# Programme Outcomes (POs)

## POs for B.Sc.

| PO | Nature of Knowledge | Science Graduates will be able to : |
|---|---|---|
| **PO1** | **Remember** | Define and describe the scientific terms |
| **PO2** | **Understand** | Characterize and classify various subject related components. |
| **PO3** | **Application** | Apply knowledge through calculation, drawing, sketching etc. |
| **PO4** | **Analysis** | Analyze, correlate and examine the scientific problems. |
| **PO5** | **Evaluate** | Conclude, criticize and determine the solutions to scientific problems. |
| **PO6** | **Create** | Create and generate knowledge based models, projects etc. |
| **PO7** | **Ethics** | Become good citizens of the Nation. They will be aware of fundamental rights of themselves and others. |
| **PO8** | **Individual and Team work** | Develop leadership qualities and actively participate in Individual and team works. |
| **PO9** | **Communication** | Develop communication skill and express themselves effectively. |
| **PO10** | **Life-long learning** | Develop life-long learning skills and keep themselves engaged in updating their subject related knowledge. |

## POs for M.Sc.

| PO | Nature of Knowledge | Science Post Graduates will be able to : |
|---|---|---|
| **PO1** | **Advance knowledge** | Understand, acquire and apply knowledge of the scientific principles. |
| **PO2** | **Understand** | Characterize and classify various subject related components. |
| **PO3** | **Application** | Demonstrate thorough knowledge, understanding and skills in application of scientific methodology to undertake and report on experimental investigation. |
| **PO4** | **Analysis** | Analyze, correlate and examine the scientific problems. |
| **PO5** | **Scientific and critical thinking** | Possess high awareness of major issues and development of research and competent in initiating, developing, and pursuing a scientific research. |
| **PO6** | **Create** | Create and generate knowledge based models, projects etc. |
| **PO7** | **Ethics** | Act with integrity and good ethics in their profession and their obligation to society |
| **PO8** | **Social skills and responsibility** | portray good interpersonal skills with high ability to work collaboratively as part of a team undertaking a range of different team roles |
| **PO9** | **Communication** | present technical, scientific information and arguments clearly and correctly, in written and oral presentation |
| **PO10** | **Life-long learning** | Seek new knowledge, skills and manage relevant information from various sources. |

# Course Outcomes

**Faculty – Science & Technology**

**Department of Botany**

**Name of Course Title : Algae and Fungi**

**Course Code : DSEC 1A/BO31165**

CO1) Understand the different aspects of lower cryptogams.
CO2) Classify, compare, and explain the lower cryptogams.
CO3) Identify the lower cryptogams based on their morphological characteristics.
CO4) Learn about the economic and ecological importance of lower cryptogams.

**Name of Course Title : Archegoniate**

**Course Code : DSEC 1B/BO31175**

CO1) Understand different forms of Archegoniate.
CO2) Describe morphological features of Higher cryptogams.
CO3) Classify and compare the Bryophytes and Pteridophytes.
CO4) Explain ecological and economic importance of Bryophytes and Pteridophytes
CO5) Discuss evolution and distribution of Bryophytes and Pteridophytes.

**Name of Course Title : Spermatophyta and Paleobotany**

**Course Code : DSEC 2A /BO31185**

CO1) recognize the general characteristic features of Gymnosperms.
CO2) explain the structure, reproduction of Pinus and Gnetum.
CO3) Describe diagnostic features, economic Importance of families Nymphaeaceae, Asclepiadaceae, Euphorbiaceae and Cannaceae.
CO4) compare the national and international herbaria.

**Name of Course Title : Plant Ecology**

**Course Code : DSEC 2B /BO31195**

CO.1 Get well versed with inter-relationships between the living worlds, an environment.
CO.2 Concept of population & community ecology will be understood.
CO.3 Understand better the biogeochemical cycles, their types & significance in an ecosystem.
CO.4 EIA, Environmental audit, significance of each in suitable development.

**Name of Course Title : Cell and Molecular Biology**

**Course Code : DSEC 3A/BO31205**

CO1) Understand the fundamentals of cell structures, composition& functions.

CO2) Discuss the various types of cell organelles, their structure & function.

CO3) Get an insight into structures & functions of the basic unit of life. i.e. cell and organelles.

CO4) Learn about genetic material DNA, its structure, function & the process of replication.

CO5) Explain gene expression & gene regulation.

**Name of Course Title : Genetics**

**Course Code : DSEC 3B/BO31215**

CO 1 State & explain different laws of genetics.

CO 2 Interpret allelic and intergenic interaction.

CO 3 Identify, classify, describe and correlate chromosomal mutations.

CO 4 Construct a chromosomal map.

**Name of Course Title : Botany Practical Course - I**

**Course Code : DSEC-1/ BO31225**

CO1) Identify, classify & describe morphological and anatomical features

CO2) Dissect & observe given plant specimens.

CO3) Compare Lower & higher cryptogams on the basis of morphological & anatomical features.

CO4) Prepare the temporary mount of various plants part.

**Name of Course Title : Botany Practical Course II**

**Course Code : DSEC 2/BO31235**

CO1) Identify, Classify, describe and write the diagnostic features of phanerogams

CO2) Dissect flowers to observe reproductive characters.

CO3) Identify fossil types

CO4) Perform ecological experiments.

CO5) Acquatise and interpret ecological data.

**Name of Course Title : Botany Practical Course-III**

**Course Code : DSEC/ BO31245 No. of Credits: 02**

CO1) Identify & describe various stages of cell division.

CO2) Isolate and estimate the amount of DNA &RNA.

CO3) Prepare slides and discuss concepts of chromosomes, tetraploidy, structural heterozygotes.
CO4) Apply and solve problems on genetics related to PTC, Sensitivity , multiple alleles, three point test cross etc.

**Name of Course Title : Medicinal botany**
**Course Code : SEC-1/BO31255**
CO 1 Compare the different systems of medicine.
CO 2 Learn new skills to conserve and propagate medicinal plants used in traditional medicine.
CO 3 Understand the concept of Ethno botany and folk medicine.

**Name of Course Title : Plant Diversity and Human Health**
**Course Code : SEC-2/ BO31265**
CO1 Describe and explain basic concepts regarding biodiversity.
CO2 Summarize biodiversity types and comment on loss of biodiversity.
CO3 Illustrate role of various organizations in biodiversity conservation.

**Name of Course Title : Plant Physiology and Metabolism**
**Course Code : DSEC 4A/ BO31276**
CO1 Define and explain various physiological processes.
CO2 Summarize role of nutrients and PGRS in plant growth and development
CO3 Draws schematic diagrams of various physiological processes.
CO4 Comment on various steps involved in metabolic pathways.

**Name of Course Title : Biochemistry**
**Course Code : DSEC 4B/ BO31286**
CO1) Define and explain structure and function of various biomolecules.
CO2) Draw ultrastructure of biomolecules & summarize their properties.
CO3) Classify biomolecules on the basis of chemical composition and elaborate their role in plants.

**Name of Course Title : Plant Pathology**
**Course Code : DSEC 5A/ BO31296**
CO1: Understand and explain the basic plant pathology terminologies.
CO2: Classify and compare the defense mechanisms based on their mode of action
CO3: Inspect and Identify the disease symptoms in order to conclude the cause of plant disease.
CO4: Differentiate between disease control measures practices

**Name of Course Title : Evolution and Population genetics**

**Course Code : DSEC 5B/ BO31306**

CO1 Describe the various theories of evolution.

CO2. Illustrate evolutionary processes through various pieces of evidence.

CO 3. Elaborate Speciation and isolation mechanisms.

CO4. State Hardy-Weinberg law and comment on factors affecting allelic frequency.

**Name of Course Title : Advanced Plant Biotechnology**

**Course Code : DSEC 6A/ BO31316**

CO1 Understand the concept of tissue culture in detail from the time of its discovery and landmarks.

CO2 Demonstrate different techniques in genetic engineering used to prepare genetically modified plants.

CO3 Explain the role of microorganisms in the synthesis of different commercial products.

CO4 Learn about the application of nanotechnology in agriculture.

CO5 Interpret role of microorganism in biotechnological process.

**Name of Course Title : Plant breeding and Seed technology**

**Course Code : DSEC 6B/ BO31326**

CO1: Introduce a field of Agriculture called plant breeding, concept and scope.

CO2: Learn traditional and advanced methods of plant breeding.

CO3: Understand the techniques of plant breeding and seed technology.

CO4: Develop employability and marketing skills.

**Name of Course Title : Botany Practical Course – I**

**Course Code : DSEC 4/BO31336**

CO1 Separate plant pigments and amino acids by chromatographic techniques.

CO2 Calculate stomatal index and determine osmotic potentials.

CO3 Estimate Amino acids, Proteins, reducing sugar and vitamins.

CO4 Perform a qualitative Test.

**Name of Course Title: Botany Practical Course II**

**Course Code: DSEC 5/ BO 31346**

CO1 Identify causal organism, write symptoms and comment on various diseases.

CO2 Prepare culture media, jivamruta & Bordeaux mixture.

CO3 Isolate and culture pathogens by different methods.

CO4 Solve problems based on population genetics.

**Name of Course Title : Botany Practical Course III**

**Course Code : DSEC-6 BO31356**

CO1 Prepare plant based nanoparticles, M-S media and performs PTC experiments.

CO2 Know physical purity moisture content and germination percentage of seed sample.

CO3 Explain instruments involve in genetic engineering, PTC and hybridization techniques.

CO4 Solve problem based on genetic engineering.

**Name of Course : Nursery and Gardening Management**

**Course Code : SEC3/ BO31366**

CO1 Define and explain vegetative methods of propagations.

CO2 Comment on Seed storage Seed banks, factors affecting seed viability, genetic erosion –Seed production technology - seed testing and certification.

CO3 Elaborate concept of Gardening.

**Name of Course : Biofertilizers**

**Course Code : SEC4/BO31376**

CO 1 Summarize role of bio fertilizer in agriculture.

CO 2 Explain types of bio fertilizer and their production.

CO 3 Compare bio fertilizer with chemical fertilizers.

**Faculty – Science & Technology**

**Department of Physics**

**Name of Course Title : Mathematical Methods in Physics II**

**Course Code : SU-48**

CO1 Recall gradient, divergence and curl and their significance as well as Galilean transformation and Lorentz transformations.
CO2 Identify generating functions for Legendry polynomial, Hermite polynomial and Bessel equation of first kind.
CO3 Describe Frobenius power series solution method and properties/recurrence relations for Legendry polynomial, Hermite polynomial and Bessel equation of first kind.
CO4 Calculate power series solution for any second order linear homogeneous differential equations.
CO5 Test power series solution for given second order linear homogeneous differential equations.
CO6 Compare Newtonian relativity and special theory of relativity.

**Name of Course Title : Electrodynamics**

**Course Code : SU-49**

CO1 Describe the basic concepts in electrostatics including electric field, potential, state related laws.
CO2 Explain the behavior of charges in external electric and magnetic field.
CO3 Classify polar and non-polar molecules.
CO4 Distinguish between the laws applicable under static electric and magnetic fields.
CO5 Calculate magnetic field and forces using Biot-Savart's, Ampere's law.
CO6 Apply cole-cole relation to the experimental data.

**Name of Course Title : Classical Mechanics**

**Course Code : SU-50**

CO1 Recall the Newton's laws of motion and its applications with examples.
CO2 Understand the kinds of motions that can occur under a central potential and their applications to planetary orbits.
CO3 Compare the elastic and inelastic scattering in lab and centre of mass frame.
CO4 Analyze the various artificial satellite and its properties.
CO5 Evaluate the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulations of classical mechanics.
CO6 Develop the conceptual competence regarding satellite launching device by doing inquiry based learning activity.

**Name of Course Title : Atomic and Molecular Physics**
**Course Code : SU-51**
CO1 Describe the atomic spectra of one and two valance electron atoms.
CO2 Explain the change in behavior of atoms in external applied electric and magnetic field
CO3 Classify rotational, vibrational, electronic and Raman spectra of molecules.
CO4 Distinguish between Normal and Anomalous Zeeman Effect.
CO5 Prove the rotational spectrum of a diatomic molecule consists of a series of equally spaced absorption lines.
CO6 Construct experimental setup of Zeeman and Raman Effect.

**Name of Course Title : Computational Physics**
**Course Code : SU-52**
CO1 Describe the fundamental concepts related to algorithms, flow charts and C-programming
CO2 Explain the structure of C-program, 'C' Character set, key words, Constants and variables used in C-programming.
CO3 Distinguish Input/output functions, operators and expressions, control statements used in C-programming
CO4 Prove the use of numerical methods to solve the physics problems
CO5 Estimate the use of C tokens for writing C program of numerical methods
CO6 Construct project related to physics problems using C-programming

**Name of Course Title : Elements of Material Science**
**Course Code : SU-53**
CO1 Define the properties of materials
CO2 Explain the defects in solids
CO3 Describe the various deformation phenomenon.
CO4 Classify the ceramic materials.
CO5 Importance of phase diagrams.
CO6 Elaborate the smart materials.

**Name of Course Title : Physics Laboratory-3A**
**Course Code : SU-54**
CO1 Recall the various electronic components, instruments and their application
CO2 Discuss the theoretical background of an experiment
CO3 Demonstrate the procedure to perform the experiments and the skills required for the particular experiment.
CO4 Analyze the data, plot appropriate graphs and reach the result and conclusion part from data analysis
CO5 Evaluate the various parameters after completion of experiment
CO6 Standardize the entire procedure to obtain reliable, repeatable results.

**Name of Course Title : Physics Laboratory- 3B**
**Course Code : SU-55**
CO1 Describe the fundamental concepts program writing skill
CO2 Explain the significance C programing to solve physics problems
CO3 Distinguish accuracy in root of the function using different iterative methods
CO4 Estimate the data generated by program for various physical quantities.
CO5 Explain use of CRO
CO6 Construct the flow chart and program for physics problems

**Name of Course Title : Project-I**
**Course Code : SU-56**
CO1) learn the basic aspects of the topic chosen for the project.
CO2) perform the literature survey.
CO3) set up the basic experimental/theoretical and computational techniques needed for the project.
CO4) acquire basic skills of scientific writings.
CO5) develop the presentations skills
CO6) acquainted with the basics of research methodology.

**Name of Course Title : Nanomaterial Synthesis**
**Course Code : SU-57**
CO1 Recall the material physical and chemical properties.
CO2 Explain Trends in Materials Synthesis.
CO3 Compare/ Differentiate Composite materials.
CO4 Classify the various types routes for nanomaterial synthesis.
CO5 Estimate the prerequisites of chemical synthesis on nanomaterials.
CO6 Design a project based on synthesis of nanomaterials by various routes.

**Name of Course Title : Physics Workshop Skills – I**
**Course Code : SU-58**
CO1 Write working principles of various measuring instruments.
CO2 Explain working of the measuring instruments.
CO3 Use proper instrument to measure physical quantity.
CO4 Compare results of various instruments use for same physical quantity.
CO5 Select proper instrument according to their properties (sensitivity repeatability etc.)
CO6 Design and calibrate measuring instrument.

**Name of Course Title : Solid State Physics**
**Course Code : SU-59**
CO1 Describe the basic concepts related to crystal structure
CO2 Explain the method to assign miller indices
CO3 Classify a structure based on its lattice parameters.
CO4 Distinguish between conductors, semiconductor and insulators on the basis of band theory.
CO5 Evaluate the density of state equation in 3D.
CO6 Specify the importance of magnetic materials.

**Name of Course Title : Quantum Mechanics**
**Course Code : SU-60**
CO1 Recall the concepts which are the part of origin of quantum mechanics.
CO2 Describe the concept of wave function and wave packets with group and phase velocity.
CO3 Apply the Schrodinger steady state equation to solve the various physical problem.
CO4 Differentiate various operators in quantum mechanics with examples.
CO5 Evaluate the expectation value of position & momentum of various systems by using normalization condition.
CO6 Develop the conceptual competence regarding decay of alpha particle from the radioactive source by doing inquiry based learning activity.

**Name of Course Title : Thermodynamics and Statistical Physics**
**Course Code : SU-61**
CO1 Define fundamental aspects of statistical physics like probability distribution function, micro, macro states, ensemble etc.
CO2 Explain transport phenomenon like viscosity, thermal conductivity and diffusivity.
CO3 Calculate accessible micro and macro states for the system of particles.
CO4 Apply maxwell's relations in specific heat equation, latent heat equation etc.
CO5 Distinguish classical (MB) and quantum (BE and FD) statistics.
CO6 Compare Maxwell-Boltzmann's statistics, Bose-Einstein Statistics, Fermi-Dirac Statistics.

**Name of Course Title : Nuclear Physics**
**Course Code : SU-62**
CO1 Recall the basic concept of nucleus.
CO2 Interpret the laws of radioactivity decay.
CO3 Identify the nuclear accelerator.
CO4 List the application of radioactive decay.
CO5 Estimate the amount of energy release in fission.
CO6 Discuss the nuclear reactor in India.

**Name of Course Title : Electronics II**
**Course Code : SU-63**
CO1 Describe the use of different electronic components in an electronic circuit.
CO2 Explain the working and applications of Semiconductor Devices and Different ICs.
CO3 Construct different types of flip flops using logic gates.
CO4 Distinguish between JFET and MOSFET.
CO5 Test binary to gray and gray to binary code conversion.
CO6 Design half adder, full adder, half subtract.
CO7 Design Astable & monostable multivibrator using IC-555.

**Name of Course Title : Advanced Electronics**
**Course Code : SU-63**
CO1 Describe the use of different electronic components and IC's in an electronic circuit.
CO2 Explain the various types of control systems.
CO3 Construct of different decoder circuits.
CO4 Distinguish between motion, optical and thermal sensors.
CO5 Test analog & digital multiplexer and de-multiplexer.
CO6 Design Instrumentation amplifier using 3-Op-Amps.

**Name of Course Title : Physics of Nanomaterials**
**Course Code : SU-64**
CO1 Describe the fundamental concepts related to Nanomaterial and Nanotechnology
CO2 Explain the significance of Nano-size and properties of Nanomaterials
CO3 Distinguish vapor phase and liquid phase approach of nanomaterial synthesis
CO4 Define special nanomaterials : Quantum dots and their properties
CO5 Estimate the use of nanomaterial for various applications
CO6 Construct the experimental prototype for synthesis of nanomaterials.

**Name of Course Title : Physics Laboratory-4A**
**Course Code : SU-65**
CO1 Recall various concepts involved in experiments
CO2 Discuss the theoretical background of an experiment
CO3 Execute experimental procedure to obtained desired result
CO4 Analyze the data, plot appropriate graphs and reach the result and conclusion part from data analysis
CO5 Evaluate the various parameters after completion of experiment
CO6 Design new experiment to verify relations between parameters.

**Name of Course Title : Physics Laboratory-4B**
**Course Code : SU-66**
CO1 Recall the various electronic components, instruments and their application.
CO2 Discuss the theoretical background of an experiment.
CO3 Demonstrate the experiment with electronic circuit connection and brief working.
CO4 Analyze the data, plot appropriate graphs and reach the result and conclusion part from data analysis.
CO5 Evaluate the various parameters after completion of experiment.
CO6 Design electronic circuit for specific application.

**Name of Course Title : Project-II**
**Course Code : SU-67**
CO1) Learn the basic concepts along with the applied part of the topic chosen for the project.
CO2) Build the working/theoretical/computational model.
CO3) Understand the collected data/information.
CO4) Analyze the collected data/information.
CO5) Acquire basic skills of experimenting.
CO6) Acquainted with the basics of research methodology.

**Name of Course Title : Experimental Data Analysis**
**Course Code : SU-68**
CO1 Describe the basic concepts related to Windows OS.
CO2 Explain the working principles of XRD, IR and UV Vis spectroscopy.
CO3 Apply the concepts to determine crystal structure using XRD.
CO4 Analyze the given UV Vis spectra.
CO5 Estimate crystallite size, energy band gap.
CO6 Combine XRD and IR data to determine elastic properties of a material.

**Name of Course Title : Physics Workshop Skills-II**
**Course Code : SU-69**
CO1 Recall the basic laws regarding to the measurements
CO2 Understand the principle, characteristics and working of various electrical instruments.
CO3 Compare the Digital and analog performance of various electrical instruments.
CO4 Analyze the various aspects of measurements of different electrical instruments
CO5 Test and handle the various electrical instruments by taking measurements.
CO6 Develop the conceptual competence regarding electrical instruments by doing activity.

**Faculty – Science & Technology**

**Department of Chemistry**

**Name of Course Title :Physical Chemistry - I**

**Subject Code : DSEC-1 A CH3825**

CO1) Define and outline the fundamentals of quantum chemistry, molecular spectroscopy and photochemistry.
CO2) Explain the formulation of Schrodinger equation and apply it to 1D, 2D and 3D box.
CO3) Apply the physical methods to investigate molecular structure.
CO4) Discuss the types of spectroscopic methods (rotational, vibrational and NMR) and use these to interpret the molecular structure.
CO5) Recall and describe the photochemical and photophysical processes.
CO6) Solve the numerical based on quantum chemistry, investigation of molecular structure and photochemistry.

**Name of Course Title : Analytical Chemistry**

**Subject Code : DSEC-1B, CH3835**

CO1) Understand basic concept/principles of Analytical chemistry
CO2) Define and understand the fundamental concepts which govern the gravimetric and inorganic qualitative analysis.
CO3) Explain the basic concepts of thermal methods of analysis.
CO4) Classify the Stereoisomeric separation and analysis apply to experimental analysis.
CO5) Illustrate the basic concepts of nanomaterial analysis and UV-visible spectroscopy.
CO6) Solve the numerals related to analytical chemistry and its applications.

**Name of Course Title: Inorganic Chemistry-I**

**Subject Code : DSEC-2 A, CH3845**

CO1) Define and explain various terminologies involved in Inorganic Chemistry.
CO2) Apply MOT to draw and explain MO energy level dig. of Oh complexes and explain magnetic properties, apply the trans effect of ligand in substitution reaction to predict the product.
CO3) Classify, draw, analyze reactions with the mechanism of coordination compounds and also to understand and discuss the concept of labile and inert complexes along with their stability.
CO4) Write electronic configurations and explain trends in periodic properties of d-block & f-block elements and write various nuclear reactions.
CO5) Understand and explain the separation of lanthanides, preparation of transuranic elements and various metallurgical operations.
CO6) Illustrate the conductivity of metals, semiconductors with the help of N(E) curves.

**Name of Course Title : Industrial Chemistry**

**Subject Code : DSEC-2 B, CH3855**

CO-1 Describe various fundamental terms in the chemical industry.
CO-2 Understand the manufacturing processes of basic Chemicals in industry.
CO-3 Identify the requirement of the fermentation process.
CO-4 Understand the manufacturing of ethyl alcohol by using molasses and fruit juice.

CO-5 Design Structures and synthetic routes of dyes and pigments.
CO-6 Describe Manufacturing processes involved in Industrial Organic Synthesis such as Methanol, Isopropanol, Glycerol, Acetylene and Aromatic hydrocarbon i.e. Toluene from petroleum with their uses.

**Name of Course Title : Organic Chemistry-I**
**Subject Code : DSEC-3 A, CH3865**
CO1) Define and explain various neighbouring groups Organic Chemistry
CO2) Apply different synthetic application methods by using variety of reagents
CO3) Write and explain various active methylene groups and their proper mechanisms
CO4) Identify various types of Rearrangements and Reactions Organic Chemistry.
CO5) Correlate different types of Elimination Reactions like E1, E2, E1cB.
CO6) Develop and justify synthetic route for synthesis of expected target molecules by reactions.

**Name of Course Title : Chemistry Of Biomolecules**
**Subject Code : DSEC-3B, CH3875**
CO1) Understand biochemistry at atomic level and concept of biochemistry.
CO2) Describe the fundamental concepts and significance of biochemistry to human society.
CO3) Encourage academic students towards the noble career.
CO4) Understand in detail amino acids and proteins.
CO5) Understand lipid and porphyrin structures, lipoproteins and functions of porphyrins.
CO6) Understand structure, functions, and the mechanisms of action of enzymes.
CO7) Understand current applications and future potential of enzyme.

**Name of Course Title : Physical Chemistry Practical – I**
**Subject Code : DSEC-1, CH3885**
CO1) Apply the basic theory concepts and terms of physical chemistry.
CO2) Interpret the quantitative calculations depending upon equations studied in the theory.
CO3) Develop the laboratory instrumental handling skills with understanding of chemistry concepts.
CO4) Apply theoretical principles of spectrophotometry and colorimetry, conductometry studied in theory.
CO5) Understand and apply the techniques of chemistry experiments.
CO6) Develop the practical skills in accordance with their fundamental ideas.

**Name of Course Title : Inorganic Chemistry Practical-I**
**Subject Code : DSEC-2, CH3895**
CO-1 Estimate the quantity of metal ions from a given sample of metal ions.
CO-2 Prepare complex compounds of metals ions and ligands
CO-3 Analyses the percentage of metals in alloys.
CO-4 Identify the metal ions i.e. cations and anions from any inorganic salt mixture.

**Name of Course Title : Organic Chemistry Practical – I**
**Subject Code : DSEC-3, CH3905**

CO1) Define the basic terms in organic qualitative analysis and carry out the separation of binary organic mixture.
CO2) Explain the reactions involved in organic qualitative analysis and organic preparations.
CO3) Identify and apply the appropriate solvent system for crystallization and Thin Layer Chromatography techniques.
CO4) Interpret and explain the results of organic qualitative analysis of unknown binary mixture.
CO5) Understand the concept of green organic synthesis.
CO6) Develop the skills required in chemistry such as proper handling of apparatus and chemicals.

**Name of Course Title : Polymer Chemistry**
**Subject Code : SEC-1, CH3915**

CO1) understand the basic concepts / principles of Polymer chemistry.
CO2) know the different types of polymers and nomenclature systems.
CO3) describe the fundamental concepts which govern the polymer processing.
CO4) know the different polymers with their structure
CO5) explain the properties and applications of different polymers.

**Name of Course Title : Environmental Chemistry**
**Subject Code : SEC -2, CH3925**

CO1) Understand the basic theory concepts of environmental chemistry
CO2) Describe the fundamental concepts which govern the Water resources, Segments of Environment and Biogeochemical cycles of C, N, P, S and O system.
CO3) IIlustrate the units of concentration, pH, conductance, DO, ammonia, nitrate and nitrite, Cl, F, CN, Sulfide, sulphate, phosphate, total hardness, boron, metals and metalloids - As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, COD, BOD, TOC in case studies of water pollution.
CO4) Identify Water resources, Water quality parameters and standards and water pollutants Organic and Inorganic pollutants, Sewage and Domestic waste.
CO5) Distinguish between Water pollutants, Waste water treatment, industrial waste water treatment, drinking water supplies, Trace elements in water.
CO6) Define the pH, conductance, DO, total hardness, metals and metalloids, COD, BOD and TOC.

**Name of Course Title :Physical Chemistry – II**
**Subject Code : DSEC-4A, CH3936**

CO1) Define and outline the fundamentals of quantum electrochemical cells, crystal structure and nuclear chemistry.
CO2) Classify electrochemical cells and predict the spontaneity and non-spontaneity of reactions.
CO3) Explain the applications of EMF measurements.
CO4) Describe the different crystal systems.
CO5) Compare the properties and penetrating power of nuclear radiations.
CO6) Apply different applications of radioactive elements.

**Name of Course Title : Physical Chemistry III**
**Subject Code : DSEC-4B, CH3946**

CO-1 Define colligative properties of diluted solutions.
CO-2 Understand the various rate laws for kinetics of solid state reactions.
CO-3 Describe Cohesive energy in ionic crystals, electronic structure of solids, conductors and insulators, Ionic crystals, semiconductors, cohesive energy in metals.
CO-4 Solve the Numericals based on colligative properties and cohesive energy.
CO-5 Identify the class of polymer and chemical bonding in the polymers.
CO-6 Determine molecular weight of polymer.

**Name of Course Title : Inorganic Chemistry-II**
**Subject Code : DSEC-5A, CH3956**

CO1) Define and explain various terminologies involved in Inorganic Chemistry.
CO2) Explain the synthesis and important reactions of organometallic compounds, inorganic polymers, inorganic solids and ionic liquids.
CO3) Apply the concept of point group and perform symmetry operations to find the point group of given molecules for determining their optical activity.
CO4) Identify, understand and explain the biological role of metal ions in enzymatic and non-enzymatic processes.
CO5) Compare inorganic polymers with organic polymers and explain the structural aspects and uses of polymers of Si, B and P.

**Name of Course Title : Inorganic Chemistry III**
**Subject Code : DSEC-5B, CH3966**

CO1) Understand the basic theory concepts of acid base and their theories, properties of acids and bases, Arrhenius Concept, Brønsted–Lowry Concept, solvent system concept, Lux Flood concept, Lewis Concept and Ferromagnetism and related phenomena.
CO2) Describe the fundamental concepts of Frontier Orbitals and Acid–Base reactions, Crystal structures – Simple, Cubic, Lattice energy, Cryochemical synthesis, Curie law, Curie-Weiss Law, Synthesis and Stabilization of Nanoparticles.
CO3) Illustrate the Ionic radius, Palings univalent and crystal radii, Conversion of univalent radii to crystal radii, problems based on conversion of radii, Radius ratio effect, Lattice energy.
CO4) Identify the crystal structures of simple cubic, body centered cubic and face centered cubic, Schottky and Frenkel defect, Zeolite Structures: Framework Composition, Extra-framework Species, Magnetic materials.
CO5) Distinguish between Crystalline and amorphous solids, Natural and artificial Zeolites, Hard and soft acids and bases, soft magnetic materials, Hard magnetic materials.
CO6) Define the Hard and soft acids and bases, crystal radii, Crystalline and amorphous solids, Micelles, Emulsions and Dendrimers, Zeolites.

**Name of Course Title : ORGANIC CHEMISTRY-II**
**Subject Code : DSEC-6A, CH3976**

CO1) Define and explain wave parameters and terms involved in spectroscopy.
CO2) Define and explain different spectroscopic methods in Organic Chemistry
CO3) Understand principle, concept and the terms used in each type of spectroscopy.

CO4) Interpret of UV, IR, NMR, Mass spectra of unknown organic compound.
CO5) Apply different spectroscopic methods for structure determination of compounds.
CO6) Correlate different types all spectroscopic methods in structure determination of organic molecules.
CO7) Apply for progress of reactions multistep reactions and determine structure.
CO8) Describe methods of analysis in organic chemistry
CO9) Solve problems based on spectral data.

**Name of Course Title : Organic Chemistry-III**
**Subject Code : DSEC-6B, CH3986**
CO1) Illustrate the basic concept of synthetic organic chemistry.
CO2) Understand and apply the fundamental concepts of retrosynthetic analysis
CO3) Know the various reagents and their applications in organic synthesis
CO4) Understand and apply the fundamental concepts of retrosynthetic analysis
CO5) Explain the concept of the natural product with their structure, properties, synthesis and applications.

**Name of Course Title : Physical Chemistry Practical's – II**
**Subject Code : DSEC-4, CH3996**
CO1) Demonstrate experimental understanding of potentiometric titration.
CO2) Evaluate the practical concepts based on pH meter.
CO3) Explain the basic concepts of distribution law.
CO4) Classify the colligative properties and apply to experimental analysis.
CO5) Illustrate the experimental concepts of turbidometry and transport number.
CO6) Solve the numerals related to physical chemistry as a table work.

**Name of Course Title : Inorganic Chemistry Practical-II**
**Subject Code : DSEC-5, CH31006**
CO1) Understand and perform the techniques of chemistry experiments.
CO2) Demonstrate the concept of volumetric analysis and gave laboratory level application.
CO3) Operate flame photometer with the understanding of basic concepts.
CO4) Prepare nanomaterial.
CO5) Synthesize the metal complexes.
CO6) Explain and calculate band gap for nanoparticles.
CO7) Analysis of Inorganic materials of industrial importance.

**Name of Course Title : Organic Chemistry Practical – II**
**Subject Code : DSEC-6, CH31016**
CO1) Define the basic terms in NMR and IR spectroscopic techniques.
CO2) Interpret and explain the NMR and IR spectra for any organic molecules.
CO3) Identify and apply the appropriate solvent system for column chromatography technique.

CO4) Estimate different organic compounds.
CO5) Understand and perform the organic extractions.
CO6) Develop the skills required in chemistry such as proper handling of apparatus and chemicals.

**Name of Course Title : Introduction to Forensic Chemistry**
**Subject Code : SEC-3, CH31026**
CO1) Understand the fundamental, basic concept, principles, and recent developments in the forensic science.
CO2) Describe the fundamental concepts and significance of forensic science to human society.
CO3) Identify opportunities and encourage academic students towards the noble career.
CO4) Find to know work nature in a forensic science laboratory.
CO5) Describe the classification and characteristics of the narcotics, drugs and psychotropic substances.
CO6) Identifying different methods of analysis of narcotics, drugs and psychotropic substance.
CO7) Describe the forensic identification of illicit liquors.
**Name of Course Title : Analytical Chemistry- II**
**Subject Code : SEC-4, CH31036**
CO1) Understand basic concept/principles of pharmaceutical analysis.
CO2) Define and understand the fundamental concepts which govern Instrumental Methods of Chromatographic Analysis.
CO3) Explain the basic concepts of High Performance Liquid Chromatography.
CO4) Classify the Gas chromatography and atomic absorption spectroscopy.
CO5) Illustrate the concepts of flame emission spectroscopy in analytical chemistry.
CO6) Solve the numerals related to analytical chemistry.

**Faculty – Science & Technology**

**Department of Zoology**
**Name of Course Title : Wildlife Management**
**Course Code : ZO31505 (DSEC1A)**
CO1) define various terminologies, and explain their need and scope of Wildlife Management.
CO2) describe various conservation strategies for wildlife and concepts in wild life management
CO3) discuss tools and techniques used in wildlife management.
CO4) analyze the habitat management of wild life and compare in- situ and ex – situ conservation methods.
CO5) explain causes of destruction of biodiversity and wild life.

**Name of Course Title : Histology**
**Course Code : ZO31515 (DSEC 1B)**
CO1) describe the histological structure and functions of different organs.
CO2) define and explain the different types of tissues and stains.

CO3) Identify and classify the sections of tissues, organs and stains.
CO4) draw various histological structure of tissues, organs.
CO5) describe the different histochemical staining techniques.

**Name of Course Title : Biological Chemistry**
**Course Code : ZO31525 (DSEC 2A)**
CO1) apply concepts and methods of biochemistry for preparation of solutions of different concentrations, pH, buffers etc.
CO2) identify and classify carbohydrates, proteins, enzymes and lipids based on their structures and properties.
CO3) explain the biological significance of biomolecules and their mechanism of functioning.
CO4) analyze the effect of physical and/ or chemical factors on the activity of biomolecules and their properties.

**Name of Course Title : Genetics**
**Course Code : ZO31535**
CO1) understand and explain various terminologies in Genetics, population genetics.
CO2) describe Mendel's laws of inheritance and exceptions to these laws like co-dominance, incomplete dominance, multiple alleles and its examples, lethal alleles etc.
CO3) classify types of chromosomes, analyze human karyotype and describe various chromosomal aberrations, describe congenital chromosomal abnormalities and the techniques used for sampling.
CO4) illustrate various sex determination methods, genetic disorders, sex linked inheritance etc.
CO5) solve the problems related to monohybrid, dihybrid cross and Hardy-Weinberg law.

**Name of Course Title : Developmental Biology**
**Course Code : ZO31545 (DSEC 3A)**
CO1) define and explain various terminologies in Developmental biology.
CO2) describe the process of gametogenesis and structure of gamete.
CO3) Explain the process of fertilization and concept of polyspermy.
CO4) Define cleavage, blastulation and illustrate different types of cleavage and blastula.
CO5) discuss gastrulation movements, process of gastrulation in frog and concept of organizer in frog.
CO6) understand chick embryo development with reference to its fertilization, cleavage, formation of primitive streak, organogenesis at 24, 33, &48 hrs.

**Name of Course Title : Parasitology**
**Course Code : ZO31555 (DSEC 3B)**
CO1) define and explain the terminologies in parasitology.
CO2) describe the concepts of host parasite relationship.
CO3) draw and explain morphology, life cycle, pathogenicity, prophylaxis and treatment of Protista and parasitic worm.
CO4) describe morphology, pathogenicity and control measures of ectoparasite.

**Name of Course Title : Practical Course - I**
**Course Code : ZO31565 (DSEC 1)**
CO1) identify and describe the wildlife mammalian, avian and herpeto fauna.
CO2) identify and explain the equipment's in wildlife management
CO3) demonstrate the distribution of wildlife animals and national parks/ sanctuaries in India
CO4) Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers
CO5) Identify and describe the permanent histological tissues of various organs.
CO6) Draw the histology structure and functions of various organ systems.
CO7) Prepare the temporary mount of various muscle fibres, Nerve fibre and blood smear.
CO8) Demonstrate the various staining techniques of histology.

**Name of Course Title : Practical Course II**
**Course Code : ZO31575 (DSEC 2)**
CO1) estimate carbohydrates, proteins and lipids qualitatively and quantitatively.
CO2) determine biochemical parameters such as pH and enzyme specific activity.
CO3) analyze the effect of physical and chemical parameters on enzyme activity.
CO4) solve problems related to monohybrid, dihybrid cross and estimate the allelic frequency on the basis of Hardy-Weinberg law.
CO5) evaluate and distinguish between karyotypes of individuals with chromosomal aberrations.
CO6) demonstrate polytene chromosomes using suitable biological material.

**Name of Course Title : Practical Course -III**
**Course Code : ZO31585 (DSEC 3)**
CO1) mount helminth parasites and analyze parasite from fecal sample.
CO2) identify the life cycle stages through permanent slides and microphotograph of endoparasites.
CO3) identify and explain the role as a vector of ectoparasites.
CO4) dissect any suitable organism to identify rectal parasites.
CO5) identify and explain the type of cleavage, blastula and gastrula.
CO6) identify the developmental stage of chick embryo with respect to brain and heart development in whole mount and TS of 24, 33 and 48 hrs.
CO7) perform the temporary preparation of whole mount and ex –vivo culture of chick embryo.

**Name of Course Title : Computer Applications In Life Science**
**Course Code : ZO31595 (SEC-1)**
CO1) define and explain the basics component of computer including hardware and software.
CO2) apply Microsoft word, excel and power point for biological purpose.
CO3) analyze the given data using biostatistical methods.
CO4) Interpret the importance of computer application in Biotechnology.

**Name of Course Title : Poultry Management**
**Course Code : ZO 31605 (SEC -2)**
CO1) define and explain terminologies in poultry farming, breeding and housing management.
CO2) Identify various breeds and strain of broilers and layers.
CO3) describe house management, feeding management
CO4) identify various diseases and health management of fowl.
CO5) evaluate importance of poultry products and by product.

**Name of Course Title : Medical and Forensic Zoology**
**Course Code : ZO31616 (DSEC 4A)**
CO1) understand and explain various terminologies, scope and need of Medical and Forensic Zoology.
CO2) describe the basic principles of Medical and Forensic Zoology.
CO3) analyze urine and blood samples.
CO4) describe various scientific methods in Medical and forensic Sciences..
CO5) explain the modern tools and techniques in crime detection.

**Name of Course Title : Animal Physiology**
**Course Code : ZO31626 (DSEC 4B)**
CO1) understand and explain various aspects of physiological organ- system and their importance to the integrative functions of human body.
CO2) Draw and describe the structure and functions of various organ systems and endocrine glands.
CO3) illustrate the mechanism of digestion, gases transport, elimination of waste materials, sliding filament theory, formation of gametes and working of endocrine glands.
CO4) Identify and categorize the disorders of various organ systems and endocrine glands.

**Name of Course Title : Molecular Biology**
**Course Code : ZO31636 (DSEC 5A)**
CO1) illustrate the mechanism of molecular events of cells such as DNA replication, transcription and translation.
CO2) distinguish between different types of DNAs, RNAs, mutations, DNA repair mechanisms
CO3) recall the classical experiments of molecular biology such as Griffith's experiment, Hershey and Chase experiment, Messelson and Stahl Experiment.
CO4) justify the role of restriction enzymes, cloning vectors etc. in recombinant DNA technology.

**Name of Course Title : Entomology**
**Course Code : ZO31646 DSEC 5B)**
CO1) understand basic concept of entomology and classify insect with characteristics.
CO2) describe insect morphology and anatomy.
CO3) explain metamorphosis and economic importance of insects.
CO4) justify concept of insect, role of hormones ecology and their social behaviour.

**Name of Course Title : Techniques in Biology**
**Course Code : ZO31656 (DSEC 6A)**
CO1) understand and explain various terminologies in techniques used in biology.
CO2) describe the principle and techniques related to microscopy, microtomy, haematology, immunology, chromatography, biodiversity and DNA bar coding.
CO3) compare different types of microscopes, microtomes and chromatography techniques.
CO4) classify fixation methods and chemical fixative agents, analyze the problems in sectioning.

**Name of Course Title : Evolutionary Biology**
**Course Code : ZO31666 (DSEC 6B)**
CO1) define evolution and explain the origin of eukaryotic cell.
CO2) describe theories of evolution.
CO3) Illustrate various evidences of evolution and evolutionary forces.
CO4) explain isolating mechanisms and types of speciation.
CO5) compare the evolutionary differences of man from kenyapithecus to Homo sapiens
CO6) describe Zoogeographical realms of fauna; explain major extinction events during evolution.

**Name of Course Title : Practical Course – I**
**Course Code : ZO31676 (DSEC 4)**
CO1) analyze the urine and blood samples for different parameters.
CO2) determine urea, uric acid and calcium from blood serum
CO3) examine human hair for cortex and medulla
CO4) Identify and differentiate various types of fingerprints
CO5) estimate the blood hemoglobin, blood glucose.
CO6) measure blood pressure and lung capacity.
CO7) Identify and describe the various disorders of endocrine glands.
CO8) Identify different blood cells and detect different types of nitrogenous waste.
CO9) Demonstrate and explain the principle of kymograph unit.

**Name of Course Title : Practical Course II**
**Course Code : ZO31686 (DSEC 5)**
CO1) design a paper model to explain the structure of DNA
CO2) estimate DNA and RNA using suitable methods
CO3) quantify DNA using spectrophotometry
CO4) apply principles of molecular biology in isolation of DNA, estimation of DNA or RNA and PCR
CO5) explain external character of insect
CO6) dissect insect pest to expose digestive, reproductive system and also mount mouth part, antennae, legs, wings.
CO7) identify various life stages of insect and insect vector.

CO8) visit to a Wildlife Sanctuary / National Park / Tiger Reserve

**Name of Course Title : Practical Course III**
**Course Code : ZO31696 (DSEC6)**
CO1) use various microscopes, write the principle of DNA barcoding.
CO2) demonstrate the techniques related to use of micrometer scale/ histology/hematology/ chromatography/ insect survey.
CO3) Compare the morphological similarities and differences of man an ape, identify the successive stages of evolution of man with the help of models and photographs.
CO4) explain the evidences of evolution and relate animal adaptations, homologous and analogous organs with respect to evolution.
CO5) construct world map showing zoogeographical distribution of animals with respect to zoogeographical realms.

**Name of Course : Environmental Impact Assessment**
**Course Code : ZO31706 (SEC - 3)**
CO1) define and explain the concept of environment and pollution.
CO2) apply the goals of sustainable development.
CO3) explain environmental impact assessment and steps involved in its process.
CO4) discuss the various stakeholders involved in environmental impact assessment process.

**Name of Course : Project**
**Course Code : ZO31716 (SEC - 4)**
CO1 report the observation
CO2 analyze the observation
CO3 Prove the hypothesis
CO4 Present the data.

**Faculty – Science & Technology**

**Department of Electronics**
**Name of Course Title : Digital Design using Verilog**
**Course Code : EL 32525**
CO1: know and understand structure of HDL and Verilog.
CO2: understand different modeling styles in Verilog.
CO3: use Verilog effectively for simulation, verification and synthesis of digital systems.
CO4: understand basics of programmable logic devices.

**Name of Course Title : Microcontroller Architecture and Programming**
**Course Code : EL 32535**
CO1:- understand the basics of AVR microcontroller.
CO2:- acquire basic programming skills in C language.

CO3:- write a program in C language for AVR microcontroller.
CO4:- develop small scale project based on AVR.

**Name of Course Title : Analog Circuit Design and Applications**
**Course Code : EL 32545**
CO1: Understand basics of analog circuit design.
CO2: Analyze waveform generators required for testing different circuits.
CO3: Build application circuits using specialized ICs.
CO4: Design analog systems using available ICs.
**Name of Course Title : Electronic Product Design and Entrepreneurship**
**Course Code : EL 32555**
CO1: To know design steps of electronic product.
CO2: Know about product debugging and testing techniques.
CO3: Understand different types of documentation procedures required for product design.
CO4: Understand requirements for entrepreneurship.

**Name of Course Title : Signals and Systems**
**Course Code : EL 32565**
CO1: Know basics of electronic signals.
CO2: Know different types of systems.
CO3: Analyze systems using Laplace and Fourier analysis.
CO4: Understand digital signal processing system.

**Name of Course Title : Nanoelectronics**
**Course Code : EL 32575**
CO1: Define basic terms of nanotechnology & nano devices and nanotechnology
CO2: Illustrate electron transport mechanism in nanostructures.
CO3: Explain techniques of characterization of nanostructures.
CO4: Compare different devices constructed using nanotechnology.

**Name of Course Title : Practical Course-I**
**Course Code : EL 32585**
CO1: develop and simulate design digital systems using Verilog.
CO2: design and develop AVR microcontroller based systems.
CO3: inculcate basic skills required for design and development of Embedded Systems.

**Name of Course Title : Practical Course-II**
**Course Code : EL 32595**
CO1: Analyze different design and test procedures for analog circuits and systems.
CO2: Measure different parameters of optical fiber communication systems.

CO3: Understand importance of product design and entrepreneurship.
CO4: Develop electronic systems for given application.

**Name of Course Title : Practical Course-III (Projects)**
**Course Code : EL 32605**
CO1: Understand basic methodology of selection of topic for project.
CO2: Understand how to do literature review for selected topic for project.
CO3: Apply the knowledge for design and development of the selected project.
CO4: Use different software and hardware for testing, validation and verification of circuits for successful outcome of project
CO5: Understand documentation process in the form of presentation and project report
CO6: Understand process of systematic development of electronic system and Development of skills for successful outcome.

**Name of Course Title : Fundamentals of Internet of Things**
**Course Code : EL 32615**
CO1: Define basic terms and building blocks of IOT
CO2: Justify importance of IOT protocols
CO3: Select suitable sensors and Actuators for different IOT applications
CO4: Explain Arduino and Rasberry Pi IOT platforms.

**Name of Course Title : Electronic Design Automation Tools**
**Course Code : EL 32625**
CO1: Design the electronics circuits using EDA software tools
CO2: Simulate various analog and digital circuits using EDA software tools
CO3: Plot various waveforms.
CO4: Simulate basic electronic system blocks

**Name of Course Title : Modern Communication Systems**
**Course Code : EL 32636**
CO1: understand the digital modulation techniques.
CO2: understand different types of pulse modulation techniques.
CO3: describe the evolution and importance of Mobile communication and cellular communication
CO4: know the basics of satellite communication systems.

**Name of Course Title : Embedded System Design using Microcontrollers**
**Course Code : EL 32646**
CO1:- acquire basic knowledge of embedded system.
CO2:- understand features and architecture of PIC and ARM microcontroller.
CO3:- write a program in C language for PIC and ARM microcontroller.
CO4:- demonstrate embedded system using given microcontroller.

**Name of Course Title : Industrial Electronics**
**Course Code : EL 32656**
CO1: Understand basics of semiconductor power devices.
CO2: Analyze basic power electronics circuits and demonstrate applications.
CO3: Understand basics of motor control.
CO4: Understand basics of Electric Vehicle systems.

**Name of Course Title : Sensors and Systems**
**Course Code : EL 32666**
CO1: Understand basic principles and types of different sensors.
CO2: Understand basic principles and types of actuators.
CO3: Know about signal conditioning systems for sensors.

**Name of Course Title : Process Control Systems**
**Course Code : EL 32676**
CO1: Familiar with different types of sensors and related systems
CO2: Know different types of measurement systems.
CO3: Understand control parameters in process automation.
CO4: Understand different types of process control systems and their characteristics.

**Name of Course Title : Manufacturing Processes for Electronics**
**Course Code : EL 32686**
CO1: Explain basics of Passive Electronic component manufacturing processes
CO2: Describe processes involved in PCB manufacture process
CO3: Identify modern assembly techniques for electronic systems.
CO4: Explain about the semiconductor device and IC fabrication processes.

**Name of Course Title : Practical Course-I**
**Course Code : EL 32696**
CO1: Demonstrate different types of digital communication systems.
CO2: Design embedded systems using PIC microcontroller.
CO3: Design embedded systems using ARM microcontroller.

**Name of Course Title : Practical Course-II**
**Course Code : EL 32706**
CO1: Demonstrate power electronic circuits.
CO2: Demonstrate PLC SCADA using ladder programming.
CO3: Design and develop sensor systems for different applications.
CO4: Understand working principles of different power devices and their characteristics.

**Name of Course Title : Practical Course-III (Projects)**
**Course Code : EL 32716**
CO1: Understand basic methodology of selection of topic for project.
CO2: Understand how to do literature review for selected topic for project,
CO3: Apply the knowledge for design and development of the selected project.
CO4: Use different software and hardware for testing, validation and verification of Circuits for successful outcome of project
CO5: Understand documentation process in the form of presentation and project report
CO6: Understand process of systematic development of electronic system and Development of skills for successful outcome.

**Name of Course Title : Applications of Internet of Things**
**Course Code : EL 32726**
CO1: Explain various IOT platforms
CO2: Design and Implement real time applications of IOT
CO3: Utilize python programming for IOT applications
CO4: Explain how to design and develop IOT based system through case studies.

**Name of Course Title : Mobile Application Development**
**Course Code : EL 32736**
CO1: Understand basics of Mobile application development.
CO2: Develop ability to work in android development environment.
CO3: Design and develop mobile applications.

**Faculty – Science & Technology**

**Department of Mathematics**

**Name of Course Title : Metric Spaces**

**Course Code : SU-15**

CO1) understand the introductory concepts of metric spaces;
CO2) correlate these concepts to their counter parts in modern analysis by studying examples;
CO3) learn to analyze mappings between spaces.
CO4) attain background for advanced courses in real analysis, functional analysis, and topology.
CO5) appreciate the abstractness of the concepts such as open balls, closed balls, compactness, connectedness etc. beyond their geometrical imaginations.

**Name of Course Title : Real Analysis- I**

**Course Code : SU-16**

CO1) learn the basic facts in logic and set theory
CO2) learn to define sequence in terms of functions from N to a subset of R and to understand several properties of the real line.
CO3) recognize bounded, convergent, divergent, Cauchy and monotonic sequences and tocalculate their limit superior, limit inferior, and the limit of a bounded sequence.
C04) use the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

**Name of Course Title : Group Theory**

**Course Code : SU-17**

CO1) recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc;
CO2) analyze consequences of Lagrange's theorem
CO3) learn about structure preserving maps between groups and their consequences.
CO4) explain the significance of the notion of cosets, normal subgroups, and factor groups.

**Name of Course Title : Ordinary Differential Equations**

**Course Code : SU-18**

CO1) To understand the genesis of ordinary differential equations.
CO2) To learn various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order.
CO3) To grasp the concept of a general solution of a linear differential equation of an arbitrary order and also learn a few methods to obtain the general solution of such equations.

**Name of Course Title :Operations Research**

**Course Code : SU-19**

CO1) To understand the concept in operational research.

CO2) To analyze and solve linear programming models of real-life situations.
CO3) To understand the graphical solution of LPP with only two variables.
CO4) To illustrate the concept of convex set and extreme points
CO5) To develop the theory of the simplex method.
CO6) To understand the relationships between the primal and dual problems and their solutions with applications to transportation, assignment and two-person zero-sum game problems.

**Name of Course Title :Machine Learning-I**
**Course Code : SU-20**
CO1) To understand the fundamentals of Machine learning.
CO2) To understand python packages used in Machine Learning.
CO3) To apply Machine Learning techniques in prediction analysis.

**Name of Course Title : Practical Course -I**
**Course Code : SU-21**
CO1) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays , and state important facts resulting from their studies.
CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Practical Course-II**
**Course Code : SU-22**
CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Practical Course-III**
**Course Code : SU-23**
CO1) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays , and state important facts resulting from their studies.

CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Programing in Python-I**
**Course Code : SU-24**
CO1) understand the fundamentals of Python.
CO2) perform mathematical operations.
CO3) apply conditional statements in programming.
CO4) draw graphs of functions using python.
CO5) apply python programming in Mathematics.

Name of Course Title : LaTeX for Scientific Writing
Course Code : SU-25
CO1) Write a simple LaTeX input document based on the article class.
CO2) Turn the input document into pdf with the pdflatex program.
CO3) Format Words, Lines, and Paragraphs.
CO4) Understand how to present data using tables.
CO5) Write a document in color text.

**Name of Course Title : Complex Analysis**
**Course Code : SU-26**
CO1) Understand the significance of differentiability of complex functions leading to the understanding of Cauchy-Riemann equations.
CO2) Evaluate the contour integrals and understand the role of Cauchy-Goursat theorem and the Cauchy integral formula.
CO3) Expand some simple functions as their Taylor and Laurent series.
CO4) Classify the nature of singularities, find residues and apply Cauchy Residue theorem to evaluate integrals.
CO5) Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

**Name of Course Title : Real Analysis-II**
**Course Code : SU-27**
CO1)Some of the families and properties of Riemann integrable functions, and the applications of the fundamental theorems of integration.
CO2) Beta and gamma functions and their properties.
CO3) Recognize the difference between pointwise and uniform convergence of a sequence of functions.
CO4) Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

**Name of Course Title : Ring Theory**
**Course Code : SU-28**
CO1)The fundamental concept of Rings, Fields, subrings, integral domains and the corresponding morphisms.
CO2) Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields.
CO3) Appreciate the significance of unique factorization in rings and integral domains.

**Name of Course Title : Partial Differential Equations**
**Course Code : SU-29**
CO1) To formulate, classify and transform partial differential equations into canonical form.
CO2) To solve linear partial differential equations using various methods and apply these methods in solving some physical problems.
CO3) To solve Laplace equations using various analytical methods demonstrate uniqueness of solutions of certain kinds of these equations.

**Name of Course Title : Optimization Techniques**
**Course Code : SU-30**
CO1) To understand fundamentals of Network Analysis using CPM and PERT.
CO2) To solve a sequencing Problem for various jobs and machines.

**Name of Course Title : Machine Learning-II**
**Course Code : SU-31**
CO1) perform classification of data.
CO2) understand linear regression algorithms.
CO3) understand logistic regression algorithms.
CO4) understand various supervised machine learning algorithms.

**Name of Course Title : Practical Course-I**
**Course Code : SU-32**
CO1) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays , and state important facts resulting from their studies.
CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Practical Course-II**
**Course Code : SU-33**

CO1) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays , and state important facts resulting from their studies.
CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant onclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Practical Course-III**
**Course Code : SU-34**

CO1) A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology and recognize basic geometrical figures and graphical displays , and state important facts resulting from their studies.
CO2) A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
CO3) A student should get adequate exposure to global and local concerns that explore many aspects of Mathematical Sciences.
CO4) A student is able to apply their skills and knowledge ,that is, translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
CO5) A student should be made aware of the history of mathematics and hence of its past, present and future role as part of our culture.

**Name of Course Title : Programing in Python-II**
**Course Code : SU-35**

CO1) understand the Graphics in Python.
CO2) understand the data visualization in Python.
CO3) apply python programming in Computational Geometry.
CO4) python programming in Operation research.

**Name of Course Title : Mathematics in to LaTeX**
**Course Code : SU-36**

CO1) Write a simple LaTeX input document based on the article class.
CO2) Turn the input document into pdf with the pdflatex program.
CO3 Present data using tables.
CO4) typeset mathematical formulas, use nested list, tabular and array environments.
CO5) Import figures and pictures that are stored in external files.

**Faculty – Science & Technology**

**Department of Statistics**

**Name of Course Title : Distribution Theory-I**

**Course Code : ST -351**

CO1) To define various continuous probability distribution and outline the properties of probability density functions, cumulative distribution functions.

CO2) To compute moment generating function, raw moment, central moment of different continuous probability distribution.

CO3) To demonstrate the significance of the distributions and identify the real life situations for probability distributions.

CO4) To analyse the relationship between different continuous distributions using the nature of the distributions.

CO5) To relate the probability distributions to real life situations.

**Name of Course Title : Theory of Estimation**

**Course Code : ST -352**

CO1) To describe various terms for point estimation, interval estimations to understand problem of statistical inference.

CO2) To study of properties of estimation.

CO3) To explain the method to obtain estimators using maximum likelihood, method of moments, method of scoring and Fisher Information function .

CO4) To evaluate efficiency of estimators and justify the importance of Fisher information function.

CO5) To collect various situations to discuss about importance of an estimator of unknown parameter.

**Name of Course Title : Design and Analysis of Experiment**

**Course Code : ST -353**

CO1) To identify relationships between cause and effect, planning and designing the experiments.

CO2) To apply different experimental designs to real life situations.

CO3) To analyse collected information through the experiments planned according to different designs using ANOVA and ANCOVA techniques.

CO4) To design a lay out of different statistical technique.

**Name of Course Title : Statistical Process and Product Control**

**Course Code : ST - 354**

CO1) To understand the basic concepts of quality improvement.

CO2) To demonstratew the ability to use the methods of statistical process control.

CO3) To demonstrate the ability to design, use and interpret control charts for variables and attribute.

CO4) To perform analysis of process capability and measurement system capability.

**Name of Course Title : Operation Reserch-I**
**Course Code : ST – 355**
CO1) To represent given situation into LPP and formulate the objective function, constraints and the network diagram.
CO2) To apply the techniques of solving LPP to obtain optimal solution.
CO3) To recall the concept of Linear Programming.
CO4) To classify the solutions and interpret them according to the situations.
CO5) To evaluate the CPM and PERT networks and apply project crashing techniques.

**Name of Course Title: Regression Analysis**
**Course Code: ST -356**
CO1) To recall the concept of fitting of simple regression models.
CO2) To analyse the multiple linear regression and ligistic regression models.
CO3) To compare residual dianostics and apply corrective measures.
CO4) To determine tests of htpothesis of model parameters.

**Name of Course Title : Practical Paper I**
**Course Code : ST – 357**
CO1) To relate the probability distribution to real life situations
CO2) To determine and develop problem solving techniques needed to accurately calculate probabilities.
CO3) To recall the concept of fitting of simple regression model.
CO4) To compare residual diagnostic and apply corrective measure.
CO5) To justify weighted least square method.

**Name of Course Title : Practical Paper II**
**Course Code : ST – 358**
CO1) To Identify relationship between cause and effect, planning and designing the experiment.

CO2) To outline interaction among causative factor through factorial design.

CO3) To apply different experimental design to real life situations.

CO4) To design a lay out of different Statistical design.

CO5) To validate the design employed in real life situations using residual analysis.

**Name of Course Title : Practical Paper III**
**Course Code : ST - 359**
CO1) To represent given situation into LPP and formulate the objective function, constraint and the network diagram.

CO2) To apply the techniques of solving LPP to obtain optimal solution.

CO3) To evaluate the CPM and PERT networks and apply project crashing techniques.

**Name of Course Title: Turbo C**
**Course Code: ST -3510**
CO1) To introduce the concept of algorithm and programming and define differenciate terminology of C programming.
CO2) To articulate the different situations where programming is helpful for analysing the statistical data.
CO3) To apply the method to write simple C programs and use them to analyse the statistical data.
CO4) To consider and justify the use of parametric or non-parametric tests.
CO5) To write simple programs in C for statistical data analysis.

**Name of Course Title : Statistical Computing using R Software**
**Course Code: ST -3511**
CO1) To recall the principles of designs of experiments and prepare layout of designs employed. .
CO2) To apply parametric and non-parametric method of analysis of variance. apply the pivotal quantity techniques to obtain confidence interval.
CO3) To analyse various experimental design, regression models and continuous probability distribution using R.
CO4) To interpret the output of analysis of various statistical designs.

**Name of Course Title : Distribution Theory II**
**Course Code : ST-361**
CO1) Understand the different distributions.
CO2) Understand the different pdf, mgf, cgf .
CO2) Understand the real life applications of distributions.

**Name of Course Title : Testing of Hypothesis**
**Course Code : ST-362**
CO1) Understand the different parametric tests.
CO2) Understand the concept of likelihhod ratio test.
Co3) Understand the different non parametric tests.

**Name of Course Title : Sampling Theory**
**Course Code : ST-363**
CO1) Understand the different sampling methods.
CO2) Understand statistical thechniques of sampling,
CO3) Understand the role of statistics in research methodology.

**Name of Course Title : Introduction to Survival Analysis**
**Course Code : ST-364**
CO1) Understand the concept of Ageing.
CO2) Understand Some Parametric Families of life distributions.
CO3) Understand what is censoring.

**Name of Course Title : Operations Research II**

**Course Code : ST-365(B)**

CO1) Understand inventory theory.
CO2) Understand replacement theory.
CO3) Understand decision theory and game theory.

**Name of Course Title : Reliability Theory and Applications**

**Course Code : ST-366 (B)**

CO1) To understand the Concept of Reliability.

**Name of Course Title : Practical Paper IV**

**Course Code : ST-367**

CO1) Understand the different parametric tests.
CO2) Understand the concept of likelihhod ratio test.
CO3) Understand the different non parametric tests.

**Name of Course Title : Practical Paper V**

**Course Code : ST-368**

CO1) Understand the different parametric tests.
CO2) Understand the concept of likelihhod ratio test.
Co3) Understand the different non parametric tests.

**Name of Course Title : Introduction to Python**

**Course Code : ST-3610**

CO1) Understand how to use Python.
CO2) Understand the basic concepts of Python.
CO3) Understand the different librarys of Python.

**Name of Course Title : Data Analytics**

**Course Code : ST-3611**

CO1) Understand the concept of data analysis.
CO2) Understand machine learning .
CO3) Understand clustering,svm etc.
CO4) Understand real life applications of data analysis.

**Faculty – Science & Technology**

**Department of Microbiology**

**Name of Course Title : Medical Microbiology-I**

**Course Code : MB32185 (DSEC 1A)**

CO1) understand and explain the human anatomy, pathogens associated with diseases.
CO2) describe the principles underlying establishment of pathogens in human body.
CO3) determine the pathogenesis of specific microbial pathogens.
CO4) identify and describe microbial disease diagnosis, disease treatment and prevention measures.

**Name of Course Title : Immunology-I**

**Course Code : MB32195**

CO1) understand and explain various terminologies of immunology.
CO2) describe immune system structure, composition, function and comparison of different types of immunity.
CO3) explain concept of antigens, pathogen recognition, antigen processing and presentation; Immunity to infection and pathological consequences of immunodeficiency.
CO4) describe applications of Immunology, monoclonal antibodies, vaccines production and Immunotherapy.

**Name of Course Title : Enzymology**

**Course Code : MB32205 (DSEC 2A)**

CO1) understand and explain terminologies in enzymology, active site determination, role of enzymes and its cofactors in microbial physiology.
CO2) determine enzyme assay, purification and quantification of enzymes activity.
CO3) describe enzyme kinetics in terms of initial, final velocity, mathematical expression of enzyme kinetic parameters.
CO4) illustrate metabolism regulation at enzyme level and identify appropriate methodology for commercial applications of enzymes.

**Name of Course Title : Genetics**

**Course Code : MB32215**

CO1) understand and explain terms used in genetics and molecular biology.
CO2) describe the central dogma of Molecular Biology, processes like replication, transcription, translation in prokaryotes and eukaryotes.
CO3) compare between transcription and translation processes in in prokaryotes and eukaryotes.
CO4) illustrate bacterial conjugation, transformation, transduction and operon.

**Name of Course Title : Fermentation Technology-I**

**Course Code : MB32225 (DSEC 3A)**

CO1) understand and describe the process of commercial fermentations.
CO2) explain classical, advanced strain improvement and isolation techniques for fermentation processes.
CO3) summarize and illustrate techniques used in upstream, downstream processing and quality assurance of fermentation products for Commercially economical and efficient fermentations

**Name of Course Title : Agricultural Microbiology**
**Course Code : MB32235 (DSEC 3B)**
CO1) understand and explain plant growth improvement with respect to disease resistance, environment tolerance.
CO2) describe stages of plant disease development, epidemiology, symptom- based classification, control methods.
CO3) dissect out the importance of microorganisms in sustainable agriculture.

**Name of Course Title : Practical course-I**
**Course Code : MB32245 (DSEC 1)**
CO1) demonstrate Haemocytometer technique for blood cells counting.
CO2) evaluate bacterial characters based on various biochemical tests and justify.
CO3) examine clinical sample via physical chemical analysis.
CO4) illustrate staining techniques for bacteria identification.
CO5) identify and isolate pathogens from clinical sample.

**Name of Course Title : Practical course-II**
**Course Code : MB32255 (DSEC 2)**
CO1) evaluate absorption spectra and molar extinction coefficient.
CO2) perform qualitative analysis of protein and carbohydrates.
CO3) demonstrate separation of amino acid mixture by paper chromatography, isolation and estimation of DNA concentration, bacterial conjugation, chromosome staining etc.

**Name of Course Title : Practical course-III**
**Course Code : MB32265 (DSEC 3)**
CO1) prepare bioinoculants and demonstrate its applications.
CO2) determine MIC and MAB.
CO3) assess screening techniques for industrially important microorganisms.
CO4) illustrate antibiotic assay techniques.
CO5) demonstrate isolation an identification of plant pathogens.

**Name of Course Title : Mushroom Cultivation Technology**

**Course Code : MB32275 (SEC-1)**
CO1) understand and explain various terminologies and techniques related to Mushroom cultivation, principle of mushroom cultivation.
CO2) describe nutritional aspects and commercial uses of mushrooms for human consumption.
CO3) demonstrate practical skills of cultivation of mushrooms, mushroom harvesting and various avenues for using it into an entrepreneurship.

**Name of Course Title : Dairy Microbiology**
**Course Code : MB32285 (SEC-2)**
CO1) understand and explain various terminologies and techniques related to dairy.
CO2) compare between types of milks and their composition, and describe naturally occurring preservative systems.
CO3) summarize microbial aspects of quality control and quality assurance in dairy.
CO4) evaluate quality of milk and milk products using suitable microbial quality control tests.

**Name of Course Title : Medical Microbiology-II**
**Course Code : MB32296**
CO1) understand, explain and summarize pathogenesis of specific microbial pathogens.
CO2) describe the epidemiological patterns of microbial disease transmission through various modes and their intensity at local and global level.
CO3) understand and discuss the principles of chemotherapy of microbial diseases and development of drug resistance among pathogens and strategies to mitigate.

**Name of Course Title : Immunology-II**
**Course Code : MB32306**
CO1) understand and explain various terminologies like cytokines, humoral immune response, cell mediated immune response, hypersensitivity, autoimmunity and autoimmune diseases, immunodeficiency etc.
CO2) discuss or illustrate the mechanism of acquired Immunity.
CO3) classify types of hypersensitivity reactions and their mechanism, types of autoimmune diseases.
CO4) understand, illustrate, describe and discuss immune tolerance, therapeutic immunosuppression, malfunctioning of immune system resulting in autoimmunity and related diseases, complement immunodeficiency, congenital immunodeficiency disorders etc.

**Name of Course Title : Metabolism**
**Course Code : MB32316**
CO1) understand and explain various terminologies related to metabolism, membrane transport, bioenergetics, metabolic pathways, autotrophy etc.
CO2) illustrate various membrane transport mechanisms, mitochondrial electron transport chain, bacterial photosynthesis etc.
CO3) describe concepts like free energy, entropy, high energy compounds, polymerization and degradation of macromolecules, chemolithotrophy.

**Name of Course Title : Molecular Biology**
**Course Code : MB32326**

CO1) understand and explain various terminologies related to molecular biology, linkage, crossing over, DNA damage and repair mechanism, and recombinant DNA technology.
CO2) illustrate/discuss phenomena like crossing over, genetic complementation and cis-trans genetic function, various DNA damage and repair mechanisms, use of vectors in RDT, Southern and Northern blotting techniques etc.
CO3) evaluate use of restriction enzymes, ligase, vectors, screening methods in RDT.
CO4) describe types of phages, mitosis, meiosis, compare between different DNA repair mechanisms.

**Name of Course Title : Fermentation Technology-II**
**Course Code : MB32336**

CO1) understand and explain various terminologies related to fermentation technology, solid state and submerged fermentations.
CO2) illustrate/discuss/describe large scale production of primary and secondary metabolites, enzymes, steroids, biomass based products, milk products, vaccines, immune sera etc.
CO3) differentiate between beer and wine production methods.
CO4) explain modern trends in microbial production.

**Name of Course Title : Food Microbiology**
**Course Code : MB32346**

CO1) understand and explain various terminologies related to food microbiology.
CO2) describe factors affecting microbial growth, food spoilage due to microorganism, food preservation principles.
CO3) identify and discuss microbial organisms responsible for food poisoning and food infection.
CO4) compare between various food processing methods, prebiotics and probiotics.
CO5) explain concept of fermented food, food sanitation and regulatory authorities.

**Name of Course Title : Practical Course-I**

**Course Code : MB32356**

CO1) identify microbial pathogens with help of permanent slides.
CO2) demonstrate isolation and identification techniques for yeast and fungal Pathogens.
CO3) assess antibiotic sensitivity of bacterial pathogens.
CO4) demonstrate techniques related to immunohematology, immune chromatography, immunoprecipitation etc.
CO5) demonstrate electrophoresis, ELISA, virus cultivation by egg inoculation techniques.

**Name of Course Title : Practical Course –II**
**Course Code : MB32366**
CO1) estimate blood sugar, urea, serum cholesterol, proteins and albumin.
CO2) demonstrate lab scale production, precipitation, specific activity and immobilization of amylase using appropriate techniques.
CO3) explain principle, methodology and calculations for enrichment, isolation and enumeration of bacteriophages.
CO4) demonstrate isolation of plasmid DNA, electrophoresis, and mitosis techniques.

**Name of Course Title : Practical Course III**
**Course Code : MB32376**
CO1) demonstrate lab scale production of either ethanol or citric acid, solid state fermentation for production of products from either Trichoderma sp. / mushrooms / enzymes.
CO2) determine TDP, TDT, TDR and D values.
CO3) compile/explain the SOPs for pharmaceutical industry and HACCP guidelines for food industry.
CO4) demonstrate isolation and identification/detection techniques for probiotic microflora from given sources and aflatoxin.

**Name of Course Title : Waste management**
**Course Code : MB32386**
CO1) understand waste management and its practicable applicability.
CO2) assess the magnitude and influence of hazardous content of waste, waste water treatment technologies, solid biodegradable waste processing techniques etc.
CO3) determine the dissolved oxygen, total solids (dissolved and suspended) in water samples and its potability.
CO4) describe aerobic and anaerobic digestion models, use of various indictor microbes.

**Name of Course Title : Nano biotechnology**
**Course Code : MB32396**
CO1) understand and explain design, development and application of Nanomaterials and their application in Nanodevices.
CO2) discuss fundamentals of nanotechnology as to Synthesis and characterization techniques of nanoparticles.
CO3) describe applications of nanomaterials in different disciplines of human life.
CO4) compare the merits of using nanotechnology with existing technologies in context to their applications.

**Faculty – Science & Technology**

**Department of Geography**

**Name of Course Title : Geography of Tourism - I**

**Subject Code : GEO31155**

CO1) Acquire the advance knowledge and good communication skill about the tourism and its related activities.
CO2) Understand the various concepts of tourism.
CO3) Apply tourism knowledge to the suggestion for the development of tourism.
CO4) investigate the tourist places and examine the problems of the tourist places.
CO5) critically accept wisdom and scientific views about tourism research.
CO6) create the new ideal development plan of the tourism corridors and they will be establish their own business and create employment.

**Name of Course Title : Geography of India - I**

**Course Code : GEO31165**

CO1) To introduce the students to the basic concepts in Geography of India
CO2) To introduce latest concept in Geography of India
CO3) To acquaint the students with the value and application of Physical, historical, geographical features of India
CO4) To make the students aware about Drainage Pattern, Important River, their importance of Indian society & cultural such as Bhartiya Sanskruiti

**Name of Course Title : Practical Geography - I**

**(Techniques of Spatial Analysis)**

**Course Code : GEO31175 DSE- 2 (C)**

CO1) Remember and understand the Map history & types. Various eras of map making, use & types in the world civilization.
CO2) Apply and analyze the different types of topographic maps
CO3) Develop interpretation skill and use of versus toposheets to apply their subject knowledge with help of sign & symbols, qualitative & quantitative methods day today's life. CO4) Evaluate and determine the Indian daily weather report with the help of sign & symbols for weather forecasting.
CO5) To make students aware of the new techniques, of aerial photograph, satellite image for accuracy of ground truth
CO6) Aware about the skills of GIS techniques and their use in updating Geography related knowledge.

**Name of Course Title : (Value skill based Course) Research Methodology-I**

**Subject Code : GEO31185**

CO1. Remember and understand the Research concepts, steps, design, technical writing, ethics knowledge and advance trends.
CO2. Applications and analysis of learned methods of research to develop the various research.
CO3. Develop research skills use of research methods to apply in the day today educations and research.
CO4. To make students aware about the new techniques, skills of advance research and prepare students for problems solving research.

**Name of Course Title : Geography of Tourism-II**
**Subject Code : GEO31196**

CO1) acquire the advance knowledge, good communication skill and understand the various concepts of tourism
CO2) investigate the tourist places and examine the problems of the tourist places.
CO3) create the new ideal development plan of the tourism corridors.
CO4) take advanced knowledge, with the help of this knowledge, they will be establish their own business and create employment.

**Name of Course Title : Geography of India -II**
**Course Code : GEO31206**

CO1) To introduce the students to the basic concepts in Geography of India.
CO2) To introduce latest concept in Geography of India.
CO3) To acquaint the students with the value and application of Physical, historical, geographical features of India
CO4) To make the students aware about Drainage Pattern, Important River, their importance of Indian society & cultural such as Bhartiya Sanskriti.
CO5) To Aware with Resources and importance of Agricultural in Indian Economy.

**Name of Course Title : Practical Geography – II (Techniques of Spatial Analysis, Surveying and Excursion / Village / Project Report**
**Course Code : GEO31216 DSE – 2D**

CO1) understand, define and remembering the basic term and concept of Practical Geography.
CO2) apply the statistical test for the geographical issues and problems or development related factor.
CO3) analyse, evaluate and classify the basic concept of statistical test.
CO4) develop the communication skill and ethics with updated geography related knowledge.

**Name of Course Title : (Value/skill based Course) Research Methodology -II**
**Subject Code : GEO31226 SEC-2D**

CO1. Remember and understand the Research concepts, steps, design, technical writing, ethics knowledge and advance
CO2. Applications and analysis of learned methods of research to develop the various research.
CO3. Develop research skills use of research methods to apply in the day today educations and research.
CO4. To make students aware about the new techniques, skills of advance research and prepare students for problems solving research