic Syntheses

After completing the course students will be able to understand

- CO 1: Prepare solutions and handle chemicals.
- CO 2: Use of microscale equipments.
- CO 3: Apply the techniques.
- CO 4: Draw the conclusions.
- CO 5: Prepare reports.
- CO 6: Acquire the skills.

3. M. Sc. Analytical Chemistry

M. Sc. I Chemistry

Semester-I

CHP-110, Physical Chemistry-I, Thermodynamics and Chemical Kinetics and Reaction Dynamics

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: Learn the concepts energy, orbitals, etc.
- CO 3: Solve the equations.
- CO 4: Solve the problems.
- CO 5: Apply the laws.

CHI-130, Inorganic Chemistry-I, Molecular Symmetry and Chemistry of Main Group Elements

After completion of the course students will be able to

- CO 1: Define the terms, laws and principles.
- CO 2: Learn the concepts.
- CO 3: Perform the symmetry operations and identify the symmetry elements.
- CO 4: Solve the problems.
- CO 5: List the elements, compounds and functions.
- CO 6: Draw the structures.
- CO 7: Give applications.

CHO-150, Organic Chemistry-I, Semester - I Basic Organic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Draw the structures.
- CO 3: Write equations.
- CO 4: List the reagents.
- CO 5: Identify isomers.
- CO 6: Suggest the use of reagents.

CHG - 190, General Chemistry-I, Theory Option-A: Introduction to Solid State of Matter

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Draw the structures.
- CO 3: List the equations.
- CO 4: Solve the problems.
- CO 5: Learn the principles.
- CO 6: Suggest methods.

CHG - 190, General Chemistry-I, Theory Option-B: Chemical Mathematics

After completion of the course students will be able to

- CO 1:** Write equations.
- CO 2:** Solve the equations.
- CO 3:** Suggest the Functions
- CO 4:** Solve the differential Equations

Option-C: Introduction to Chemical Biology

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Give the chemical formulae and structures of compounds.
- CO 3:** Write the reactions.
- CO 4:** Solve the reactions/problems.
- CO 5:** Learn the functions
- CO 6:** Make a list of molecules involved in the life of living organisms.

CHG-190, SECTION-II: Option-A: Inorganic Material Synthesis and Analysis

After completion of the course students will be able to

- CO 1:** Prepare the solutions.
- CO 2:** Prepare the reagents and solutions.
- CO 3:** Perform the experiment/ reactions.
- CO 4:** Apply the principles.
- CO 5:** Synthesis of materials.
- CO 6:** Prepare / write reports.

Option - B: Chemical Biology-I Practical

After completion of the course students will be able to

- CO 1:** Prepare the solutions.
- CO 2:** Prepare the reagents and samples.
- CO 3:** Perform the experiment/ reactions.
- CO 4:** Apply the principles.
- CO 5:** Write/Prepare report.

CHP-107: Practical Course – I Synthesis of materials, Basic Practical Chemistry

After completion of the course students will be able to

- CO 1:** Prepare the solutions.
- CO 2:** Prepare the reagents and samples.
- CO 3:** Perform the experiment/ reactions.
- CO 4:** Write/Prepare report.
- CO 5:** Learn the safety techniques for the handling of chemicals.

Semester-II

CHP-210, Physical Chemistry-II, Molecular Spectroscopy and Nuclear Chemistry

After completion of the course students will be able to

- CO 1: Define the terms and laws.
- CO 2: Learn the concepts.
- CO 3: Solve the equations.
- CO 4: Solve the problems/ interpret the spectra.
- CO 5: Apply the laws.
- CO 6: Learn the principles.

CHI-230, Inorganic Chemistry-II, Coordination and Bioinorganic Chemistry

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Preparation of microstate table.
- CO 3: Evaluate/Identify term symbols.
- CO 4: Draw the correlations diagram, Orgel diagram and structures.
- CO 5: Solve the problems.
- CO 6: Make a list of important metals in biology and physiology.
- CO 7: Suggest the functions in biology.

CHO - 250, Organic Chemistry-II, Photochemistry and Spectroscopy

After completion of the course students will be able to

- CO 1: Learn the reactions of functional groups
- CO 2: Write example, suggest the reagents and mechanism.
- CO 3: Identify the isomers.
- CO 4: Identify applications of spectroscopy.

CHG - 290, General Chemistry -II, SECTION-I: Theory, Option-A: Material Characterization Technique

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Learn the concepts.
- CO 3: Make a list of characterization techniques.
- CO 4: Interpret the spectra.

Option - B: Organometallic and Inorganic Reaction Mechanism

After completion of the course students will be able to

- CO 1: Define the terms and principles.
- CO 2: Learn the concepts.
- CO 3: Suggest the names.
- CO 4: Suggest the mechanism.
- CO 5: List the types of reactions.

Option- C: Introduction to Chemical Biology-II

After completion of the course students will be able to

- CO 1: Define the terms.

- CO 2: Learn the concepts.
- CO 3: List the methods to solve the problems.
- CO 4: Identify the importance.
- CO 5: Give an interdisciplinary approach.

CHG-290, SECTION-II: Electrochemical Methods of Analysis

After completion of the course students will be able to

- CO 1: Prepare the solutions.
- CO 2: Handle the instruments.
- CO 3: Perform the experiment/ reactions.
- CO 4: Write/Prepare report.
- CO 5: Learn the safety techniques for the handling of chemicals and equipments.

CHP-227: Practical Course-II Basic Practical Chemistry (Compulsory)

After completion of the course students will be able to

- CO 1: Prepare the solutions and perform the reactions.
- CO 2: Handle the instruments.
- CO 3: Write/Prepare report.
- CO 4: Learn the safety techniques for the handling of chemicals and equipments.
- CO 5: Synthesis of important inorganic materials and their characterizations.
- CO 6: Understanding of reaction kinetics in terms of the rate as well as energetics.
- CO 7: Use of techniques.

M.Sc. II Analytical Chemistry

Semester III

CHA-390 Electrochemical and Thermogravimetric methods of chemical analysis

After completing the course students will be able to understand

- CO 1: Define the terms.
- CO 2: Learn the principles.
- CO 3: Compare the methods.
- CO 4: Solve the problems.
- CO 5: Suggest a suitable technique for analysis.

CHA-391 Analytical Method Development and Extraction Technique

After completing the course students will be able to understand

- CO 1: Define the terms.
- CO 2: Learn the principles.
- CO 3: Compare the methods.
- CO 4: Solve the problems.
- CO 5: Suggest a suitable technique for analysis.

CHA-392 Advanced Chromatographic Methods of Analysis

After completing the course students will be able to understand

- CO 1: Define the terms.
- CO 2: Learn the principles.
- CO 3: Compare the methods.
- CO 4: Solve the problems.
- CO 5: Suggest a suitable technique for analysis.

CHA-393(B) Analysis of Food and Controlled Substances

After completing the course students will be able to understand

- CO 1: Define the terms.
- CO 2: Learn the principles.
- CO 3: Compare the methods.
- CO 4: Solve the problems.
- CO 5: Suggest a suitable technique for analysis.

CHA-394: Practical I: Basics of Instrumental Methods of Chemical Analysis

After completing the course students will be able to understand

- CO 1: Define the terms.
- CO 2: Learn the principles.
- CO 3: Prepare the solutions.
- CO 4: Compare the methods.
- CO 5: Solve the problems.
- CO 6: Suggest a suitable technique for analysis.

Semester IV

CHA-490: Advanced Analytical Spectroscopic Techniques

After completing the course students will be able to

- CO 1: Make a list of spectral techniques.
- CO 2: Learn the principles.
- CO 3: Interpret the spectrum
- CO 4: Solve the problems.
- CO 5: Apply the spectral methods.

CHA-491: Chemical Methods of Pharmaceuticals Analysis

After completing the course students will be able to

- CO 1: Make a list of methods of analysis.
- CO 2: Learn the principles.
- CO 3: Solve the problems.
- CO 4: Apply the methods.

CHA-492: A) Laboratory Automation and Environmental Analytical Chemistry

After completing the course students will be able to

- CO 1: Make a list of methods of analysis.
- CO 2: Learn the principles.
- CO 3: Solve the problems.

CO 4: List the automated techniques.

CO 5: Apply the methods.

Practical III CHA-493-A: Optional Analytical Chemistry Practical or Project

After completing the course students will be able to understand

CO 1: Define the terms and select the problem.

CO 2: Use manual/ library resources.

CO 3: Learn the principles.

CO 4: Prepare the solutions.

CO 5: Relate with theory.

CO 6: Prepare reports.

CO 7: Suggest a suitable technique for analysis.

CCPP-4, CHA-494: Practical II: Applied Analytical Chemistry

After completing the course students will be able to understand

CO 1: Learn the principles.

CO 2: Prepare the solutions.

CO 3: Prepare reports.

CO 4: Suggest a suitable technique for analysis.

4. B. Sc. Physics

F.Y.B.Sc.

Semester -I

PHY-111: Mechanics and Properties of Matter

After completion of the course students will be able to

- CO 1: Learn the basic concepts of physics.
- CO 2: Define laws and state the principles.
- CO 3: Learn the properties of solid like stress and strain.
- CO 4: Make a list of examples for the concepts.

PHY-112: Physics Principles and Applications

After completion of the course students will be able to

- CO 1: Learn the general structure of atom, spectrum of hydrogen atom.
- CO 2: Define atoms, molecules.
- CO 3: Learn the electromagnetic waves and its spectrum.
- CO 4: Identify and explain the types of electromagnetic waves and applications.

PHY-113 and PHY-123: Physics Laboratory:

After completion of the course students will be able to

- CO 1: Correlation between theory and experiment.
- CO 2: Verify the laws.
- CO 3: Develop the practical skills.
- CO 4: Handle the fundamental instruments

Semester -I

PHY-121: Heat and Thermodynamics:

After completion of the course students will be able to

- CO 1: Learn the concepts.
- CO 2: Define the terms.
- CO 3: Determine the units and sign conventions.
- CO 4: State the laws.
- CO 5: Apply the concept of entropy and state the law.

PHY-122: Electricity and Magnetism

After completion of the course students will be able to

- CO 1: Learn the concept stationary charges.
- CO 2: Define potential energy.
- CO 3: State the laws.
- CO 4: Solve the problems.

PHY-123: Physics Laboratory:

After completion of the course students will be able to

- CO 1: Correlation between theory and experiment.
- CO 2: Verify the laws.
- CO 3: Develop the practical skills.
- CO 4: Handle the fundamental instruments

S.Y.B.Sc.

Semester -III

PHY-231 Mathematical Methods in Physics -I

After completion of the course students will be able to

- CO 1: Learn differential equations.
- CO 2: Prepare list of equations.
- CO 3: Solve differential equations
- CO 4: Use the concepts of gradient, Divergence and Curl in Physics

PHY- 232 Electronics

After completion of the course students will be able to

- CO 1: Compare electrical charge, electrical field, electrical potential, and magnetism.
- CO 2: Solve numerical problems.
- CO 3: Learn the network theorems.
- CO 4: Learn the working of transistors, Op-Amp and Basic Digital Components.

PHY-233 Physics Laboratory:

After completion of the course students will be able to

- CO 1: Correlation between theory and experiment.
- CO 2: Verify the laws.
- CO 3: Develop the practical skills.
- CO 4: Handle the fundamental instruments

Semester -IV

PHY- 241 Waves, Oscillations and Sound

After completion of the course students will be able to

- CO 1: Define wave motion and construct the equation
- CO 2: Learn the role of the wave equation and correlate with nature of wave motion.
- CO 3: Learn the superposition of harmonic waves.
- CO 4: Solving problems.

PHY-242 Optics

- CO 1: Learn the types of lenses
- CO 2: Apply lens maker formulas to design optical instruments
- CO 3: Learn the interference and diffraction
- CO 4: Apply the optical phenomena through the lab course

CO 5: Develop skills in experimental design and solving problems.

PHY-243 Physics Laboratory:

After completion of the course students will be able to

CO 1: Correlation between theory and experiment.

CO 2: Verify the laws.

CO 3: Develop the practical skills.

CO 4: Handle the fundamental instruments

T.Y.B.Sc.

Semester -V

PHY-351 Mathematical Methods in Physics -II

After completion of the course students will be able to

CO 1: Learn differential equations.

CO 2: Prepare list of equations.

CO 3: Solve differential equations

CO 4: Use the concepts of gradient, Divergence and Curl in Physics

PHY-352 Electrodynamics

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the relationship between electrical charge, electrical field, electrical potential, and magnetism.

CO 3: Solve numerical problems.

CO 4: State and explain the laws.

CO 5: Solve the problems

PHY-353 Classical Mechanics

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Correlate Optical motion and Radial motion.

CO 3: Solve numerical problems.

CO 4: Define Rocket motion

PHY-354 Atomic and Molecular Physics

After completion of the course students will be able to

CO 1: Learn the models of atom.

CO 2: Learn the fine and hyperfine structure of hydrogen atom

CO 3: Solve numerical problems.

CO 4: Solve the problems

PHY-355 Computational Physics

After completion of the course students will be able to

CO 1: Make a list of programming languages.

- CO 2: Use C language in programming.
- CO 3: Solve numerical problems.
- CO 4: Make programmes in C

PHY-356(B) Elements of Material Science

After completion of the course students will be able to

- CO 1: Learn and compare the crystalline and amorphous types of materials
- CO 2: Learn the defects and dislocations inside the materials
- CO 3: Solve numerical problems involving topics covered.
- CO 4: Learn the alloy and properties of material.

PHY-3510 SEC (H): Python Programming

After completion of the course students will be able to

- CO 1: Learn the language.
- CO 2: Write code for complex scientific computational requirement.
- CO 3: Use Libraries like NumPy for numeric computation
- CO 4: Use Library SciPy for scientific and technological calculations
- CO 5: Use Library Matplotlib for plotting of graph and its visualization.

PHY-3511 SEC (L): Physics Workshop Skill

After completion of the course students will be able to

- CO 1: Measure various electronic parameters using multimeter.
- CO 2: Measure different electrical quantities.
- CO 3: Analyze waveform using CRO.
- CO 4: Handle various instruments.

Semester -VI

PHY-361 Solid State Physics

After completion of the course students will be able to

- CO 1: Define lattice and its types.
- CO 2: Learn the Braviace Lattices in 2D and 3D
- CO 3: Learn the crystalline Planes, Miller indices and crystal structures
- CO 4: Solve various numerical problems in solid-state physics.

PHY-362 Quantum Mechanics

After completion of the course students will be able to

- CO 1: Define quantum mechanics.
- CO 2: Learn the States, operators in quantum mechanics
- CO 3: Study postulates of quantum mechanics
- CO 4: Learn the different principles and hypothesis.
- CO 5: Solve problems.

PHY-363 Thermodynamics and Statistical Physics

After completion of the course students will be able to

- CO 1:** Learn the concepts of conduction, convection and radiation.
- CO 2:** Solve numerical problems.
- CO 3:** Learn and apply the concept of Latent Heat, Specific Heat and Thermodynamics
- CO 4:** Make a list of different state functions in thermodynamics.

PHY-364 Nuclear Physics

After completion of the course students will be able to

- CO 1:** Learn the properties of nucleus
- CO 2:** Make a list of models.
- CO 3:** Nuclear reactions to generate nuclear power.
- CO 4:** Nuclear fission and fusion.

PHY-365 Electronics II

After completion of the course students will be able to

- CO 1:** Learn the basic electronic components.
- CO 2:** Identify various types of transistors, diodes and their application.
- CO 3:** Draw operational amplifier circuits.
- CO 4:** Solve problems.

PHY-366(R) Lasers

After completion of the course students will be able to

- CO 1:** Define LASERs.
- CO 2:** Explain the principles.
- CO 3:** Learn the development of modern lasers.
- CO 4:** Gain the basic skills of practical work with lasers.

PHY-3610(V) Solar PV System Installation Repairing and Maintenance

After completion of the course students will be able to

- CO 1:** Learn the solar system.
- CO 2:** Define the composition of visible light.
- CO 3:** Learn the roof mounting of solar system for domestic purpose
- CO 4:** Calculation of load and power for House requirements
- CO 5:** Gain the basic skills of practical work with PV system.

PHY-3611 SEC (AC): Radiation Physics

After completion of the course students will be able to

- CO 1:** Learn the applications of Radiation
- CO 2:** Make a list of tools
- CO 3:** Build skills in operating different types of radiation detectors.
- CO 4:** Set up business
- CO 5:** Employ their skills to develop applications of radio activity in different fields

PHY-367: Physics Practical I

After completion of the course students will be able to

- CO 1:** Correlation between theory and experiment.

- CO 2:** Verify the laws.
- CO 3:** Develop the practical skills.
- CO 4:** Use instruments independently.
- CO 5:** Prepare a report.

PHY-368: Physics Practical II

After completion of the course students will be able to

- CO 1:** Correlation between theory and experiment.
- CO 2:** Verify the laws.
- CO 3:** Develop the practical skills.
- CO 4:** Use instruments independently.
- CO 5:** Prepare a report.

PHY-369: Physics Practical III – Project

After completion of the course students will be able to

- CO 1:** Correlation between theory and experiment.
- CO 2:** Develop the practical skills.
- CO 3:** Use instruments independently.
- CO 4:** Prepare a project report.

5. M. Sc. Physics

M. Sc. I Physics

Semester -I

PHYUT-111: Mathematical Methods in Physics

After completion of the course students will be able to

- CO 1:** Explain the terms involved mathematically.
- CO 2:** Demonstrate competence with the basic ideas of linear
- CO 3:** Use the method of Laplace transforms to solve initial-value problems
- CO 4:** Solve problems

PHYUT-112: Classical Mechanics

After completion of the course students will be able to

- CO 1:** Learn Lagrangian and Hamiltonian formulation
- CO 2:** State the conservation principles
- CO 3:** Apply Newton's laws,
- CO 4:** Learn about motion of a particle under central force field.
- CO 5:** Solve the problems.

PHYUT-113: Quantum Mechanics

After completion of the course students will be able to

- CO 1:** Learn the laws and assumptions of quantum mechanics.
- CO 2:** Solve the simple problems.
- CO 3:** Construct the wave equation for simple atoms.
- CO 4:** Explain the time independent degenerate and non-degenerate perturbations

PHYDT-114: Electronics

After completion of the course students will be able to

- CO 1:** Learn the principles of circuit.
- CO 2:** Able to design the circuits using ICs.
- CO 3:** Learn to make semiconductor devices
- CO 4:** Apply the laws of Boolean algebra and K-map
- CO 5:** Learn the basic electronics of logic circuits, counters, registers

PHYUT-115: Physics Practical I

After completion of the course students will be able to

- CO 1:** Correlation between theory and experiment.
- CO 2:** Verify the laws.
- CO 3:** Develop the practical skills.
- CO 4:** Use instruments independently.
- CO 5:** Prepare a report.

Semester -II

PHYUT- 121: Electrodynamics

After completion of the course students will be able to

- CO 1: Learn the theoretical foundations of electromagnetic phenomena
- CO 2: Solve the Maxwell equations for simple configurations
- CO 3: Learn the propagation of waves.
- CO 4: Solve the problems.

PHYUP-122: Solid State Physics

After completion of the course students will be able to

- CO 1: Learn the physics behind structural properties of the solids.
- CO 2: Modify the properties of solids aiming at objectives.
- CO 3: Undertake the research work in the field
- CO 4: Solve the problems.

PHYUT-123: Statistical Mechanics

After completion of the course students will be able to

- CO 1: Define microstate and macrostate
- CO 2: Explain the concepts of microstate and macrostate of a model system
- CO 3: Define entropy and free energy
- CO 4: Apply the machinery of statistical mechanics for calculation of properties
- CO 5: Apply the laws and solve the problems.

PHDT-124: Atoms and Molecules

After completion of the course students will be able to

- CO 1: Define atoms and molecules.
- CO 2: Solve the problems.
- CO 3: Explain the rotational spectra of molecules.
- CO 4: Suggest the examples for it.
- CO 5: Learn the rotational and vibrational energy levels of diatomic molecules.
- CO 6: Learn the Raman spectroscopy.

PHUP-125: Laboratory Courses

After completion of the course students will be able to

- CO 1: Correlation between theory and experiment.
- CO 2: Verify the laws.
- CO 3: Develop the practical skills.
- CO 4: Use instruments independently.
- CO 5: Prepare a report.

M.Sc. II Physics**Semester -III****PHUT-231 Physics of Semiconductor Devices**

After completion of the course students will be able to

- CO 1:** Define junctions and its types.
- CO 2:** P-n junction devices, Hall effect, potential barrier, Depletion layer
- CO 3:** Study different diodes, their characteristics and Applications
- CO 4:** Solve the problems.

PHUT-232 Laser fundamentals and Applications

After completion of the course students will be able to

- CO 1:** Explain the principles
- CO 2:** Design of various lasers,
- CO 3:** Explain the modes of operation and areas of applications.
- CO 4:** Learn the principles of ultrashort pulse generation and amplification,
- CO 5:** Understand trends of development of modern lasers,
- CO 6:** Gain the basic skills of practical work with lasers

PHUT-233 Experimental Techniques in Physics -I

After completion of the course students will be able to

- CO 1:** Define the principle of XRD.
- CO 2:** Use XRD to solve the structures.
- CO 3:** Find errors, noise which are related to Physics
- CO 4:** Learn the magnetic and dielectric properties of solids.
- CO 5:** Solve the problems.

PHDT-234 Physics of thin films

After completion of the course students will be able to

- CO 1:** Learn the relationship between observation and theory
- CO 2:** Identify the applications of modern physics.
- CO 3:** Make a list of modern techniques.
- CO 4:** Give the composition of thin films.

PHUP-235: Laboratory Courses

After completion of the course students will be able to

- CO 1:** Correlation between theory and experiment.
- CO 2:** Verify the laws.
- CO 3:** Develop the practical skills.
- CO 4:** Use instruments independently.
- CO 5:** Prepare a report.

Semester -IV

PHUT-241 Nuclear Physics

After completion of the course students will be able to

- CO 1:** Learn the basic properties of nucleus
- CO 2:** List the nuclear models to study the nuclear structure properties.
- CO 3:** Gives aspects of nuclear reactions in power generation.
- CO 4:** Explain nuclear fission and fusion reactions.
- CO 5:** Solve the problems.

PHUT-242 Material Science

After completion of the course students will be able to

- CO 1:** Learn the terms in material science.
- CO 2:** Learn the concepts of modern physics.
- CO 3:** Identify and explain various types of defects and imperfections.
- CO 4:** Solve the problems.

PHUT-243 Experimental techniques in physics -II

After completion of the course students will be able to

- CO 1:** Learn and draw the structures in solids.
- CO 2:** Determine the structures using XRD.
- CO 3:** Learn the behaviour of electrons in solids.
- CO 4:** Explain the synthesis methods to synthesize nano-material.
- CO 5:** Make a list of characterization techniques.

PHDT-244 Physics of Nano-Material

After completion of the course students will be able to

- CO 1:** Learn the basics of nano science and nanotechnology.
- CO 2:** Synthesis and characterization of nanostructures materials.
- CO 3:** Learn the quantum dots and electron transport.
- CO 4:** Find the applications of nano science and nanotechnology

PHUP-245 Project

After completion of the course students will be able to

- CO 1:** Use of skill and knowledge in conducting research
- CO 2:** Learn the principles of measurement and error analysis
- CO 3:** Identify the findings.
- CO 4:** Prepare a report.

6. B. Sc. Botany

F.Y.B.Sc.

Semester I

BO-111: Plant Life and Utilization I

After completion of the course students will be able to

- CO 1: Learn the lower Cryptogams (Thallophytes and Bryophytes).
- CO 2: Know the life cycle patterns
- CO 3: Identify the applications of Algae, Fungi, Lichens and Bryophytes
- CO 4: Participate in field visit.

BO-112: Plant Morphology and Anatomy

After completion of the course students will be able to

- CO 1: Learn the importance of plant morphology
- CO 2: Identify the morphology of reproductive parts of plants.
- CO 3: Gain knowledge of various tissues and internal organization of plant body.
- CO 4: Explore the knowledge

BO 113: Practical Course

After completion of the course students will be able to

- CO 1: Correlate between practicals with theory to improve the understanding.
- CO 2: Participate actively in educational tour for the study of flora.
- CO 3: Learn the plant related practical skills.
- CO 4: Gain insights of research related methodology.

Semester VI

BO-121: Plant Life and Utilization-II

After completion of the course students will be able to

- CO 1: Collect the information of plant diversity
- CO 2: Gain knowledge of general characters.
- CO 3: Give classification.
- CO 4: Study life cycle of Pteridophytes, Gymnosperms and Angiosperms.

BO-122: Principles of Plant Science

After completion of the course students will be able to

- CO 1: Learn the fundamental concepts of plant physiology.
- CO 2: Gain the knowledge of cell, cell organelles and cell cycle.
- CO 3: Learn the nature of genetic material.
- CO 4: Learn the DNA replication, DNA organization in chromosome.
- CO 5: Explain the structure and types of RNA and application of molecular biology.

BO 123: Practical Course

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Participate actively in educational tour for the study of flora.
- CO 3:** Learn the plant related practical skills.
- CO 4:** Gain insights of research related methodology.

S.Y.B.Sc.

Semester III

BO-231: TAXONOMY OF ANGIOSPERMS AND PLANT ECOLOGY

After completion of the course students will be able to

- CO 1:** Gain knowledge of taxonomy.
- CO 2:** Identify, classify and give the name.
- CO 3:** Give comparative account of various systems of classification.
- CO 4:** Learn various families with reference to systematic position and description.
- CO 5:** Introduce ecology, diversity, methods of vegetation sampling and hotspots.

BO-232: PLANT PHYSIOLOGY

After completion of the course students will be able to

- CO 1:** Learn the fundamental concepts of plant physiology.
- CO 2:** Find importance and production technique of BGA.
- CO 3:** Gain of knowledge of physiology of flowering.
- CO 4:** Identify the techniques.

BO 233: PRACTICAL COURSE

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Participate actively in educational tour for the study of flora.
- CO 3:** Learn the plant related practical skills.
- CO 4:** Gain insights of research related methodology.

Semester IV

BO-241: PLANT ANATOMY AND EMBRYOLOGY

After completion of the course students will be able to

- CO 1:** Learn about plant anatomy with epidermal tissue and mechanical tissue system.
- CO 2:** Gain knowledge of normal and abnormal secondary growth in Angiosperms.
- CO 3:** Gain knowledge of embryology with respect to micro and megasporogenesis.
- CO 4:** Gain information of flower pollination, fertilization and embryo development.

BO-242: PLANT BIOTECHNOLOGY

After completion of the course students will be able to

- CO 1:** Learn the concepts of plant tissue culture techniques and single cell protein.

- CO 2:** Gain the knowledge of plant genetic engineering, genomics, proteomics and bioinformatics.
- CO 3:** Learn the bioremediation and biofuel technology.
- CO 4:** Use the techniques for the developments.

BO 243: PRACTICAL COURSE

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Participate actively in educational tour for the study of flora.
- CO 3:** Learn the plant related practical skills.
- CO 4:** Gain insights of research related methodology.

T.Y.B.Sc.

Semester VI

BO 351: CRYPTOGAMIC BOTANY (ALGAE AND FUNGI)

After completion of the course students will be able to

- CO 1:** Learn the knowledge of Lower Cryptogams.
- CO 2:** Identify the Algal and Fungal thallus.
- CO 3:** Study the life cycles of algae.
- CO 4:** Identify the economic importance of algae.
- CO 5:** Learn the symbiotic Association of Lichens, Mycorrhiza.

BO 352: ARCHEGONIATE (BRYOPHYTES AND PTERIDOPHYTES)

After completion of the course students will be able to

- CO 1:** Gain the knowledge of Archegoniate.
- CO 2:** Identify the Bryophytes.
- CO 3:** Collect the knowledge of range of thallus organisation.
- CO 4:** Study the life cycles of Bryophytes.
- CO 5:** Compare different Bryophytes.

BO 353: Spermatophyta and Palaeobotany

After completion of the course students will be able to

- CO 1:** Collect the information of origin of angiosperms.
- CO 2:** Gain the knowledge of Speciation & Endemism
- CO 3:** Learn the classifications.
- CO 4:** Gather the information of Herbaria and Botanical Gardens.

BO 354: Plant Ecology

After completion of the course students will be able to

- CO 1:** Learn the interrelationship between the living world and the environment.
- CO 2:** Gain the knowledge of Biogeography.
- CO 3:** Learn the population ecology and community ecology.
- CO 4:** Study of biogeochemical cycles.

BO 355: Cell and Molecular Biology

After completion of the course students will be able to

- CO 1:** Define the terms in Cell Biology
- CO 2:** Collect the information on cell organelles.
- CO 3:** Identify nucleus, nucleolus and nucleolar organizer and nuclear envelope.
- CO 4:** Learn about Chromosomes.
- CO 5:** Gets an idea of cell signalling.

BO 356: Genetics

After completion of the course students will be able to

- CO 1:** Define genetics and terms involved in it.
- CO 2:** Gain the insights of Mendelism and Neo Mendelism (Gene Interaction).
- CO 3:** Learn the multiple alleles, linkage, recombination and crossing over and mutation.
- CO 4:** Solve the numerical and structural alterations of chromosomes.
- CO 5:** Learn the sex linked chromosomes.

BO 357: PRACTICAL BASED ON BO351 AND BO352

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Participate actively in educational tour for the study of flora.
- CO 3:** Learn the plant related practical skills.
- CO 4:** Gain insights of research related methodology.

BO 358: PRACTICAL BASED ON BO353 AND BO354

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Participate actively in educational tour.
- CO 3:** Study of families Nymphaeaceae, Oleaceae, Amaranthaceae and Cannaceae.
- CO 4:** Prepare Botanical keys by using vegetative and reproductive characters.
- CO 5:** Study of internal and external morphology of *Gnetum* and *Pinus*.
- CO 6:** Study of types of fossils.
- CO 7:** Study of polluted water body with ref. to BOD and Study of physicochemical properties of water body.

BO 359: PRACTICAL BASED ON BO355 AND BO356

After completion of the course students will be able to

- CO 1:** Correlate between practicals with theory to improve the understanding.
- CO 2:** Cytological techniques-preparation of Fixatives, preparation of stains.
- CO 3:** Isolation of nuclei and characterization.
- CO 4:** Study of various stages of mitosis and meiosis.
- CO 5:** Study of Chromosomes Morphology
- CO 6:** Isolation of plant genomic DNA by suitable method.

- CO 7: Estimation of Plant DNA by DPA method.
- CO 8: Extraction and estimation of RNA by Orcinol Method.

SKILL ENHANCEMENT COURSE (BO 3510: MEDICINAL BOTANY)

After completion of the course students will be able to

- CO 1: Study of medicinal plants: History, Scope and Importance.
- CO 2: Definition and Scope of Indigenous Medicinal Sciences.
- CO 3: Study of Ayurveda, Siddha and Unani.
- CO 4: Learn the conservation of endangered and endemic medicinal plants
- CO 5: Propagation of Medicinal Plants.
- CO 6: Ethno botany and Folk medicines

BO 3511: PLANT DIVERSITY AND HUMAN HEALTH

After completion of the course students will be able to

- CO 1: Study of plant biodiversity, agro biodiversity and loss of biodiversity.
- CO 2: Study of Management of Plant Biodiversity and Conservation of Biodiversity.
- CO 3: Study of role of plants in relation to Human Welfare.
- CO 4: Prepare a list of plants.

Semester VI

BO 361: PLANT PHYSIOLOGY AND METABOLISM 1

After completion of the course students will be able to

- CO 1: Learn mineral nutrition.
- CO 2: Gain the knowledge of mechanism of photosynthesis.
- CO 3: Learn the respiration, types of respiration, mechanism of aerobic respiration.
- CO 4: Learn stomatal biology.
- CO 5: Gain knowledge of translocation in phloem.
- CO 6: Learn plant growth regulators and Photo morphogenesis.

BO 362: BIOCHEMISTRY

After completion of the course students will be able to

- CO 1: Learn the foundation of Biochemistry.
- CO 2: Define the terms involved in it.
- CO 3: Identify the importance of the solvent of life.
- CO 4: Define enzymes and learn nature of enzymes and co-factors,
- CO 5: Give classification and properties of enzymes.
- CO 6: Learn stomatal biology.
- CO 7: Study carbohydrates and its types
- CO 8: Study lipids and vitamins.

BO 363: PLANT PATHOLOGY

After completion of the course students will be able to

- CO 1: Learn the fundamentals of Plant Pathology.
- CO 2: Learn the concepts of plant pathology.

- CO 3: Learn the defence mechanisms.
- CO 4: Identify and use methods of studying plant diseases.
- CO 5: Learn Plant Diseases.
- CO 6: Learn non-Parasitic Diseases.
- CO 7: Learn principles of plant diseases control

BO 364: EVOLUTION AND POPULATION GENETICS

After completion of the course students will be able to

- CO 1: Learn the concept organic evolution.
- CO 2: Explain the evidence of evolution
- CO 3: Learn the evolution through ages.
- CO 4: Study population genetics and evolution.
- CO 5: Learn the speciation and isolating mechanisms.

BO 365: ADVANCED PLANT BIOTECHNOLOGY

After completion of the course students will be able to

- CO 1: Introduce biotechnology.
- CO 2: Study plant tissue culture.
- CO 3: Identify the techniques of genetic engineering and methods of gene transfer.
- CO 4: Learn Cryopreservation and Germplasm Conservation
- CO 5: Correlate the biotechnology and society
- CO 6: Learn about microbial biotechnology and transgenic plants.

BO 366: PLANT BREEDING AND SEED TECHNOLOGY

After completion of the course students will be able to

- CO 1: Define and give scope and objectives of Plant breeding.
- CO 2: Learn the techniques and practices of plant.
- CO 3: Identify and use advanced techniques in plant breeding.
- CO 4: Give the introduction of Seed Technology.

BO 367: PRACTICAL BASED ON BO361 AND BO362

After completion of the course students will be able to

- CO 1: Correlation between practical's with theory to improve the understanding.
- CO 2: To organize educational tour for study of flora.
- CO 3: To develop plant related practical skills among the students.
- CO 4: To imbibe research related methodology in students.
- CO 5: Determination of plasmolysis, stomatal index, catalase activity, photosynthesis and paper chromatography.
- CO 6: To demonstration physiological experiments.
- CO 7: To estimate of total free amino acids, proteins, RS and Vitamin C.
- CO 8: Qualitative tests for starch, lipids and proteins.

BO 368: PRACTICAL BASED ON BO363 AND BO364

- CO 1:** Study the preparation of any one culture media and culture technique for isolation of plant pathogens.
- CO 2:** Study of any two of fungal, bacterial, viral and mycoplasma diseases.
- CO 3:** Prepare 1% Bordeaux mixture, 10% Bordeaux paste and Jivamruta.
- CO 4:** Study of Koch's Postulates, Fungicides and Microbial pesticides.
- CO 5:** Study of geological time scale, types of fossils and evidences of Organic Evolution.
- CO 6:** Solve numerical problems.
- CO 7:** Study of Sympatric and Allopatric speciation with suitable example.
- CO 8:** Visit to Paleobotany Laboratory/Museum/Fossil Garden.

BO 369: PRACTICAL BASED ON BO365 AND BO366

After completion of the course students will be able to

- CO 1:** Identify the different tissue culture techniques.
- CO 2:** Study of the equipment's used in genetic engineering and study of GM plants.
- CO 3:** Prepare plant based nano-particles.
- CO 4:** Demonstrate wine production from different fruits.
- CO 5:** Demonstrate Hybridization Techniques.
- CO 6:** Study of pollen viability and floral morphology of crops.
- CO 7:** Study of seed moisture, germination, purity and viability test of seed.
- CO 8:** Study the common seed insect pest.
- CO 9:** Visit to a Plant Breeding Research Centre/ Seed Industry.

BO 3610: NURSERY AND GARDENING MANAGEMENT

After completion of the course students will be able to

- CO 1:** Study the different nursery management techniques.
- CO 2:** Study of garden management and Sowing/raising of seeds and seedlings.
- CO 3:** Prepare saplings.
- CO 4:** Learn the marketing of saplings.

BO 3611: BIOFERTILIZERS

After completion of the course students will be able to

- CO 1:** Study the general account of the microbes used as Biofertilizers.
- CO 2:** Study of bacterial, algal, *Azolla* and fungal biofertilizers.
- CO 3:** Study the compost and manuring w.r.t. recycling, methods, vermicomposting and applications.
- CO 4:** Learn the marketing skills.

7. M. Sc. Botany

M.Sc. I Botany

Semester I

BOUT 111: Botany Theory Paper I - Plant Systematics I

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Types of algae and fungi
- CO 3: Learn the principles, and concepts.
- CO 4: Identify the applications.
- CO 5: Compare them.

BOUT 112: Botany Theory Paper II- Cell Biology

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the principles, and concepts.
- CO 3: Identify the applications.
- CO 4: Learn the signalling.

BOUT 113: Botany Theory Paper III-Cytogenetics, plant breeding and evolution

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the principles, and concepts.
- CO 3: Identify the applications.
- CO 4: Solve the problems.
- CO 5: Compare the theories.

BODT 114: Botany Theory paper 4-Biofertilizer and Algal Technology

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the principles, and concepts.
- CO 3: Identify the useful Biofertilizers.
- CO 4: Learn Algal Technology.

BODP 114: Botany Practical Paper 4

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Identify the different techniques.
- CO 3: Learn the principles, and concepts.
- CO 4: Identify the useful Biofertilizers.
- CO 5: Learn the different microorganisms as Biofertilizers.

BOUP 115: Botany Practical Paper 5

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Identify the morphological observations.
- CO 3:** Learn the principles, and concepts of various algal and fungal members.
- CO 4:** Identify the chromosomes.
- CO 5:** Find out the chromosomes.

Semester –II

BOUT 121: Botany Theory Paper 1- Plant Systematics II

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the classification.
- CO 3:** List the distinguishing characters.
- CO 4:** Pteridophytes: Classification.
- CO 5:** Learn the Gymnosperms, Pteridophytes and Angiosperms

BOUT 122: Botany Theory Paper II- Molecular Biology

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the classification.
- CO 3:** Types of enzymes.
- CO 4:** Types of DNA and RNA.

BOUT 123: Botany Theory Paper III- Biochemistry

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the concepts.
- CO 3:** Aspects of Biochemistry.
- CO 4:** Types of enzymes.
- CO 5:** Types of biomolecules like carbohydrates, lipids and nucleic acids.

BODT 124: Botany Theory paper 4- Floriculture and Nursery Management

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the concepts.
- CO 3:** Learn the scope and importance of floriculture.
- CO 4:** Identify the types of Nurseries, primary requirements, site preparation,
- CO 5:** Write the design and layout of Nurseries.

BODP 124: Practical based on BODT 124 Floriculture and Nursery Management

After completion of the course students will be able to

- CO 1:** Define the terms.

- CO 2: Learn the concepts.
- CO 3: Correlate theory and experiments.
- CO 4: Start floriculture/horticulture.
- CO 5: Prepare lab reports.

BOUP 125: Botany Practical Paper 5

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn different plant families of dicotyledonous and monocotyledon.
- CO 3: Learn Isolation and quantification of plant genomic DNA.
- CO 4: Use separation techniques.
- CO 5: Performs electrophoretic separation.
- CO 6: Use instruments or equipment's used in Molecular Biology techniques.
- CO 7: Prepare lab reports.

M.Sc. II Botany

BOUT 231: Botany Theory Paper I-COMPUTATIONAL BOTANY

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concepts of Basic biostatistics concepts.
- CO 3: Use of Excel softwares for statistical analysis.
- CO 4: Learn bioinformatics and Data Retrieval tools.

BOUT 232: Botany Theory Paper II- DEVELOPMENTAL BOTANY

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the basic concepts.
- CO 3: Apply the concepts in lifelong learning.

BOUT 233: Botany Theory Paper III- PLANT PHYSIOLOGY

After completion of the course students will be able to

- CO 1: Define the terms involved.
- CO 2: Identify the types of soils and composition.
- CO 3: Identify the useful mineral elements.
- CO 4: Learn the photosynthesis

BODT 234: Botany Theory Paper IV- MYCOLOGY

After completion of the course students will be able to

- CO 1: Define the terms involved.
- CO 2: Identify fungi
- CO 3: Learn the classification of fungi.
- CO 4: Learn the general characters and structural variations.
- CO 5: Identify higher fungi.

BODP 234: Botany Practical Paper 4 (based on BODT 234)

After completion of the course students will be able to

- CO 1: List the equipment needed.
- CO 2: Prepare the medium.
- CO 3: Isolate aquatic and soil fungi.
- CO 4: Study fungi from different groups
- CO 5: Prepare lab reports.

BOUP 235: Botany Practical Paper (Based on BOUT 231, BOUT 232, BOUT 233)

After completion of the course students will be able to

- CO 1: Define the general terms.
- CO 2: Learn to measure the mean, mode and median, etc.
- CO 3: Analyze the data.
- CO 4: Analyze variance on the given data (ANOVA) using R/ SPSS/Excel.
- CO 5: Prepare standard solutions (% , ppm, molar, normal)
- CO 6: Prepare lab reports.

BODT 234 d: Botany theory paper 4- Plant Biotechnology

After completion of the course students will be able to

- CO 1: Define the terms
- CO 2: Learn the application of transgenic plants
- CO 3: Learn Plant tissue culture technology
- CO 4: Types of pollution
- CO 5: Biotechnology And Society

BODP 234: Practical paper based on BODT 234

After completion of the course students will be able to

- CO 1: Isolate plant genomic DNA
- CO 2: Enzymatic isolation of protoplast
- CO 3: Biological assessment of waste water
- CO 4: Write lab report

Semester IV

BOUT 241: Botany Theory Paper 1- Botanical Techniques

After completion of the course students will be able to

- CO 1: List the techniques.
- CO 2: Learn the concepts of techniques.
- CO 3: Use different techniques.
- CO 4: Perform TLC and column chromatography.
- CO 5: Learn and use electrophoretic techniques.
- CO 6: Learn and use spectroscopic techniques.

BOUT 242: Botany Theory Paper II- Advanced Ecology

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the types of Ecosystem.
- CO 3: Learn the methods of estimating population density.
- CO 4: Learn the environmental impact assessment.

BODT 243: Botany Theory Paper III- Applied Mycology

After completion of the course students will be able to

- CO 1: Learn the colonization strategies in fungi and their ecological role
- CO 2: Learn the fungi as Biofertilizers.
- CO 3: Learn medical mycology and industrial mycology
- CO 4: Learn fungi as food- Mushrooms.
- CO 5: Identify the types of mushroom.

BODT 243d: Botany Theory Paper III- Industrial Biotechnology

After completion of the course students will be able to

- CO 1: Define the terms
- CO 2: Scope and importance of biotechnology
- CO 3: Fermentation technology
- CO 4: Bioremediation of industrial wastes
- CO 5: Bio-plastic in environment protection

BODP 243 based on BODT 243 Industrial Biotechnology

After completion of the course students will be able to

- CO 1: Isolation of *Aspergillus niger*
- CO 2: Recovery of citric acid from fermented broth
- CO 3: Fermentative Production of Ethanol
- CO 4: Preparation of Bio-plastic

BODP 244 Botany practical paper based on BODT 244

After completion of the course students will be able to

- CO 1: Learn to prepare Cosmetic and Herbal products.
- CO 2: Analyse fixed oil and phytochemical
- CO 3: Study different packaging methods
- CO 4: Identify different quality testing centre and herbal products

BODP 243: Botany Practical paper based on BODT 243

After completion of the course students will be able to

- CO 1: List diseases.
- CO 2: Study diseases of forest plants such as Powdery mildews, rots and spots.
- CO 3: Study post-harvest diseases or market pathogens of local market.
- CO 4: Isolate mycorrhizal fungi & trichoderma as Biofertilizer.
- CO 5: Study fungal industrial metabolites/ antibiotics with their importance.

BODT 244: Botany Theory Paper IV- Herbal Technology

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn herbal technology concept.
- CO 3:** Identify herbal medicines, herbal cosmetics.

BODP 244: PG Dissertation

After completion of the course students will be able to

- CO 1:** Know the research methodology.
- CO 2:** Prepare the project report.
- CO 3:** Write manuscript.

BOUP 245: Botany practical paper based on BOUT 241 and BOUT 242

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the principle of Electrical conductivity and pH.
- CO 3:** Separate the leaf pigments.
- CO 4:** Learn various techniques.
- CO 5:** Evaluate dissolved oxygen.
- CO 6:** Write lab report.

8. B. Sc. Zoology

F. Y. B. Sc.

ZO-111 Animal Diversity I

After completion of the course students will be able to

- CO 1: Identify the animal diversity
- CO 2: Classify the animals and terminologies
- CO 3: Learn Binomial Nomenclature and Five kingdom Classification
- CO 4: Classify invertebrates

ZO-112 Animal Ecology

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concept of Ecology and Ecology: Structure and composition.
- CO 3: Learn the characteristic of population, population regulation and interaction.
- CO 4: Learn community characteristics and Ecological Succession.
- CO 5: Identify the animal interactions, competitions,

ZO-113 Zoology Practical Courses

After completion of the course students will be able to

- CO 1: Learn the biological phenomenon.
- CO 2: Correlate theory with experiment.
- CO 3: Classify the various invertebrates with help of museum specimens.
- CO 4: Think on ecological problems.
- CO 5: Participate actively in field visits.
- CO 6: Identify the pests.

ZO-121 Animal Diversity II

After completion of the course students will be able to

- CO 1: Identify the animal diversity
- CO 2: Classify the animals and terminologies
- CO 3: Learn Binomial Nomenclature and Five kingdom Classification
- CO 4: Classify invertebrates

ZO-122 Cell Biology

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the importance of Cell Biology and its application
- CO 3: List the applications of cell biology.
- CO 4: Distinguish between Prokaryotic and Eukaryotic cell.
- CO 5: Learn the different techniques.
- CO 6: Learn the structure and functions of various cell organelles.

ZO-113 and ZO- 123 Zoology Practical Courses

After completion of the course students will be able to

- CO 1:** Learn the biological phenomenon.
- CO 2:** Correlate theory with experiment.
- CO 3:** Classify the various invertebrates with help of museum specimens.
- CO 4:** Think on ecological problems.
- CO 5:** Participate actively in field visits.
- CO 6:** Identify the pests.

S. Y. B. Sc.

ZO-231 Animal Diversity III

After completion of the course students will be able to

- CO 1:** Learn the vertebrate diversity.
- CO 2:** Identify the vertebrates.
- CO 3:** Classify the higher vertebrates.
- CO 4:** Study the types of animals.

ZO-232 Applied Zoology I

After completion of the course students will be able to

- CO 1:** Identify the varieties of silkworms.
- CO 2:** Learn the techniques of silk production.
- CO 3:** List the types of agricultural pests.
- CO 4:** Learn the insect pests.
- CO 5:** Suggest pest control practices.

ZO-233 Zoology Practical Courses

- CO 1:** Learn the biological phenomenon.
- CO 2:** Correlate theory with experiment.
- CO 3:** Classify the various vertebrates with help of museum specimens.
- CO 4:** Think on ecological problems.
- CO 5:** Participate actively in field visits.
- CO 6:** Identify the silkworm and honeybee and important agricultural pests

ZO-241 Animal Diversity IV

After completion of the course students will be able to

- CO 1:** Learn the vertebrate diversity.
- CO 2:** Identify the vertebrate diversity.
- CO 3:** Learn the principles of classification.
- CO 4:** Classify the vertebrates.
- CO 5:** Learn the behaviours and adaptations in higher vertebrates.

ZO-242 Applied Zoology II

After completion of the course students will be able to

- CO 1: Learn the beekeeping tools, equipments, and beehives managements.
- CO 2: Collect the basic information about fishery.
- CO 3: Learn the preservation techniques.

ZO-233 and ZO- 243 Zoology Practical Courses

After completion of the course students will be able to

- CO 1: Learn the biological phenomenon.
- CO 2: Correlate theory with experiment.
- CO 3: Classify the various vertebrates with help of museum specimens.
- CO 4: Think on ecological problems.
- CO 5: Participate actively in field visits.
- CO 6: Identify the silkworm and honeybee and important agricultural pests

T. Y. B. Sc.

ZO-351 Pest Management

After completion of the course students will be able to

- CO 1: Learn the concept of Pest and Pest Management
- CO 2: Identify the economic, ecological, and sociological benefits of IPM.
- CO 3: Identify the problems due to chemical pesticides.
- CO 4: Identify ecological and biological characteristics in development of pest populations.
- CO 5: Discuss the society's role in IPM decisions.

ZO-352 Histology

After completion of the course students will be able to

- CO 1: Learn the histological aspects of mammalian organs.
- CO 2: Learn the important features of different types of tissues in organ system.
- CO 3: Classify the various types of basic tissues.
- CO 4: Predict the structure & functions of various tissues in organ system.
- CO 5: Learn the histological structure of various glands and its functions.

ZO-353 Biological Chemistry

After completion of the course students will be able to

- CO 1: Learn the basic concepts and significance of biochemistry.
- CO 2: Learn the basic concepts pH and Buffers.
- CO 3: Learn the chemical structures of carbohydrate, and their significance.
- CO 4: Study structure and importance of proteins and lipids
- CO 5: Discuss the variations in enzyme activity and kinetics.

ZO-354 Genetics

After completion of the course students will be able to

- CO 1: Define laws.
- CO 2: Learn the concept of Gene and Mendel's laws of Inheritance.

- CO 3:** Learn the concept of Multiple Alleles
- CO 4:** Describe mutations, their types and different types of mutagenic agents
- CO 5:** Learn the concept behind genetic disorder, and sex determination
- CO 6:** Explore new avenues in genetic counselling and diagnostics

ZO-355 Developmental Biology

After completion of the course students will be able to

- CO 1:** Define the main stages of development of multicellular organisms.
- CO 2:** Learn the order of development of multicellular organisms.
- CO 3:** Describe the main anatomical changes that occur during development.
- CO 4:** Identify the cellular behaviours during development.

ZO-356 Parasitology

After completion of the course students will be able to

- CO 1:** Learn about the basics and scope of parasitology.
- CO 2:** Describe the types of host and parasite with examples.
- CO 3:** Describe the morphology, life cycle, pathogenicity and treatment of parasites.
- CO 4:** Learn the host -parasite relationships and their effects on host body.
- CO 5:** Describe the arthropod parasites and their role as vector.

ZO-357 Zoology Practical Paper 1

After completion of the course students will be able to

- CO 1:** Learn the biological phenomenon.
- CO 2:** Correlate the biological phenomenon learnt in the theory with experiments.
- CO 3:** Develop the practical and experimental skills.

ZO-358 Zoology Practical Paper 2

After completion of the course students will be able to

- CO 1:** Learn the biological chemistry.
- CO 2:** Correlate the phenomenon with Chemistry and Genetics through experiments.
- CO 3:** Develop the practical and experimental skills.

ZO-359 Zoology Practical Paper 3

After completion of the course students will be able to

- CO 4:** Correlate the biological phenomenon learnt in the theory with experiments.
- CO 5:** Identify the parasites.
- CO 6:** Develop the practical and experimental skills.

ZO-3510 Aquarium Management

After completion of the course students will be able to

- CO 1:** Learn the Entrepreneurial skills in ornamental fish keeping & breeding, hatchery technology, fish feed production and fish processing.
- CO 2:** Learn aquarium setting, and aquarium accessories involved.

CO 3: Create awareness about major ornamental fish diseases.

CO 4: Suggest the remedies on diseases.

ZO- 3511 Poultry Management

After completion of the course students will be able to

CO 1: Learn the Poultry farming practices.

CO 2: Learn the poultry breeding techniques.

CO 3: Learn poultry rearing techniques.

CO 4: Learn the feeding requirement and food ingredients.

CO 5: Learn the poultry diseases and their pathogens.

CO 6: Take review on market value of poultry products

ZO-361 Medical & Forensic Zoology

After completion of the course students will be able to

CO 1: Learn the principles of Medical and Forensic Zoology.

CO 2: List the scientific methods in crime detection.

CO 3: Identify the advancements in the field of Medical and Forensic Zoology.

CO 4: Learn the modern tools, techniques and skills in forensic investigations.

CO 5: Describe the fundamental principles and functions of forensic science and its significance to human society.

ZO-362 Animal Physiology

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Learn the physiological organ-systems and their importance.

CO 3: Learn the concepts

CO 4: List the waste materials from the body.

CO 5: Develop the understanding in Structure and functions of muscles

CO 6: Study the formation of gametes and function of endocrine glands.

ZO-363 Molecular Biology

After completion of the course students will be able to

CO 1: Learn the molecular mechanisms of various biological processes.

CO 2: Know the structure of DNA and RNA, DNA and RNA as genetic material

CO 3: Find the Central Dogma of Molecular Biology

CO 4: Learn the concepts.

ZO-364 Entomology

After completion of the course students will be able to

CO 1: Learn the concepts in Entomology and its scope.

CO 2: Learn morphology and anatomy of Insects.

CO 3: Identify diseases causing insect vectors.

CO 4: Suggest the pest control methods.

ZO-365 Techniques in Biology

After completion of the course students will be able to

- CO 1:** Learn the various concepts.
- CO 2:** List the techniques used.
- CO 3:** List the equipments used for field visits.
- CO 4:** Learn the image processing.
- CO 5:** Use specific softwares.

ZO-366 Evolutionary Biology

After completion of the course students will be able to

- CO 1:** Learn the essential aspects of evolutionary biology.
- CO 2:** Explain important processes, principles and concepts and critically evaluate theories and empirical research.
- CO 3:** Apply evolutionary theory and concepts.
- CO 4:** Investigate evolutionary questions using literature and data.
- CO 5:** Discuss the principles, theories, problems and results of research.

ZO-367 Zoology Practical Paper 1

After completion of the course students will be able to

- CO 1:** Correlate the biological phenomenon learnt in the theory with experiments.
- CO 2:** Identify the aspects.
- CO 3:** Develop the practical and experimental skills.

ZO-368 Zoology Practical Paper 2

After completion of the course students will be able to

- CO 1:** Correlate the biological phenomenon learnt in the theory with experiments.
- CO 2:** Identify the aspects of molecular biology and Entomology.
- CO 3:** Develop the practical and experimental skills.

ZO-369 Zoology Practical Paper 3

After completion of the course students will be able to

- CO 1:** Correlate the biological phenomenon learnt in the theory with experiments.
- CO 2:** Identify the aspects of biology.
- CO 3:** Develop the practical and experimental skills.

ZO-3610 Environmental Impact Assessment

After completion of the course students will be able to

- CO 1:** Describe impact of pollution on environment.
- CO 2:** Learn the concept of sustainable development.
- CO 3:** Describe UN 17 Sustainable Development Goals (SDGs).
- CO 4:** Describe various environment protection acts
- CO 5:** Explain the concepts about the Environmental Impact Assessment (EIA).
- CO 6:** Describe the process of EIA.

CO 7: List the subjects which must be considered in EIA projects.

ZO-3611 Project

After completion of the course students will be able to

CO 1: Develop the Laboratory skills.

CO 2: Design the experimental setup.

CO 3: Conduct field work.

CO 4: Identify the findings.

CO 5: Prepare a report.

CO 6: Aware of plagiarism and research ethics.

9. B.Sc. Mathematics

F. Y. B.Sc.

Semester-I

MT111-Algebra

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Learn the concepts.
- CO 3: Describe the methods of solving division algorithm and its solution.
- CO 4: Explain algebraic properties of integers, finding GCD by Euclidean algorithm,
- CO 5: Solve the problems.
- CO 6: Solve the relations.

MT112-Calculus-I

After completion of the course students will be able to

- CO 1: Define the terms and give examples of calculus.
- CO 2: Describe the concepts.
- CO 3: Solve the examples.
- CO 4: Illustrate the concept of Limit, Continuity.
- CO 5: Classify and apply the concept of properties of Real Number.

MT113-Mathematical Practical Course

After completion of the course students will be able to

- CO 1: Getting the knowledge of basic of maxima software.
- CO 2: Calculate GCD of 2 numbers using Euclidean algorithm.
- CO 3: Solve examples of polynomial.
- CO 4: Plot functions in 2D and plots in 3D.

Semester-II

MT121-Analytical Geometry

After completion of the course students will be able to

- CO 1: Define the terms: Conic, Translation, Rotation, Centre, D.C.S., D.R.S.
- CO 2: Explain the concepts of Planes, Lines, and Spheres.
- CO 3: List the equations.
- CO 4: Solve the problems.
- CO 5: Calculate shortest distance between skew lines, radius, center of sphere and angle between planes and lines, cylinder, cone.
- CO 6: Give the diagrammatic representation of various concepts in analytical geometry.

MT122-Calculus-II

After completion of the course students will be able to

- CO 1: Define the terms and state the rules.
- CO 2: Correlate the concepts.
- CO 3: Describe the concepts.
- CO 4: Solve tricky examples.

MT123-Mathematics Practical

After completion of the course students will be able to

- CO 1: Solve the problems of Geometry and Calculus using Maxima software.
- CO 2: Draw 3 Dimension figures.
- CO 3: Learn the command of Maxima software.
- CO 4: Use various Maxima software command.

S. Y. B. Sc.

Semester-III

MT 231: Calculus of several variables

After completion of the course students will be able to

- CO 1: Find limit of functions
- CO 2: Plot graphs.
- CO 3: Solve the problems.
- CO 4: Learn the extreme value of Function, Second derivative test, Lagrange Multipliers.
- CO 5: Define the terms and give proofs.

MT-232 (A): Numerical Methods and its Applications

After completion of the course students will be able to

- CO 1: Define Basic concepts of operators
- CO 2: Find the Difference of polynomial.
- CO 3: Solve problems.
- CO 4: Derive the formulae.
- CO 5: Distinguish the rules.

MT- 233: Mathematics Practical

After completion of the course students will be able to

- CO 1: List the softwares.
- CO 2: Learn and install Software in Desktop Mobile devices.
- CO 3: Troubleshoot the problems using Maxima Software.
- CO 4: Solve the problems.
- CO 5: Plot the graphs, charts.

Semester-IV

MT-241: Linear algebra

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Discuss the linear transformations, rank, nullity.
- CO 3: Learn and recall the theorems.
- CO 4: Solve the problems/equations.

MT-242 (A): Vector Calculus

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Describe the concept.
- CO 3: Learn and recall the theorems.
- CO 4: Solve the problems/equations.

MT-243 Mathematics Practical

After completion of the course students will be able to

- CO 1: List the softwares.
- CO 2: Learn and install Software in Desktop Mobile devices.
- CO 3: Troubleshoot the problems using Maxima Software.
- CO 4: Solve the problems.
- CO 5: Plot the graphs, charts.

T. Y. B. Sc.

Semester - V

MT 351 Metric Spaces

After completion of the course students will be able to

- CO 1: Learn the concepts of metric Spaces.
- CO 2: Correlate the concepts to counter parts in metric analysis using examples.
- CO 3: Prepare the background knowledge for advanced courses.
- CO 4: Evaluate the abstracts.

MT: 352 Real Analysis-I

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Evaluate limits.
- CO 3: Recognize the functions.
- CO 4: Use the ratio, root, alternating series and limit comparison tests for convergence and absolute Convergence of an infinite series of real numbers.
- CO 5: Classify the sequence is bounded, tinbounded, Oscillatory.

CO 6: Solve the Absolute and conditional convergence of series.

MT-353 Group Theory

After completion of the course students will be able to

CO 1: Define the terms and learn the concepts.

CO 2: Classify the groups.

CO 3: Analyze the consequences theorem.

CO 4: Learn the structure preserving maps and consequences.

CO 5: Explain the significance of the notation of groups.

MT-354 Ordinary Differential Equations

After completion of the course students will be able to

CO 1: Learn the genesis of ordinary differential equation

CO 2: Learn various techniques to solve differential equations.

CO 3: Learn the concept of general solutions.

CO 4: Compare different methods of solving differential equation.

MT 355 (A): Operation Research

After completion of the course students will be able to

CO 1: Define the terms.

CO 2: Collect the models of real life situations.

CO 3: Solve linear programming models of real-life situations.

CO 4: Solve the problems.

CO 5: Discuss the relationships.

CO 6: Compare the methods of operations Research.

MT 356 B : Number Theory

After completion of the course students will be able to

CO 1: Solve the problems.

CO 2: Classify the methods.

CO 3: Illustrate one method for solving number theory.

CO 4: Analyze the methods in number theory.

CO 5: Explain the fundamental concepts.

MT-357 Practical Course Lab-1

After completion of the course students will be able to

CO 1: Solve the properties of Real numbers.

CO 2: List the methods.

CO 3: Choose the method for class I^2 example.

CO 4: List properties of metric space, convergent sequences, Cauchy sequences.

CO 5: Apply compactness property to solve examples.

MT358 Practical Course Lab-II

After completion of the course students will be able to

- CO 1:** List the methods for solving differential equations.
- CO 2:** Illustrate one method for solving differential equations.
- CO 3:** Choose appropriate method for solving ODE.
- CO 4:** List the groups.
- CO 5:** Solve the problems.

MT359 Practical Course Lab-III

After completion of the course students will be able to

- CO 1:** List the methods for solving number theory.
- CO 2:** Illustrate one method.
- CO 3:** Choose appropriate method for solving number theory.
- CO 4:** Compare methods of Operation Research
- CO 5:** Analyse the method in operation Research
- CO 6:** Apply the method for solving examples in Number theory.
- CO 7:** Discuss examples on Congruence.

MT-3510 Programming in Python

After completion of the course students will be able to

- CO 1:** Explain the basic principles
- CO 2:** List the programming languages.
- CO 3:** Learn the python.
- CO 4:** Write programme.
- CO 5:** Apply iterations and conditional statements.

MT-3511 LATEX for Scientific writing

After completion of the course students will be able to

- CO 1:** Learn the latex language.
- CO 2:** Write a simple Latex input document based on the article class.
- CO 3:** Convert the input document into pdf with the pdf latex program.
- CO 4:** Check the syntax.
- CO 5:** Present data using tables.

Semester-VI

MT-361 Complex Analysis

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Learn the concepts.
- CO 3:** Learn the significance of complex functions.
- CO 4:** Evaluate the contour integrals.
- CO 5:** Relate it with Cauchy Integral Formula.
- CO 6:** Use some simple functions.
- CO 7:** Represents functions as Taylors, powers and Laurent's Series.
- CO 8:** Classify singularities and solve examples.

MT-362 Real Analysis –II

After completion of the course students will be able to

- CO 1:** Define the terms
- CO 2:** Learn Some functions and their properties.
- CO 3:** Learn the convergence of sequence of functions.
- CO 4:** Solve the example on convergence functions.

MT-363 Ring Theory

After completion of the course students will be able to

- CO 1:** Explain the fundamental concepts.
- CO 2:** Solve the examples by using theorems.
- CO 3:** Learn the significance of UFD and ID.
- CO 4:** Illustrate the theorem on UID, PID and Factor Ring.

MT-364 Partial Differential Equation

After completion of the course students will be able to

- CO 1:** Define concepts in PDE by giving examples.
- CO 2:** Formulate and classify partial differential equation.
- CO 3:** Solve the examples using various methods.
- CO 4:** Illustrate the theorem in PDE.

MT-365 (A) Optimization Techniques

After completion of the course students will be able to

- CO 1:** Explain the fundamentals concepts in OT.
- CO 2:** Solve sequencing problems for various Jobs and Machines.
- CO 3:** Compare the methods in OT.
- CO 4:** Classify the methods and apply the concept for solving problems.

MT-366(B) Computational Geometry

After completion of the course students will be able to

- CO 1:** Construct the algorithms for simple geometrical problems.
- CO 2:** Characterize invariance properties.
- CO 3:** Describe and construct the basic geometric shapes and concept.
- CO 4:** Solve examples on transformations.

MT-367 Practical Course Lab-I

After completion of the course students will be able to

- CO 1:** Solve the examples by using theorems.
- CO 2:** Determine the Singularities and it's Types
- CO 3:** Solve improper integral of first kind and second kind
- CO 4:** Solve the example on convergence functions.

MT 368 Practical Course Lab-II

After completion of the course students will be able to

- CO 1:** List examples of rings, subrings, integral domains
- CO 2:** Solve the examples of rings.
- CO 3:** Apply Jacobean method for solving PDE.
- CO 4:** Solve examples using theorems.

DSE-6 MT 369 Practical Course Lab-III

After completion of the course students will be able to

- CO 1:** Learn all definition and basic concepts.
- CO 2:** Compare the methods in OT.
- CO 3:** Solve examples on transformations.
- CO 4:** Solve examples by using algorithms.

SEC-III MT-3610 Programming in Python –II

After completion of the course students will be able to

- CO 5:** Explain the basic principles.
- CO 6:** List the programming languages.
- CO 7:** Solve the Programmes
- CO 8:** Construct programmes.

SEC-IV MT-3611 Mathematics into Latex

After completion of the course students will be able to

- CO 1:** Type and set Mathematical Formulas.
- CO 2:** Import figures and pictures that are stored in external files.
- CO 3:** Solve the equations using mathematical operators.
- CO 4:** Define the new commands and new involvements.

10. M.Sc. Mathematics

M. Sc. I

Semester I

MTUT 111: Linear Algebra

After completion of the course students will be able to

- CO 1: Recall the basic concepts in linear algebra.
- CO 2: Classify the types of Vector space.
- CO 3: Solve examples in algebra.
- CO 4: Prove the theorems.

MTUT112: Real Analysis

After completion of the course students will be able to

- CO 1: Define the concepts in real analysis.
- CO 2: Illustrate the theorems.
- CO 3: Describe properties of measure.
- CO 4: Solve the examples by using theorems.

MTUT113: Group Theory

After completion of the course students will be able to

- CO 1: Recall the concept of group theory.
- CO 2: Classify types of groups.
- CO 3: Describe the properties of groups.
- CO 4: Solve the examples.

MTUT 114: Advanced Calculus

After completion of the course students will be able to

- CO 1: Define the concepts of advanced calculus.
- CO 2: Compare concept of integrals.
- CO 3: Illustrate the theorems.
- CO 4: Identify the methods for solving example of Integral.

MTUT 115: Ordinary Differential Equation

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Choose appropriate method for solving ODE.
- CO 3: Prove theorems of ODE.
- CO 4: Solve examples by using theorems.

Semester II

MTUT 121: Complex Analysis

After completion of the course students will be able to

- CO 1: Define the basic concepts of complex analysis.
- CO 2: Evaluate the contour integrals.
- CO 3: Solve examples on Contour Integration, Zero and Poles.
- CO 4: Illustrate the theorems.
- CO 5: Classify the types of Singularities.

MTUT122: General Topology

After completion of the course students will be able to

- CO 1: Define the concept of topology.
- CO 2: Solve the examples of topology.
- CO 3: Illustrate the theorems.
- CO 4: Classify the concept of compact Space, Topological space, Connected Space.

MTUT 123: Ring Theory

After completion of the course students will be able to

- CO 1: Explain the fundamental concepts.
- CO 2: Solve the examples by using theorems.
- CO 3: Learn the significance of UFD, ID,PID, FD and ED.
- CO 4: Illustrate the theorem on ring.

MTUT124: Advanced Numerical Analysis

After completion of the course students will be able to

- CO 1: Define the concepts of numerical by giving examples.
- CO 2: Solve the problems in numerical analysis.
- CO 3: Determine Eigen values and Eigen vectors.
- CO 4: Illustrate the theorems.

MTUT125: Partial Differential Equations

After completion of the course students will be able to

- CO 1: Recall the basic concept in Partial Differential Equation
- CO 2: Solve examples of partial differential equation using various methods.
- CO 3: Illustrate the theorems.
- CO 4: Classify the various methods.

M.Sc. II Mathematics**Semester III****MTUT 131: Functional Analysis**

After completion of the course students will be able to

- CO 1:** Define the terms by giving examples.
- CO 2:** List the operators.
- CO 3:** Learn the concept of all operators in Functional Analysis.
- CO 4:** Use of operators for solving problems.
- CO 5:** Illustrate theorems.

MTUT 132: Field Theory

After completion of the course students will be able to

- CO 1:** Define the terms by giving examples.
- CO 2:** Illustrate theorems
- CO 3:** Solve problems using theorems.
- CO 4:** Find the order of Galois group.

MTUT 133: Programming with Python

After completion of the course students will be able to

- CO 1:** Learn the language.
- CO 2:** Explain various concepts.
- CO 3:** Construct the mathematical equations.
- CO 4:** Solve examples using Python Programming.

MTUT 134: Discrete Mathematics

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Solve the examples by using algorithms.
- CO 3:** Explain the concepts.
- CO 4:** Illustrate the theorems.

MTUT 135: Mechanics

After completion of the course students will be able to

- CO 1:** Define the terms.
- CO 2:** Solve the examples.
- CO 3:** Explain the concepts.
- CO 4:** Illustrate the theorems.

Semester IV

MTUT 141: Fourier series and Boundary Value Problems

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Solve the examples.
- CO 3: Explain the concepts.
- CO 4: Illustrate the theorems.

MTUT 142: Differential Geometry

After completion of the course students will be able to

- CO 1: Explain the concepts in Graphs.
- CO 2: Illustrate examples on Graphs.
- CO 3: Draw level curves of function using graphs.
- CO 4: Illustrate the theorems.

MTUT 143: Introduction to Data Science

After completion of the course students will be able to

- CO 1: Learn the Data Science in a big data world.
- CO 2: Classify the data, machine learning.
- CO 3: Learn the data processing.
- CO 4: Solve the problems.

MTUT: 144 Number Theory

After completion of the course students will be able to

- CO 1: Define the terms.
- CO 2: Solve the problems using theorems.
- CO 3: Illustrations of theorems.
- CO 4: Identify the types of congruence.
- CO 5: Explain the concepts: congruence.

MTUT 148: Probability and Statistics

After completion of the course students will be able to

- CO 1: List the types of probabilities.
- CO 2: Solve the problems on probability distributions.
- CO 3: Identify linear regression and correlation, random variable, Probability.
- CO 4: Differentiate distributions.