SGT UNIVERSITY
SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
(UGC Approved) Gurugram, Delhi-NCR
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

Faculty of Physical Sciences

Program Outcomes (POs)

B.Sc. (Non-Medical)

Program Outcomes:

At the completion of the B.Sc. program, the student will be able to:

Cognitive Outcomes

PO1.

Acquiring fundamental knowledge:

Identify reason and relate fundamental concepts in physical and allied sciences.

PO2.

Developing practical skills:

Formulate experiment, analyze observations and use relevant tools for conclusive inference from numerical and qualitative data.

Skill Outcomes

PO3.

Demonstrating knowledge:

Formalize assumptions,refer literature, correlate scientific results and undertake problem-solving.

PO4.

Exhibiting scientific skills:

Collect data in observations, designmodeland improve it using valid scientific techniques.

Affective Outcomes

PO5.

Practicing Science and ethics:

Practise scientific methods using ethics to address public safety, health and environment in societal and National interests.

M.Sc.(Non-medical)

Program Outcomes:

At completion of the M.Sc. program, the student will be able to:

Cognitive outcomes

PO1.

Acquiring scientific knowledge:

Recognize concepts; relate fundamental results in application to established methods for scientific work.

PO2.

Recognizing literature:

Identify relevant literature, analyse topics, correlate advanced scientific techniques and derive

inference.

Skill outcomes

PO3.

Conducting investigation:

Generate information, refer procedures and apply research tools for conclusive investigation of problems and issues.

PO4.

Designing and developing solution:

Process data, develop effective logic in design of solution and combine relevant principles and practical norms.

Affective outcomes

PO5.

Life-long learning and ethics:

Engage in the life-long learning of scientific issues with ethical practise.

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Program Specific Outcomes(PSOs)

B.Sc. (Non-Medical)

Program Specific Outcomes:

At the end of the B.Sc. (Non-Medical) program, students will be able to:

Cognitive outcomes

PSO1.

Acquiring scientific knowledge skills:

Develop knowledge; understand principles and applications, from organic, inorganic and physical chemistry.

PSO2.

Reasoning of problems:

Identify scientific literature, analyze information and relate to real problems.

Skill outcomes

PSO3.

Designing and developing solution:

Identify problem, select correct methodology for valid solutions.

PSO4.

Conducting investigation:

Select appropriate procedures, instrument for particular functions and interpret from observations.

Affective outcomes

PSO5.

Life-long learning and team-work:

Motivate lifelong learning and inspire practice of professional ethics.

M.Sc. (Mathematics)

At the completion of the M.Sc. (Mathematics) program, the student will be able to:

Cognitive outcomes

PSO1.
Acquiring Knowledge:
Identify theory from literature, formulate and analyzeproblems with the aid of mathematical identities.

PSO2.
Recognizing the literature:
Prove theorems, relateto the various topics, develop modelling and applications.
Skill outcomes

PSO3.

Designing of solutions:
Resolve problems, identify math techniques and design solution to real-world problem.

Affective outcomes

PSO4.

Creating professional values and leadership:
Exhibit professional values in leading diverse teams towards community and nation building.

M.Sc.(Chemistry)

At the end of the M.Sc.(Chemistry) program, students for specialization in inorganic, organic and physical chemistry will be able to:

Cognitive outcomes

PSO1.

Acquiring scientific knowledge skills:

Develop knowledge and recognize principles and practices in inorganic, organic and physical chemistry.

PSO2.

Reasoning of problems:

Identify relevant literature, analyze information and interpret empirical model.

Skill outcomes

PSO3.

Designing and developing solution:

Recognize problem constraints, formulate methods from literature and compare solutions.

PSO4.

Conducting investigation:

Select procedures, identify equipment functions and interpret observations.

Affective outcomes

PSO5.

Life-long learning and team-work:

Generate opportunities for lifelong learning and build ethical teams.

M.Sc.(Physics)

At the end of the program, the candidate will be able to:

Cognitive outcomes

PSO 1.

Acquiring Scientific Knowledge:

Acquire familiarity on topics, comprehendfundamental concepts and relate withreal-worldobservations.

PSO 2.

Reasoning of Problems:

Recognize scientific methods to model and analysetheoretical and practical problems.

Skill outcomes

PSO 3.

Conducting experiments:

Set up experiments, interpret empirical data, deduce conclusion and connect the results with fundamental principles of Physics.

PSO 4.

Designing and developing solution:

Applyprinciples of Physics, basic computational techniques to develop solutions in relevant areas.

Affective outcomes

PSO 6.

Exhibiting Social responsibility and Ethics:
Understandthe significance of sustainable development and find solutions which have environment friendly societal contexts.

M.Sc- Environmental Science

At completion of the program the student will be able to:

Cognitive outcomes

PSO1.

Acquiring scientific knowledge skills:

Identify scientific methods and recognize environmental issues in relation to society and nature.

PSO2.

Reasoning of problems:

Apply principles of allied science areas, develop scientific understanding and interpret environmental models and their impacts.

Skills outcomes

PSO3.

Designingsolutions:

Analyze methodologies and design environmental solutions for contemporary environmental problems.

Affective outcomes

PSO4.

Contributing to Society and Nation:

Participate ethically on the roles with environmentally responsible citizens for Society and Nation.

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Course Outcomes (COs)

Name of the Program: B.Sc. Non-Medical-1st Year

1. Name of Course: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons

Course Code: 09010115

Course Outcome (CO)

CO1 Able to determine electronic configurations of atoms and ions
CO2 Explanation of chemical bonding in atoms and molecules
CO3 Able to explain electronic displacements in organic molecules with special emphasis on inductive, resonance, electromeric effects and hyperconjugation
CO4 Explanation of nucleophilic and electrophilic behavior of organic species
CO5 Understanding of spatial arrangement of atoms in organic molecules
CO6 Identifation of important properties and reactions of aliphatic hydrocarbons (alkanes, alkenes and alkynes)

2. Name of Course: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons Lab

Course Code: 09010116

Course Outcome (CO)

CO1 Knowledge of separation of mixtures of Sodium carbonate and Sodium hydrogen carbonate
CO2 Determination of strengths of solutions of oxalic acid and water of crystallization in Mohr's salt with KMnO4.
CO3 Estimation of strengths of Fe(II) solutions with $K_2Cr_2O_7$
CO4 Able to determine strengths of Cu(II) solutions iodometrically with $Na_2S_2O_3$
CO5 Detection of heteroatoms (N, S, Cl, Br, I) in organic compounds
CO6 Separation of amino acids and sugars with paper chromatography

3. Name of Course: Chemical Energetics, Equilibria, Functional Group Organic Chemistry-I

Course Code: 09010214

Course Outcome (CO)

CO1 Separation of mixtures of Sodium carbonate and Sodium hydrogen carbonate
CO2 Able to Explain energetics of chemical reactions through important principles and definitions of thermochemistry.
CO3 Understanding of free energy change in a chemical reaction
CO4 Explanation of degree of ionization and the differences between strong, moderate and weak electrolytes
CO5 Understanding of preparation and reactions of aromatic hydrocarbons; aryl and alkyl halides; alcohols, phenols and ethers; aldehydes and ketones.

4. Name of Course: Chemical Energetics, Equilibria, Functional Group Organic Chemistry-I Lab

Course Code: 09010215

Course Outcome (CO)

CO1 Determination of heat capacity of calorimeter for different volumes.
CO2 Determination of enthalpy of

a. Neutralization of hydrochloric acid with sodium hydroxide
b. Ionization of acetic acid
c. Solution of salts (KNO3, NH4Cl)
d. Hydration of Copper Sulphate
CO3 Study of solubility of benzoic acid in water
CO4 Measure pH of different solutions, for instance, aerated drinks, fruit juices, shampoos and soaps
CO5 Prepare buffer solutions (one acidic and basic each) and determine their pH
CO6 Purify organic compounds by crystallization and distillation and determine their purity with melting and boiling points
CO7 Conduct the following syntheses and determine their mechanisms
a. Bromination of Phenol/Aniline
b. Benzoylation of amines/phenols
c. Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone

5. Name of Course: Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Group Organic Chemistry-II
Course Code: 09010314
Course Outcome (CO)
CO1 Understanding the behavior of ideal solutions and Raoult's law and deviations from Raoult's law
CO2 Explanation phase diagrams for selected one component and two component systems
CO3 Explanation of migration of ions
CO4 Determine degree of ionization of weak electrolytes; solubility products of sparingly soluble salts; ionic product of water; and hydrolysis constant of a salt
CO5 Explain preparation and reactions of Carboxylic acids and derivatives; amines and diazonium salts; amino acids, peptides and proteins; and carbohydrates.

6. Name of Course: Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Group Organic Chemistry-II Lab
Course Code: 09010315
Course Outcome (CO)
CO1 Explanation of the equilibrium of selected reactions by distribution method
CO2Construction of phase diagrams of binary systems (simple eutectic) with cooling curves with determination of critical parameters
CO3 Determination of cell constant, conductance and degree of dissociation of an acid
CO4 Students will be able to perform conductometric and potentiometric titrations
CO5 Understanding to perform qualitative analyses of selected organic compounds possessing monofunctional groups and separation of amino acids by paper chromatography
CO6 Differentiation between a reducing and a non-reducing sugar

7. Name of Course: Transition Metal & Coordination Chemistry, States of matter & Chemical kinetics
Course Code: 09010412

Course Outcome (CO)

Students will be able to:

CO1 Identify the behavior of transition elements

CO2 Recognize the types of isomers, nomenclature and applications of coordination compounds.

CO3 Describe the various applications of molecules in different states and how the rate of a chemical reaction changes as a function of time.

8. Name of Course: Transition Metal & Coordination Chemistry, States of matter & Chemical kinetics Lab

Course Code: 09010413

Course Outcome (CO)

Students will be able to:

CO1 Separate the components in an inorganic mixture

CO2 Identify quality of any chemical and any formulation

CO3 Apply Arrhenius equation to study different chemical reactions

9. Name of Course: Analytical Methods in Chemistry

Course Code: 09010517

Course Outcome (CO)

CO1 Identification of choice of source, monochromator and detector for single and double beam instrument in spectrometry

CO2 Students will be able to apply and verify Lambert Beer's Law

CO3 Knowledge of usage of Flame photometers for the quantitative estimation of trace level of metal ions from water samples

CO4 Understanding of techniques of mechanism of extraction by solvation and chelation

CO5 Students will know the advantage of determining the equivalence point by performing conductometric and potentiometric titrations over volumetric titrations

CO6 Determination of pKa values using pH meter

10. Name of Course: Analytical Methods in Chemistry Lab

Course Code: 09010518

Course Outcome (CO)

CO1 Students will be able to refer to the chemical theory behind the use of modern instrumental techniques for quantitative chemical analysis

CO2 Identification and estimation of traces of metals using the theory of complexation with EDTA

CO3 Understanding of Analysis of soil for its pH and total soluble salt content

CO4 Determination of Na, Ca and Li In fruit juices and cola drinks by applying flame photometric technique

CO5 Use chromatography to separate mixtures of metal ions, dyes, sugars, amino acids and various other samples and calculate their Rf values

11. Name of Course: Molecules of Life

Course Code: 09010519

Course Outcome (CO)

CO1 Identifation of the different biomolecules and elucidate their structure
CO2 Explanation of specificity of enzyme action, enzyme inhibitors and their importance
CO3 Differentiation between oil and fats; calculation of saponification value and iodine number
CO4 Detail knowledge about Nucleic acids, and DNA in particular, which are key macromolecules for the continuity of life. DNA bears the hereditary information that's passed on from parents to children.
CO5 Students will be able to outline of catabolic pathways of Carbohydrates, Glycolysis, Fermentation, Krebs cycle, and other biomolecules

12. Name of Course: Molecules of Life Lab
Course Code: 09010520
Course Outcome (CO)
CO1 Knowledge of preparation of biochemical reagent for various solutions with respect to different Normality, Molarity, % Solutions (W/V), (V/V) &Numericals
CO2 Students will become efficient in titrations with suitable indicators to detect the sharp end point and quantitative estimation the desired samples.
CO3 Proper understanding of chromatographic methods to separate mixture of amino acids
CO4 Efficiency in preparation of chromatogram, separation of pigments from extracts of leaves and flowers/ink mixtures and determination of Rf value
CO5 Determination of iodine value and saponification value of fat/oil

13. Name of Course: Quantum Chemistry, Spectroscopy & Photochemistry
Course Code: 09010521
Course Outcome (CO)
Student will be able to :
CO1 Understand and explain the differences between classical and quantum mechanics
CO2 Understand the idea of wave function and uncertainty relations
CO3 Solve Schrödinger equation for simple potentials
CO4 Define Bonding and antibonding orbitals and apply LCAO-MO treatment to homonuclear and heteronuclear diatomic molecules (HF, LiH).
CO5 Identify the unknown molecules and measure their bond length from the values of their rotational constants.
CO6 Determine the Force constant associated with the chemical bonds
CO7 Calculate the relative population of these energy levels. Identify the regions of the electromagnetic spectrum corresponding to different molecular transitions
CO8 Determine whether the molecular vibrations of a triatomic molecule are Raman active and explain the difference between Stokes and anti-Stokes lines in a Raman spectrum.
CO9 Apply the laws of photochemistry, Lambert-Beer's law, define terms like photosensitization, quenching, chemiluminescence etc.

14. Name of Course: Quantum Chemistry, Spectroscopy & Photochemistry Lab
Course Code: 09010522
Course Outcome (CO)
CO1 Students will be able to record the spectra of different organic compounds
CO2 Understanding of effect of pH on spectra of compounds
CO3 Knowledge of determination of kinetics or rate constant of a chemical reaction

15. Name of Course: Polymer Chemistry
Course Code: 09010617
Course Outcome (CO)
CO1 Students will acquire basic knowledge of Polymer science
CO2 Knowledge of skills for the synthesis of polymeric products with different techniques

16. Name of Course: Polymer Chemistry Lab
Course Code: 09010618
Course Outcome (CO)
CO1 Understanding of synthesis of polymeric compounds
CO2 Students will be able to characterize polymeric compounds by using different methods

17. Name of Course: Organometallics, bioinorganic chemistry, polynuclear hydrocarbons and UV, IR spectroscopy
Course Code: 09010619
Course Outcome (CO)
CO1 Understanding of applications of Inorganic and organic chemistry including spectroscopic techniques
CO2 Knowledge of applications of organometallic chemistry and bioinorganic chemistry

18. Name of Course: Organometallics, bioinorganic chemistry, Polynuclear hydrocarbons and UV, IR spectroscopy Lab
Course Code: 09010620
Course Outcome (CO)
CO1 Understanding of preparation and purification of metal complexes by using chromatographic separation techniques
CO2 Knowledge of qualitative Organic Analysis of Organic Compounds

19. Name of Course: Chemistry of main group elements, theories of acids and bases
Course Code: 09010621
Course Outcome (CO)
CO1 Students will acquire knowledge of acids, bases, *s*- and *p*-Block Elements, Noble gases and inorganic polymers
CO2 Understanding of general principles of metallurgy and their applications

20. Name of Course: Chemistry of main group elements, theories of acids and bases Lab
Course Code: 09010622
Course Outcome (CO)
CO1 Understanding of the applications of analytical methods based on titrations such iodometric, gravimetric, and isolation, separations methods, etc
CO2 Students will be able to solve most important problems of quantitative analysis
CO3 Knowledge of applications of the quantitative analysis in daily life

21. Name of Course: Basic Analytical Chemistry
Course Code: 09010526

Course Outcome (CO)

CO1 The students will gain an understanding of application of analytical methods in day to day life such as soil, water, food product and cosmetic analysis

CO2 The students will gain hands-on practices on chromatographic and instrumental techniques

22. Name of Course: Fuel Chemistry
Course Code: 09010527
Course Outcome (CO)

CO1 Identification and characterization of various renewable and non-renewable energy sources.
CO2 Developing an understanding of the Petrochemical Industry applications
CO3 knowledge of use of techniques such as coal liquefaction, solvent refining and gasification, etc

23. Name of Course: Chemical Technology & Society
Course Code: 09010528
Course Outcome (CO)

CO1 Students will learn of basic principles of chemical technology
CO2 Understanding of key processes used in chemical technology
CO3 Identification of key equipment employed in chemical technology
CO4 Knowledge of clean technology
CO5 Understanding of complex societal and technological issues from a scientific viewpoint

24. Name of Course: Pharmaceutical Chemistry
Course Code: 09010529
Course Outcome (CO)

CO1 Understanding of drug discovery, design and development
CO2 Students will learn about representative classes of drugs, *e.g.*, analgesic agents, antipyretic agents,antibiotics etc
CO3 Explanation of the production of selected drugs and Vitamins *via* the fermentation process

25. Name of Course: Chemistry of Cosmetics & Perfumes
Course Code: 09010530
Course Outcome (CO)

CO1 Discovery of social and scientific concepts of human beauty
CO2 Delivery of the knowledge for safety of cosmetics and perfumes.
CO3 Understanding the history and science of cosmetics and perfumes.

26. Name of Course: Pesticide Chemistry
Course Code: 09010531
Course Outcome (CO)

CO1 Understanding of the importance of pesticides
CO2 Knowledge of the usage of pesticides

Name of the Program: B.Sc. (NM) (Physics Only)

Name of Subject:Mechanics
Subject Code:09010113
Course Outcome (CO)
After going through this course the student will be able to
CO1. Implement the elastic properties of the materials in everyday life.,
CO2. Understand the mechanism of satellite motion.
CO3. Understand latest developments in theory of relativity.

Name of Subject:Mechanics Lab
Subject Code:09010114
Course Outcome (CO)
After successful completion of the course, students will be able to verify
CO1. The theoretical formulas by performing experiment.
CO2. Demonstrate the practical application of properties of materials etc. in actual practice.

Name of Subject: Electricity, Magnetism and EMT
Subject Code:09010212
Course Outcome (CO)
After successful completion of this course, students will have understanding of
CO1. Basic principles of electricity and magnetism, and their everyday life applications.
CO2. Propagation of electromagnetic radiation in different media like vacuum, isotropic dielectric medium etc.

Name of Subject: Electricity and magnetism Lab
Subject Code:09010213
Course Outcome (CO)
After successful completion of the course, students will be able to:
CO1. Apply the concepts of basic electronic devices to design various electronic circuits.
CO2. Understand operation of diodes, transistors in order to design basic circuits.
CO3. Measure the oscillations of a mass under different combination of springs

Name of Subject: Thermal Physics and Statistical Mechanics
Subject Code:09010312
Course Outcome (CO)
After completion of this course, students will have understanding of
CO1. Different laws of thermodynamics and their practical applications
CO2. Maxwell's law of distribution of velocities, conduction and diffusion phenomenon etc.
CO3. Fermi-Dirac distribution law, electron gas,Bose-Einstein distribution law, photon gas and comparison of their statistics.

Name of Subject: Thermal Physics and Statistical Mechanics Lab
Subject Code:09010313
Course Outcome (CO)
After successful completion of the course, students will be able to
CO1. Apply the concepts of basic thermodynamic principle to design the different type's thermocouples for daily life applications such as a refrigerator, cooling etc.
CO2. Understand the mechanism of flow of heat through different medium.

Name of Subject: Waves and Optics
Subject Code:09010410
Course Outcome (CO)
After completion of this course, students will have understanding of
CO1. Lissajous figures, phenomenon of viscosity, surface tension, musical notes, acoustics of buildings, interference diffraction and polarization.

Name of Subject: Waves and Optics Lab
Subject Code: 09010411
Course Outcome (CO)
After performing these experiment, students will be able to
CO1. Implement and demonstrate the use of optical instruments, indetermination of various physical quantities related to light and materials

Name of Subject: Solid State Physics
Subject Code:09010511
Course Outcome (CO)
After successful completion of the course, students will
CO1. Understand the concept of crystal, symmetries, reciprocal space and be able to use it as a tool to know the significance of Brillouin zones.
CO2. Be able to calculate thermal and electrical properties in the free-electron model.
CO3. Know the fundamental principles of semiconductors, including pn-junctions, and be able to estimate the charge carrier mobility and density.
CO4. Know the basic models of magnetism.

Name of Subject: Solid State Physics Lab
Subject Code: 09010512
Course Outcome (CO)
After performing these experiments, the student will be able to
CO1. Convert solar energy into electrical energy using solar cell, laser diode and design circuit rectifier, amplifier etc.

Name of Subject: Atomic, Molecular and Laser Physics
Subject Code:09010513
Course Outcome (CO)
The student will be able to
CO1. State and explain the key properties of many electron atoms and the importance of the Pauli Exclusion Principle.
CO2. Explain the observed dependence of atomic spectral lines on externally applied electric and magnetic fields.
CO3. State and justify the selection rules for various optical spectroscopies in terms of the symmetries of molecular vibrations.

Name of Subject: Atomic, Molecular and Laser Physics Lab
Subject Code:09010514
Course Outcome (CO)
After performing these experiment students will be able to
CO1. Demonstrate the experiment and their practical applications.

Name of Subject: History and Philosophy of Science
Subject Code:09010515
Course Outcome (CO)
After completing this course Students will able to
CO1. Know the names of different philosophers and scientists who contributed in the development of science.
CO2. Understand the conceptual development of science by criticism and hypothetical consideration.

Name of Subject: History and Philosophy of science Lab
Subject Code:09010516
Course Outcome (CO)
After successful completion of the course, students will be able to
CO1. Implement the basic concepts of science-working including testability, Popper's criterion and experimental methods in practical life.

Name of Subject: Elements of Modern Physics
Subject Code:09010611
Course Outcome (CO)
After completing this course Students will be able to
CO1. Explain the quantum mechanical view of particle and wave nature, uncertainty in measurements, certainty and probability in measurements, source of nuclear energy and related devices.

Name of Subject: Elements of Modern Physics Lab
Subject Code:09010612
Course Outcome (CO)
After performing these experiments, students will be able to
CO1. Implement and demonstrate the photoelectric effect that is how radiation can be converted into electric energy, effect of stress on materials to develop potential difference etc.

Name of Subject: Quantum Mechanics
Subject Code:09010613
Course Outcome (CO)
After completing this course Students will be able to
CO1. Explain the quantum mechanical view of particle and wave nature, uncertainty in measurements, certainty and probability in measurements, time dependent and time independent Schrodinger wave equations and its solution for hydrogen atom and many electron atoms.

Name of Subject: Quantum Mechanics Lab
Subject Code:09010614
Course Outcome (CO)
After performing these experiments, students will be able to
CO1. Implement and demonstrate the photoelectric effect that is how radiation can be converted into electric energy, effect of magnetic field to develop potential difference etc.

Name of Subject: Nuclear and particle physics
Subject Code:09010615
Course Outcome (CO)
After the successful completion of the course, students would be able to
CO1. Understand the science involved with interaction of nuclear radiations with matter.
CO2. Explain the characteristics of GM counter, gamma ray spectroscopy and high purity germanium detectors.
CO3. Explain the basic concepts of isospin, nuclear forces, Coulomb excitation, nuclear kinematics etc.
CO4. Describe the basic features involved in high energy physics.

Name of Subject: Nuclear and particle physics Lab
Subject Code:09010616
Course Outcome (CO)
After performing these experiment students will be able to
CO1. Demonstrate the experiment and their practical applications.

Name of Subject: Digital and analog electronic circuit and instrumentation
Subject Code:
Course Outcome (CO)
After going through this course the student will be able to
CO1. implement, the basic concepts of digital electronics, semiconductor devices, operational amplifiers s in everyday life, understand the working of logic circuits, LEDs, Photodiode, differential amplifiers etc.

Name of Subject: Digital and analog electronic circuit and instrumentation Lab
Subject Code:
Course Outcome (CO)
After successful completion of the course, students will be able to:
CO1. Apply the concepts of basic electronic devices and digital electronics to design various electronic circuits.
CO2. Understand operation of diodes, transistors in order to design basic circuits.
CO3. To investigate the use of different types of operational amplifier.

Name of Subject: Computational Physics Skills
Subject Code: 09010415
Course Outcome (CO)
After completion of this course, students will have understanding of
CO1. The use of computational methods to solve physical problems
CO2. Use of computer language as a tool in solving physics problems (applications).
CO3. Course will consist of hands on training on the Problem solving on Computers.

Name of Subject: Applied Optics
Subject Code: 09010416
Course Outcome (CO)
After completion of this course, students will have understanding of
CO1. Different types of light sources and detectors.
CO2. Use Fourier transform spectroscopy for analyzing various physical phenomenon related to light.

Name of Subject: Mobile Communications
Subject Code:09010417
Course Outcome (CO)
After completion of this course, students will have:
CO1. Familiarity of the fundamental principles of mobile communications.
CO2. Familiarity with components of a mobile handset and wireless communications.

Name of Subject: Renewable energy and energy harvesting
Subject Code:09010418
Course Outcome (CO)
Students will have enhanced their abilities to:
CO1. Understand how physical principles influence energy use.
CO2. Understand how to solve the problem of energy demand using various alternatives.

Name of Subject: Physical Workshop Skills
Subject Code:09010419
Course Outcome (CO)
CO1. After performing these experiment students will be able to demonstrate the experiment and their practical applications.

Name of Subject: Basic Instrumentation Skills
Subject Code:09010420
Course Outcome (CO)
After performing these experiment students will be able to
CO1. Demonstrate the experiment and their practical applications.

Course Name: Differential Calculus
Course Code: 09010117
Course Outcome (CO): Students that successfully complete this course will be able to:
CO1. Learn to find and use limits of functions.
CO2. Apply the Mean Value Theorem
CO3. Find intervals of concavity and points of inflection of elementary algebraic functions and trigonometric functions.
CO4. Find Curvature and Asymptotes.

Course Name: Differential Equations
Course Code: 09010216
Course Outcome (CO): Upon successful completion of this course, the student will be able to:
CO1. Differential Equations are used in many models to determine how the state of model is changing regarding time or any other variable.
CO2. Its application is inevitably based on mathematical theories of realityDistinguish among open and closed sets on different topological spaces.
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Course Name: Real Analysis
Course Code:09010316
Course Outcome (CO): On successful completion of this course, students will be able to:
CO1. Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
CO2. Define convergence of series using the Cauchy criterion and use the comparison, ratio, and root tests to show convergence of series.

CO3. Define continuity; state, prove, and use properties of limits of continuous functions, including the fact that continuous functions attain extreme values on compact sets.

CO4. Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.

CO5. Construct rigorous mathematical proofs of basic results in real analysis.

CO6. State the Fundamental Theorem of Calculus and use it in proofs.

CO7. Construct the Riemann Integral and state its properties.

Course Name: Algebra

Course Code: 09010414

Course Outcome (CO): Upon completion of the course, students will be able to:

CO1. Demonstrate knowledge and understanding of groups, subgroups, and order of an element in finite groups.

CO2. Demonstrate knowledge and understanding of the concept of cosets of a subgroup of a group, normal subgroups, symmetric groups, cyclic groups and their properties.

CO3. Demonstrate knowledge and understanding of direct product of groups, quotient groups, group homomorphism and isomorphism.

CO4. Demonstrate knowledge and understanding of rings, subrings, integral domains, fields, Euclidean ring and unique factorization domain.

Discipline Specific Elective Courses

Course Name: Matrices **Course Code: 09010523**

Course Outcome (CO):

CO1. Students in this course will demonstrate ability to work with matrices.

CO2. Students in this course will demonstrate ability to solve system of linear equations.

CO3. Students in this course will come to know about some basic examples of vector spaces.

Students in this course will demonstrate ability to work with Bilinear and quadratics forms of matrices.

Course Name: Calculus Without Limit

Course Code: 09010524

Course Outcome (CO):

CO1. After Completion of the Course the Student will be able to interpret a function from an Algebraic, Numeric.

CO2. Graphical. Also we expects Students to have a reasonable mastery.

Course Name: Probability & Statistics

Course Code: 09010525

Course Outcome (CO): After successfully completing of this course, students will be able to:

CO1. Apply the knowledge gained in Probability theory in Medical Sciences, Life Sciences and Engineering fields.
CO2. Translate real world problems into Probability models.

Course Name: Numerical Method
Course Code: 09010623
Course Outcome (CO): On completion of this course, the students will learn
CO1. Practical and theoretical knowledge of a range of iterative techniques for solving linear and nonlinear systems of equations
CO2. Practical and theoretical knowledge of polynomial interpolation.
CO3. Practical and theoretical knowledge of schemes for numerical integration
CO4. Practical and theoretical knowledge of schemes for solving differential equations

Course Name: Integral Calculus
Course Code: 09010624
Course Outcome (CO):
CO1. Calculus is a primary gateway to an engineering and engineering technology.
CO2. Properly carry out integration through the use of the fundamental formulae and/or the various techniques of integration for both single and multiple integral.
CO3. Correctly apply the concept of integration in solving problems involving evaluation of arc lengths, areas, volumes, work, and force

Course Name: Elementary Inference
Course Code: 09010625
Course Outcome (CO): Upon successful completion of this course the students are able to perform the following:
CO1: How to apply discrete and continuous probability distributions to various business problems.
CO2: Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
CO3: Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.
CO4: Perform ANOVA and F-test

Skill Enhancement Courses

Course Name: Special Function and Integral Transform
Course Code: 09010626
Course Outcome (CO): At the end of the course, the student will be able:
CO1: To solve Linear Differential Equations using Power-Series Methods

CO2: To learn Special functions like Legendre, Bessel, Chebyshev functions.
CO3: To know how root finding techniques can be used to solve practical engineering problems.

Course Name: Linear Algebra
Course Code: 09010602
Course Outcome (CO):
CO1: Students in this course will demonstrate ability to work within vector spaces.
CO2: Students in this course will demonstrate ability to distill vector space properties.
CO3: Students in this course will demonstrate ability to manipulate linear transformations.
CO4: Students in this course will demonstrate ability to work within Inner product spaces.

Course Name: Vector Calculus
Course Code: 09010627
Course Outcome (CO): After completing the course, students are expected to be able to
CO1: Compute dot product, cross product, length of vectors.
CO3: Compute partial derivatives, derivatives of vector-valued functions, gradient functions
CO4: Evaluate integrals of functions or vector-related quantities over curves, surfaces, and domains in two- and three-dimensional space.

Course Name: Operations Research
Course Code: 09010628
Course Outcome (CO): On successful completion of this course, students will be able to:
CO1: Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
CO2: Apply the concept of simplex method and its extensions to dual simplex algorithm.
CO3: Solve the problem of transporting the products from origins to destinations with least transportation cost.

Course Name: Complex Analysis
Course Code: 09010629
Course Outcome (CO): After completing this course, students will be able to:
CO1: Becoming familiar with the concepts Complex numbers and their properties and operations with Complex number.
CO2: Finding domain and range of complex functions and sketching their graphs.
CO3: Evaluating limits and checking the continuity of complex function.
CO4: Checking differentiability and Analyticity of functions.
CO5: Evaluate Complex integrals and applying Cauchy integral.

Course Name: Computer Fundamentals
Course Code: 09010630

Course Outcome (CO): Upon successful completion of this course, students will be able to perform

CO1: Set up a basic workstation, including installing basic hardware and software and establishing basic network connectivity; identify and correct compatibility issues, identify and prevent basic security risks; and practice basic support techniques on computing devices.
CO2: Identify hardware commonly found in or attached to computing devices.
CO3: Identify software commonly installed on computing devices.
CO4: Set up a basic workstation and configure network access.
CO5: Work with files, folders, and applications.
CO6: Configure and use wireless devices and secure computing devices.
CO7: Support computers and users.

B.Sc Forensic Science

COURSE OUTCOME

SEMESTER I

Name of Course: Physics-I
Course Code: 08070101
After completion of this course, students will
CO1. Apply knowledge of thermodynamics, sound waves, and light waves to explain natural physical processes and related technological advances.
CO2. Use an understanding of algebraic mathematics along with physical principles to effectively solve problems encountered in everyday life.
CO3. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.
CO4. Assess the contributions of physics to our evolving understanding of global change and sustainability.

Name of Course: Chemistry-I
Course Code: 08070103
Students will be able to
CO1. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
CO2. Skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
CO3. Clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
CO4. Explore new areas of research in both chemistry and allied fields of science and technology

Name of Course: Biology-I

Course Code: 08070105

CO1.Students will demonstrate an understanding of Mendelian and molecular genetics, cell structure, cell physiology, and molecular processes of cells.
CO2. Students will demonstrate an understanding of organismal form, function, and diversity.
CO3. Students will demonstrate an understanding of the principles of evolution and ecology
.

Name of Course: Introduction to Forensic Science

Course Code: 08070107

CO1. Define the disciplines that are within the Forensic Sciences.
CO2. Determine what types of evidence are appropriate for analysis and what questions can be answered.
CO3. Follow the evidence from the scene of crime, through the laboratory and into the court system.
CO4. Understand the basic scientific principles and methodologies employed in forensic analysis.

Name of Course: Crime, Society & Police organizations

Course Code: 08070108

CO-1. Students would be able to describe the concept of crime.
CO-2. They would be able to conduct Criminal Profiling.
CO-3. They would make use of various IPC, Cr PC, and IEA sections.
CO-4. Students would be able to explain the relationship between forensic science and police system.
CO-5. Students would be able to know about the Juvenile delinquency & their types.

Name of Course: English

Course Code: 08070109

Students will be able to:
CO1. Demonstrate a significant increase in word knowledge.
CO2. Employ prereading, skimming, and prewriting techniques.

SEMESTER II

Name of Course: Chemistry-II

Course Code: 08070201

CO1. An ability to employ critical thinking and efficient problem solving skills in four basic areas of chemistry (analytical, inorganic, physical).
CO2. An ability to conduct experiments analyzes data, while observing responsible and ethical scientific conduct.

Name of Course: Biology-II

Course Code: 08070203

CO1.Students will apply the process of science through observation, experimentation and hypothesis testing.
CO2.Students will be able to use quantitative reasoning in the analysis of dynamic biological systems.
CO3.Students will use bioinformatics and databases to study biological processes.
CO4. Students will understand and practice the ethics surrounding scientific research.

Name of Course: Crime Scene Investigation & Management
Course Code: 08070205
The students will know –
CO1. The methods of securing, searching and documenting crime scenes.
CO2. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.

Name of Course: Forensic Psychology
Course Code: 08070206
The students will know –
CO1. The major areas of interests shared by psychology and the law.
CO2. The types of forensic evaluations conducted in criminal and civil cases.
CO3. The landmark legal cases that impact forensic psychology.

Name of Course: Applied Mathematics
Course Code: 08070208
CO1. Compute a given integral using the most efficient method;
CO2. Use integrals to formulate and solve application problems in science and engineering;
CO3. Construct and plot parametric and polar curves;

Name of Course: Computer Sciences
Course Code: Analyze a
CO1. Complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
CO2.Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
CO3. Apply computer science theory and software development fundamentals to produce computing-based solutions.

SEMESTER III
Name of Course: Physics-III
Course Code: 08070301
The students will attain –
CO1.Conceptual understanding of fundamental principles of physics.

CO2.Students will demonstrate proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

Name of Course: Biology-III
Course Code: 08070303
The students will know–
CO1. Techniques fundamental to the practice of Forensic Science.
CO2. A range of concept and issues in Forensic Science

Name of Course: Basic Instrumentation
Course Code: 08070305
The students will know –
CO1.The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
CO2. The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

Name of Course: Economic Offences
Course Code: 08070306
The students will know –
CO1.Basic economic and financial terminology.
CO2. Economic crimes in India are linked to several other crimes.
CO3.Economic crimes often have a bearing on national security.

Name of Course: Introduction to Questioned Documents
Course Code: 08070307
The students will know –
CO1. Different types of questioned documents, the types of forgeries and disguise generally encountered.
CO2. Handling of equipments used in examination of Questioned Documents

Name of Course: Cyber Security
Course Code: 08070308
The students will know –
CO1.The laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
CO2.The ethical standards of the profession and apply those standards to all aspects of the study and practice of digital forensics

Name of Course: Environmental Sciences
Course Code: 08070309
The students will know –
CO1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO2.The transnational character of environmental problems and ways of addressing them.

SEMESTER IV
Name of Course: Fingerprints & Other Impressions
Course Code: 08070401
the students will know –
CO1.Importance of Fingerprints in identification.
CO2.Different methods of identification.

Name of Course: Forensic Engineering
Course Code: 08070403
The students will know –
CO1. The different failure modes, using conceptual and engineering diagrams.

Name of Course: Digital Forensics & Photography
Course Code: 08070405
CO1. Produce photographs acceptable to use for biomedical and forensic documentation.
CO2. Follow established procedures and protocol when handling and photographing biomedical/forensic specimens

Name of Course: Forensic Ballistic
Course Code: 08070406
CO1.Able to classify different firearms and their firing mechanisms.
CO2.The methods of identifying firearms.

Name of Course: Applied Instrumentation
Course Code: 08070408
CO1. The principles of operation for common chemistry laboratory instrumentation used in forensic science using knowledge of chemical structure and properties and instrument design.

SEMESTER V
Name of Course: Advanced Forensic Biology
Course Code: 08070501

CO1.Students will develop critical thinking skills while learning concepts and understanding the tools used by comparative vertebrate animal physiologists and anatomists to study function and structure

CO2. Students will use their skills and knowledge in comparative vertebrate animal physiology and anatomy to secure employment or to advance in higher education in biology-related disciplines

Name of Course: Forensic Chemistry-Drugs &Poisons
Course Code: 08070503
CO1.The methods of analyzing trace amounts of petroleum products in crime scene evidence.
CO2. The methods of analyzing contaminants in petroleum products.

Name of Course: Forensic Physics
Course Code: 08070505
The students will know –
CO1.Different properties of Soil ,Glass, Cement.
CO2. The methods of analyzing the property of different physical evidence.

Name of Course: Anthropology & Personal Identification
Course Code: 08070507
The students will able to –
CO1. Demonstrate a good knowledge and understanding of major concepts and controversies within Forensic Anthropology.
CO2. Compare and analyze scientific forensic anthropological data across various contexts and through temporal boundaries

Name of Course: Quality Management
Course Code: 08070509
The students will know –
CO1. The different meanings of the quality concept and its influence.
CO2.The elements that are part of the quality measuring process in the laboratory.

Name of Course: French
Course Code: 08070510
The students will know –
CO1.The requirement of everyday situations.
CO2.Able to demonstrate good comprehension of written discourse in areas of special interests.

Name of Course: German
Course Code: 08070511

The students will know –

CO1. The critical skills to analyze literary and cultural texts.

CO2.To achieve cultural competency through living in another cultural and linguistic environment.

SEMESTER VI

Name of Course: Forensic Serology

Course Code: 08070601

The students will know –

CO1. The general concept and definition used in serology and also bout nature and role of forensic biologists in crime scene investigation

CO2. How to locate and collect various types of biological evidences and also about the laboratory handling procedures of such evidences.

Name of Course: Forensic Toxicology

Course Code: 08070603

The students will know –

CO1. The significance of toxicological studies in forensic science.

CO2. The classification of poisons and their modes of actions. .

Name of Course: Forensic Medicine

Course Code: 08070605

The students will know –

CO1. The duties of the first responding officer who receives a call on homicide or suicide case.

CO2. The steps involved in processing the death scene.

Name of Course: Forensic Odontology

Course Code: 08070607

The students will know –

CO1. The concepts and methodology involved in the identification of human remains.

CO2. The concepts methodologies and complexities associated with managing victim identification in mass disasters.

Name of the Program: M.Sc.

1ST Semester.

Course Name: Real Analysis **Course Code: 08030101**

Course Outcome (CO):

CO1. Students in this course will demonstrate ability to work with Riemann Stieltjes integral.

CO2. Students in this course will be able to solve problems based on function of several variables.

CO3. Students in this course will come to know about sequence and series of functions and their convergence.

CO4. In this course will come to know about some basic concepts of mathematical analysis like power series, Fourier series, gamma functions etc.

Course Name: Topology **Course Code: 08030102**

Course Outcome (CO): Upon successful completion of this course, the student will be able to:

CO1. Distinguish among open and closed sets on different topological spaces;

CO2. Know the two fundamental topologies: discrete and indiscrete topologies.

CO3. Identify precisely when a collection of subsets of a given set equipped with a topology forms a topological space;

CO4. Understand when two topological spaces are homeomorphic;

C05. Identify the concepts of distance between two sets; connectedness, denseness, compactness and separation axioms.

Course Name: Abstract Algebra **Course Code: 08030103**

Course Outcome (CO):

CO1. The Students should be able to solve their problem of nilpotent group, field theory and finite field.

CO2. The students will demonstrate understanding of the importance of algebraic properties. They should use their skills of abstract algebra to solving different types of problems.

Course Name: Differential Geometry **Course Code: 08030104**

Course Outcome (CO):

CO1. After completion the syllabus student will have knowledge and skill to explain the concept and Language of Differential Geometry and its role in Modern Mathematics.

CO2. Apply the Differential Geometry techniques to specific research problems in Mathematics.

Course Name: Probability & Mathematical Statistics **Course Code: 08030105**

Course Outcome (CO): This course intends to help students with major in science, engineering, and other related fields to develop their computing skills of probability and mathematical statistics and advanced ability to solve practical problems with mathematics. On successful completion of this course students will be able to:

CO1. Demonstrate knowledge of, and properties of, statistical models in common use,

CO2. Understand the basic principles underlying statistical inference (estimation and hypothesis testing).

Course Name: Introduction to Mat lab & its Applications
Course Code: 08030106
Course Outcome (CO): Upon successful completion of this course, the student will be able to:

CO1. Understand the main features of the MATLAB development environment.

CO2. Design simple algorithms to solve problems, Write simple programs in MATLAB to solve scientific and mathematical problems like Complex integration, and Ordinary differential equations.

II Semester.

Course Name: Ordinary Differential Equations Course Code: 08030201
Course Outcome (CO):

CO1. Differential equations play an important role in modelling virtually every physical, technical, or biological process, from celestial motion, to bridge design, to interactions between neurons **.**

CO2. This course provides an introduction to methods for solving and analysing ordinary differential equations.

Course Name: Abstract Algebra-II Course Code: 08030202
Course Outcome (CO):

CO1. The Students should be able to solve their problem of nilpotent group, field theory and finite field.

CO2. The students will demonstrate understanding of the importance of algebraic properties.

CO3. The students should use their skills of abstract algebra to solving different types of problems **.**

Course Name: Measure Theory Course Code: 08030203
Course Outcome (CO):

CO1. The students in this course will able to understanding of the concepts of measure and Lebesgue integral.

CO2. The students in this course will learn the technique of calculating the Lebesgue integral and understand the applications of Lp-spaces in probability theory.

Course Name: Complex Analysis Course Code: 08030204
Course Outcome (CO):

CO1: After studied the course will be able to analyses complex exponential, logarithm and Calculate the image of circles and lines.

CO2: Students in this course will able to find harmonic function, Express analytic functions in terms of power series and Laurent series.

CO3: Students in this course will able to calculate complex line integrals and some infinite real integrals using Cauchy's integral theorem or residue calculus

Course Name: Metric Space **Course Code: 08030205**

Course Outcome (CO):

CO1: In this course, students will able to identify the three properties of a metric or distance, define the basic terms and concepts in metric space, classify and explain open and closed sets, adherent points.

CO2: After studied this course, students will come to know about convergent and Cauchy convergent sequences, complete spaces, compactness and connectedness etc., and prove logically theorems in metric space using the definitions of basic terms and properties of metric spaces.

Course Name: General Relativity and Cosmology **Course Code: 08030206**

Course Outcome (CO):

CO1: After completed this course student will understand the physical principle which guided Einstein in relativity.

CO2: Students will able to derive the basic concept of cosmology and manipulation tensors. and understand the key properties of black holes.

Course Name: Graph Theory **Course Code: 08030207**

Course Outcome (CO):

CO1: Students in this course will be able to understand the meaning and types of Graphs.

CO2: Students in this course will be able to work with Trees**.**

CO3: Students in this course will demonstrate ability to work with Planar graphs and Coloring of Graphs.

CO4: Students in this course will demonstrate ability to work with Directed graphs.

III Semester.

Course Name: Number Theory-I **Course Code: 08030301**

Course Outcome (CO):

CO1: On the Completion of this course Students will be able to solve the linear Congruence.

CO2: Students will also know the lower bound details and Chinese Remainder Theorem its extensions

Course Name: Discrete Mathematics and Automata Course Code: 08030302

Course Outcome (CO):

CO1: Students in this course will learn how to determine of the logical equivalence of propositions and the validity of formal arguments via truth tables.

CO2: Students in this course will learn to design and construction of a combinatorial circuit from a verbal description.

CO3: Students will come to know how finite automata are able to construct a recognizer simple language.

Course Name: Partial differential Equations Course Code: 08030303

Course Outcome (CO):

CO1: Students will be able to many physical processes such as vibrating strings, diffusion of heat and fluid flows are well modelled by partial differential equations.

CO2: This course provides an introduction to methods for solving and analysing standard partial differential equations.

Course Name : **Numerical Analysis and its Applications Course Code: 08030304**

Course Outcome (CO):

CO1: Students will able to find the roots of nonlinear equations and solution of system of linear equations.

CO2: Students will come to understand how to solve the difference operators and the use of Interpolation.

CO3: Students will able to solve numerical Differentiation and Integration and numerical solutions of ordinary and partial differential equations.

Course Name: **Statistical Inference Course Code: 08030305**

Course Outcome (CO):

CO1: This course explain the notion of a parametric model and point estimation of the parameters of those models.

CO2: The course Explain and apply approaches to include a measure of accuracy for estimation procedures and our confidence in them by examining the area of interval estimation.

CO3: This course asses the plausibility of pre-specified ideas about the parameters of a model by examining the area of hypothesis testing.

CO4: The course explain and apply the idea of non-parametric statistics, wherein estimation and analysis techniques are developed that are not heavily dependent on the specifications of an underlying parametric model.

Course Name: **Integral Equations & Calculus of Variation Course Code: 08030305**
Course Outcome (CO):

CO1: In this student will be able to understand different kinds of **Fredholm and Voltera** Integral equations.

CO2: During this course students will learn **Orthonormal systems of functions in Integral equations**

CO3: In this course students will learn **different methods in Calculus of variations.**

Course Name: **Reliability Theory and Modeling** **Course Code: 08030305**
Course Outcome (CO):

CO1: The comparative study of the reliability measures will be made wherever required. The reliability measures will provide necessary criteria by which alternate design policies can be compared judged that will help the system planner to select the one which best satisfies the objectives under certain techno-economic conditions.

CO2: The applications of the present study will be applicable in the industrial and management sectors.

IV Semester.

Course Name: Functional Analysis **Course Code: 08030401**
Course Outcome (CO): during this course students will able to:

CO1.describe properties of normed linear spaces and construct examples of such spaces

CO2.extend basic notions from calculus to metric spaces and normed vector spaces

CO3.state and prove theorems about finite dimensionality in normed vector spaces

CO4.prove that a given space is a Hilbert spaces or a Banach Spaces

CO5.describe the dual of a normed linear space

CO6.state and prove the Hahn-Banach theorem.

Course Name:Fuzzy Sets & its Applications **Course Code: 08030402**
Course Outcome (CO): After studied this course student will

CO1. be able to understand basic knowledge of fuzzy sets and fuzzy logic,

CO2.be able to apply fuzzy inferences,

CO3.be able to apply fuzzy information in decision making,

CO4.be able to appreciate the theory of possibility on the basis of evidences**.**

Course Name:Number Theory-II **Course Code: 08030403**

Course Outcome (CO):

CO1. On the Completion of this course Students will be able to analysis the results in analytic number theory, fundamental theorems with detailed proofs and highlighting the relations between them.

Course Name: Stochastic Process &its Applications **Course Code: 08030405**

Course Outcome (CO): During this course students will able to:

CO1. Apply Markovian model stochastic processes and obtain solutions especially in the field of engineering

CO2. Derive new queue models to provide better solutions.

CO3. Find solutions for the untoward happening using the knowledge on reliability theory.

CO4. Indulge in strong research to get solutions in all walks of life since everything is probabilistic.

Course Name: Numerical Methods for Partial differential Equations

Course Code: 08030406

Course Outcome (CO):

CO1. Students will learn the finite element method (basic) for solving the PDEs.

CO2. Students in this course able to understand the finite difference and finite volume methods for solving the PDEs

Course Name: Operations Research **Course Code: 08030407**

Course Outcome (CO):

CO1. After Completion of this course the Students will be able to explain the various Techniques of Operational Research. After apply the techniques they will use in real life problems. Students will able to select an optimum solution

Course Name: Mathematical Programming and its Application

Course Code: 08030408

Course Outcome (CO):

CO1. After studied this course students will able to solve problems involving optimization models with integer constraints.

CO2. Students will have deep insight in solving optimization problems which are non-linear.

CO3. Students will able to distinguish between "single objective" and "multiple objective" functions

M.Sc(Chemistry)

Course Outcomes

Semester – I

Course Name : Stereochemistry, Metal-Ligand Equilibria and Reaction Mechanism of Transition Metal Complexes.
Course Code:09040107
Course Outcomes:(CO)
CO1 Explain bonding in main group compounds
CO2 Predict the shapes and determine the energetics of hybridization of main group compounds
CO3 Explain stepwise and overall formation constants and their interactions
CO4 Explain mechanisms of ligand displacement reactions in octahedral and square planar complexes
CO5 Understand the structures and properties of isopoly and heteropoly acids and salts
CO6 Explain crystal structures of selected binary and ternary compounds

Course Name : Quantum Mechanics-I and Thermodynamics
Course Code:09040108
Course Outcomes:(CO)
CO1. Various concepts of quantum mechanics & wave mechanics**.**
CO2. Detailed application & need of first & second law of thermodynamics
CO3. Describing systems of one component as well as multi-component systems

Course Name : Stereo Chemistry and Organic Reaction Mechanism-I
Course Code:09040109
Course Outcomes:(CO)
CO1 Differentiate chiral and achiral molecules.
CO2.Recognize and draw structural isomers (constitutional isomers), stereoisomers including enantiomers and diastereomers, racemic mixture, and meso compounds.
CO3.Identify the stereocenters in a molecule and assign the configuration as R or S.
CO4. Know the relationship between enantiomers and their specific rotations.
CO5. Differentiate simple synthesis and asymmetric synthesis of organic molecules.
CO6 Deliver the importance of reaction mechanism.
CO7. Identify and differentiate the aromatic and aliphatic nucleophilic substitution reactions

Course Name : Inorganic Chemistry Practical I
Course Code:09040104
Course Outcomes:(CO)
CO1. Determine iodide, Hydrazine and Antimony (III) using Potassium Iodate.
CO2. Determine Antimony (III), Aluminum, Magnesium and Zinc using Potassium bromate
CO3. Determine Calcium, Copper and Barium using EDTA (forward and back titrations)
CO4. Determine strengths of metal ions in the presence of masking agents
CO5. Synthesize selected metal acetylacetonato complexes employing green methods.

Course Name : Physical Chemistry Practical I

Course Code:09040105
Course Outcomes:(CO)
CO1. Describe various conductometric titrations of Strong acid/Strong base, Weak acid /Weak base, Strong acid/Weak base and Weak acid/Strong base.
CO2. Describe application of thermochemistry in determination of heat of neutralization.
CO3. Know the handling of instruments such as refractometer.

Course Name : Organic Chemistry Practical I
Course Code:09040106
Course Outcomes:(CO)
CO1.Demonstrate knowledge of separation of organic compounds from binary mixture
CO2 Recognize different types of procedures for separation , identification and purification of organic compounds
CO3.Apply basic chemical concepts to write the mechanism of the derivatives.
CO4. Describe different methods for separation of mixtures.

Course Name : Human values and professional ehtics
Course Code:
Course Outcomes:(CO)
CO1 To understand Ethics and Universal Declaration on Bioethics and Human Rights
CO2 To become socially responsible citizens by inheriting moral and human values.
CO3 To give due regard to nature and other forms of life by protecting the environment, biosphere and biodiversity.
CO4 To become Professionally strong by taking responsibility for what they do.

Semester – II

Course Name : Coordination Chemistry and Clusters
Course Code:09040210
Course Outcomes:(CO)
CO1. Explain bonding in transition metal complexes.
CO2. Derive spectroscopic states from spectroscopic terms.
CO 3. Interpret Orgel and Tanabe-Sugano diagrams.
CO4. Explain electronic spectra of complexes.
CO5. Apply fundamentals of magnetochemistry in structure determination.
CO6. Explain structure and bonding in selected metal clusters and transition metal- complexes.

Course Name : Chemical Kinetics & Electrochemistry
Course Code:09040211
Course Outcomes:(CO)
CO1. Students will be able to learn various areas of chemistry like chemical kinetics & electrochemistry.
CO2. Students will be able to learn various concepts of physical chemistry like Chain Reactions & Ion Transport in solutions.

Course Name : Organic Reaction Mechanism - II

Course Code:09040212
Course Outcomes:(CO)
CO1. Be able understand all different kind of mechanisms given by different compounds
CO 2. Know about the region and chemo-selectivity, and different type of elimination and addition reactions
CO 3. Develop capacity to solve the organic reaction mechanism related problems.
CO 4. Develop a clear understanding about the reactions for addition to the carbon-carbon and carbon-hetero bond.

Course Name : Inorganic Chemistry Practical II
Course Code:09040204
Course Outcomes:(CO)
CO 1. Separate and determine binary mixtures of metal ions using gravimetric and volumetric methods
CO 2. Determine strengths of Ferrous, Oxalate and Nitrite ions using Cerimetry.

Course Name : Physical Chemistry practical-II
Course Code:09040205
Course Outcomes:(CO)
CO1.Describe various conductometricpotentiometric titrations of Strong acid/Strong base and Weak acid/Strong base etc.
CO2.Describe the concept of pH through working of instrument like pH meter.
CO3.Determine partition coefficient and equilibrium constant of various systems

Course Name : Organic Chemistry Practical II
Course Code:09040206
Course Outcomes:(CO)
CO1. Handle organic chemicals in a safe and competent manner.
CO2. Perform the standard techniques used in practical organic chemistry.
CO3. Carry out multistep synthesis of organic compounds following a prescribed procedure.
CO4. To develop skills to determine the mechanism of the performed practical.
CO5. Characterize and purify the synthesized compounds.

Skill Enhancement Compulsory Courses

Course Name : General Spectroscopy
Course Code:09040207
Course Outcomes:(CO)
CO1. Study the spectra of compounds and propose structures for compounds.
CO2. Determine functional groups and write structures.

Course Name : Techniques in Chemistry
Course Code:09040208
Course Outcomes:(CO)
CO1.Study the basic principle, instrumentation of Atomic Absorption Spectroscopy,AtomicEmission Spectroscopy and Flame Photometry.

CO2.Provide the students with knowledge and the basic understanding of nanomaterials.
CO3.Study different chromatographic techniques.
CO4.Study the concept of electrophoresis.

Foundation Course (Compulsory)

Course Name : Environmental Chemistry.
Course Code:09040209
Course Outcomes:(CO)
CO1. Demonstrate knowledge of chemical and biochemical principles of fundamental environmental processes in air, water, and soil.
CO2. Recognize different types of toxic substances & responses and analyze toxicological information.
CO3. Apply basic chemical concepts to analyze chemical processes involved in different environmental problems (air, water & soil).
CO4.Describe causes and effects of environmental pollution by energy industry and discuss some mitigation strategies.
CO5.Explain energy crisis and different aspects of sustainability.
CO6.Discuss local and global environmental issues based on the knowledge gained throughout the course.

Semester-III
Discipline Specific Elective Courses Specialization: Inorganic Chemistry

Course Name : Advanced Inorganic spectroscopy.
Course Code:09040319
Course Outcomes:(CO)
CO1. Identify and characterize the molecule on the basis of spectroscopic study.
CO2. Apply vibrational spectroscopy to identify modes of bonding of ambidentate ligands.
CO3. Apply ESR in transitional metals with unpaired electrons.
CO4. Define Hyperfine coupling and splitting,
CO5. Discuss the active sites of metalloproteins with Raman spectra.
CO6. Find application of mass spectroscopy in various fields like finger print application, molecular weight determination, and evaluation of heat of sublimation of high melting solids.
CO7. Sketch qualitatively rotational-vibrational spectrum of diatomic molecule.

Course Name : Nuclear Chemistry
Course Code:09040320
Course Outcomes:(CO)
CO1. Explain origin of nuclear energy and decay of unstable nuclei
CO2. Explain structure of the nucleus based on experimental evidence
CO3. Discuss the impact of radiation on matter
CO4. Describe various methods of detecting nuclear radiation

CO5. Explain types and mechanism of nuclear reactions

Course Name :
Bioinorganic Chemistry
Course Code:09040321
Course Outcomes:(CO)
CO1. Identify essential and trace elements found in nature and describe their function
CO2. Explain how metal ions contribute to functioning of vital biological systems
CO3. Explain the structure and function of vial metalloproteins
CO4. Explain the structure and function of vital metalloenzymes
CO5. Explain the composition of the atmosphere
CO6. Explain the impact of foreign particles (chemicals, noise etc) released into the atmosphere.

Course Name : Inorganic special practical-1
Course Code:09040322
Course Outcomes:(CO)
CO1. Synthesize different coordination complexes.
CO2.Observe the various colours associated with the particular complexes.
CO3. Compare the properties of these complexes by preparing similar complexes changing the metal
CO4. Analyze the samples and estimate their yield.

Course Name : Inorganic special practical-II
Course Code:09040323
Course Outcomes:(CO)
CO1.Spectrophotometric determination of Fe, Ni, Mn, Cr, V, Ti and fluoride, Nitrate and phosphate.
CO2.Determination of pK value of an indicator spectrophotometrically.
CO3.Study of complexation (Stoichiometry and stability constant) between Fe-thiocyanate, Fe-phenanthroline and Cu-ethylenediamine by Job's method/ Slope ratio method.

Course Name : Inorganic special practical-III
Course Code:09040324
Course Outcomes:(CO)
CO1. Determine selected metal ions and mixtures polarographically
CO2. Conduct amperometric titrations
CO3. Estimate metal ions by Atomic Absorption Spectrophotometry and Flame Photometry.
CO4. Interpret graphs of DTA/TGA for a given sample.

Semester-III
Specialization: Physical Chemistry

Course Name : Chemical Dynamics & Surface Chemistry
Course Code:09040325
Course Outcomes:(CO)
CO1. Thermodynamics of electrified interfaces

CO2. Models of simple ionic liquids & lattice oriented models
CO3. Gibb's adsorption equation and its applications
CO4. Method for the calculation of energy of activation

Course Name : Statistical Thermodynamics & Quantum Mechanics-II
Course Code:09040326
Course Outcomes:(CO)
CO1.computing entropy by counting the number of allowed states for simple systems such as the ideal gas.
CO2. identifying the relationship and correct usage of infinitesimal work, work, energy, heat capacity, specific heat, latent heat, and enthalpy.
CO3. using some empirical equations of state to compute the final state of thermodynamical systems such as the ideal gas.

Course Name : Spectroscopy & Corrosion-I
Course Code:09040327
Course Outcomes:(CO)
CO1.Various techniques studying metal complexes or organic radicals and determining structure of molecules.
CO2.Methodologies for predicting, measuring, and analyzing corrosion performance of materials.
CO3.Identifying practices for the prevention and remediation of corrosion**.**

Course Name : Physical Special Practical -1
Course Code:09040328
Course Outcomes:(CO)
CO1.Determine dielectric constant of non- aqueous liquid at different concentration and hence determination of Dipole Moment.
CO2.Describe various potentiometric titrations.
CO3.Describe application and functioning of pH meter & Dipole meter.

Course Name : Physical Special Practical -11
Course Code:09040329
Course Outcomes:(CO)
CO1. Perform titrations of strong acid-strong base, weak acid- strong base and strong acid-weak base, conductometrically.
CO2. Perform titration of combination of acids with alkali and find their respective strength conductometrically.
CO3.Identify dextro and laevo rotatory substances and measure their specific rotation using polarimeter.
CO4.Determine the concentration of ions of alkali and alkali earth metals using flame.

Course Name : Physical Special Practical -III
Course Code:09040330
Course Outcomes:(CO)
CO1.Able to measure the sound for various liquids.

CO2.Verify lambert-Beer's law with different coloured solutions and find the unknown concentration of any coloured solution.
CO3.Determine the activation energy for hydrolysis of an ester.
CO4.Study reaction kinetics of iodine clock reaction.

Semester-III
Specialization: Organic Chemistry

Course Name : Organic Spectroscopy
Course Code:09040331
Course Outcomes:(CO)
CO1.Determine functional groups and write structures.
CO2.Study the spectra of compounds and propose structures for compounds.
CO3.Elucidate the structures of organic molecules from spectral data.

Course Name : Natural products-I and Biochemistry
Course Code:09040332
Course Outcomes:(CO)
CO1.Able to know the determine of structure and synthesis of given vitamins.
CO2.Know the importance and route for the synthesis of given carotene and porphyrins.
CO3.Have a clear understanding about the biological importance and types of enzymes and coenzymes.

Course Name : Heterocyclic Chemistry and Organic Synthesis.
Course Code:09040333
Course Outcomes:(CO)
CO1.Nomenclature, synthesis and reactivity of different heterocyclic compounds.
CO2.Nucleosides and Nucleotides
CO3.General methods of formation and reaction mechanisms of Ylides
CO4.Relationship between physiological action and the chemical constitution of different type of drugs

Course Name : Organic Special Practical -I
Course Code:09040334
Course Outcomes:(CO)
CO1.Describe various techniques used for the structural determination of organic compounds.
CO2. Describe disposal techniques and laboratory emergency procedures.
CO3. Know the handling of instruments.
CO4. Apply identification techniques for the structural determination of organic compound

Course Name : Organic Special Practical -II
Course Code:09040335
Course Outcomes:(CO)
CO1.The application of analytical methods based on titrations, isolation, separations, etc

CO2.The design and application of an analysis related to a question of relevance based on experience in the laboratory and research of the scientific literature.
CO3.Solving most important problems of quantitative analysis.

Course Name : Organic Special Practical -III
Course Code:09040336
Course Outcomes:(CO)
CO1.Describe various techniques used for synthesis of organic compounds.
CO2. Describe disposal techniques and laboratory emergency procedures.
CO3. Know the handling of instruments.
CO4. Apply purification techniques for the purification of organic compounds

Semester-IV
Discipline Specific Elective Courses
Specialization: Inorganic Chemistry

Course Name : Organometallic Chemistry
Course Code:09040419
Course Outcomes:(CO)
CO1.Define and identify an organometallic compound
CO2.Write their structure, synthesis and reaction mechanism.
CO3.Apply their properties for different applications like polymerization, catalytic hydrogenation etc.
CO4.Comment on their kinetics and stability.

Course Name : Inorganic Materials and advanced analytical techniques
Course Code: 09040420
Course Outcomes:(CO)
CO1.Display an appreciation of the techniques available for the study of structures and mechanisms in solid state inorganic chemistry.
CO2.Demonstrate knowledge of crystal structures and their defects, non-stoichiometry and physical properties.
CO3.Compare the advantages and/or disadvantages of electrogravimetry and coulometry.
CO4.Describe how a coulometric titration is performed and discuss the advantages of a coulometric titration over a conventional redox titration.
CO5.Describe the process of performing an amperometric titration.
CO6.Determine the size of nanoparticles using TEM and SEM .
CO7.Use the techniques of solvent extraction, ion exchangers including liquid ion exchangers and chromatographic methods for identification and estimation of multicomponent systems (such as TLC, GC, HPLC, etc)

Course Name : Metals in Medicine
Course Code:09040421
Course Outcomes:(CO)
CO1.Identify the metal deficiency diseases and treat them with proper therapy.

CO2.Become familiar with carcinogens, tumor growth and role of various metals in anticancer activity.
CO3.Discuss role of ligands and their beneficial effects as chelating agents in anti-cancer drugs, antiviral activity etc.
CO4.Apply knowledge of nuclear medicine as they study about radioiodine -1 31, technetium – 99m, gallium and indium.

Course Name : Inorganic Special Practical – IV
Course Code:09040422
Course Outcomes:(CO)
CO1.Synthesize the inorganic and coordination compounds.
CO2.Interpret their structure and bonding from IR spectra.
CO3.Differentiate the isomers from spectra.

Semester-IV
Specialization: Physical Chemistry

Course Name : Solid State Chemistry and Polymers
Course Code:09040424
Course Outcomes:(CO)
CO1.Apply the principles of electrochemistry in various electrochemical energy converters.
CO2.Perform Amperometric titrations determination of activation energy for an irreversible electrode process.
CO3.Classify types of solids and calculate lattice energy.
CO4.Identify the structure and packing in solids and different defects in crystals.
CO5.Identify polymerization reactions and their kinetics.
CO6.Calculate the molecular weight of polymers by osmometry, viscometry, light scattering and sedimentation method.
CO7.Evaluate the size, shape, molecular weight and extent of hydration of biopolymers by various experimental techniques.

Course Name :Statistical Thermodynamics and Quantum Mechanics-II
Course Code:09040425
Course Outcomes:(CO)
CO1. learn to recognize, define, and solve problems in equilibrium thermodynamics and statistical physics.
CO2.Understand the fundamentals and thermodynamic criteria for non-equilibrium states, entropy production and entropy flow.
CO3.Apply the theory of fluctuations and calculate equilibrium fluctuations of extensive parameters, intensive parameters and densities in systems.
CO4.Use the Hamiltonian operator to derive the quantization rulesand also use the method of ladder operators
CO5.Apply Huckel's method for the determination of energies of conjugated hydrocarbon systems like ethylene, benzene, butadiene.

Course Name : Spectroscopy and Corrosion –II
Course Code:09040426
Course Outcomes:(CO)
CO1. Identify symmetry elements and recognize symmetry operations generated by each symmetry element for a given molecule.
CO2. Combine symmetry operations and set up multiplication table for simple point groups.
CO3. Perform vector transformation and generate reducible representation of common molecules.
CO4. Classify the irreducible representations into translational, rotational and vibrational modes.
CO5. Find the number of infrared and Raman active vibrations in a molecule.
CO6. Identify the causes and conditions of corrosions.
CO7. Apply technologies to limit corrosion and methods to prevent corrosion

Course Name : Physical Special Practical – IV
Course Code:09040427
Course Outcomes:(CO)
CO1. Estimate the strength of individual acids in a mixture
CO2. Plot the graphs of base added vs the pH and determine the equivalence point.
CO3. Find the dissociation constant of weak acid.
CO4. Compare the strength of different acids by titrating them with base potentiometrically and Ph metrically.
CO5. Find the basicity of an acid from the titration curves.

Semester-IV
Specialization: Organic Chemistry

Course Name : Photochemistry and Pericyclic Reactions
Course Code:09040428
Course Outcomes:(CO)
CO1.Be able to understand and deal Phenomenon of photochemistry.
CO2.Be able to understand the photochemical reactions of Alkenes, Carbonyl and Aromatic compounds.
CO3.Be able to understand and be able to apply the Woodward–Hoffmann rules governing pericyclic reactions.

Course Name : Natural Product II
Course Code:09040429
Course Outcomes:(CO)
CO1.Identify and characterize various classes of natural products by their structures.
CO2.Have some knowledge of some of the plants around them and their pharmaceutical importance.
CO3.Have some knowledge of bacteria and other life forms from which useful pharmaceuticals are derived.

CO4.Have acquired the skills to isolate, purify and characterize simple products that are derived from plants and some animals. 11

Course Name : Reagents and Rearrangements
Course Code:09040430
Course Outcomes:(CO)
CO1.Apply different reagents in the organic transformations.
CO2.Understand the need to study molecular rearrangements.
CO3.Construct efficient, simple mechanistic pathways for the synthesis of a given compound.

Course Name : Organic Special Practical-IV
Course Code:09040431
Course Outcomes:(CO)
CO1. Demonstrate knowledge of isolation of organic compounds.
CO2. Recognize different types of isolation methods.
CO3. Apply basic chemical concepts to estimate different types of organic compounds.
CO 4. Describe different methods for isolation.

M.SC Forensic Science

SEMESTER I

Name of Course: Basic Forensic Sciences
Course Code: 08080101
CO1:-Understand the basics and history of Forensic science in India and worldwide.
CO2 :-Know report writing of Forensic Science in accordance with Indian justice system.

Name of Course: Physical Evidences
Course Code: 08080102
CO1:-. Understand the different patterns of Textiles and fabrics and its Forensic examination.
CO2 :- Understand with general features of Soil, glass, Paint and its Forensic Application.

Name of Course: Crime Scene Investigation And Management
Course Code: 08080103
CO1:-. Understand the legal importance of chain of custody.
CO2 :- Able to handle tools and for analysis of different types of crime scene evidence.

Name of Course: Fingerprints
Course Code: 08080104
CO1:-. Understand the Individual identification from fingerprint and they can use in the crime investigation.
CO2 :- Significance of foot, palm, ear and lip prints.
CO3:- Able to develop latent fingerprints on crime scene.

Name of Course: Basics Of Forensic Ballistics, Physics And Computer Forensics
Course Code: 08080105
After studying this Course the students will able to understand –
CO1:-. The nature of firearm injuries.
CO2 :- The methods for characterization of gunshot residue.
CO3:- Importance of physical evidence in crime scene investigation.

Name of Course: Open Elective/Professional Ethics & Human Values
Course Code: 08080106
CO1:-. Ethical issue in the Course matter under investigation or in a relevant field.
CO2 :- Identify the multiple ethical interests at stake in a real-world situation or practice.

SEMESTER II

Name of Course: Basics Of Questioned Document Examination **Course Code:** 08080201
The students will able to –
CO1.Develop an understanding on Individuals Characteristics feature of handwriting.
CO2. Different instrumental techniques that use in document examinations.

Name of Course: Basics Of Forensic Chemistry And Toxicology
Course Code: 08080202
The students will able to
CO1.Understand the general principles of poisoning management; explain actions, interactions, uses and toxicity of certain medications.
CO2. Illustrate clinical features of diseases and appropriate medical intervention in emergency situations, with stress on some genetic abnormalities and toxicology of addiction.

Name of Course: Basics Of Forensic Biology And Serology **Course Code:** 08080203
The students will know –
CO1. The importance of biological fluids (blood, semen, saliva and other body fluids) in crime investigations.
CO2.The significance of wildlife and the crucial role they can play in providing justice to wildlife.

Name of Course: Basics Of Forensic Anthropology And Odontology
Course Code: 08080204
The students will know –

CO1. The bones and major anatomical features of the human skeleton.
CO2. Employ metric and non-metric techniques for determining sex, age, ancestry, and stature.

Name of Course: Forensic Psychology **Course Code:** 08080205
The students will know –
CO1. The various career opportunities and the education and training needed to become a forensic psychologist
CO2. Use APA style writing and to enhance psychological writing skills

Skill Enhancement Compulsory Course
Name of Course: Forensic Voice Identification
Course Code: 08080207
The students will know –
CO1.The speaker identification through voice.
CO2.The accused can be identify from his voice by auditory and voice spectrographic techniques that is objective techniques in crime cases.

Name of Course: Introduction to Biometry
Course Code: 08080208
The students will know –
CO1.The basis of biometry.
CO2. The classification of biometric processes.
CO3. The importance of behavioral biometry.

Name of Course: Basis of Forensic Biology & Serology
Course Code: 08080209
The students will know –
CO1.The fundamentals of various disciplines in forensic science, with an emphasis on forensic biology and DNA.

SEMESTER III
Name of Course: Instrumentation-I
Course Code: 08080301
The students will know –
CO1.Definition and Fundamentals of spectroscopy.
CO2.Advanced study on principle, instrumentation and sample detection.
CO3.Forensic application of spectroscopic techniques

Name of Course: Basics Of Forensic Medicine
Course Code: 08080302
The students will know –
CO1. The duties of the first responding officer who receives a call on homicide or suicide case.
CO2. The steps involved in processing the death scene.

Name of Course: Quality Management And Research Methodology
Course Code: 08080303
The students will know –
CO1.Forensic software skills and research project.
CO2.Quality of laboratory in Forensic filed.
(Specialization:-Forensic Chemical Sciences)
Name of Course: Elements Of Forensic Chemistry & Toxicology
Course Code: 08080304
The students will know –
CO1. The concept and Significance of Forensic Toxicology.
CO2. General study of Poisons and their analysis
CO3. Extraction and isolation of organic and inorganic poisons.

Name of Course: Arson & Explosives
Course Code: 08080305
The students will know –
CO1.The cause of fire whether the fire is accidentally or intensely.
CO2. By the examination of explosive material the one can known the type of explosive is used.

(Specialization:-Forensic Biological Sciences)
Name of Course: Forensic Biology & Serology
Course Code: 08080307
The students will know
CO1.They would be able to define biology and chemistry of the identification tests used for examination of different body fluids.

Name of Course: Elements of Forensic Botany, Microbiology & Entomology
Course Code: 08080308
The student will be able to-
CO1. Differentiate between evidences of plant origin like seeds, pollens etc.and its forensic significance.
CO2.Elicit the Diatoms and its classification, basic structure and morphology. Forensic significance of diatom

(Specialization:-Forensic Physical Sciences)

Name of Course: Forensic Ballistics

Course Code: 08080310

The students will know –

CO1.The characteristics of ammunition

CO2.The importance of firearm evidence.**:-**

Name of Course: Forensic Engineering & Photography

Course Code: 08080311

The students will know –

CO1.Students would be able to know the handling and functioning of Camera for forensic photography.

CO2. Immense technical and investigative skills, as a blend of these two qualities only can lead to a positive outcome.

SEMESTER IV

(Specialization:-Forensic Chemical Sciences)

Name of Course: Advance forensic chemistry

Course Code: 08080402

CO1. Student will able to demonstrate problem-solving and critical-thinking skills so as to knowledgeably discuss forensic chemical principles in their historic and current contexts.

CO2 Student will able to review the existing scientific literature and critically assess merit, novelty, and validity of scientific papers.

CO3. Student will able to apply modern methods of forensic analysis in a laboratory setting.

CO4. Student will able to design appropriate experiments to obtain meaningful results in a safe and environmentally sensitive manner.

Name of Course: Advance forensic toxicology

Course Code: 08080403

CO1. Understand toxic profile of various drugs and other xenobiotics including sources, identification, symptoms, management, control and first aid measures.

CO2.Assess drug interactions and adverse drug reactions. - analyze, evaluate and interpret clinical cases of toxicity.

(Specialization:-Forensic Biological Sciences)

Name of Course: Advance forensic Biology

Course Code: 08080406

The students will know –

CO1. The forensic significance of botanical evidence to pinpoint a place of crime, clandestine graves and probable time of crime.

CO2.The difference between ante and post-mortem drowning along with the bearing the diatoms have in the investigation of probable place and time of drowning.

Name of Course: Advance DNA Profiling
Course Code: 08080407
The students will know –
CO1.The basic concepts of human genetics.
CO2.Understand the usefulness of genetic markers in forensic investigation along with the interpretation of a DNA profile

Name of Course: Digital Forensics
Course Code: 08080409
The students will able to –
CO1.Analyze various computer forensics systems.
CO2. Illustrate the methods for data recovery, evidence collection and data seizure.
CO3.Summarize duplication and preservation of digital evidence

Name of Course: Audio-Video Authentification
Course Code:08080410
The students will know –
CO1. The latest forensic audio authentication techniques.
CO2. Advanced principles of forensic audio authentication.
CO3. Digital evidence seizure and acquisition.

B.Sc Forensic Science
COURSE OUTCOME
SEMESTER I
Name of Course: Physics-I
Course Code: 08070101
After completion of this course, students will
CO1. Apply knowledge of thermodynamics, sound waves, and light waves to explain natural physical processes and related technological advances.
CO2. Use an understanding of algebraic mathematics along with physical principles to effectively solve problems encountered in everyday life.
CO3. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.
CO4. Assess the contributions of physics to our evolving understanding of global change and sustainability.

Name of Course: Chemistry-I
Course Code: 08070103
Students will be able to
CO1. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
CO2. Skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
CO3. Clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
CO4. Explore new areas of research in both chemistry and allied fields of science and technology

Name of Course: Biology-I
Course Code: 08070105
CO1.Students will demonstrate an understanding of Mendelian and molecular genetics, cell structure, cell physiology, and molecular processes of cells.
CO2. Students will demonstrate an understanding of organismal form, function, and diversity.
CO3. Students will demonstrate an understanding of the principles of evolution and ecology.

Name of Course: Introduction to Forensic Science
Course Code: 08070107
CO1. Define the disciplines that are within the Forensic Sciences.
CO2. Determine what types of evidence are appropriate for analysis and what questions can be answered.
CO3. Follow the evidence from the scene of crime, through the laboratory and into the court system.
CO4. Understand the basic scientific principles and methodologies employed in forensic analysis.

Name of Course: Crime, Society & Police organizations
Course Code: 08070108
CO-1. Students would be able to describe the concept of crime.
CO-2. They would be able to conduct Criminal Profiling.
CO-3. They would make use of various IPC, Cr PC, and IEA sections.
CO-4. Students would be able to explain the relationship between forensic science and police system.
CO-5. Students would be able to know about the Juvenile delinquency & their types.

Name of Course: English
Course Code: 08070109

Students will be able to:

CO1. Demonstrate a significant increase in word knowledge.

CO2. Employ prereading, skimming, and prewriting techniques.

SEMESTER II

Name of Course: Chemistry-II

Course Code: 08070201

CO1. An ability to employ critical thinking and efficient problem solving skills in four basic areas of chemistry (analytical, inorganic, physical).

CO2. An ability to conduct experiments analyzes data, while observing responsible and ethical scientific conduct.

Name of Course: Biology-II

Course Code: 08070203

CO1.Students will apply the process of science through observation, experimentation and hypothesis testing.

CO2.Students will be able to use quantitative reasoning in the analysis of dynamic biological systems.

CO3.Students will use bioinformatics and databases to study biological processes.

CO4. Students will understand and practice the ethics surrounding scientific research.

Name of Course: Crime Scene Investigation & Management

Course Code: 08070205

The students will know –

CO1. The methods of securing, searching and documenting crime scenes.

CO2. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.

Name of Course: Forensic Psychology

Course Code: 08070206

The students will know –

CO1. The major areas of interests shared by psychology and the law.

CO2. The types of forensic evaluations conducted in criminal and civil cases.

CO3. The landmark legal cases that impact forensic psychology.

Name of Course: Applied Mathematics

Course Code: 08070208

CO1. Compute a given integral using the most efficient method;

CO2. Use integrals to formulate and solve application problems in science and engineering;

CO3. Construct and plot parametric and polar curves;

Name of Course: Computer Sciences
Course Code: Analyze a
CO1. Complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
CO2.Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
CO3. Apply computer science theory and software development fundamentals to produce computing-based solutions.

SEMESTER III

Name of Course: Physics-III
Course Code: 08070301
The students will attain –
CO1.Conceptual understanding of fundamental principles of physics.
CO2.Students will demonstrate proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.

Name of Course: Biology-III
Course Code: 08070303
The students will know–
CO1. Techniques fundamental to the practice of Forensic Science.
CO2. A range of concept and issues in Forensic Science

Name of Course: Basic Instrumentation
Course Code: 08070305
The students will know –
CO1.The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
CO2. The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

Name of Course: Economic Offences
Course Code: 08070306
The students will know –
CO1.Basic economic and financial terminology.
CO2. Economic crimes in India are linked to several other crimes.
CO3.Economic crimes often have a bearing on national security.

Name of Course: Introduction to Questioned Documents
Course Code: 08070307
The students will know –

CO1. Different types of questioned documents, the types of forgeries and disguise generally encountered.
CO2. Handling of equipments used in examination of Questioned Documents

Name of Course: Cyber Security
Course Code: 08070308
The students will know –
CO1.The laws and procedures associated with identifying, acquiring, examining and presenting digital evidence.
CO2.The ethical standards of the profession and apply those standards to all aspects of the study and practice of digital forensics
Name of Course: Environmental Sciences
Course Code: 08070309
The students will know –
CO1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO2.The transnational character of environmental problems and ways of addressing them.

SEMESTER IV

Name of Course: Fingerprints & Other Impressions
Course Code: 08070401
the students will know –
CO1.Importance of Fingerprints in identification.
CO2.Different methods of identification.

Name of Course: Forensic Engineering
Course Code: 08070403
The students will know –

CO1. The different failure modes, using conceptual and engineering diagrams.

Name of Course: Digital Forensics & Photography
Course Code: 08070405
CO1. Produce photographs acceptable to use for biomedical and forensic documentation.
CO2. Follow established procedures and protocol when handling and photographing biomedical/forensic specimens

Name of Course: Forensic Ballistic
Course Code: 08070406

CO1.Able to classify different firearms and their firing mechanisms.
CO2.The methods of identifying firearms.

Name of Course: Applied Instrumentation
Course Code: 08070408

CO1. The principles of operation for common chemistry laboratory instrumentation used in forensic science using knowledge of chemical structure and properties and instrument design.

SEMESTER V

Name of Course: Advanced Forensic Biology
Course Code: 08070501
CO1.Students will develop critical thinking skills while learning concepts and understanding the tools used by comparative vertebrate animal physiologists and anatomists to study function and structure
CO2. Students will use their skills and knowledge in comparative vertebrate animal physiology and anatomy to secure employment or to advance in higher education in biology-related disciplines

Name of Course: Forensic Chemistry-Drugs &Poisons
Course Code: 08070503
CO1.The methods of analyzing trace amounts of petroleum products in crime scene evidence.
CO2. The methods of analyzing contaminants in petroleum products.

Name of Course: Forensic Physics
Course Code: 08070505
The students will know –
CO1.Different properties of Soil ,Glass, Cement.
CO2. The methods of analyzing the property of different physical evidence.

Name of Course: Anthropology & Personal Identification
Course Code: 08070507
The students will able to –
CO1. Demonstrate a good knowledge and understanding of major concepts and controversies within Forensic Anthropology.
CO2. Compare and analyze scientific forensic anthropological data across various contexts and through temporal boundaries

Name of Course: Quality Management
Course Code: 08070509

The students will know –
CO1. The different meanings of the quality concept and its influence.
CO2.The elements that are part of the quality measuring process in the laboratory.

Name of Course: French
Course Code: 08070510
The students will know –
CO1.The requirement of everyday situations.
CO2.Able to demonstrate good comprehension of written discourse in areas of special interests.

Name of Course: German
Course Code: 08070511
The students will know –
CO1. The critical skills to analyze literary and cultural texts.
CO2.To achieve cultural competency through living in another cultural and linguistic environment.

SEMESTER VI

Name of Course: Forensic Serology
Course Code: 08070601
The students will know –
CO1. The general concept and definition used in serology and also bout nature and role of forensic biologists in crime scene investigation
CO2. How to locate and collect various types of biological evidences and also about the laboratory handling procedures of such evidences.

Name of Course: Forensic Toxicology
Course Code: 08070603
The students will know –
CO1. The significance of toxicological studies in forensic science.
CO2. The classification of poisons and their modes of actions. .

Name of Course: Forensic Medicine
Course Code: 08070605
The students will know –
CO1. The duties of the first responding officer who receives a call on homicide or suicide case.
CO2. The steps involved in processing the death scene.

Name of Course: Forensic Odontology

Course Code: 08070607

The students will know –

CO1. The concepts and methodology involved in the identification of human remains.

CO2. The concepts methodologies and complexities associated with managing victim identification in mass disasters.

M.Sc(Physics)

Course Outcomes

Name of Subject: Mathematical Physics
Subject Code:09020101
Course Outcome (CO)

CO1 Learn Various techniques to solve differential equations

CO2 Use special functions in various physics problems

Name of Subject: Classical Mechanics
Subject Code:09020102
Course Outcome (CO)

CO1 Understand the Lagrangian formulation and Hamilton's principle.

CO2 Write Lagrangian and Hamiltonian for the rigid body motion.

CO3 Describe the basics involved in the small oscillation and related Hamilton equation.

Name of Subject: Quantum Mechanics-I
Subject Code: 09020103
Course Outcome (CO)

CO1 Learn the importance of quantum mechanics compared to classical mechanics at microscopic level.

CO2 Use of various tools to calculate Eigen values and total angular momentum of particles.

Name of Subject: Statistical Mechanics
Subject Code: 09020106
Course Outcome (CO)

CO1 Understand phase space and canonical system.

CO2 Write partition functions for the canonical, micro-canonical and grand-canonical systems.

CO3 Describe the basic involved in Bose-Einstein condensation, Ising model, random walk and Brownian motion

Name of Subject: Laboratory Course-I
Subject Code: 09020107
Course Outcome (CO)

CO1 Apply the concepts of basic electronic devices to design various electronic circuits

CO2 Understand operation of diodes, transistors in order to design basic circuits

CO3 Analyse electronic circuits Design small and large signal amplifier circuits for various practical applications

Name of Subject: Solid State Physics
Subject Code: 09020207
Course Outcome (CO)

CO1 Gain a basic knowledge of crystal systems and spatial symmetries

CO2 Understand the concept of reciprocal space and be able to use it as a tool to know the significance of Brillouin zones

CO3 Know the fundamental principles of semiconductors, including pn-junctions, and be able to estimate the charge carrier mobility and density

Name of Subject: Quantum Mechanics-II
Subject Code: 09020202
Course Outcome (CO)

CO1 Learn approximation methods, scattering theory, etc.

CO2 Understand the importance of relativistic quantum mechanics compared to non-relativistic quantum mechanics.

Name of Subject: Electrodynamics and Plasma Physics
Subject Code: 09020209
Course Outcome (CO)

CO1 Demonstrate and understanding of the use of scalar and vector potentials and of gauge invariance

CO2 Know about radiation fields of moving charge

CO3 Basic understanding of Plasma fourth state of matter, controlled fusion and otherapplications.

Name of Subject: Electronic Devices
Subject Code: 09020210
Course Outcome (CO)

CO1 Apply the concepts of basic electronic devices to design various electronic circuits

CO2 Analyse electronic circuits

Name of Subject: Laboratory Course-II
Subject Code: 09020208
Course Outcome (CO)

CO1 Have a practical knowledge of semiconductor devices like photovoltaic cell, diode LASER etc.

Name of Subject: The Science of the Solar System
Subject Code: 09020212

Course Outcome (CO)

CO1 Know about the science behind the solar system, inside the giant planet.

CO2 Find the fact regarding possibility of water and lives at Mars and feasibility of life in our solar system and beyond.

Name of Subject: The Physics of Energy
Subject Code: 09020213
Course Outcome (CO)

CO1 Understand how physical principles influence energy use.

CO2 Solve the problem of energy demand using various alternatives.

Name of Subject: Statistical Physics in Biology
Subject Code: 09020214
Course Outcome (CO)

CO1 Gain familiarity with topics from primary research areas of Biophysics.

CO2 Learn statistical techniques used in Physics.

Name of Subject: Spectroscopy Techniques
Subject Code: 09020215
Course Outcome (CO)

CO1 Identify the basic components of spectroscopic instrumentation.

CO2 Demonstrate an understanding of the processes responsible for NMR chemical shifts and splitting patterns.

CO3 Elucidate the structures of molecules from spectral data.

Name of Subject: Computational Methods & Programming
Subject Code: 09020302
Course Outcome (CO)

CO1 Learn C programming language and write programmes.

CO2 Formulate various computational methods like bisection method, Euler, Newton-Raphson and Ranga-Kutta useful to solve research problems.

Name of Subject: Atomic and Molecular Physics
Subject Code: 09020311
Course Outcome (CO)

CO1 Identify the basic components of spectroscopic instrumentation.

CO2 Demonstrate an understanding of the processes responsible for NMR chemical shifts and splitting patterns.

CO3 Elucidate the structures of molecules from spectral data.

Name of Subject: Laboratory Course-III
Subject Code: 09020312

Course Outcome (CO)

CO1 Learn C programming language and write programmes.

CO2 Formulate various computational methods like bisection method, Euler, Newton-Raphson and Ranga-Kutta useful to solve research problems.

Name of Subject: Condensed Matter Physics-I
Subject Code: 09020304
Course Outcome (CO)

CO1 Get exposure to topics like electron dynamics in semiconductors and metals, Fermi surface and its determination, optical and magnetic properties of solids, dielectrics and ferroelectrics.

CO2 Relate theoretical formulation of condensed matter propertieswith relevant experiments.

Name of Subject: Electronics-I
Subject Code: 09020305
Course Outcome (CO)

CO1 Comprehend the working principle and characteristics of operational amplifier.

CO2 Study amplitude and frequency modulation and its related electronic circuits, different types of logic circuits and its various application, the basics of A/D and D/A convertors.

CO3 Get to know about the architecture, control logic unit and arithmetic logic unit of different types of microprocessor.

Name of Subject: Nuclear Physics-I
Subject Code: 09020306
Course Outcome (CO)

CO1 Gain knowledge about the particle Identification, Nuclear Electronics, techniques, circuits and analyzers. working principles of ion accelerators & ion beam interactions in solids.

CO2 Learn the basic features involved in nuclear stability and Nuclear reactors.

Name of Subject: Lasers and its applications-I
Subject Code: 09020313
Course Outcome (CO)

CO1 Become familiar with fundamental principles of laser operations.

CO2 Become familiar with design of coherent light sources.

CO3 Become familiar with detection technique and applications of lasers.

Name of Subject: Project
Subject Code: 09020413
Course Outcome (CO)

CO1 Work independently to plan scientific project.

CO2 Apply skills to develop novel ideas.

CO3 Organise and manage project related works.

Name of Subject: Laboratory Course-IV
Subject Code: 09020414
Course Outcome (CO)

CO1 Describe the particle Identification.

CO2 Explain the Nuclear Electronics, techniques, circuits, analysers, working principles of ion accelerators & ion beam interactions in solids, basic features involved in nuclear stability and Nuclear reactors.

Name of Subject: Condensed Matter Physics-II
Subject Code: 09020411
Course Outcome (CO)

CO1

Emphasizes on the consequences of going beyond the independent electron approximation and an exposure to the language of second quantization- the language in use in condensed matter theory research. Importantly, it also includes an introduction to the emerging field of Nano-structures and electron transport phenomenon in such systems.

Name of Subject: Electronics-II
Subject Code: 09020404
Course Outcome (CO)

CO1 Have a basic knowledge of crystal growth and silicon wafer production

CO2 Understand the science behind the different types of transistors

CO3 Be able to understand the techniques for making contact between semiconductor and metals.

CO4 Know the working principle of adders, subtractor,counters and shift registers

Name of Subject: Nuclear Physics-II
Subject Code: 09020412
Course Outcome (CO)

CO1 Describe the two nucleons problem.

CO2 Explain the Nuclear reaction theory and different types of nuclear reactions.

CO3 Explain the Nuclear models and their relative success and failures.

Name of Subject: Advanced Lasers Spectroscopy-II
Subject Code: 09020416
Course Outcome (CO)

CO1 Give basic knowledge on spectroscopic techniques that use lasers and theoretical background on lasers and the interaction between laser radiation and matter.

CO2 Provide knowledge on the techniques and instrumentation for laser spectroscopy.

CO3 Illustrate the concepts and phenomena that are characteristic of lasers

CO4 Provide a degree of experimental skill in the spectroscopic applications.

M.Sc(Environmental Sciences)

Course Outcomes

SEMESTER I

Name of Subject: Ecology **Subject code: 08160101**

CO1: To understand principles of ecology, and predict potentially adverse effect which might happens around them.

CO2: To understand the relationship of living organisms with their environment.

CO3: To understand about population and resource dynamics in relation with nature, forests, wild species and climatic factors.

Name of Subject: Natural Resources and Disaster Management Subject code: 08160102

CO1: To understand and distinguish among different resources with their benefits, adverse impacts on environment, availability, use and energy generation processes.

CO2: To understand the environmental impact of exploitation, processing and smelting of minerals; and overuse of mineral reserves.

CO3: To understand effects of hazards, hazard classification natural hazards and technological hazards.

CO4: To understand management of cyclone, flood, earth quake, drought, disease, fire and volcanic disasters along with forecasting and warning system of disaster.

Name of Subject: Instrumentation and Analytics Subject code: 08160103

CO1 To understand different environmental monitoring and analysis techniques to choose according to the field study requirement.

CO2 To get acquainted with different spectroscopy based techniques and other analytical methods.

CO3 To understand methods for quantification of different bio molecules.

Name of Subject: Water Chemistry and Pollution Subject Code: 08160104

CO1: To understand water distribution, water quality and different physico-chemical properties of water.

CO2: To know about different water quality parameters and their permissible limits.

CO3: To understand the dynamics of water treatment in both sewage and effluent treatment processes and their practical operation. To get acquainted with Indian monsoon, water distribution and drainage systems.

SEMESTER II

Name of Subject: Environmental Biology Subject Code: 08160201

CO1: To be able to identify and describe the features of plant organs/tissues/cells/organelles and the relationships among major plants groups.

CO2: To understand biomolecules, microorganisms and there effect on ecosystem.

CO3: To get acquainted with various natural and genetically engineered microbes in water and solid waste treatment.

Name of Subject: Stress Physiology **Subject Code: 08160202**

CO1: To explain the physiological adaptations evolved in animals and plants in a wide variety of environments.
CO2: To understand regulation of growth and development in plants and animals.
CO3: To understand different ecological systems in various stress conditions.

Name of Subject: Environmental Geology (Semester-II) **Subject Code: 08160203**

CO1: To Understand the theory and scientific principles underlying the operation of major geographical systems
CO2: To discuss and describe the scientific methods as applied in the earth sciences.
CO3: To explain the hydrological cycle and development of landforms and geologic structures.

CO4: To explain the plate tectonic theory and explain its relationship to earth processes, features, and landforms.

Name of Subject: Atmospheric Chemistry and Pollution **Subject Code: 08160204**

CO1: To apply basic concepts of chemical thermodynamics, kinetics, and photochemistry to analyze chemical processes existing in atmosphere.
CO2: To understand the concepts and unifying features of atmospheric chemistry.
CO3: To understand the interconnections between different layers of atmosphere and the effect of human activities on the natural atmospheric constitution.

Name of Subject: Biodiversity and its Conservation **Subject Code: 08160205**

CO1: To acquire knowledge and critical understanding of the theory and principles of biodiversity and there interrelationships.
CO2: To realize and combine the complexity of the relations and interactions between the ecosystem structures and functions and the human impacts.
CO3: To Cooperate and synthesize an integrated management and restoration plan for the biodiversity and the natural ecosystems.
CO4: To know and apply the rules and recommendations related to environmental protection.

SEMESTER- III

Name of Subject: Environmental Modelling and CSE **Subject Code: 08160301**

CO1: To understand various computer-based and statistical methods used for study and management of natural resources and the environment.
CO2: To understand about remote-sensing techniques, physical principles, sampling, statistics and image-analysis methods.
CO3: To understand different environmental aspects and methodology of formulation of dynamic balance models.

Name of Subject: Agriculture and Environment Subject Code: 08160302

CO1: To develop critical thinking and skills to solve contemporary problems related to environment and agriculture.
CO2: To address issues of the competing needs of diverse clientele and communities relating to crop and livestock production, and environmental management.
CO3: To identify research interest in problems related to environment and agriculture.
CO4: To understand the agricultural system and environmental problems posed by intensive agriculture.

Name of Subject: Soil chemistry and Solid Waste Subject Code: 08160303

CO1: To understand the implications of the production, resource management and environmental impact of solid waste management.
CO2: To understand components of solid waste management infrastructure systems to minimize the above effects.
CO3: To be familiar with relationships between inappropriate waste management practices and their impacts on water, soil and sediment quality.
CO4: To understand the solid waste and its environmental implications and to learn about safe methods of solid waste disposal.

Name of Subject: Occupational Health and Safety Subject Code: 08160307

CO1: To understand and maintain the physical, mental and social well-being of workers.
CO2: To understand unfavorable effects on health caused by the working conditions
CO3: To understand about Industrial and Environmental Safety measures to be taken to reduce health effects.
CO4: To learn the basics of occupational health issues and methods to reduce the health issues.
CO5: Student will able to know the responsibilities of safety officers and head of department for person working in the premises of department.
CO6: Student will able to know about the benefits and rights given to employee in case of injury, sickness and maternity conditions.

Nam of Subject: Social Issues And Environment Subject Code: 08160306

CO1: To learn about the harmful effects of excessive use of fertilizers, pesticides and other toxins.
CO2: To understand about water conservation methods in domestic, agriculture and industries.
CO3: To understand the properties of hazardous waste and its management.
CO4: To know about the relocation policies of indigenous people by govt. and their right how to protect our cultural heritage

SEMESTER IV

Name of Subject: EIA and Risk Analysis Subject Code: 08160401

CO1: To know about EIA, its need and basic goals for which EIA is compulsory.
CO2: To know about types of EIA as per the requirement of the case and the process of EIA for developmental projects.
CO3: To understand environment management systems and role of public participation in EIA.
CO4: To know about ISO in Environmental Management Systems.

Name of Subject: Environmental Toxicology and Health Subject Code: 08160402

CO1: To understand the harms and health hazards associated with different occupations and the causes behind them.
CO2: To understand the common epidemiological issues due to naturally present elements.
CO3: To understand the carcinogenic effect of different pollutants and other chemical species through modelling using dose-effect relationships.
CO4: To know about toxicity mechanism of some common pesticides and their derivatives.

Name of Subject: Environmental Economics Subject Code:08160404

CO1: To understand the ecosystem stability with material balance approach
CO2: To know about the relationship between ecology and environment
CO3: To understand the inter-generational and intra-generational equity.
CO4: To know about the sustainability and understand about the economic growth and environmental degradation.
CO5: To know the about the different laws and treaties for the protection of environment and natural resources.
CO6: To understand the analysis of statistics on the economy and the environment simultaneously.
CO7: To understand the pressure on natural resources in relation with consumerisms.

Name of Subject Environmental Legislations, Economics and Awareness
Subject Code: 08160405

CO1: To understand role of Labels on different consumer goods and to know about eco-friendly products.
CO2: To know about the insurance for the purpose of providing immediate relief to the persons affected by accident occurring during handling of hazardous substance.
CO3: To know about the responsibilities of state for Protection and improvement of environment, safeguarding of forests and wild life
CO4: To know with individual duties for protection of environment.
CO5: To understand the penalties for violation of various environmental act.

Name of the Program: M.Sc. (Environmental Science)

Name of Subject: Ecology and Biodiversity (Lab-I) Subject Code: 08160105
Course Outcome (CO)

CO1: Students will be able to demonstrate fieldwork skills like species identification and ecological survey.
CO2: Students will also be able to explain the distribution and abundance of different plant species in any region.
CO3: Students will be able to evaluate the relationship/interactions among the different species.

Name of Subject: Water Chemistry and Pollution (Lab-II) Subject Code: 08160106

Course Outcome (CO)

CO1: Students will be able to analyze various parameters for water quality assessment like BOD, COD, turbidity etc.

CO2: Students will also be able to explain the characteristics and relation of different water pollutants.

CO3: The course will make students acquainted with different methods of water quality assessment.

Name of Subject: Stress Physiology (Lab-I) Subject Code: 08160206

Course Outcome (CO)

CO1: Students will be able to analyze various parameters like: proline and chlorophyll content.

CO2: Students will gets acquainted with use of air pollution tolerance index for selection of trees for different regions.

CO3: Students will be able to understand and demonstrate the bioremediation and phytoremediation techniques.

Name of Subject: Atmospheric Chemistry and Pollution (Lab-II)

Course Outcome (CO) Subject Code: 08160207

CO1: Students will be able to use different instruments for air quality assessment.

CO2: Students will be able to analyze various parameters for air quality assessment like concentration of NO_2, SO_2, CO, PM etc.

CO3: Students will also be able to explain the sources of different types air pollutants.

Name of Subject: Agriculture and Environment (Lab-I) Subject Code: 08160304

Course Outcome (CO)

CO1: Students will be able to determine the concentration and type of pesticides in soil, water and environment.

CO2: Students will also be able to explain the relation between soil parameters like cation exchange capacity and electrical conductivity.

CO3: Students will also able to understand and use different methods and techniques for analysis of Na and K concentration in soil.

Name of Subject: Soil Chemistry and Solid Waste (Lab-II)

Course Outcome (CO) Subject Code: 08160305

CO1: Students will also able to understand and use different methods and techniques for soil quality analysis.

CO2: Students will also able to characterize the solid waste on the basis of different properties.

CO3: Students will also be able determine the heavy metals concentration in soil.