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2.6.1 - Programme and course outcomes for all Programmes offered by the institution are stated and displayed on website and communicated to teachers and students.

B.Sc. PHYSICS PROGRAMME

COURSE OUTCOMES

CO 1: Understand constrains, identify and apply different types of constrains in classical mechanical problem. Able to know and calculate degrees of freedom in space point and configuration space.
Describe displacement and virtual work Apply general coordinates D Alembert's Principle to Derive Lagrange's Equation for conservative systems.Able to apply Lagrange's method to solve simple pendulum and Linear Harmonic Oscillator problems.

CO 2: Identify the limitation of classical mechanics and rectify these by application of quantum mechanics By understanding Compton scattering, expression for Compton shift, de Broglie hypothesis, Davision and Germer's experiments need for quantum mechanics is realized and problem in classical mechanics are rectified with application of quantum mechanics Illustarion with examples of Gamma ray microscope and diffraction of electrone at single slit Usage of the quantum mechanical concepts to set the Schrodinger's equation for wave motion Able to interprate wave function and hence able to calculate Eigen function and Eigen values using Schrodinger's equation Application of wave equation to calculate the energy of particle ininfinite square well and three dimensional box , Linear Harmonic Oscillator. Able to understand the concept of zero point energy Distinguish different statistical particles and different statistical Maxwell-bolzmann, Bose –Einstein and Fermi-Dirac statistics are explained Describe degenerate Fermi Gas

CO 3 : Apply the vector model of atom to understand the spin interaction .Able to Identify the difference of different coupling scheme like LS and jj coupling of atom. Describe Pauli exclusion principle Differentiate electronic configuration of single valence electron atom and two valence in alkali metals with their spectra consist of principle ,sharp, diffuse and fundamental series. Able to find Electronic Configuration of given atom UnderstandStern –Gerlach experiment Able to calculate magnetic moment due to orbital and spin motion Describe Larmor precession, Differentiate Normal and Anamalous Zeeman effect Differentiate Normal and Anamalous Zeeman effect and the

experimental method to study the same Explain and conduct experiment to study Zeeman Effect Describe energy level diagram for sodium D lines in weak magnetic field.

COURSE OUTCOMES
B.Sc-I Semester

CO 1: Analyze data, (graphical and analytical), through estimation of errors and their sources in experimental determination of physical quantities. Also able to fit experimental data to straight line graph and calculate standard deviation, standard error and probable error.

CO 2: Distinguish inertial, non-inertial and rotational frames of reference. Also able understand and distinguish real, fictitious and Coriolis force and its importance in real life.

CO 3 : Distinguish Galilean, Lorentz transformation and their applications . Understand special theory of relativity by studying variation of length, mass and time with relativistic velocity.

CO 4 : Analyze collision problems through laboratory and center of mass frame of reference, also able to relate these two frames.

CO 5 : Understand concept of moment of inertia of regular/irregular bodies and its variation with axes through distribution of mass.

CO 6 : Find Young's modulus, rigidity modulus and their importance in understanding materials and applications.

CO 7 : Understand concept of surface tension and viscosity of liquids and their experimental determination.

CO 8: Understand importance of surface tension and viscosity of liquids/fluids in real life situation (everyday life).

B.Sc-II Semester

CO 1: Understand and distinguish application of Gauss law in vacuum and dielectric medium.

CO 2: Determine dielectric constant of solid/liquid materials by experiments in laboratory.

CO 3 : apply the resonant circuits in the field of communication and signal oscillator building

CO 4 : Apply concepts of AC and DC bridges to determine values of resistance, capacitance of capacitor and self- inductance of coil.

CO 5 : Understand how to produce magnetic field from electric current. Understand magnetic field produced by current in toroid and solenoid.

CO 6 : Distinguish Seeback and Peltier effect and their applications to real life. Also able to distinguish different type of thermocouples as temperature sensors.

CO 7 : explain Maxwell's equations to articulate the relationship between varying electric and netic field. Also able to explain electromagnetic waves and their characteristics

BSC-III Semester (CBCS)

CO 1: Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.

CO 2: Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.

CO 3 : Apply Gauss's law of electrostatics to solve a variety of problems.

CO 4 : Describe the magnetic field produced by magnetic dipoles and electric currents. Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

CO 5 : Describe how magnetism is produced and list examples where its effects are observed. Learn about electrical appliances which work with AC and DC electricity.

CO 6 : Study the working principle of electrical instruments and their applications Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.

CO 7 : Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines.

CO 8: About power transmission, the construction of regulated and unregulated power supplies and necessity of the use of different power supply filters and voltage regulators in the power supplies. Apply the working principle of thermocouple in the construction of TEG and TEC.

BSC-IV (CBCS)

CO 1: To inspire interest for the knowledge of concepts is physical and geometrical physics

CO 2: Understand the image formation by lenses, their defects and draw cardinal points for a lens system. Apply the principles of light to various phenomena such as interference, diffraction and polarization

CO 3 : Apply and illustrate the concepts of optics through experiments.

CO 4 : Have an understanding of Maxwell's equations and apply them to EM problems. Analyze moving charges in magnetic fields.

CO 5 : Master techniques to solve electrostatic problems. Understand boundary conditions on field vectors and apply them to solve problems

CO 6 : State several laws and principles of electric, magnetic, and electromagnetic fields. Use vector calculus and other mathematics to describe electromagnetic phenomena.

CO 7 : Solve problems in electrostatic, magnetostatic, and electromagnetic fields. Describe the principles of operation of several electrical, magnetic, and electromagnetic devices

B.Sc. ELECTRONICS PROGRAMME

COURSE OUTCOMES

BSC-I

CO1: Study and analyze basic networks using network theorems in a systematic manner.
CO2. Build simple electronic circuits used in various applications.
CO3. Describe the behaviour of basic semiconductor devices
CO4. Reproduce the VI characteristics of diode/BJT devices
CO5. Describe the frequency response of BJT amplifiers.
CO6. Explain the behaviour, characteristics and applications of Varactor diode, Schottky diode, Tunnel diode, LED, LCD and solar cells.
CO7. Apply standard device models to explain/calculate critical internal parameters of semiconductor devices.
CO8. Understand and represent numbers in powers of base and converting one from the other, carry out simple arithmetic operations.

CO9. Understand the basic knowledge of Digital system building blocks, effectively can construct simple digital designs with the knowledge of Boolean algebra.

BSC-II(NEP)

CO1. Reproduce the VI characteristics of various MOSFET devices,
CO2 Apply standard device models to explain/calculate critical internal parameters of semiconductor devices.
CO3. Explain the behavior and characteristics of power devices such as UJT, SCR, Diac, Triac etc.
CO4. Perform experiments for studying the behavior of semiconductor devices.
CO5. Calculate various device parameter values from their VI characteristics.
CO6. Interpret the experimental data for better understanding the device behaviour.
CO7. Understand basic logic gates, concepts of Boolean algebra and techniques to reduce/simplify Boolean expressions
CO8. Analyze combinatorial and sequential circuits

BSC-III(CBCS)

CO1. Understand Verilog as hardware description language which is used to model electronic systems.
CO2 Understand basics of system Verilog and development of digital design using Verilog.
CO3. Understand the basics of simulation and synthesis tools.
CO4. Understand basics of HDL, its syntax, data flow modeling and practical examples
CO5. Build a strong foundation in programming and logical thinking.
CO6. Develop C-Programs.
CO7. Control the sequence of the program using control statements and looping.

CO8. Implement arrays and strings in the program.

BSC-IV(CBCS)

CO1. Know the basic concept of Analog Communication.
CO2 Understand the principle with which Analog Communication works.
CO3. Know the Various modulation techniques involved in radio communication before the transmission.
CO4. Understand the various blocks involved in radio transmitter.
CO5. Know different detection process involved in receiver to detect the original signal and able to design "AM" and "FM" detectors.
CO6. Familiar with "AM" and "FM" superheterodyne receivers.
CO7. Understand the basic concept of Pulse Modulation, Carrier Modulation for digital transmission and able to construct simple pulse modulation.

B.Sc. GEOGRAPHY PROGRAMME

COURSE OUTCOMES

Ist Semester : NEP

COs. DSC.(T)

CO 1 : To Define the Geomorphology and to explain the essential principles of it.
CO 2 : To outline the mechanism of dynamic nature of the Earth's surface and interior of the Earth.
CO 3 : To illustrate and explain the forces affecting the crust of the earth and its effect on it.
CO 4 : To understand the conceptual and dynamic aspects of landform development
CO 5 :To understand the principles of geomorphology thoroughly and explain them.

COs. DSC.(Pr)

CO 1: To identify the different types of minerals through their characteristics.
CO 2: To interpret the topographical maps extracted the geomorphic information.
CO 3: To illustrate the slope analysis and prepare the Hypsometric curve and integral
CO 4: To delineate the watershed area, stream ordering, drainage density and drainage frequency.
CO 5: Analyze the morphological analysis of any geographical space.

COs. OEC-1

CO 1 : To define the Physical Geography, the shape and size of the earth surface.
CO 2 :To identify the different types of rocks and their characteristics and agents of denudation.
CO 3: To discuss the nature of structure and composition of Atmosphere.
CO 4 : To discuss the ocean floor and marine resources.
CO 5: To analyse the physical geography of any geographical regions.

Cos: SKILL ENHANCEMENT COURSE (SEC)-I

CO 1: To define statistics and enable to use for analysis.
CO 2: To handle the data collection, tabulation and sampling.
CO 3: To enable the calculations of mean, median and mode.
CO 4: To enable the calculations of mean, median and mode.

BSC-II(NEP)Th

CO 1 : To define the field of climatology and to understand the atmospheric composition and structure.
CO 2 : To outline the mechanism and process of solar radiation transfer to earth surface and to explain the temperature distribution and variation according to time and space.
CO 3 : To illustrate and explain the air pressure system, wind regulating forces and the formation of the Atmospheric Disturbance.
CO 4 : To understand and compute the air humidity as well as to explain the process of Condensation and formation of precipitation and its types .
CO 5 : To understand the principles of climatology and explain in detail.

COs. DSC.(Pr)- COs.

CO 1 : To understand the structure and functions of the Indian Meteorological Department.
CO 2 : To plot the temperature data using graphical methods.
CO 3 : To handle the instruments to measure the temperature and pressure.
CO 4 : To Use the wet and dray Bulb thermometer for measuring humidity.
CO 5 : To interprete the daily weather map seasonally.

OPEN ELECTIVE COURSE (OEC-2). Cos

CO 1 : To define the natural disasters related to Lithosphere.
CO 2 : To identify the different types of atmospheric disasters and their impact.
CO 3 : To identify the different types of atmospheric disasters and their impact.
CO 4 : To define the biosphere disasters and their impact.

III Semester:CBCS

CO 1: Able to describe the nature and field of Physical geographic and origin and history of the earth
CO 2: Students able to identify different land forms and forces behind the formations of lands
CO 3: Students will learn the physical and mechanical process of infraction between the atmosphere and the earth's surface.
CO 4: Gain the knowledge about the factors affecting global warming, its impact on man and environment and find the solution.
CO 5: Understand how the process of circulations takes place in the atmosphere with respect to the atmospheric pressure.

GYPr:C

CO 1: Student will be learning and familiar with different types of scales, importance and conversion
CO 2: Student gains the knowledge of globe and regional maps, Essentials of map, history, map

making, type and use.

IV Semester:CBCS

CO 1: Acquire basic knowledge of the field, scope and branches of Human geography
CO 2: Understand man-environment relationship with reference to different approaches
CO 3: Able to evaluate World major Races and their geographical location and life style.
CO 4: Explain the origin, types and spatial distribution of different types of settlements in the world.
CO 5: Gain the knowledge about the mode of life and spatial relationship of primitive people of the world with the environment.
CO 6: Getting the deep knowledge about the world population particularly, spatial distribution, sex ratio, literacy rate etc.

GYPr:D

CO 1: Students will understand the representation of spatial and aspatial data with the help of graphics.
CO 2: They will able to know how to prepare and describe the thematic maps.
CO 3: Creates the skill of identifying different weather symbols, analysis and interpretation of the weather maps.

V Semester: NON-CBCS- Cos (PI&PII)

CO 1: Students able to understand Basics concepts of Geographical thoughts
CO 2: Acquires the deep knowledge about the modern, Medieval and ancient geographers and their contributions.
CO 3: Learns different themes in geography and their applicability in the present context
CO 4**:** Acquire basic knowledge of the field, scope Human and economic geography
CO 5: Understand the physical features, Rivers systems and climate of the world.
CO 6**:** Able to evaluate spatial distribution and life style major Races of the world.
CO 7: Students learn the agricultural features of the world
CO 8**:** Gain the deep knowledge about the distribution and production of various minerals and industries in the world.

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VI Semester: NON-CBCS- COs (PI&PII)

CO 1**:** To understand scope and subject matter of Environmental Geography
CO 2**:** To examine the relationship between man and environment
CO 3: To study the Bio-diversity types and uses from local to global level**.**
CO 4: To analysis the level of destruction, causes and consequences of Bio-diversity
CO 5: Acquire the knowledge of environmental pollution. Causes and measure to control the pollution
CO 6: To understand the extent or ozone layers and its impact on biotic and abiotic components
CO 7: Getting the idea about the nature and scope of agricultural and rural geography
CO 8: Able to evaluate crop concentration, delineation of combination region and different

crops.

CO 9: Able to learn the planning skill and formulation the policies for the development of agriculture.

CO 10: To know the characteristics of rural settlements, pattern and morphology and rural settlement.

CO 11: To study the rural depopulation and different government rural development progrmmes.

B.Sc. ZOOLOGY PROGRAMME

COURSE OUTCOMES

BSC-I

CO 1: The structure and function of the cell organelles.

CO 2: The chromatin structure and its location.

CO 3 : The basic principle of life, how a cell divides leading to the growth of an Organism and also reproduces to form a new organisms.

CO 4 : How a cell communicates with its neighboring cells.

CO 5 : The principles of inheritance, Mendel‘s laws and the deviations.

CO 6 : How environment plays an important role by interacting with genetic factors. CO

CO 7 : Detect chromosomal aberrations in humans and study of pedigree analysis

BSC-I(OEC)

CO 1: Gain knowledge about silkworms rearing and their products.

CO 2: Gain knowledge in Beekeeping equipment and apiary management.

CO 3 : Acquaint knowledge on dairy animal management, the breeds and diseases of cattle and learn the testing of egg and milk quality.

CO 4 : Acquaint knowledge about the cultural techniques of fish and poultry.

CO 5 : Acquaint the knowledge about basic procedure and methodology of vermiculture.

CO 6 : Learn various concepts of lac cultivation.

CO 7 : Students can start their own business i.e.self-employment.

CO 8 : Get employment in different applied sectors

BSC-I(SEC)

CO 1: Understands the importance of earthworms in maintaining soil quality.

CO 2: Learns that the vermicomposting is an effective organic solid waste management method.

CO 3 : Gets acquainted with the importance of earthworms in agro-based economic activity.

CO 4 : Vermicomposting leads to organic farming and healthy food production.

CO 5 : Vermicomposting may be taken up as a small scale industry by the farmers and unemployed youth.

CO 6 : Get jobs in teaching institutions or vermiculture units as technicians.

CO 7 : Learn the concept of vermicomposting as bio fertilizers thus student can become an entrepreneur after completion of the course.

CO 8 : Best opportunity for self-employment and lifelong learning with farmers.

BSc-II(NEP)

CO 1: To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.

CO 2: How simple molecules together form complex macromolecules.

CO 3 : To understand the thermodynamics of enzyme catalyzed reactions.

CO 4 : Mechanisms of energy production at cellular and molecular levels.

CO 5 : To understand various functional components of an organism.

CO 6 : To explore the complex network of these functional components.

CO 7 : To comprehend the regulatory mechanisms for maintenance of function in the body.

BSc-II(OEC)

CO 1: Know the stages of the life cycles of the parasites and infective stages

CO 2: Develop ecological model to know population dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system.

CO 3 : Develop skills and realize significance of diagnosis of parasitic infection and treatment.

CO 4 : Understand about diseases caused by Protozoa, Helminthes, Nematodes and Arthropods at molecular level.

CO 5 : Develop their future career in medical sciences and related administrative services.

BSc-III(CBCS)

CO 1: Histology: Students will gain knowledge of the microscopic anatomy and structure of cells, tissues, and organs. They will learn how to use a microscope to observe and identify cells and tissues, and will understand the basic principles of tissue preparation and staining.

CO 2: Evolution: Students will learn about the principles of evolution, including natural selection, genetic drift, and adaptation. They will explore the mechanisms of evolution and how these principles apply to the diversity of life on earth.

CO 3 : Paleontology: Students will gain knowledge of the fossil record and the history of life on earth. They will learn about the major groups of organisms that have existed throughout the history of life, and how the study of fossils can help us understand the evolution of life on earth.

CO 4 : Biostatistics: Students will learn the basic principles of statistics and how they apply to the study of biology. They will be able to analyze data using statistical tools and will understand how to interpret and present statistical results.

BSc-IV(CBCS)

CO 1: Same as aboveB.Sc II sem DSC

CO 2: Biochemistry and physiology deal with the chemical and physical processes that occur within living organisms.

CO 3 : By studying these subjects, students can gain a deeper understanding of how the organisms function at a molecular and cellular level.

BSc-V PAPER-II (NON-CBCS)

CO 1: Animal behavior: Ethology and applied zoology are concerned with the study of animal behavior, including its evolution, development, and ecological significance.

CO 2: By studying these subjects, students can gain a deeper understanding of how animals interact with each other and their environment.

CO 3 : Ethology and applied zoology are foundational subjects for many careers in animal-related fields, such as veterinary medicine, wildlife conservation, animal behavior research, and animal training.

CO 4 : A strong background in these subjects can prepare students for a wide range of careers in the animal industry, including animal welfare and management. students can have a significant positive impact on students' understanding of animal behavior, animal welfare, and conservation.

BSc-V PAPER-I (NON-CBCS)

CO 1: Ecology, zoogeography, and wildlife biology involve the study of ecological principles, such as species interactions, population dynamics, and ecosystem processes.

CO 2: By studying these subjects, students can gain a deeper understanding of the complex interactions between living organisms and their environment.

CO 3 : Ecology, zoogeography, and wildlife biology are foundational subjects for many careers in wildlife-related fields, such as wildlife conservation, wildlife management, and ecological research.

CO 4 : A strong background in these subjects can prepare students for a wide range of careers in the wildlife industry, including wildlife biology, wildlife management, and conservation biologist.

BSc-V PAPER-II (NON-CBCS)

CO 1: Genetics, biotechnology, and nanotechnology involve the study of fundamental biological processes at the molecular level.

CO 2: Understanding of fundamental biological processes: These involves the study of fundamental biological processes at the molecular level. By studying genetics, students can gain a deeper understanding of DNA, gene expression, and genetic variation.

CO 3 : By studying these subjects, students can gain a deeper understanding of DNA, protein synthesis, and gene expression and Inheritance of characters

CO 4 : Students may learn to think critically about the implications of genetic variations or develop strategies for creating and testing new biotech products that can be applied in various areas of life, including medical research, disease diagnosis, and genetic counseling. And also applications of biotechnology and nanotechnology for the benefit of mankind, biodiversity, disease diagnosis, cure of the diseases and agriculture

B.Sc. INDUSTRIAL FISHERIES PROGRAMME

COURSE OUTCOMES

CO 1: The ability to demonstrate sound understanding related to biology, breeding, genetics and nutrition of various cultivable organisms.

CO 2: Acquired sufficient skills and knowledge in aquaculture reproduction, hatchery management and applied genetics, fish breeding

CO 3 : Gained sufficient knowledge on applying the adaptive management strategies to protect the freshwater and brackish water fishery resources

CO 4 : Ability to diagnose aquaculture-related diseases and manage health and safety issues in aquaculture ventures.

CO 5: Employ scientific techniques, practical skills and management strategies aimed at improving culture resource management.

CO 6: Expertise in handling various instruments and technical aspects related to water/soil quality assessment thus resulting in solving issues in connection with quality management in culture systems.

CO 7: Skilled to analyse the quality assessment and post-harvest technology to manage live fish and fishery products.

CO 8: Exploit and utilize wisely fisheries resources using appropriate and innovative fishing methods

CO 9: Apply post-harvest practices that are compliant to international standards for food safety and quality

CO 10: Engage effectively in biochemical analyses which are relevant in culture industry

CO 11: Become adept in the concepts of capture, culture and management of fisheries making oneself suitable employment in both the public and private sector.

CO 12: Identify and formulate technically sound, economically feasible, and socially relevant fishery related projects.

CO 13: In depth know-how of the fishery products and by-products technology to venture into self-entrepreneurship with the "learn with earn concept".

B.Sc. MICROBIOLOGY PROGRAMME

COURSE OUTCOMES

CO 1: To learn about the contributions and discoveries of scientists in the field of Microbiology with general charactersand classification of Microorganisms.

CO 2: Comprehend the evolutionary and economic importance of microorganisms.

CO 3 : Good knowledge and application of GLP and GMP in quality control.

CO 4 : Develop the best practical skills and safety rules in students.

CO 5: Knowledge and understanding of the disease-causing microorganisms.

CO 6: To provide students with industrial problem-based knowledge and skill towards employment or higher education in Biotechnology or multi-disciplinary areas involving different branches of sciences.

CO 7: Develop thorough knowledge andunderstanding ofconcepts of Biochemistry, enzymes, microbial metabolism, growth, bioenergetics, and physiology.

CO 8: Thorough knowledge and understanding of concepts of Food microbiology, principles of food preservation, and spoilage of foods as well as Dairy.

CO 9: Students could study the molecular basis of life and its applications in genetic engineering with biotechnology programs and regulations.

CO 10: The study ofisolation of microbes from the environment by air samplers, testing potability of water by MPN, and demonstration of sewage treatment plants by visiting treatment plants created awareness in students about conserving the environment.

CO 11: Students study applications of microorganisms in soil fertility, biogeochemical cycle, plant-microbe interactions, its their production in PGPR, bio-inoculants, and bio-fertilizer.

CO 12: Students learn microbial diseases of agriculture crops and their control measures.

CO 13: Students can learn to screen industrially important microbes in fermentation, upstream and downstream processing and the production of minerals and petroleum.

CO 14: Students learn immunology and their techniques.

CO 15: Students learn epidemiology, pathogenicity, prophylaxis, treatment, and control of all microbial diseases in humans, plants and animals.

B.Sc. BOTANY PROGRAMME

COURSE OUTCOMES
BSC-I(NEP) DSC

CO 1: Understanding and appreciating the unity and diversity of microbes fungi and Lichens.

CO 2: Skill development to diagnose plant disease and to apply general control measures.

CO 3 : Develop skill in studying the fungal diversity and Lichens through the study of representative taxon and methodology.

CO 4 : Understanding the interrelationship between plants and microbes both beneficial and harmful.

CO 5: Understanding the significance of microbes in nature's dynamicity.

BSC-I (NEP) DSC PR

CO 1: Understanding diversity in morphology, anatomy, reproduction and life cycle in lower groups of plants, Algae and Bryophytes.

CO 2: Skill Development in collection and preservation of Algae and Bryophytes.

CO 3 : Realizing the economic/ecological importance of Algae and Bryophytes.

CO 4 : Understanding the evolutionary lineages in Algae and Bryophytes.
A comparative knowledge of lower vascular plants and lower group of flowering plants.

CO 5: Skill development for the proper description, identification and classification through morphological, anatomical and life cycle studies.

CO 6: Awareness on the morphological, anatomical and reproductive features of primitive and advanced plants with an evolutionary link between them.

CO 7: Skill development in collection preservation and studies in diversity of Algae, Bryophytes, Pteridophytes and Gymnosperms.

BSC-I (OEC)

CO 1: Knowledge on general terms with updated information used in cell bio log

CO 2: Understanding the fundamental concepts in cytology.

BSC-I (SEC)

CO 1: Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept

CO 2: Skill development for the proper description of internal structure using botanical terms, their identification and further classification.

CO 3 : Induction of the enthusiasm on internal structure of locally available plants.

CO 4 : Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.

Bsc-II DSC

CO 1: Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept

CO 2: Skill development for the proper description of internal structure using botanical terms, their identification and further classification.

CO 3 : Induction of the enthusiasm on internal structure of locally available plants.

CO 4 : Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.

Bsc-II DSC PR

CO 1: Observation and classification of the floral variations from the premises of college and house.

CO 2: Understanding the various reproductive methods sub-stages in the life cycle of plants.

CO 3 : Observation and classification of the morphological variations in fruits and seeds of angiosperms.

CO 4 : Enthusiasm to understand evolution based on the variations in reproduction among plants.

Bsc-II DSC

CO 1: Understanding the main features in Angiosperm evolution

CO 2: Skill development in identification and classification of flowering plants.

CO 3 : Ability to identify, classify and describe a plant in scientific terms, thereby, Identification of plants using dichotomous keys.

CO 4 : Recognition of locally available angiosperm families and species.Recognition of economically important plants.

CO 5 : Appreciation of human activities in conservation of useful plants from the past to the present. Understanding about the folklore knowledge on plants

Bsc-II DSC PR

CO 1: Preliminary understanding of the basic functions in a plant body.

CO 2: Awareness on the interdisciplinary nature of botany, chemistry and physics by studying the principles of plant life, growth and reproduction.

CO 3 : Recognising the wonderful mechanism of transport and the Interrelationships existing between metabolic pathways thereby gaining and idea about the importance of plants in the dynamicity of nature.

CO 4 : Enhance research interest among students by introducing the historical aspects of physiological research.

Bsc-II (OEC)

CO 1: Understanding the fundamental concepts in ecology, environmental science and phytogeography.

CO 2: Concept development in conservation, global ecological crisis, Sustainable development and pros and cons of human intervention.

CO 3 : Enable the student to appreciate bio diversity and the importance of various conservation strategies, laws and regulatory authorities.

CO 4 : Recognition of the need for more research to create a baseline data for sustainable exploitation- Think globally and Act locally Analyse the interrelationship between the geography and pattern of distribution of plants.

CO 5 : Appreciate key concepts from economic, political, and social analysis as pertained to

the design and evaluation of environmental policies and institutions.

CO 6 : Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.

CO 7 : Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Bsc-II (SEC)

CO 1: Identify the basic principles and current trends in classical genetics.
Recognize the historical process of the evolution of molecular genetics from classical genetics.

CO 2: Review the relevance of the application of genetic principles in agriculture, medicine, research and industry.

CO 3 : Outlining the use of genetic principles for conservation, defining and better understanding of nature.

CO 4 : Develop theoretical background on molecular genetics to provide a strong support for the student for future research and employability.
Appreciate the way scientists work in understanding biological processes and the organization of cell.

CO 5 : Cite examples for scientific interventions to human and plant life through brief exposure to plant breeding principles.
Modify the concept on gender, human diseases and their management based on the study of genetic principles of human beings.

Bsc-III (CBCS)

CO 1: Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.

CO 2: Skill development for the proper description of internal structure using botanical terms, their identification and further classification.

CO 3 : Induction of the enthusiasm on internal structure of locally available plants.

CO 4 : Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.

CO 5 : Observation and classification of the floral variations from the premises of college and house.

CO 6 : Understanding the various reproductive methods sub-stages in the life cycle of plants
Observation and classification of the embryological variations in angiosperms.

CO 7 : Enthusiasm to understand evolution based on the variations in reproduction among plants.

Bsc-III (CBCS) PR

CO 1: Skill development for the proper description of internal structure using botanical terms, their identification and further classification.

CO 2: Observation of variations that exist in internal structure of various parts of a plant and as well as among different plant groups in support for the evolutionary concept.

CO 3 : Understanding various levels of organization in a plant body with an outlook in the relationship between the structure and function through comparative studies.

CO 4 : Understanding the various reproductive methods sub-stages in the life cycle of plants

Observation and classification of the embryological variations in angiosperms.

Bsc-IV (CBCS)

CO 1: Students will understand the importance of photosynthesis in plants. They will also understand photosynthesis is one of the most important processes that allow plants to Live.

CO 2: Students will come to know that, energy produced by respiration is essential for normal functioning of body.

CO 3 : Student will understand importance of metabolism to maintain living state of cells. They also understand role of nitrogen cycle in environment.

CO 4 : Students will understand how enzymes serve important function in body, in digestion and metabolism. They have developed knowledge about pathways of water through xylem and phloem.

CO 5 : Student will understand importance of metabolism carbohydrate metabolism and their regulation.

CO 6: Student will understand importance of enzymes and their regulation in living state of cell.

CO 7: Student will understand the defense mechanism involved in plants and how the secondary metabolites are useful in defense mechanism.

Bsc-IV (CBCS) PR

CO 1: Able to understand Effect of time and enzyme concentration on the rate of enzyme action AND Effect of substrate concentration and pH on enzyme action.

CO 2: Students able to understand the determination of osmotic potential of plant cell sap by plasmolytic method.

CO 3 : Students able to understand the effect of two environmental factors (light and wind) on transpiration by excised twig.

CO 4 : Students are able to know the calculation of stomatal index and stomatal frequency of a mesophyte and a xerophyte.

CO 5 : Students able to understand how to demonstration of Hill reaction in photosynthesis Students able to perform Separation of amino acids by paper chromatography

CO 6: Students are able to make acomparison of the rate of respiration in any two parts of a plant.

Bsc-V (NON-CBCS)

CO 1: This course aims to add to understanding of the students about the diversity of plants, Morphology, their modifications for various functions, their Description, Identification, Nomenclature and their classification including recent advances in the field.

CO 2: Student learns about the brief comparative study of Engler and Prantle, Hutchinson and Angiosperm Phylogeny Group III

CO 3 : Study of at least 22 locally available families of flowering plants

Bsc-V (NON-CBCS) PR

CO 1: Study of root, stem and leaf structure and modifications. Study of inflorescence types.

CO 2: Study of flower and its parts, floral diagram and floral formula. Study of fruits.

CO 3 : Study of families mentioned in theory with at least two examples for each

Bsc-V (NON-CBCS)

CO 1: Student will have developed knowledge about structure and function of ecosystem

CO 2: Students will understand the Vegetation types and distribution

CO 3 : Students will understand the effect of air, water and soil pollution in environment. They will also develop knowledge about greenhouse gases its sources and role

CO 4 : Students will understand the utilization of plants such as food plants, fiber plants, timber , medicinal plants etc.

Bsc-V (NON-CBCS) PR

CO 1: The student will gain the knowledge about the quadrat study, moisture content and water holding capacity of soil. pH and temperature of different water bodies,

CO 2: Students will understand the morphology and anatomical adaptation in hydrophytes , xerophytes and halophytes.

CO 3 : Students will gain the indigenous knowledge of medicinal plants and economic plants.

Bsc-VI (NON-CBCS)

CO 1: Acquaint with concepts in prokaryotic, eukaryotic cell.

CO 2: Understand the Morphology and ultrastructure of chromosome

CO 3 : Understanding concept of DNA replication and genetic inheritance and Genetic variations.

Bsc-VI (NON-CBCS) PR

CO 1: student will know the process of cyclosis, cell inclusion, mitosis and meiosis.

CO 2: students will learn the genetic problems related to Mendelism, interaction of genes.

Bsc-VI (NON-CBCS)

CO 1: Students able to understand origin of life and process

CO 2: Students learn about the plant propagation and breeding and also learn about the genetic engineering and PCR technique.

Bsc-VI (NON-CBCS) PR

CO 1: student will know the process of propagation methods like – cutting, layering and grafting.

CO 2: students will learn about the pollen viability, anatomy of dry and wet stigma, synthetic seed.

CO 3 : Able to know the Isolation and estimation of DNA.

B.Sc. BIOTECHNOLOGY PROGRAMME

COURSE OUTCOMES

BSC-I (NEP) DSC

CO 1: Understanding concepts of Biotechnology and demonstrate interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology

CO 2: Understanding of basic structure of cell and its functions

CO 3 : Understanding of basic of genetic s and it application in basic biology

BSC-I(NEP) Pr

CO 1: Learning and practicing the Laboratory skills in cell biology, basic and applied microbiology with an emphasis on technological aspects

CO 2: Learning and practicing the concepts of Biotechnology and practical skills in interdisciplinary skills acquired in cell biology, genetics, biochemistry, microbiology, and molecular biology

BSC-I(NEP) OEC

CO 1: Understanding importance of Genetic engineering in Industry and bio-therapeutic proteins

CO 2: Applications of molecular Genetics in Forensic science to solve criminal cases by DNA analysis

B.Sc. Semester – II(NEP) DSC

CO 1: Understanding of Microbes and their handling , culture methods, etc.,

CO 2: Learning of various methods for identification of microbes.

CO3 : Microbiological diseases from bacteria, fungi and virus, its pathological significance

B.Sc. Semester – II (NEP) Pr

CO 1: Understanding of Microbes and their handling , culture methods, etc.,

CO 2: Understand and identification of methods for microbes.

CO 3 : Analyze microbial diseases from bacteria, fungi and virus, its pathological significance

B.Sc. Semester – II OEC

CO 1: Competent to apply the knowledge and skills gained in the fields of Plant biotechnology, in pharma, agriculture, herbal and nutraceutical industries.

CO 2: Application of Bio based nutrient and growth promoters for agriculture yields.

B.Sc. Semester – II OEC

CO 1: Competent to apply the knowledge and skills gained in the fields of Plant biotechnology, in pharma, agriculture, herbal and nutraceutical industries.

CO 2: Application of Bio based nutrient and growth promoters for agriculture yields.

B.Sc. CHEMISTRY PROGRAMME

COURSE OUTCOMES
BSC-I (NEP) DSC

CO 1: Describe the dual nature of radiation and matter; dual behavior of matter and radiation, de Broglie's equations, Heisenberg uncertainty principle and their related problems. Quantum mechanics. Derivation of Schrodinger's wave equation. Orbital sh ap e s of s, p, d and f atomic orbitals, nodal planes. Electronic configurations of the atoms.

CO 2: Define periodicity, explain the cause of periodicity in properties, and classify the elements into four categories according to their electronic configuration. Define atomic radii, ionisation energy, electron affinity and electronegativity, discuss the factors affecting atomic radii, describe the relationship of atomic radii with ionization energy and electron affinity, describe the periodicity in atomic radii, ionization energy, electron affinity and electro negativity.

CO 3 : Explain bond properties, electron displacement effects (inductive effect, electrometric effect, resonance effect and Hyper conjugation effect). steric effect and their applications in explaining acidic strength of carboxylic acids, basicity of amines. Understand basic concept of organic reaction mechanism, types of organic reactions, structure, stability and reactivity of reactive intermediates.

CO 4 : Describe important characteristics of configurational and conformational isomers. Practice and write conformational isomers of ethane, butane and cyclohexane. Understand the various concepts of geometrical isomerism and optical isomerism. Describe CIP rules to assign E,Z notations and R& S notations. Explain D and L configuration and threo and erythro nomenclature. Explain racemic mixture and racemisation, resolution of racemic mixture through mechanical separation, formation of diastereomers, and biochemical methods, biological significance of chirality.

CO 5: Explain the existence of different states of matter in terms of balance between intermolecular forces and thermal energy of the particles. Explain the laws governing behavior of ideal gases and real gases. Understand cooling effect of gas on adiabatic expansion. Describe the conditions required for liquefaction of gases. Realize that there is continuity in gaseous and liquid state. Explain properties of liquids in terms of intermolecular attractions.

CO 6: Understand principles of titrimetric analysis. Understand principles of different type's titrations. Titration curves for all types of acids – base titrations. Gain knowledge about balancing redox equations, titration curves, theory of redox indicators and applications.

CO 7: Understand titration curves, indicators for precipitation titrations involving silver nitrate- Volhard's and Mohr's methods and their differences. Indicators for EDTA titrations - theory of metal ion indicators. Determination of hardness of water.

BSC-I (NEP) Pr

CO 1: Understand and practice the calibration of glasswares (burette, pipette, volumetric flask).

CO 2: Basic concepts involved in titrimetric analysis, primary standard substances, preparation of standard solutions.

CO 3 : Explain the principles of acid-base, redox and iodometric titrations.

CO 4 : Work out the stoichiometric relations based on the reactions involved in the titrimetric analysis.

CO 5: Based on principles of titrimetric analysis student can perform

CO 6: Describe the significance of organic quantitative analysis.

CO 7: Determine the amount of phenol, aniline, amide, ester and formaldehyde in a given solution by performing blank titration and main titrations.

CO 8: Determine aspirin in the tablet by hydrolysis method.

BSC-I (NEP) OEC

CO 1: Understand the chemical constituents in various day to day materials used by a common man like Tooth paste, Cosmetics, Soaps and detergents and Biomolecules

CO 2: Understand the chemical constituents and applications in Food additives, adulterants and contaminants, Artificial food colorants.

CO 3 : Understand the scientific reasons in various aspects and chemotherapy and its applications. CO4: Understand the basic constituents and applications in polymers, surface coatings, fertilizers, insecticides and pesticides, chemical explosives etc.

BSC-I (NEP) SEC

CO 1: Acquire skills for Laboratory management and routine analysis of Soil.

CO 2: Improve working ability in analytical laboratory.

CO 3 : : Helpful for obtaining jobs in various fields

CO 4: The student can start his own business /laboratory or can associate with any kind of laboratory or associated jobs with confidence.

B.SC. SEMESTER – II (DSC)

CO 1: Explain ionic bond, Born Lande equation ,Born Haber cycle and Fajan's rules. State VSEPR theory, hybridisation and shapes of various molecules. Understand the concept of resonance and write resonating structures of NO_3^- , CO_3^{2-} and SO_4^{2-} .

CO 2: Explain MO Theory and draw the MO diagrams for homonuclear diatomic molecules and ions of 1st and 2 nd periods and heteronuclear diatomic molecules such as CO, NO and NO^+ . Compare MO and VB theory.

CO 3 : Learn preparation and reactions of alkanes, alkenes and alkynes. Clear the concept learning mechanism of Free radical mechanism of halogenations of alkanes. Understand the mechanisms of addition reactions of alkenes and alkynes.

CO 4 : Learn the concept of polymerization, ozonolysis in alkenes and alkynes. Learn acidity of alkynes, formation of metal acetylides and their applications. Explain

cycloalkanes and their relative stability. Explain conformational analysis of cyclohexane with Karplus energy diagram. Axial and equatorial bonds. Relative stability of mono substituted cycloalkanes.

CO 5: Expected to learn symmetry elements, unit cells, crystal systems. Learn Bravais lattice, types and identification of lattice planes. Explain laws of crystallography - law of constancy of interfacial angles, law of rational indices.

CO 6: Miller indices. X–Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CsCl (qualitative treatment only). Explain defects in crystals. Learn the applications of liquid crystals. Learn the concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. 19

CO 7: Understand the concept of order and molecularity of a reaction and their applications. Define half–life of a reaction. Explain methods for determination of order of a reaction by half life period and differential equation method. Understand the concept of activation energy and its calculation from Arrhenius equation. Explain theories of reaction rates: Collision theory and activated complex theory of bimolecular reactions.

CO 8: Learn principles of gravimetric analysis. Learn the precipitation, mechanism of precipitation, factors influencing precipitation, co-precipitation and post-precipitation. Learn structure, specificity, conditions and applications of organic reagents. Advantages of organic reagents over inorganic reagents.

CO 9: Learn about quality of surface water, ground water. Impurities in water, standards of water quality (color, pH, hardness, TDS, sulphate, fluoride, chloride) for potable, domestic, industrial and agricultural purpose. Learn Water treatment technologies – house hold water treatment, municipal water treatment, industrial treatment (primary and secondary treatment of industrial effluent), softening of water, and disinfection of water. Determinations of DO, BOD and COD, and their significance.

CHEMISTRY LAB CHM P- 2

CO 1: Learn regarding errors, types of errors, accuracy, precision, significant figures and standard deviation. To determine the total alkalinity in antacids, Vitamin C in lemon juice/formulations. To determine free alkali present in differentsoaps/detergents. Learn analysis of DO in waste water sample.

CO 2: To determine Chemical Oxygen Demand (COD) in waste water sample.

CO 3 : To determine temporary, permanent and total hardness of water by collecting different samples of water.

CO 4 : Enable to understand the applications of experiments like methods of determination of viscosity, surface tension, refractive index.

B.SC. SEMESTER – II (OEC)

CO 1: Acquire knowledge about different types of sugars and their chemical structures. Identify different types of amino acids and determine the structure of peptides.

CO 2: Explain the actions of enzymes in our body and interpret enzyme inhibition. Predict

action of drugs. Depict the biological importance of oils and fats. Importance of lipids in the metabolism. Differentiate RNA and DNA and their replication. Explain production of energy in our body.

COURSE OUTCOMES
BSC-III (CBCS)

CO 1: Student will be able to gain knowledge on Chemical Energetics and its various concepts on Thermodynamics and its applications.

CO 2: To learn about Chemical Equilibrium; Limitations of first law of thermodynamics and its associated various energy concepts.

CO 3 : To acquaint with the factual knowledge on Distribution lawand its applications in solvent extraction- simple and multiple extractions.

CO 4 : To understand about carboxylic acids preparation physical and chemical properties. Application of Functional group approach for the various reactions of synthetic significance.

CO 5 : To acquire ability of critical thinking on extended studies on carboxylic acid and their various derivatives along with relevant named reactions viz., Reformatsky Reaction, Perkin condensation.

CO 6 : To understand Amines and Diazonium Salts and their physico chemical properties. The applications of various named reactions viz., Gabriel's Phthalimide synthesis, Hofmann Bromamide reaction. Hofmann Carbylamine test, Schotten – Baumann Reaction.

CO 7 : To learn on diazonium salts*Preparation:* from aromatic amines. *Reactions:* conversion to benzene, phenol, dyes.

CO 8: To acquire the knowledge on Heterocyclic CompoundsClassification and nomenclature, Structure, aromaticity in 5- numbered and 6-membered rings.

CO 9: To understand the method of extraction and structural elucidation and synthesis of Natural products like Hygrine and Nicotine.

CO 10: To understand Occurrence, classification, isoprene rule; Elucidation of structure and synthesis of Citral, Neral and α-terpineol.

BSC-IV (CBCS)

CO 1: Student will be able to understand Chemistry of *s* and *p* Block Elements. Further, Structure, bonding, preparation and uses of important compounds of s and p block elements specially focused.

CO 2: Student will be able to gain knowledge on Chemistry of *d* and *f* Block Elements and general group trends of Transition Elements, Lanthanides and Actinides.

CO 3 : Student will be able learn IUPAC nomenclature of Coordination compounds, Structural and stereoisomerism and various theories related to Coordination Chemistry.

CO 4 : Student will be able to gain knowledge on Nuclear particles, nuclear instability, Nuclear reactions, applications of radioisotopes in tracer technique and carbon dating.

CO 5 : Student will be able to learn thermodynamics of ideal solutions and Raoult's law, Vapour pressure-composition and temperature- composition curves of ideal and non-ideal solutions and various properties related to solutions.

CO 6 : Student will be able to explain Phase Equilibrium,Gibbs Phase Rule and its thermodynamic derivation, Clausius – Clapeyron equation and Phase diagrams.

CO 7 : Student will be able to aquire knowledge on Ionic conductance, equivalent and molar conductivity, Kohlrausch law of independent migration of ions and its various applications.

CO 8: Student will be able to clear various concepts of Electrochemistry. Further, thermodynamic properties like ΔG, ΔH and ΔS from EMF data. Able to understand solving problems and exercises pertaining to electrochemistry and Battery technology.

BSC-V (NON-CBCS) P-I

CO 1: Student will able to familiar with the concepts of Coordination Chemistry with special focus on theories, IUPAC nomenclature of coordination compounds, calculation of effective atomic number (EAN) in different complexes, stereochemistry , coordination numbers, Ionization, hydrate, linkage, geometrical and optical isomerism in coordination compounds.

CO 2: Understanding of major concepts in Organometallic chemistry,Classification of organo-transition metal complexes and their applications in the synthesis of metal carbonyls, bonding in metal carbonyls, 18- electron and 16-electron rules with reference to metal carbonyls.

CO 3 : Student will able to understand about Metal Clusters Carbonyl clusters and halide type clusters.

CO 4 : Student will able to understand various aspects of Heterocyclic Compounds their Classification, aromaticity, synthesis of different heterocyclic compounds and mechanism of electrophilic substitution reaction in pyrrole and pyridine.

CO 5 : Student will be able to gain the knowledge on Natural products specially on Alkaloids their Classification, extraction, general properties etc.,

CO 6 : To critically think on Pericyclic reaction,Types of pericyclic reaction, molecular orbital theory(MOT), symmetry properties of reactant and product orbitals, cyclo addition reaction-[2+2] and [4+2] cycloaddition reactions. Electro cyclic reaction: cyclisation of 4n and [4n+2]π systems, sigmatropic rearrangements.

CO 7 : Students to acquire ability of critical thinking on extended studies on Electrochemistry like Theory of strong electrolytes: Debye – Huckel theory of strong electrolytes, Debye – Huckel Onsagar equation (no derivation), and relevant aspects. Further, will study and acquainted with Theories of electrolyte dissociation.

CO 8: Student will be able to acquire the knowledge on various aspects of Chemical kinetics, theories, influence of ionic strength on reaction rates, salt effects (primary and

secondary).

BSC-V sem (Non-CBCS) P-II

CO 1: Students will be able to understand theory of Gravimetric Analysis, principles, various techniques and methods of analysis

CO 2: Students will be able to learn on Industrial Chemistry and acquire knowledge on Alloys, Glass, Cement and raw materials required, manufacture and mechanism of setting. Will be understanding about Nanomaterials

CO 3 : Student will be able to understand about Ultraviolet Spectroscopy Types of electronic transitions, λmax calculation and various applications of UV spectroscopy.

CO 4 : Student will be able to understand about Infrared Spectroscopy, Types of electronic transitions, λmax calculation and various applications of Infrared Spectroscopy in various functional group detection.

CO 5 : Student will be able to understand on Dyes, Colour and constitution, classification, synthesis and applications of congo red, malachite green, phenolphthalein and alizarin, dyes used in food and their safety concern, organic pigments with examples.

CO 6 : Student will be able to understand about Molecular spectroscopy; Interaction of electromagnetic radiation with matter, electromagnetic spectrum, Rotational spectroscopy, Vibrational spectroscopy and Electronic spectroscopy with problems on spectroscopic.

BSC-VI sem (Non-CBCS) P-I

CO 1: Student will be understand the extended curricula various aspects of theories and concepts of Coordination chemistry and its applications.

CO 2: Student will get vivid knowledge on aspects of Bioinorganic Chemistry with special reference to Essential and trace elements, toxic effects of Hg,Cd, Pb and As, role of haemoglobin, myoglobin and chlorophyll in biological systems etc.,

CO 3 : Student will be able to know elaborated studies on Carbohydrates chemistry and its chemical behaviour and various methods to structure related aspects like Monosacchrides and Polysaccharides.

CO 4 : Student will get acquainted with Classification of amino acids, stereochemistry of amino acids, Zwitter ion and explanation to isoelectric point, synthesis of amino acids Peptides etc.,

CO 5 : Student will be gaining significance of Vitamins and Hormones and their Classification, Synthesis and biological significance, source and structure of Vitamin A, B1(thiamine), B2(riboflavin), B6(pyridoxine), a-tocopherol, K1 (phylloquinone),C (abscorbic acid).

CO 6 : Student will be able to enrich his / her knowledge on Electro Motive Force(EMF) and it s various aspects associated to this concepts.

CO 7 : With the sound background of electrochemistry the advances could be on Battery technology and different batteries.

BSC-VI sem (Non-CBCS) P-II

CO 1: Student will be able to understand important aspects of Analytical Chemistry with special reference to various types/ methods of Chromatography. Furthing in Flame Photometry and its principle, instrumentation, applications. Atomic adsorption spectroscopy: principle, instrumentation, advantages over flame emission spectroscopy and applications and Thermogravimetry: principle and applications of TG & DTA

CO 2: Student will be able to gain nowldge on Nuclear Magnetic resonance(NMR) and its principles , applications in identifying the various types of aspects of Chemically equivalent and non equivalent protons and their significance in the structure identification of compounds.

CO 3 : Student will be able to understand concept of Drugs, Definition and classification, requirement of an ideal drug, synthesis and therapeutic use of various category drugs.

CO 4 : Student will understand about natural product likeTerpenes its Classification, isoprene rule, special isoprene rule constitution and synthesis of citral and α-terpinol.

CO 5 : Students will be able to understand on Macromolecules like polymers: natural and synthetic, polyethylene, polystyrene, PVC and polymethylmethacrylate, mechanism of addition, polymerization reaction and condensation reaction (Nylon 66), and some analytical methods.

CO 6 : Student will be able to understand Quantum chemistry and theories. To study wave nature of electron, derivation of Schrödinger's wave equation, wave function and its interpretation, Eigen function and Eigen values, normalization and orthogonality.

B.Sc. COMPUTER SCIENCE PROGRAMME

COURSE OUTCOMES

B.Sc. Semester – I (DSC)

CO 1 : Familiarize with fundamental concepts and computer programming.

CO 2 : Learn fundamental concepts of programming by developing and executing programs in C.

CO 3 : Focuses on the structured program.

CO 4 : Various constructs and their syntax.

B.Sc. Semester – I (DSC)Pr

CO 1 : Understand the basics of programming by executing the simple programming

CO 2 : Be able to design & execution of code.

CO 3 : Have practical knowledge of arrays, strings & functions

B.Sc. Semester – I Open Elective Course (OEC-1)

CO 1 : Understanding the basic concepts Computer.

CO 2 : Paperless environment.

CO 3 : To develop word processor abilities of students.
CO 4 : To develop numerical abilities of students using electronic spread sheet.
CO 5 : To acquire practical skills related to Presentation Software

SKILL ENHANCEMENT COURSE (SEC)

CO 1 : To teach the basics involved in data representation and digital logic circuit.
CO 2 : It includes the general concept in digital logic design.
CO 3 : To make better understanding of logic used in combinational circuit design.

B.Sc. Semester – II

Subject: Computer Science Discipline Specific Course (DSC)

CO 1 : To impart the basic concepts of data structures and algorithms.
CO 2 : To familiar with data structural algorithms such as sorting & searching, stack & queue,
CO 3 : To be familiar with some graph algorithms such as binary tree representation of tree and operations on trees.
CO 4 : To understand the basic concepts of tree traversal.
CO 5 : How to use basic data structure for program implementation.

B.Sc. Semester – II (DSC) Pr

CO 1 : Be able to design & implement list data structure using
i. Stack & Queue
ii. Linked list
iii. Singly & doubly linked list
CO 2 : Design & implement searching and sorting by applying various operations.
CO 3 : Design & implement basic operation on trees

B.Sc. Semester – II (OEC)

CO 1 : Understand broad range of computer networks and data communication technology.
CO 2 : Introducing basic knowledge, basic communication fundamentals.
CO 3 : Understand the network models such as OSI and TCP/IP.
CO 4 : Understand cellular and satellite networks.

BSC-III (CBCS)

CO1: Understand the basics of Time, Frequency Domain related to Signals.
CO2:Identify Fourier Representation for signals and Applications.
CO3: Draw Z-Transforms with respect to Signals.

BSC-III (CBCS)

CO1: Understand the background of Machine and Assembly language.
CO2: Identify principles of Assemblers, Linkers, Loaders and Compilers.

CO3:Learn Macro Language and Macro Processors.
CO4:Identify the phase of Compilers.

BSC-III (CBCS)

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CO1: Understand the basics of Visual Basic Language.
CO2:Learn to develop simple applications using VB.
CO3: Learn advance programming and Managing Forms in VB. CO4:Implementation of MDI Forms.

BSC-III (CBCS)

CO1: Understand the basics of Database, Characteristics and Structure.
CO2:Identify Database Concepts and Architecture.
CO3:Recognize the Data Models and Entity-Relationship Model.
CO4: Understand Functional Dependencies and Normalization concepts.
CO5: Learn PL/SQL and Transaction Processing Concepts.

BSC-III (CBCS)

CO1: Understand the origin and development of the World wide web.
CO2:Build the logic by learning the syntax of basic Java Programming.
CO3:Dig deep into the objects and classes concepts of Java Programming.
CO4:Identify the solutions for the problems based on Arrays,Strings,Interface.
CO5:Manage the output using certain Exception Handling Mechanism.
CO6: Develop GUI based programs based on Applets and Graphics.

BSC-IV (NON-CBCS)

CO1: Understand the basics of Networks and Topologies.
CO2: Understand the Significance of OSI Reference model and TCP/IP Model.
CO3: Dig deeper into the Layers of the OSI Model.
CO4: Understand the flow of data from sender to receiver through packets.
CO5:Learn and Identify Different Types of Network.

BSC-IV (NON-CBCS)

CO1: Understand the basics of Operating System Components and Services.
CO2: Identify different Process Scheduling Concepts.
CO3: Recognize the Process Synchronization and deadlock mechanism.
CO4: Understand Memory Management, Logical and Physical Addressing.
CO5:Identify different File Structure, File Handling, Disk Management, Protection & Security of

Files.

BSC-IV (NON-CBCS)

CO1: Understand the Basic principles of Electronic Commerce
CO2: Learn the concepts of Electronic data Interchange.
CO3: Handle Payments and Security with respect to Applications.
CO4: Gain Knowledge on Consumer Oriented E-Commerce Applications.
CO5: Build a basic web page using HTML and get the idea of Site Architecture.

BSC-IV (NON-CBCS)

CO1: Understand the basics of Discrete Fourier Transformation.
CO2: Learn to perform efficient computation of DFT.
CO3: Draw various Frequency Transformation of Signals.
CO4: Designing of digital Filters like FIR and IIR Filters.
CO5: Recognize various Digital Filter Structures.

B.Sc. GEOLOGY

COURSE OUTCOMES

B.Sc. Semester – I (NEP) DSC

CO 1: Understand the significance of various branches of Geology, the concept of rock cycle; describe characteristics of earth and its origin in relation to the Solar System.

CO 2: Describe internal structure and composition of the earth.

CO 3 : Explain basic concepts of plate-tectonics, ideas of plate boundaries, plate movements and associated geological features.

CO 4 : Describe weathering processes and types. Stages of river by Devi's concepts

CO 5 : Describe volcanic activity, types of volcanoes, volcanic products and earthquakes, types, causes, effects; elastic rebound theory, seismic waves, scale of measures.

B.Sc. Semester – I (DSC) Pr

CO 1: Understanding of topographical maps.

CO 2: Explain what is meant by map interpretation and what procedure is followed for its interpretation.

CO 3 : Describe the commonly used scales for mapping our country used by the Survey of India

CO 4 : Describe contours. Marginal information in Topographical sheets using the Survey of India toposheets

CO 5 : Understanding the Preparation of LU/LC maps

CO 6 : Describe physiographic models and also using lens stereoscope and mirror stereoscope.

B.Sc. Semester – I (OEC)

CO 1: A basic understanding of the Earth as an holistic system;

CO 2: Knowledge of the main components of the Earth system and their interactions;

CO 3 : An appreciation of the implications of human interaction with the Earth system for sustainable management of the planet; and Acquired skills in inquiry-based learning.

B.Sc. Semester – I (SEC)

CO 1: Understanding of Earth environmental segments. Atmosphere (structure and composition), hydrosphere- hydrological cycle.

CO 2: Describe Environmental Hazards: 1) Natural-Brief, 2) Manmade – Brief.

CO 3 : Understanding of Identification of rocks and minerals in the field and collection of samples.

B.Sc. Semester – II (NEP) DSC

CO 1: Identify face, form, Axis, symmetry and laws of crystallography.

CO 2: What is crystallography notation? Describe different symmetry class and morphological forms present in particular symmetry class.

CO 3 : Define mineral and describe physical/chemical properties and optical properties of given mineral.

CO 4: Describe physical and optical properties of given mineral group.

CO 5: Explain parts and functions of petrological microscope

CO 6 : Describe physical properties of magma generation in crust and mantle. Add a note on metamorphism and metamorphic rocks.

B.Sc. Semester – II (DSC)Pr

CO 1: As minerals are the basic building blocks of Earth materials, this course is designed to give a fundamental understanding of their classification, structure, and properties.

CO 2: The student will learn the basic principles of crystal chemistry and how this is related to the external form, chemical composition, and physical properties of minerals.

CO 3 : Identification, classification and interpretation of the occurrence of rock-forming minerals will be addressed

B.Sc. Semester – II (OEC)

CO 1: Distinguish industrial rocks and minerals among other geological commodities.

CO 2: Classify and explain the uses of different industrial minerals and rocks

CO 3 : Understand the specifications of industries as regards physical and chemical properties of industrial minerals and rocks.

CO 4: Carry out efficient exploration of industrial minerals.

CO 5 : Describe Properties, occurrences and distribution of the minerals/rocks in India, with special reference to Karnataka.

B. Sc III semester (CBCS) DSC

CO 1: Explain about forms and classification of igneous rocks

CO 2: Identify, describe and classify sedimentary rocks using hand specimens

CO 3 : Describe the formation of sedimentary rocks, their textures and structures

CO 4: Carry out efficient exploration of industrial minerals.

CO 5 : Explain about the formation of metamorphic rocks, their texture and structure

CO 6: Describe and identify the kinds of metamorphism

CO 7: Identify and classify various types of metamorphic rocks.

CO 8: Explain the concept of metamorphic facies,

B. SC IV SEMESTER(CBCS) DSC

CO 1: Understand and describe the basic principles of Stratigraphy and breaks in stratigraphic successions and their significance.

CO 2: Understand and explain the elements of stratigraphic classification, Geological Time Scale, Stratigraphic correlation and define typical terms related to stratigraphic studies

CO 3 : Understand and describe the physiographic and geological divisions of India and acquire knowledge about cratons and mobile belts.

CO 4 : Understand and describe the Early Precambrian and Late Precambrian formations of India with emphasis on lithology, classification, age, structure, post- tectonic intrusives, and organic remainsand economic resources.

CO 5 : Understand and describe the important Phanerozoic formations of India with reference to their distribution, lithology, classification, fossils and age.

CO 6: Understand and explain significance of paleontology, the conditions and methods of fossilization, classification and nomenclature of fossils and the basic principles of Taxonomy, Systematics and Binomial nomenclature.

CO 7: Understand and explain the morphology, classification, geological history and stratigraphic importance of Phylum Protozoa, Phylum Coelenterata – Class Anthozoa, Phylum Brachiopoda, Phylum Mollusca – Classes Pelecypoda, Gastropoda, Cephalopoda.

CO 8: Understand and describe the morphology, classification, geological history and stratigraphic importance of Phylum Arthropoda – Class Trilobita, Phylum Echinodermata – Class Echinoidea and Phylum Hemichordata – Class Graptolithina.

CO 9: Understand the basic ideas and describe the characteristics of important plant fossils, morphology, distribution and significance of Gondwana flora.

B. Sc V Semester (NON-CBCS)

CO.1: Identify the top and bottom of rock beds in a series of rocks.

CO.2: Analyze the contour maps and assess the strike and dip using Clinometers

CO.3: Compute the thickness of the outcrops

CO.4: Identify and classify Unconformities

CO.5: Discuss about various types of Joints

CO.6: Explain about parts of fold and classify various folds

CO.7: Recognize and classify the faults in the field and on geological map

B. Sc VISemester (NON-CBCS)

CO 1: Understand and describe the physiographic and geological divisions of India.

CO 2: Understand and describe Archean formations; and Archean formations of Karnataka with special reference to economic resources.

CO 3: Understand and describe thePaleozoic, Mesozoic and Cenozoic formations of India with reference to their distribution, lithology, classification, fossils and age.

B.Sc. STATISTICS PROGRAMME

COURSE OUTCOMES

B.Sc. Semester – I (NEP) DSC

CO 1: Knowledge of introductory Statistics and its scope and importance in various areas such as Medical, Engineering, Agricultural, Social Sciences, etc.

CO 2: Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency, dispersion, etc.

CO 3: Knowledge of correlation and regression analysis, regression diagnostics, partial

CO 4: Knowledge of types of data reflecting independence or association between two or more attributes.

B.Sc. Semester – I (NEP) DSC PR

CO1: Practical knowledge of handling various types of data, their organization and evaluation of summary measures such as measures of central tendency ,dispersion, etc.

CO2: Practical knowledge of carrying out correlation and regression analysis, regression diagnostics, partial and multiple correlations.

CO3: Computing knowledge of types of data reflecting in dependence or association between two or more attributes.

B.Sc. Semester – I (OEC)

CO1: Acquire knowledge of statistical methods.

CO2: Identify types of data and visualization, analysis and interpretation.
CO3: Know about elementary probability and probability models.
CO4: Employ suitable test procedures for given data set.

B.Sc. Semester – I (SEC)

CO1: Frame and formulate management decision problems.

CO2: Understand the basic concepts underlying quantitative analysis.

CO3: Use sound judgment in the applications of quantitative methods to management decisions.

B.Sc. Semester – II (DSC)

CO1:Ability to distinguish between random and non-random experiments
CO2: Knowledge to conceptualize the probabilities of events including frequents

CO3 : Knowledge related to concept of discrete and continuous random variables and their probability distributions including expectation and moments

CO 4: Knowledge of important discrete and continuous distributions such as Binomial, Poisson, normal distributions.

CO5: Knowledge on R-programming in the descriptive statistics and probability models.

CO6: Students will be able to write and execute R-code for basics of probability and statistics.

B.Sc. Semester – II (DSC) PR

CO1: Practical knowledge of computing the probabilities, conditional probability including the concept to fBayes' Theorem

CO2:Knowledge of computing discrete and continuous probability distributions

CO3: Practical knowledge of using R-programming in computing the descriptive statistics and probability models.

B.Sc. Semester – II (OEC)

CO1: Acquire knowledge of statistical methods.

CO2 Identify types of data and visualization, analysis and interpretation.

CO3 Know about elementary probability and probability models.

CO4 Employ suitable test procedures forgiven dataset.

B.Sc. CRIMINOLOGY AND FORENSIC SCIENCE PROGRAMME

COURSE OUTCOMES
B.Sc. Semester – I (NEP) DSC

CO1: Understand the concept of crime and historical perspective

CO2:A systematic disciplinary knowledge of the fundamental concepts, analytical reasoning, principles and processes.

CO3: Apply appropriate methodologies in order to conduct analytical skills and detect patterns of crime and victimization.

CO4: Apply moral and ethical awareness/reasoning

CO5:identify the patterns of crime and its preventions

B.Sc. Semester – I (DSC) PR

CO1:to identify the crime news
CO2:practice to collection of crime news clipping
CO3:to understand different types of crime through experiments
CO4:to understand crimes of different place
CO5:to capable analyze the crimes

B.Sc. Semester – I (OEC)

CO1:Understand the concept and purpose of Police Organization in India ,the developmental process over the years according to the needs of the society.

CO2:Develop the knowledge regarding the historical development of police system, organization, and structure of police.

CO3:Explain the different Police Units at the Central and State level

CO4:Become aware about the different Auxiliary Units and their function

CO5:Understandthepolicefunctioning

B.Sc. Semester – I (SEC)

CO1:Understand the importance of specific digital skills required for crime data analysis

CO2:Encourage to develop the necessary digital skills to become crime data analyst

CO3:Explain the importance of communication, analytical skills and writing skills

CO4:Explain the pre-requisite qualities of able crime data analysts.

CO5:Equip the students to attend the challenges of digital life

B.Sc. Semester – II (NEP) DSC

CO1:Understand the definition, scope and basic principles of Criminalistics ,exhibit the various tool and techniques utilized in the application of the subject.

CO 2: Explain the significance of evidence, types and classification of physical evidence such as blood, fibre, paint, fire arms, finger prints,etc.

CO3:Examine the forensic documents, tools and techniques employed, types offor geries, types of handwriting and its characteristics, etc.

CO4:Explain the basic principle and stages involved in crime scene reconstruction.

CO5:Describe the scope and importance of medical evidence such as oral and documentary, etc.

B.Sc. Semester – II (NEP) DSC PR

CO1:Understand the importance of scene of crime

CO2:Analyze the difficulties in evidence collection

CO3:Understand the value of physical evidences

CO4:Understand the methods and types of scene of crime

CO5:Explore different methods of Scene of Crime Investigation

B.Sc. Semester – II (OEC) DSC PR

CO1: Understand the different social problems in India,their causes, which leads to crimes, criminality and social disorder.

CO2: Explain the various forms of women and child relate dissues, crimes and their related laws.

CO 3: Understand about alcoholism and drugs leads to social disorganization and crimes

CO 4: Explain about the corruption and terrorism and their impact on society with related laws

CO5:Understand the effect of drug abuse on society

B.Sc. GENETICS PROGRAMME

COURSE OUTCOMES
B.Sc. Semester – I (NEP) DSC

CO1: Understand the structure and function of all the cell organelles.

CO2: Understand mechanism of cell division and in sight in to cell cycle regulation

CO3: Understand chromosome number and abnormalities

B.Sc. Semester – I (DSC) PR

CO1: Learn preparation of chemicals and reagents used for cytogenetics analysis

CO2: Carry out hands-on techniques in cytogenetics

CO3 : Prepare and analyse the karyo type of plants and assess the evolutionary significance.

B.Sc. Semester – I (OEC)

CO1: Use microscopes to study the events inside cell

CO2: Understand functioning of cell organelles

CO3: Have insight chromosome abnormalities and its implication in human health

B.Sc. Semester – I (SEC)

CO1:Hands on experience of preparation of chemicals and reagents used for cytogenetics analysis

CO2:Knowledge of techniques in cytogenetics

CO3:Proficiency of carrying out cytogenetic techniques independently.

B.Sc. Semester – II (DSC)

CO1: Learn historical overview genetics and laws Inheritance.

CO2:Understand Mendel's principles and deviations.

CO3:Gene interactions and their outcome through gene mapping.

B.Sc. Semester – II (DSC)

CO 1 : Handle Drosophila and carryout Genetic experiments
CO 2 : Understand Mendel's principles experimentally.
CO 3 : Gene interactions and their outcome through gene mapping.

B.Sc. Semester – II (OEC)

CO1: Mendelian genetics and inheritance of characteristics

CO2: Sex determination inplants animals and humans

CO3: Extra nuclear inheritance

COURSE OUTCOME (CO):

B.Sc Semester – III (CBCS)

CO 1: Molecular details of structure of nucleic acids
CO 2: Molecular mechanism of DNA and RNA synthesis
CO 3: Details of Genetic code and Mechanism of protein synthesis
CO 4: Organization of genes

B.Sc Semester – IV (CBCS)

CO 1: Molecular basis of Mutation
CO 2: Bacterial genetics and Recombination
CO 3: Details of gene regulation
CO 4: Chromosome mapping

B.Sc Semester – V (NON-CBCS)

CO 1: Behavioural genetics
CO 2: Molecular details of Genome organization
CO 3: Genes in development of different organisms
CO 4: Quantitative traits , variance, inbreeding and effects
CO 5: Evolutionary genetics and plant breeding

B.ScSemester – V (NON-CBCS)

CO 1: Probability and Problems
CO 2: ANOVA- One way and Two way ANOVA
CO 3: Biological databases and sequence retrieval
CO 4: Bioinformatics tools like BLAST, Clustal W NEBCUTTER etc

B.Sc Semester – VI (NON-CBCS)

CO 1: Mechanism of Immune system and components
CO 2: Human Genetics and Genetics of Cancer
CO 3: Techniques of plant breeding and applications

B.Sc Semester – VI (NON-CBCS)

CO 1: rDNA technology and applications, Different types of vectors
CO 2: Techniques of DNA isolation, PCR , Electrophoresis
CO 3: Applications of Genetic Engineering, Transgenic Plants and Animals

B.Sc. ANTHROPOLOGY PROGRAMME

COURSE OUTCOMES

BSC-I

CO 1: The student will be able to define and explain the basic concepts in Anthropology and how the discipline is relevant to gain a holistic understanding of human beings.
CO 2: The student will be able to explain human anatomy, identify the bones and determine the sex of the bones.

BSC-II

CO 1: The student will be able to define and explain the basic concepts in Biological Anthropology. Students will learn the existence and evolution of humans, and the various stages of human biological evolution.
CO 2: The student will be able to observe human variation in terms of certain characteristics, and also be able to accurately measure and record the data collected on living individuals, as well as human skulls.

BSC-III

CO 1: Students will be able to explain the concepts of human biology and reciprocate the aspects of growth, variation, nutrition, and diseases among humans.
CO 2: The student will be able to do experiments about health and genetic related diseases. The student will understand the concepts of dermatoglyphics thoroughly.

BSC-IV (CBCS)

CO 1: Student will acquire a basic understanding of the structure and function of DNA and the concept of the gene.
CO 2: They will understand the inheritance pattern of human traits/diseases and types of chromosomal abnormalities.
CO 3 : With the help of basic methods and techniques used in human genetics, the student will understand the importance of genetic counselling and genetic engineering.

V Semester: NON-CBCS- Cos (PI&PII)

PSO 1 : As Fieldwork is an integral part of Anthropology, this course will expose the student to the Research Methodology and Socio-cultural Anthropology.
PSO 2 : This upgrades the insight of the student to apply his/her theoretical knowledge for the practical purposes
PSO 3 : Understand the concepts of society and its forms with anthropological prospectives
PSO 4: Research Design, fieldwork tradition in anthropology will be ascertained

PSO 5: Students will be trained in both physical and social concepts.
PSO 6 : Capable to write Anthropological Report.
PSO 7 : Puts the foundation towards different kinds of research in all fields of anthropology.

VI Semester: NON-CBCS- Cos (PI&PII)

PSO 1 : Student will acquire a basic understanding of the structure and function of DNA and the concept of the gene.

PSO 2 : They will understand the inheritance pattern of human traits/diseases and types of chromosomal abnormalities.
PSO 3 : With the help of basic methods and techniques used in human genetics, the student will understand the importance of genetic counselling and genetic engineering.
PSO 4: Studies on Tribal education will be understood
PSO 5: Tribal Knowledge their customs and traditions in different parts of the world
PSO 6 : Become effective anthropologists, administrators and researchers.

B.Sc. MATHEMATICS PROGRAMME

B.Sc.Semester–I (NEP) DSC

CO 1: Learn to solve the system of homogeneous and non homogeneous linear equations in m variables by using concept of rank of matrix, finding eigen values and eigenvectors.

CO2: Sketch curves in Cartesian, polar and pedal equations.

CO3: Learn geometrical represent at ion and problem solving on MVT and Rolls theorems.

CO4: Get familiar with the techniques of integration and differentiation off unction with real variables.

CO5: Identify and apply the intermediate value theorems and L'Hospital rule and Trace the curves.

B.Sc.Semester–I (DSC) PR

CO1: Learn Free and Open Source Software (FOSS) tools for computer programming
CO2: Solve problem on algebra and calculus using FOSS softwares.
CO3: Acquire knowledge of applications of algebra and calculus through FOSS.

B.Sc.Semester–I (OEC)

CO1: Apply sets, relations, functions in business.
CO2: Use permutations and combinations.
CO3: Use matric esin commercial field.

CO4: Apply trigonometric function in real world.

B.Sc.Semester–I (SEC)

CO1: Understand the Scilab and apply command sin Scilab

CO 2: Use looping in Scilab

CO 3: Build Scilab functions

CO 4: Plot graphs

CO5: Develop skills to write programme in Scilab

B.Sc.Semester–II (NEP) DSC

CO1: Recognize the countable set and groups.

CO2: Link the fundamental concepts of groups and symmetries of geometrical objects.

CO3: Explain the significance of the notions of Cosets, normal subgroups and factor groups.

CO4: Finding the extreme values of functions.

CO5: Evaluate multiple integration.

B.Sc.Semester–II (DSC) PR

CO1: Learn Free and Open Source Software (FOSS) tools for computer programming

CO2: Solve problem on algebra and calculus using FOSS softwares.

CO3: Acquire knowledge of applications of algebra and calculus through FOSS R

B.Sc.Semester–II (OEC)

CO1: Integrate concept in business concept with function in gof global trade.

CO2: Understand the commercial arithmetic.

CO3: Apply decision-support tools to business decision making.

CO4: Apply knowledge of business concepts and functions in an integrated manner.

B.Sc BACHELORE OF COMPUTER APPLICATIONS PROGRAMME

BCA Semester–I (NEP) TH-1

CO1: Familiarize with fundamental concepts and computer programming.

CO2: Learn fundamental concepts of programming by developing and executing programs in C.

CO3: Focuses on the structured program.

CO4:Various constructs and their syntax.

BCA Semester–I (DSC) PR-1

CO1: Understand the basics of programming by executing the simple programming

CO2: Be able to design & execution of code.

CO3: Have practical knowledge of arrays, strings & functions

BCASemester–I TH-2

CO1: Be familiar with fundamentals of Linux operating system.

CO2: To learn the concepts of files and file organization.

CO3: To learn the mechanisms involved in ownership of files and file attributes

CO4: To gain the knowledge on editor and regular expressions

CO5: To know the techniques of shell programming.

BCASemester–I PR-2

CO1: Use basics of fundamental ability which are required again & again on daily basis to work on modern operating system.

CO2: Write use fulshell scripts,which enhance the use fulness of computers

CO3: Understand basics of various OS related concept like files, directories,Kerneletc.,

BCASemester–I (OEC)

CO1: To develop data handling ability of students.

CO2: To develop diagrammatic representation of the data.

CO3:To create awareness of descriptive statistics.

CO4:To acquire practical skills related to regression analysis.

BCASemester–I (SEC)

CO1: To teach the basics involved in data representation and digital logic circuit.

CO2: It includes the general concept in digital logic design.

CO3:To make better understanding of logic used in combinational circuit design.

BCASemester–II (NEP) TH-1

CO1: To impart the basic concepts of data structures and algorithms.
CO2: To familiar with data structural algorithms such as sorting & searching, stack & queue, linked list and trees.
CO3: To be familiar with some graph algorithms such as binary tree representation of tree and operations on trees.
CO4: To understand the basic concepts of tree traversal.
CO5:How to use basic datastructure for program implementation.

BCASemester–II (NEP) PR-1

CO1: Be able to design & implement list data structure using

i. Stack &Queue
ii. Linked list
iii. Singly & doubly linked list

CO2:Design & implement searching and sorting by applying various operations.

CO3: Design & implement basic operation on trees.

BCASemester–II (NEP) TH-2

CO 1: Define basic concepts of preposition logic and proofs.

CO2: Define sets,sequences,sum and summation.

CO3: Solve problems using counting techniques.

CO4:Solve problems using advance counting technique.

CO5 :Introduction to induction & recursion and writing algorithm using recursion.

CO6:Studying the properties of relations.

CO7:Describe the origin of graph theory, illustrate different types of graphs.

CO8:Categorize trees

BCASemester–II (NEP) PR-2

CO1: Design &implement quantification &arithmetic series.

CO2: Design &implement of sets by applying various operations.

CO3: Implement the recursion operation on Factorial, Fibonacci series, tower of Honai, Binary search &Merge sort.

BCASemester–II (OEC)

CO1: To develop accounting ability of students.
CO2: To teach the basics involved in creating book of account,ledgers,voucher system.

CO3: To make better understanding of bank reconciliation statement and trail balance.

CO4:To explore the basics of stock groups.

CO5:To study the preparation off in alaccounts of trading, loss account and balance sheet.

CO6:Tomakethebetterunderstandingofprovisionsofcompaniesact.

M.Sc. MATHEMATICS PROGRAMME

Paper Code and Name: PG83T101: Algebra-I	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. To simplify algebraic expression, using commutative, associative and distributive properties. CO2. Identify the types of group. CO3. Understand the concepts of Sylow's theorem. CO4. Explain and demonstrate accurate and efficient use of advanced techniques. CO5. Prove and explain the concepts from advance algebra	

Paper Code and Name: PG83T102: Real Analysis	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Describe the real line as a complete ordered field and prove the properties of real numbers. CO2. Understand interior point, limit point, closed set, open set, compact set and prove their properties. CO3. Explain the basic theory of metric space and its related concepts such as continuity, completeness, compactness and connectedness and prove their results in the metric space. CO4. Apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis. CO5. Determine the Riemann integrability of a bounded function and prove theorems concerning integration.	

Paper Code and Name: PG83T103: Topology-I	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand to construct topological spaces using general properties of open sets, closed sets, neighborhoods, basis and sub-basis and from metric spaces. CO2. Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various characterizations of topological spaces. CO3. Use continuous functions and homeomorphisms to understand structure of topological spaces CO4. Understand the concepts and properties of the compact, locally compact and connected topological spaces.	

Paper Code and Name: PG83T104: Differential Equations-I	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Solve ODE with constant coefficients. CO2. Apply Method of variation of parameters. CO3. Apply Strum comparison theorem. CO4. Apply Picard's method for solution of IVP. CO5. Apply Laplace Transforms to solve ODE.	

Paper Code and Name: PG83T105: Discrete Mathematics	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand Boolean algebra CO2. Apply Coding theory CO3. Understand the Basic Graph theory CO4. Check traversability of a network.	

Paper Code and Name: PG83T106: Computer Programming	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Develop the algorithm. CO2. Understand the computer programming language. CO3. Develop the skill for C-Programming. CO4. Understand the data structure in the programme.	

Paper Code and Name: PG83T107: Operations Research	Teaching Hours:
	50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Formulate Linear Programming problems. CO2. Apply methods to solve LPP CO3. Understand Transportation Problems and Assignment Problems. CO4. Compute Game Theory Problems. CO5. Use Queuing Theory for Stochastic Process and Markov Chain.	

M.A. / M.Sc. MATHEMATICS

II – SEMESTER

CORE PAPERS:

Paper Code and Name: PG83T201: Algebra-II	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand rings, ideals, field and Euclidean domain. CO2. Find the roots of polynomials. CO3. Understand the characteristic of rings and fields. CO4. Understand the fundamental concepts of homomorphism and their role in mathematics. CO5. Apply uniqueness theorem.	

Paper Code and Name: PG83T202: Complex Analysis-I	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Discuss the convergence of power series expansions. CO2. Use Cauchy's Theorem, and Cauchy's Integral Formulae to solve contour integration. CO3. Express an analytic function in terms of power series in the domain of analyticity. CO4. Understand the characteristic of a complex function in the neighbourhood. CO5. Acquire the skill of contour integration to evaluate complicated real integrals via residue calculus. CO6. Apply Rouches theorem to determine the number of zeros and poles of a meromorphic function in the given domain.	

Paper Code and Name: PG83T203: Linear Algebra	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand Vector spaces CO2. Apply Linear Transformations CO3. Compute eigenvalues and eigenvectors CO4. Formulate the diagonalization of matrices.	

Paper Code and Name: PG83T204: Functions of Several Variables	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand inner product space CO2. Apply metric space CO3. Discuss convergence of sequences in R^n CO4. Apply Inverse and Implicit Function Theorem in R^n	

Paper Code and Name: PG83T205: Differential Equations-II	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand series solution about ordinary and regular singular points. CO2. Apply Power and Frobenius methods. CO3. Understand variable coefficient ODE. CO4. Understand orthogonality of special functions.	

Paper Code and Name: PG83P206: Programming Lab-I	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Develop C-language codes. CO2. Develop Programme to solve mathematical problems. CO3. Compute scientific problems with C-Programming. CO4. Analyze obtained data.	

ELECTIVE PAPER:

Paper Code and Name: PG83T207A: OEC-Fuzzy Sets and Fuzzy Logic	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand Fuzzy sets and fuzzy logic. CO2. Apply operations on fuzzy sets. CO3. Understand fundamentals of computers. CO4. Apply ability logically and arithmetically for quantitative aptitude	

M.A. / M.Sc. III SEMESTER

CORE PAPERS:

Paper Code and Name: PG83T301: Measure Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand measure of a set and measurable sets CO2. Understand measurable functions. CO3. Approximating measurable functions by specific functions. CO4. Compute Lebesgue integrals.	

Paper Code and Name: PG83T302: Complex Analysis-II	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand the characteristic of analytic functions. CO2. Understand conformal mapping to compute geometric mappings. CO3. Extend analyticity continuation to analytic function and its natural boundary. CO4. Discuss convergence of a sequence of complex functions. CO5. Understand the effect of uniform convergence.	

Paper Code and Name: PG83T303: Topology-II	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand to construct the separation axioms using open and closed sets. CO2. Know the concepts of convergence and compactification. CO3. Demonstrate knowledge and understanding of metric spaces. CO4. Apply theoretical concepts in topology to understand the real world applications.	

Paper Code and Name: PG83T304: Differential Geometry-I	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to:	

CO1. Understand Euclidean space, Tangent vectors, Vector fields.
CO2. Find directional derivatives.
CO3. Obtain dot product in E^3 and dot product of tangent vectors.
CO4. Understand curvature and torsion of a unit speed curve.

Paper Code and Name: PG83T305: Numerical Methods	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand error analysis. CO2. Apply Numerical methods for solving nonlinear equations. CO3. Use interpolation and extrapolation for Numerical differentiation and Integration. CO4. Apply multistep methods for solving Initial Value Problems (IVP)	

Paper Code and Name: PG83P306: Programming Lab-II	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand for loop to solve matrix related problems. CO2. Solve the diversified solutions such as arithmetic operations on matrices and finding the norm of a matrix. CO3. Solve system of equations by implementing C-Programming. CO4. Handle runtime error during execution.	

ELECTIVE PAPER:

Paper Code and Name: PG83T307A: OEC-Discrete Mathematical Structures	Teaching

	Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand concept of Mathematical induction CO2. Perform operations on sets and Relations CO3. Apply counting principle. CO4. Understand tree network. CO5. Solve data interpretation problems.	

M.A. / M.Sc. IV SEMESTER

CORE PAPERS:

Paper Code and Name: PG83T401: Functional Analysis	Teaching Hours: 50

Course Outcomes (COs)
After completing this paper, the students will be able to: CO1. Understand concept of Normed linear spaces, Banach spaces and Hilbert spaces. CO2. Compute the dual spaces of certain Banach space and Hilbert space CO3. Find the orthonormal vectors CO4. Obtain self-adjoint and normal operators.

Paper Code and Name: PG83T402A: Fuzzy Topology	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Construct the appropriate fuzzy sets using membership function of uncertain problems. Co2. Understand the differences in crisp sets and fuzzy sets. CO3. Construct the fuzzy numbers corresponding to uncertain and imprecise collected data. CO4. Create new fuzzy topological spaces by using fuzzy sets.	

Paper Code and Name: PG83T402B: Dimension Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1.Understand local finiteness and point-finiteness of a family of subsets of a topological space. CO2. Identify paracompact spaces and its related spaces. CO3. Discuss perfect function. CO4. Understand Local dimension Theory.	

Paper Code and Name: PG83T402C: Relativity	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Represent Lorentz group, Time dilation, Space contraction. CO2. Understand contraction symmetric and skew symmetric tensors. CO4. Understand tensor algebra and calculus in curved space-time. CO4. Derive Einstein field equation.	

Paper Code and Name: PG83T402D: Ring Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to:	

CO1. Understand the characteristics of ring and ideal. CO2. Discuss Modules. CO3. Apply Schur's lemma and Jordan-Holder theorem. CO4. Determine ideals in matrix ring. CO5. Understand Noetheriam and Artinian rings.

Paper Code and Name: PG83T402E: Galois Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand characteristic of a field and splitting field of a polynomial.	

CO2. Understand algebraic extension, algebraic closure and algebraically closed field. CO3. Apply Artin's theorem, Hilbert's theorem and Artin – Schreier's theorem. CO4. Discuss Galois groups of quadratic, cubic and quartic polynomials.

Paper Code and Name: PG83T402F: Number Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand residue systems and linear congruences. CO2. Discuss Diophantine equations. CO3. Discuss primitive roots with modulo p. CO4. Understand quadratic congruences. CO5. Apply Euler's partition theorem.	

Paper Code and Name: PG83T403A: Graph Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Discuss factorization and coverings of graphs. CO2. Understand the planarity of graphs. CO3. Apply coloring of graphs. CO4. Discuss spectra of graphs CO5. Discuss domination parameters of graphs.	

Paper Code and Name: PG83T403B: Differentiable Manifolds	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand the charts and atlases. CO2. Discuss pull back functions, tangent vectors and tangent spaces. CO3. Understand the dual of the differential map. CO4. Discuss Tensor product of finite dimensional vector spaces. CO5. Understand torsion and curvature tensors.	

Paper Code and Name: PG83T403C: Nevanlinna Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand entire and meromorphic functions. CO2. Apply Poisson –Jenson's formula for meromorphic functions. CO3. Discuss Proximity function, Counting function and Characteristic function. CO4. Apply Picard's theorem and Borel's theorem to prove second fundamental theorem of Nevanlinna theory and uniqueness theorem.	

Paper Code and Name: PG83T403D: Geometric Function Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Discuss conformal mapping, Unit disc transformation and normal families. CO2. Discuss Dirichlet's problem. CO3. Discuss power series with finite radius of convergence. CO4. Apply Area theorem, Distortion theorem, Bieberbach theorem.	

Paper Code and Name: PG83T403E: Group Theory	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand groups, subgroups, normal subgroup, factor group. CO2. Apply Cauchy's theorem and Sylow theorem. CO3. Discuss solvable groups. CO4. Discuss Automorphism groups, semidirect products and factor sets. CO5. Discuss infinite abelian groups, torsion, reduced groups and finitely generated abelian	

Paper Code and Name: PG83T403F: Commutative Algebra	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand rings, subrings, ideals, quotient rings. CO2. Apply operations on ideals. CO3. Understand modules, submodules and quotient modules. CO4. Discuss properties of rings.	
CO5. Understand Noetherian module. Artinian module. Modules of finite length.	

Paper Code and Name: PG83T404: Differential Equations-III	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand critical and simple critical points of linear and nonlinear system.	
CO2. Discuss periodic solutions. CO3. Understand classification of second order PDEs. CO4. Understand the solution of fundamental PDE's.	

Paper Code and Name: PG83T406: Integral Transforms and Integral Equations	Teaching Hours: 25
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Understand linear integral equations of the first and second kind. CO2. Discuss solution by successive substitutions and successive approximations.	
CO3. Apply Laplace Transform techniques to understand real world problems. CO4. Discuss Fourier series. CO5. Apply Fourier transform techniques to solve the partial differential equations.	

Paper Code and Name: PG83P407: Programming Lab-III	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Write and execute C-programming for numerical methods. CO2. Discuss sub routing of C-programming.	
CO3. Discuss arrays, functions and strings in mathematical problems. CO4. Handle possible errors during program execution.	

Paper Code and Name: PG83T408: Project Work	Teaching Hours: 50
Course Outcomes (COs)	
After completing this paper, the students will be able to: CO1. Survey literature. CO2. Understand real world problems through mathematical modeling. CO3. Formulate the problem and apply the suitable techniques for solution. CO4. Write the dissertation.	

M.Sc. CHEMISTRY PROGRAMME

COURSE OUTCOMES

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Student would learn to separate and determine the metal ions using gravimetric and volumetric methods such as

- Fe(II) + Ni (II)
- Fe(II) + Cu(II)

- ❖ Zn(II) + Cu(II)
- ❖ Zn(II) + Ni(II)

CO 2: Students are also exposed to synthetic methodologies of the preparation of coordination compounds.

M.Sc. Semester – I

Inorganic Chemistry□II

CO 1: Synthesis, properties and structures of compounds of non-transition elements such as B, Si, P, N, S, Halogens and Noble gases.

CO 2: Structure and Properties of interhalogen compounds, oxyacids.

CO 3 : Synthesis, structure and bonding in transition metal organometallic compounds.

CO 4 : Classification of molecules on the basis of point groups.

CO 5: Applications of group theory in chemical bonding and spectroscopy (IR and Raman).

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Students would learn semi- micro qualitative analysis of salt mixtures, containing three cations and two anions viz. W, Pb, Cu, Cd, Mo, As, Fe, Cr, Ti, Zr, Ce, V, Ni, Zn, Co, Ca, Sr, Ba, Mg, K, Na, Li and halides, nitrate, sulphate, phosphate, oxalate, borate, acetate.

M.Sc. Semester – I

Applied Inorganic Chemistry

CO 1: Separation techniques such as ion exchange and solvent extraction.

CO 2: The principles and classification of chromatographic methods such as paper, thin layer, column and liquid chromatography.

CO 3 : Analysis of data using different techniques.

CO 4 : thermal methods of analysis

CO 5: The essential role of trace metals in biological processes.

CO 6: The transport and storage of dioxygen in Heame proteins.

CO 7: The structure and functions of Heamoglobin, Myoglobin, Hemocyanin etc.

CO 8 : The structure and functions of metalloproteins in electron transport processes.

CO 10 : The principles of transition metal coordination complexes in understanding functions of biological systems.

CO 11: The role of metals in medicines.

M.Sc. Semester – I

Advanced Coordination & Bioinorganic Chemistry

CO 1: To interpret the electronic spectra and magnetic properties of coordination compounds.

CO 2: Indetail about the reaction mechanism of Inorganic metal complexes and to understand the substitution reaction mechanism along with the involvement of reactive intermediates.

CO 3 : Also, to understand their structure and reactivity through various inorganic reactions. This course gives idea about the way in which a reaction proceeds and its kinetics, especially for inorganic substitution reactions.

CO 4 : The essential role of trace metals in biological processes.

CO 5: The transport and storage of dioxygen in Heame proteins.

CO 6: The structure and functions of Heamoglobin, Myoglobin, Hemocyanin etc.

CO 7: The structure and functions of metalloproteins in electron transport processes.

CO 8 : The principles of transition metal coordination complexes in understanding functions of biological systems.

CO 9: The role of metals in medicines.

M.Sc. Semester – I

Molecular Spectroscopy

CO 1: apply IR, NMR, UV-Vis, EPR, NQR and Mossbauer spectroscopie techniques in solving the structures of organic and inorganic compounds.

CO 2: interpret the spectroscopic data of unknown compounds.

M.Sc. Semester – I

Selected topics in Inorganic Chemistry

CO 1: Preparation, structure and bondingof metal nitrosyls,

CO 2: Chemistry of dinitrogen and dioxygen complexes.

CO 3 : analysis of pesticides and insecticides.

CO 4 : analysis of fuel and fertilisers.

CO 5: Chemistry of lanthanoids and actinoids

CO 6: Flurescence, phosphorescence and photochemistry of transition metal complexes.

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Students are exposed to different synthetic methodologies of coordination compounds.

CO 2: Students are made to understand the characterization of prepared complexes by, various analytical methods viz. elemental analysis, metal percentage determination, chloride and sulphate determination etc.

CO 3 : Student would learn to establish the composition of coordination compounds.

CO 4 : Students are trained to scan, IR, NMR, UV-Vis spectra of prepared compounds and to interpret the observed spectra.

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Students are exposed to use the instruments such as, colorimeter, potentiometer, conductometer for the determination of metal ions/halides.

CO 2: Students would learn to determine the composition of coordination complexes by colorimetry.

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Students are exposed to the analysis of food and drug by analysing.

- iodine in common salt.
- calcium in milk powder.
- vitamin-c in tablets.
- iron in tablets.
- aspirin content in tablets.

M.Sc. Semester – I

Instrumental Methods of Analysis.

CO 1: atomic absorption and emission spectroscopy

CO 2: molecular luminescence spectroscopy

CO 3 : electrophoresis and gel filteration

CO 4 : coloumetry and amperometry

CO 5: ion selective electrodes

CO 6: thermal methods of analysis

CO 7: polarography, voltammetry and stripping analysis

CO 8: light scattering methods

M.Sc. Semester – I

Material, Nuclear and Environmental Chemistry

CO 1: nuclear reactions and use of nuclear energy in generating electricity.

CO 2: safety measures to be adopted in handling radioactive materials.

CO 3 : Composition of atmosphere.

CO 4 : Various types of pollutants related to soil, water and air.

CO 5: Use of chemistry in the betterment of society.

CO 6: Nanomaterials and electron microscopes.

CO 7: Synthetic methods for nanomaterials and carbon nanotubes.

CO 8: Principle& types of LED, LCD

CO 9: The advantages and disadvantages of LED and LCD.

CO 10: Properties of glass, ceramics and clay products.

M.Sc. Semester – I

Organometallic and Solid State Chemistry

CO 1: Metal ions as catalysts and their importance in synthetic procedures.

CO 2: Catalysts in industrial applications such as, Wacker's process, Hydroformylation, Monsanto acetic acid synthesis, Water gas shift reaction, Fischer-Tropsch synthesis,

Alkene polymerization, etc.

CO 3 : Structures of solids.

CO 4 : Optical properties of solids and their applications.

CO 5: Magnetic properties of solids and their applications.

CO 6: Phenomenon of superconductivity and its applications.

CO 7: Alloys and phase diagrams.

M.Sc. Semester – I

ProjectWork

MProject work is carried out by the students under the guidance of teachers in the department. A topic of research is chosen by the students, in consultation with the respective mentors.

CO 1: Students gather a complete knowledge in carrying out the research, which would help them in their higher studies (such as Ph.D programme) and in industrial career.

Student may get a publication on successful completion of his/her project work.

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Cyclic voltammetric method.

CO 2: Determination of fluoride content and acidity of water.

CO 3 : Ion exchange methods for purification of water.

CO 4 : Importance of TG–DTA in analysis of compounds.

CO 5: Analysis of backing soda.

CO 6: Determination of iron in food samples.

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: colour, pH, and temperature.

CO 2: dissolved oxygen, COD, BOD and oxidising power.

CO 3 : chloride and sulphate ions.

CO 4 : calcium, magnesium ions.

CO 5: temporary and permanent hardness.

CO 6: Analysis of heavy metals in waste water and sea water.

CO 7: Acid content in soft drinks.

CO 8: Preparation and characterization of nanoparticles.

CO 9 : Analysis of glass and ceramics

M.Sc. Semester – I

Lab Course in Inorganic Chemistry

CO 1: Determination of total acidity in beverages.

CO 2: Analysis of antacids.

CO 3 : Analysis of tablets.

CO 4 : Analysis of milk powder.

CO 5: Analysis of cement.

CO 6: Analysis of urine.

M.Sc. Semester – I I

ORGANIC CHEMISTRY-I

CO 1: The localized chemical bonding helps the students to understand the hybridization bond distance, bond angles, bond energies etc..to the modern ideas in chemical technology.

CO 2: The study of reaction mechanism impart the internal energy changes in reaction as well as nature of the intermediate in the organic reactions.

CO 3 : In the study of organic reactions the exploration of stereochemistry and conformational analysis gives the ideas of structure of organic molecules and their enantiomers, diastereomers,e pimers etc.. to the student to get the depth knowledge about the organic molecules.

CO 4 : To study the internal energetic π electrons in the aromatic compounds the gives the ideas regarding nature of organic reactions to the modern temples called as industry

to understand by the students.

CO 5: To overall view the studies of concepts in the organic chemistry reveals that the most exciting organic reactions and their products called organic molecules are exploited in various industries to explore the knowledge to the students.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY-I

CO 1: The theoretical study of the organic reactions are proved by the synthesis of targeted organic molecules for further application in various industries.

CO 2: The students shall understand the imaginary organic reactions through the synthetic study of internal mechanistic transformations of one organic molecule to the another organic molecule.

M.Sc. Semester – I I

ORGANIC CHEMISTRY-II

CO 1: The students will be able to understand the aliphatic and aromatic electrophilic substitutions and nucleophilic reaction mechanism. This gives an insight into the organic reactions.

CO 2: Advanced stereochemistry course makes the students to differentiate the prochidal and achiral molecules, enantiomers, homotopic and diasterotopic ligands.

CO 3 : This course also helps the students to classify and understand the reactions of mono and disaccharides.

CO 4 : The students are made aware of classification an d reactions of five membered heterocycles.

M. Sc. Semester – I I

LAB COURSE ORGANIC CHEMISTRY

CO 1: The students understand the quantitative estimation of acid, amide , ester and glucose.

CO 2: Students will understand how the molecular weight is determined by the base hydrochloride method.

CO 3 : The chemical transformation of organic compounds to the products by the preparation of derivative thus trains the students about synthetic organic chemistry.

M.Sc. Semester – I I

CHEMISTRY OF NATURAL PRODUCTS

CO 1: The students understand the important steroidal harmones and their structure synthesis stereochemistry and spectral features.

CO 2: The students will be aware of natural alkaloids and terpenes which are being exploited inpharmaceutical industry and perfumery industry along with photochemical synthesis of some important narcotic alkaloids.

CO 3 : In the ongoing teaching, the students are enable to make more focus on Natural fatty acids and Prostaglandins which are having remarkable applications in various oleochemical and pharmaceutical industry,

CO 4 : This course also helps the students to understand the biomolecules such as nucleosides, nucleotides and peptides with amino acid sequences.

M.Sc. Semester – I I

Lab Course in Organic Chemistry

CO 1: The binary mixture analysis helps the students to understand the nature, physical properties and functional group of the unknown organic compounds.

CO 2: This course also helps the students to know about separation and purification techniques.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: The chemical transformations of organic compounds to the other products by preparation of derivatives which will train the students in the synthetic organic chemistry.

CO 2: The students get the training in chromatographic techniques particularly inTLC and column chromatography.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: The students will learn the extraction methods for natural products and isolation methods.

CO 2: Students will learn how to assign the structure of natural products by spectroscopic methods.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: **Isolation, Characterization of Natural products:**

1. Cysteine from human hair.
2. Hesperidine from orange peel.
3. Caffeine from tea leaves.
4. Myristine from nutmug.
5. Piperine form black pepper.
6. Azaleic acid from castor oil.
7. Lycopene from tomato.

M.Sc. Semester – I I

ORGANIC SYNTHESIS

CO 1: The students we able to understand the retrosynthetic analysis to get a target and helps to make them for the research work.

CO 2: The study of newer reagents and reactions make the students to recent development in the synthesis of most potential biomolecules.

M.Sc. Semester – I I

PHOTOCHEMISTRY AND PERICYCLIC REACTIONS

CO 1: The students are able to understand the classifications and features of pericyclic reactions and are being useful in research work.

CO 2: Students understand the molecular rearrangements, mechanistic pattern etc.

CO 3 : The biochemical mechanism is useful for students to study the bio- chemical reaction associated with enzymes and vitamins.

M.Sc. Semester – I I

HETEROCYCLIC AND MEDICINAL CHEMISTRY

CO 1: The students are made aware of the classification, nomenclature and reactions of three, four and seven membered heterocycles.

CO 2: The students are able to understand transformations, photochemistry and rearrangements of heterocycles.

CO 3 : This course also helps to the student to study modern theories of drug actions and SAR studies and chemotherapy.

M.Sc. Semester – I I

PROJECT WORK

CO 1: The students will be exposed to the spectroscopic methods which will help them to synthesize the previously unknown molecules.

CO 2: The outcome of research work is being published in the international journals of repute which makes students to inspire in the future research field.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: The students will be trained in purification methods by column chromatographic techniques

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: The Ternary mixtures analysis helps the students to study the nature, physical properties and functional group of the unknown organic compounds.

CO 2: This course also helps the students to know about separation and purification techniques.

M.Sc. Semester – I I

LAB COURSE IN ORGANIC CHEMISTRY

CO 1: The chemical transformations of organic compounds to the other products by preparation of derivatives which has trained the students in the synthetic organic chemistry.

CO 2: Further students are beings exposed to prove the structure of organic molecules by spectroscopic methods.

M.Sc. Semester – I II

PHYSICAL CHEMISTRY: QUANTUM CHEMISTRY, REACTION KINETICS, THERMODYNAMICS & ELECTROCHEMISTRY AND INTRODUCTION TO POLYMERS

CO 1: This course helps students a better understanding to describing and predict the behaviour of matter at atomic and molecular level.

CO 2: At the end of this course, the students will learn, the kinetics and mechanism of reactions take place and also the significance of activation parameters.

CO 3 : In this course, the students will learn, the energy of activation and entropy of a chemical reaction

CO 4: This course provides the fundamentals of polymers, their synthesis and degradation.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This course is designed in such a way that it provides a bridge to the students and attempts to make a link between their undergraduate experiments to master level.

CO 2: The aim is to make students gain familiarity with a variety of physicochemical measurement techniques of some basic physical chemistry experiments like spectrometry, conductometry, potentiometry, law etc.

CO 3 : Also familiarize the students with general information and chemical mathematics, calibration of glassware's, concentration measures of solutions and treatment of experimental data

M.Sc. Semester – III

PHYSICAL CHEMISTRY□II MOLECULAR SPECTROSCOPY, ELECTRONIC SPECTROSCOPY, THERMODYNAMICS, REACTION KINETICS AND INTRODUCTION TO POLYMERS

CO 1: This course demonstrate the development of physical science.

CO 2: This course describes the arrangement of atoms and molecules in crystalline solids and also exhibits how crystal line solids show strong diffraction patten when exposed toX-rays,neutronandelectrons.

CO 3 : This course helps to understand the solvent and ionic strength effects on kinetic of solutions and also about Stopped-Flow technique.

CO 4: This course helps in understanding the basics of redox reactions at surface of the electrode and also helpful in understanding the electric double layer at inter-phase region between the electrode and electrolyte.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: It consists of several experiments that use different techniques to explore fundamental concepts of solubility of a solute, cyoscopic determination of the degree of dissociation of agiven strong electrolyte, spectro photometry, conductance. Potentiometry,viscometry,etc.

CO 2: This course also helps the students to learnt hermal behaviour of crystalline and amorphous polymers and also synthesis and kinetics of polymerization

M.Sc. Semester – III

QUANTUM MECHANICS, DIFFRATION & GROUP THEORY

CO 1: This course covers the application and solution of the Schrodinger equation in spherical polar coordinates and Schrodinger's equation for atoms of many electron systems.

CO 2: Element alanalysis by emission spectroscopy

CO 3: This course explains the locations of atoms and molecule sin crystalline solids and also exhibits how crystalline solids show strong diffraction pattern when exposed to x-rays, neutrons and electrons.

CO 4: Group theory helps to know the structure and behaviour of molecules and crystals depending on their different symmetry.

M.Sc. Semester – III

SPECTROSCOPY & VOLTAMMETRY

CO 1: This course covers the theory that allows us to deduce the bond lengths and bond angles from rotational spectra experiments. Vibrational spectra provide information on bond lengths, bond strength and molecular geometry.

CO 2: NMR Technique is a powerful tool for the elucidation of molecular structure. Also,i th elpsustogainin sight into bonding and molecular structure.

CO 3 : The EPR spectroscopy is help fu line lucidating the structures of paramagnetic complexes and CD and ORD spectra are useful in gross structural determination of organic compounds.

CO 4: Voltametric techniques are useful in understanding the type of reaction sate lectrode surface and quantitative determination of electroactive compounds.

M.Sc. Semester – III

STATISTICAL MECHANICS AND POLYMER CHEMISTRY

CO 1: This course provides methods for calculation of microscopic properties of many particle systems interms of microscopic properties using statistical laws.

CO 2: This course provides the information of properties and applications of polymers in industry and biomedical field and also how electro chemical cell can be used to obtain the power.

CO 3 : This course helps the students to understand how the polymer membranes are used in water and solvent purification technique and also provides utilization of information in various fields of science and Technology.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This lab course is designed to expand and deepen the knowledge int he variety of experimental methods presented in physical chemistry laboratory previously.

CO 2: This lab is based on several sets of advanced experiments on various topics in physical chemistry including viscosity, verification of the Debye-Huckel-Onsagr equation conduct o metrically, reaction kinetics, potentio metricest imati on of a mixture of halides, cryoscopy, pH-metry, spectro photometric estimation of metalion.etc.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This lab course is designed with the aim that student demonstrates capabilities such as experiment design and implementation with an emphasis on safety rules.demonstrating measurement capabilities, analysis and discussion ,developing independent thinking abilities.

CO 2: This lab is based on the following set of advanced experiments on various to pics in physical chemistry including adsorption, conductometric titration of moderately weak acid with strong base,determination of degree of hydrolysis of ureahydrochloride by studying kinetics of hydrolysis of methyl acetate using HCl and equi normal hydrochloride solutions, acid and based issociation constants of an amino acid and its isoelectric point,etc.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This lab course is designed to provide students with idea of scientific activity.

CO 2: This laboratory is based on several sets of experiments covering a wide range of topics in physical chemistry such as solubility study, the effect of addition of an electrolyte on the solubility of an organic acid. construction of phase diagram of three component system. studying the kinetics of saponification of ethylacetate by conductance method. determination of step wise heat of neutralization of a poly basic acid. reactionkineticsofH2O2andHI:clockreaction,etc.

M.Sc. Semester – III

QUANTUM MECHANICS AND SOLID-STATE CHEMISTRY

CO 1: This course describes the quantum mechanical treatment of the molecules by using different theories.

CO 2: The course solid state chemistry provides the properties and applications of solids.

M.Sc. Semester – III

CATALYSIS AND POLYMER CHEMISTRY

CO 1: This course describes there action kinetics of homogeneous and heterogeneous catalyzed reactions and industrial applications.

CO 2: This course gives the different methods available for the polymer weight determination.

CO 3 : This unit provides the information regarding thermal characterization techniques and method of polymer fabrication and synthesis of polymers.

M.Sc. Semester – III

SPECTROSCOPY AND MICROSCOPY

CO 1: The Raman spectroscopy is commonly used in chemistry to provide a structural fingerprint by which molecules can be identified.

CO 2: The mass spectrometry is helpful indetermining the structure of a compound by observing its fragmentation and its uses in analytical laboratories.

CO 3 : Photoelectron spectroscopy involves the study of the electronic structure of molecules. Moss bauer spectro scopy is used to study nuclear structure with the absorption and re emission of gamma rays.

CO 4: Micro scopic technique make it possible to assess the morphology, composition, physical properties, and dynamic behaviour of materials.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This course is planned to familiarize and introduce the students to modern laboratory instrumentation and experimental techniques in physical chemistry.

CO 2: It consists of a number of experiments that use different techniques to explore fundamental concepts in variation of solubility of an organic acid, studying the kinetics of saponification of ethylacetate by conduct ance method and hence determine the rate constant, thermo chemistry. reaction kinetics, etc.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This course is intended to acquaint the students with the practice of experimental physical chemistry and to provide an introduction to this area of modern scientific activity.

CO 2: This laboratory is based on several sets of experiments covering a wide range of topics in physical chemistry such as comparison of clean sing power of two detergent samples, construction of phase diagram of three component system, cryoscopy, mobility of ions, influence of ionic strength on the solubility of $CaSO_4$ and determination of its thermo dynamic solubility product and mean ionic activity.

M.Sc. Semester – III

LAB COURSE IN PHYSICAL CHEMISTRY

CO 1: This lab course is designed so that the students learn how to describe experimental results and analyse them quantitatively and develop the ability of scientific communications through written reports and frontal presentations

CO 2: The experiments include, determination of molecular surface energy and association factor,determination of formula of the complex for med between copperions and ammonia by distribution method, kinetics of oxidation of 2-propanol by chromic acid and determination of Transport number of Ag^+ and NO-insolution(concentration cells).

M.Sc. Semester – IV

ANALYTICAL CHEMISTRY

CO 1: The classification of analytical techniques, classical quantitative techniques (volumetry and gravimetry) with regard to regard to minimization of errors, mechanism of precipitation and factors influencing precipitation, coprecipitation and post- precipitation, usage of organic reagents in gravimetric analysis,

CO 2: Selection of suitable indicators in various titrimetric analysis such as neutralization reactions, redox reactions, complexometric reactions and precipitation reactions. The application of these titrimetric methods for inorganic analysis.

CO 3 : The classification and theory of various chromatographic methods such as column chromatography, TLC, HPLC, GC and Ion-exchange chromatography.

CO 4: The applications, advantages and limitations of various chromatographic techniques.

CO 5: Use of solvent extraction method in the quantitative determination of metal ions

M.Sc. Semester – IV

LAB ANALYTICAL CHEMISTRY

Organic Chemistry Practical

CO 1:

- Quantitative analysis
- Titrimetric Estimation of amino acids.
- Estimation of glucose by Bertrand's method.
- Estimation of keto group.
- Iodine value of oil (Chloramine - T method)
- Estimation of Nitro group by reduction using SnCl2. Qualitative Analysis

M.Sc. Semester – IV

Instrumental Methods of Analysis.

CO 1: Principles, theory, instrumentation and analytical applications of various optical methods such as AAS, emission spectroscopy and molecular luminescence spectroscopy.

CO 2: Principles, theory, instrumentations and analytical applications of coulometry, amperometry, polarygraphy, electrophpresis, electrogravimetry, supercritical fluid chromatography, voltammetry, nephelometry and turbidometry besides their advantages of each method.

CO 3 : The types and importance of ion-selective electrodes in selective determination.

CO 4: The use of thermal methods such as TGA, DTA, and DSC for characterization of inorganic compounds, polymers, pharmaceutical etc.

M.Sc. Semester – IV

MOLECULAR SPECTROSCOPY

CO 1: Importance of interaction of electromagnetic radiation with matter.

CO 2: The principle, theory and instrumentation of various spectroscopic techniques.

CO 3 : Application of different spectroscopic techniques (UV-Vis, IR, NMR, EPR,

Mossbauer) in the structural elucidation of organic/Inorganic compounds, biomolecules etc.

M.Sc. Semester – IV

Selected Topics in Analytical Chemistry-I.

CO 1: Classification, properties and analytical and biological applications of different types of sensors

CO 2: The importance of various elements in biological systems, their structural and functional roles such as dioxygen transportation and storage, electron transfer in different processes, metalloenzymes etc.

CO 3 : Use of metal complexes in medicine.

CO 4: The overview, principles and types of automated systems and their advantages and disadvantages in the analysis.

CO 5 : Use of computer software programmes in chemistry for better understanding.

M.Sc. Semester – IV

Lab course in Analytical Chemistry I

CO 1: The hands on experience of various analytical instruments such as nephlometer/turbidometer (sulphate/phosphatecontent in ground water) and colorimeter (Ti4+ using H2O2 and composition of Fe(phen)3]2+), complexometric titration using EDTA (calcium in Milk and Fe2+/Fe3+ in a mixture), and Ion-Exchange chromatography (chloride and Bromide; Cadmium and zinc). Upon acquiring the required knowledge as well as practical skills, the students can extend it for the analysis of different metal ions in different samples including soil, environmental, pharmaceutical etc samples.

M.Sc. Semester – IV

Lab course in Analytical Chemistry-II

CO 1: The hands on experience inpaper& column chromatography (separation of amino acids and plant pigments), conductometric titrations, visual and potetiometric titrations (iron in razor blade and pharmaceuticals), complexometric titrations (Al and Mg inantacid) and precipitation titration (saccharin in Tablets). Such knowledge is helpful to students to analyse a variety of samples in quality control/ quality assurance.

M.Sc. Semester – IV

Lab course in Analytical Chemistry – III

CO 1: Polarimeter used to study the optical isomers

CO 2: Potentiometer used to analyze the halide mixture and iron

CO 3 : Conductometer used to analyze halide mixture and sulphate

CO 4: pH meter used to determine the strength of acids and bases

CO 5 : spectrophotometer used to analyze the water sample

M.Sc. Semester – IV

Pollution and Analysis

CO 1: causes for different types of pollution (soil, air, water, radiation and noise)and their hazardous effects on life and solutions for minimization of pollution.

CO 2: Different methods of analysis to understand extent of pollution by determining pH organic matter and trace metals in soil; hardness, fluoride and dissolved oxygen in water; measurement of noise and analysis of radionuclides.

CO 3 : Analysis of pollutants present in soil, water & air, and radioactive substances.

CO 4: Determination of Chemical Oxygen Demand(COD) and Biological Oxygen Demand(BOD) using laboratory techniques.

M.Sc. Semester – IV

Quality control, Analysis of Food, Beverages and Pharmaceuticals

CO 1: Basic concepts of quality control and quality assurance

CO 2: Importance of quality control in drugs, pharmaceuticals and raw materials

CO 3 : Law related case studies of quality control section in various industries

CO 4: Classification and analysis of beverages, food preservative, adulterants, drugs, pharmaceuticals, dairy products and edible oils.

M.Sc. Semester – IV

Selected Topics in Analytical Chemistry – II

CO 1: Analysis of various biomedical samples, ores, minerals, fertilizers, metals, alloys and cement.

CO 2: Types, composition and purification methods of crude oil.

CO 3 : Analysis of products and residues producedbin refinery process of crude oil

CO 4: Usage of various analytical techniques in the evaluation of crude oil and its product.

M.Sc. Semester – IV

PROJECT WORK

CO 1: During the project work, students will find new problems in the frontier areas of Research and work on them either in Industry/other educational instituions/R&D organization/parent institution by applying the theoretical and practical knowledge gained during their M.Sc Course. This is the platform wherein the student can make use of his novel ideas to implement for the betterment of the society

M.Sc. Semester – IV

Instrumental Methods of Analysis.

CO 1: Analysis of water for alkalinity and acidity by pH metric method

CO 2: Determination of strength of commercial phosphoric acid by pH titration

CO 3 : Determination of ammonia in household cleaners by conductometric titrations.

CO 4: Determination of sodium and potassium in soil by flame photometry

CO 5: Determination of phosphate in domestic waste water by spectrophotometry.

CO 6: Analysis of mercury/lead in industrial effluents by spectrophotometry

CO 7 : Determination of DO, BOD and COD of a waste water sample by titrimetry

CO 8: Determination of fluoride by spectrophotometric method

CO 9: Soil analysis

M.Sc. Semester – IV

Instrumental Methods of Analysis.

CO 1: Analysis of medicines: APC tablet, paracetomol, sulpha drugs by potentiometry/spectrophotometry/titrimetry

CO 2: Assay of aspirin / caffeiene / phenacetin by spectrophoptmetry

CO 3 : Determination of vitamin A in vanaspathi by UV spectrophotometry.

CO 4: Isolation of casein and lactose from milk

CO 5: Food analysis: Determination of iron in mustard sugar, phosphorus in peas, ascorbic acid in tomato, benzoic acid in food products

CO 6: Determination of iodine value of an oil sample

CO 7 : Saponification of an oil sample

CO 8: Determination of fluoride by spectrophotometric method

CO 9: Soil analysis

M.Sc. Semester – IV

Instrumental Methods of Analysis.

CO 1: Analysis of fertilizers: Urea, super phosphates

CO 2: Analysis of pyrolusite ore

CO 3 : Analysis of alloys: cupronickel and bronze

CO 4: Analysis of cement

CO 5: Determination of (i) aluminium and magnesium in a mixture

CO 6: Analysis of Stainless steel-Ni gravimetrically using DMG, Fe volumetrically using Ce(IV),

M.Sc. PHYSICS PROGRAMME

COURSE OUTCOMES

M.Sc. Semester – I

Mathematical Methods in Physical Sciences

CO 1: Interpret the various special mathematical functions to understand the physical consequences. Discuss and interpret the matrices for solving the physical problems

CO 2: Apply the group theory for knowing the physical properties of the matter

CO 3 : Describe the mathematical techniques for the statistical interpretation of the physical

CO 4 : sciences Studying the Probability functions using Monte Carlo Simulations

M.Sc. Semester – I

Classical Mechanics

CO 1: Demonstrate a basic and advanced knowledge of Lagrangian and Hamilton's principles and solve related problems. Demonstrate the concept of motion of a particle under central force,

CO 2: Different orbits and apply advanced methods to deal with the central force problems. Understand the kinematics and dynamics of rigid body in detail and ideas regarding

CO 3 : Euler's equations of motion and techniques for solving problems of rigid body mechanics. Learn the details of fixed and moving co-ordinate systems, Coriolis force acting on

CO 4 : Falling body, torque free motion and motion of symmetric top. Understand the Hamiltonian formalism in solving physics problems and understand

CO 5 : Poisson bracket method in tackling physical problems. Use Hamilton-Jacobi theory for finding the solutions of various classical systems

CO 6: Understand the fundamentals of rocket propulsion, including thrust equation, specific

CO 7: Impulse of a rocket engine. Understand the effect of gravity on rocket, equation for burnout velocity, rocket

CO 8: staging and optimization of multistage rocket.

M.Sc. Semester – I

Electronics and Communication (General)

CO 1: Understand the basic principles of working of operational amplifiers and design op-amp based circuits such as amplifier, integrator, differentiator, full wave and half wave rectifiers. Understand the design of various electronic circuits.

CO 2: Gain knowledge of designing additional op-amp based filter circuits and oscillators Comparators, frequency multipliers, basics of modulation and demodulation. Appreciate the importance and working of Optical Fibre Communication system, its

CO 3 : Design and applications which help the student to appreciate the current advances in communication system.

CO 4 : Gain knowledge of working of various Gates and logic circuits, sequential circuits which form the elements of Digital circuits. Will be able to implement the above practically with the help of Numerical problems solving

M.Sc. Semester – I
Condensed Matter Physics (General)

CO 1: The formation of crystalline state in solids along with the basic definitions associated with geometrical arrangement of atom in crystal can be understood.

CO 2: The atomic arrangement in real crystals can be studied experimentally by using X-ray diffraction by introducing the concept of reciprocal lattice.

CO 3 : The crystal binding of solids through chemical bonding is an important topic to understand the strength and physical properties of materials that can be achieved by this course.

CO 4 : The behavior of materials in terms of interaction of atoms and electrons in subject to applied external fields/force can be understood.

M.Sc. Semester – I
Electronics and Condensed Matter Physics

CO 1: It helps to solve the crystal structure of given X-ray patters and hence to estimate the lattice and lattice parameters.

CO 2: The experiment gives an idea to measure the energy gap of a given semiconductor through the temperature dependent resistivity measurement. It clears the concept of structure factor and its significance

CO 3 : Design and learn implementing the operational amplifier IC 741 based amplifier,• adder, subtractor, differentiator, integrator circuits

CO 4 : Design and learn implementing op-amp 741 based circuits in generation of sinusoidal and triangular waveforms and characterize them

CO 5: Design and learn implementing op-amp based low-pass, high-pass and band-pass filter circuits

CO 6 : Learn simplification of Boolean expressions using NAND gates Learn using FORTRAN programming for solving E&C related problems

M.Sc. Semester – I
Atomic & Molecular Physics and Nuclear & Particle Physics (General)

CO 1: Understand the fundamentals of various physical phenomena and physical concepts.

CO 2: Understand the interference and diffraction by means of He-Ne laser.

CO 3 : Determine the ionization potentials in atoms by the Franck-Hertz experiment.

CO 4 : Understand the impact of electric and magnetic fields on electron and determine

e/m of electron using Zeeman Effect.

CO 5: Understand the dispersion of a Grating Spectrograph.

CO 6 : Write the Fortran program, compile and execution to solve the spectroscopy problems.

CO 7 : Understand the performance and characteristics of Geiger-Muller counter for estimating the random nature of radioactive decay and attenuation of beta particles.

CO 8 : Understand the performance and characteristics of NaI(Tl) scintillation gamma ray spectrometers

M.Sc. Semester – II

Quantum Mechanics – I

CO 1: Basic postulates of Quantum mechanics, Ehrenfest's theorem and simple applications of Quantum Mechanics.

CO 2: Reduction of two body problem to single particle problem. Centre of mass and relative motions, eigen values and eigen functions.

CO 3 : Theory of time-independent perturbation theory (the case of a system with non-degenerate energy levels) its applications.

CO 4 : Theory of time-dependent perturbation theory its concept and its applications.

CO 5: Scattering theory: Differential and total cross-section. Born approximation and its derivation of the expression for different cross-section.

M.Sc. Semester – II

Atomic & Molecular Physics (General)

CO 1: How to interpret optical spectra using theoretical models & achieve agreement with experiment.

CO 2: How typical lasers work, their use in advanced frontier areas.

CO 3 : How to interpret microwave and mid IR spectra due to diatomic molecules, their relevance in chemical sciences, astrophysics & planetary science.

M.Sc. Semester – II
Nuclear & Particle Physics (General)

CO 1: Describe the basic properties of nucleus, its structure and different models that explain the static and dynamical properties of a nucleus.

CO 2: Understand the phenomenon of radioactive decays of alpha and beta particles and gamma rays, their detailed formalism and outcomes.

CO 3 : Acquire knowledge about various type of radiation detectors used in nuclear physics experiments, unique properties of different detectors and their applications.

CO 4 : Differentiate between different types of nuclear reactions, relevant aspects associated with nuclear reactions and kinematics of such reactions.

CO 5: Learn about conditions of controlled chain reaction in different nuclear reactors. Know about different elementary particles their classifications and quark model to understand the fundamental forces of nature and classification.

CO 6: Understand the stopping power of different energetic charged particles in a medium and mechanisms of interaction of gamma photon with matter.

CO 7: Understand the trace elemental analysis and applications of radioisotopes in cancer treatment, agriculture and industry.

M.Sc. Semester – II
Electronics and Condensed Matter Physics

CO 1: Students learn to measure the Hall effect which in turn helps to measure the basic parameters such as carrier density, sign of carriers and mobility of charge carriers in a semiconductor.

CO 2: It helps to explore the temperature dependent properties of a diode estimate the energy gap of a semiconductor.

CO 3 : The indexing of cubic patterns and calculation of lattice parameters is possible.

M.Sc. Semester – II
Atomic & Molecular Physics and Nuclear & Particle Physics

CO 1: Demonstrate the production and analysis of elliptically polarized light.

CO 2: Understand the Beer's Law to measure the fraction of the incident light transmitted through a solution.

CO 3 : Understand the dispersion spectra of radiations using glass prism spectrograph.

CO 4 : Acquire practical knowledge on calibrating Nal(TI)gamma ray spectrometer and to determine the energy of a given gamma ray source and calculate the energy resolution.

CO 5 : Able to determine the attenuation of gamma rays in matter using Nal(TI) gamma ray spectrometer.

CO 6 : Understand the semi-empirical mass formula to calculate the binding energy of any nucleus using Fortran 77 computer programming.

M.Sc. Semester – III
Quantum Mechanics – II

CO 1: How to formulate the foundational aspects of quantum mechanics in the formalism of linear vector algebra.

CO 2: How to use different approximate methods for solving higher problems.

CO 3 : How the different aspects of angular momentum can be used in theoretical models to understand variety of physical problems.

CO 4 : How the synthesis of two fundamental theories – theory of relativity & quantum mechanics – leads to enhanced understanding of new major results in agreement with experiment.

M.Sc. Semester – III
Electronics & Communication – I

CO 1: Learn transmission of electrical energy from one point to another and will be able to analyse the working of different types of transmission lines and also clear understanding of working of wired telephone communication system.

CO 2: Working of transmission lines at higher frequencies such as Radio Frequencies which helps student to appreciate the use of transmission lines in video/picture transmission.

CO 3 : Get a comprehensive picture of signal transmission, analysing various waveguides as well as antennas.

CO 4 : Gain knowledge of how satellites communicate with ground stations and help in appreciating various applications.

CO 5 : Will be able to implement the above practically with the help of Numerical problems solving.

M.Sc. Semester – III
Condensed Matter Physics – I

CO 1: The effect of periodic structure a lattice on the electron energy states can be learnt.

CO 2: The concept of Fermi surface is important in the understanding the properties of crystalline materials. The can be thoroughly understood by studying this course.

CO 3 : The quantization of lattice vibrations that leads to formation of quantum particle

that is phonon can be understood.

CO 4 : The course helps to apply the Boltzmann transport equation to understand the charge transport mechanism in metals and semiconductors.

M.Sc. Semester – III

Atomic & Molecular Physics –I

CO 1: Students will learn application of theoretical models to the interpretation of atomic spectra in agreement with experiment.

CO 2: Electronic structure of atoms under the influence of electric & magnetic fields.

CO 3 : Application of theoretical models to the interpretation of diatomic molecular states, electronic, vibrational & rotation spectra in agreement with experiment.

CO 4 : Relevance of these spectra in understanding atmosphere, comets, stars and inter-galactic matter

M.Sc. Semester – III

Nuclear & Particle Physics – I

CO 1: Learn the scattering phenomenon using high energy electrons on nucleus to understand the electric and magnetic form factors of protons, and magnetic form factor of neutron.

CO 2: Understand electric quadrupole moment due to single nucleon is a state J and magnetic dipole moment for odd proton and odd neutron using extreme single particle model.

CO 3 : Know and learn about the theory of deuteron, explore its ground state properties of and applications with square well potential.

CO 4 : Know the range of tensor interaction using quadrupole moment to understand the saturation of nuclear forces.

CO 5 : Understand the neutron-proton scattering and concept of scattering length and its effective range theory along with spin dependence of nuclear force.

CO 6 : Learn the effect of Coulomb and nuclear scattering, and Meson theory of nuclear force.

CO 7 : Understand the symmetry classification of elementary particles and apply the Gellmann Nishijima and Gell-Mann-Okubo formula to solve numerical problems.

CO 8 : Learn the basics of strong interactions and quark structures, experimental support for quark model and quark dynamics.

M.Sc. Semester – III

Electronics & Communication – II

CO 1: Get a clear picture of various transducer based electronic instruments used for measuring various physical quantities such as light, pressure, temperature, humidity, etc.

CO 2: Obtain a detailed knowledge of role of technology in medicine, biomedical signals and medical instrumentation system such as ECG, EEG, EMG, MRI, etc.

CO 3 : Learn classification of signals and systems and various mathematical techniques employed to study and analyse these

CO 4 : A detailed knowledge about conversion of signals from frequency domain to time domain and vice-versa, detailed mathematical background for resolving the signals in both domains.

CO 5 : Will be able to implement the above practically with the help of Numerical problems solving.

M.Sc. Semester – III

Condensed Matter Physics – II

CO 1: The classification of magnetic materials and Weiss molecular field theory of ferromagnetism can be understood.

CO 2: It clears the concept of formation of magnons at very low temperature in a ferromagnetic material and their behavior through Bloch T3/2 law will be evident.

CO 3 : Other class of magnetic materials like anti-ferromagnetic and ferromagnetic can be understood.

CO 4 : The significance of dielectric materials and their associated phenomena such as dipolar polarizibility, ferroelectrics and piezoelectric can be learn.

M.Sc. Semester – III

Atomic & Molecular Physics -II

CO 1: Students will learn how to employ the analytical techniques for the analysis of atomic and molecular samples.

CO 2: How to select an analytical technique for a given application.

CO 3 : How to apply the basic knowledge to characterize atomic & molecular samples.

CO 4 : How to set up these analytical techniques in a physical, chemical & life science laboratory.

M.Sc. Semester – III
Nuclear & Particle Physics – II

CO 1: Learn about the classification, mechanisms, properties and factors affecting performance of scintillator detectors.

CO 2: Learn about the differences between single channel analyzer and multichannel analyzer in NaI(TI) gamma ray spectrometers and to estimate calibration constant.

CO 3 : Know the basics, construction, working, advantages and disadvantages of semiconductor detectors and types and characteristics of solid-state detectors.

CO 4 : Understand about the various types of nuclear accelerators and their basic components and types of accelerations and principles of operation.

CO 5 : Understand the basic principles, construction and working of energy and wavelength dispersive x-ray fluorescence spectrometers.

CO 6 : Learn the basics and working principles of positron annihilation spectroscopy and perturbed angular correlation for study of condensed matter.

CO 7: Learn about the neutron classification, sources of neutrons and neutron detectors, especially BF3 counter and 3He based neutron detector.

CO 8 : Understand the theory of neutron diffraction of powder and single crystals, neutron diffraction patterns of superconductors and magnetic materials.

M.Sc. Semester – III
Electronics & Communication Practical– I

CO 1: Design and learn implementing the operational amplifier IC 741 based wave form generator circuits

CO 2: Design and learn implementing op-amp 741 based instrumentation amplifier and characterize it

CO 3 : Design and learn implementing op-amp based twin-T and notch filter circuits

CO 4 : Implementation of 2's complement addre and subtractor and bidirectional shift registers

M.Sc. Semester – III
Condensed Matter Physics Practical – I

CO 1: Calculation of d-spacing, structure factor and indexing of cubic and non-cubic

pattern can be understood.

CO 2: The significance of intensity of X-ray scattering and its relation to the position of atoms in an unit cell can be learnt.

CO 3 : The experimental measurement of specific heat of different metals can be realized.

M.Sc. Semester – III

Atomic & Molecular Physics Practical – I

CO 1: Basic experiments related to atomic & molecular physics.

CO 2: Hands-on experience in setting up experiments.

CO 3 : Analysis of both measured & given data as assignments.

M.Sc. Semester – III

Practical Nuclear & Particle Physics –I

CO 1: acquire practical knowledge on calibrating NaI(Tl)gamma ray spectrometer and to determine the energy of a given gamma ray source.

CO 2: Learn various modes in a multichannel analyzer and use them to calculate the energy resolution, energy of gamma ray.

CO 3 : Determine the mass attenuation coefficient of beta particles from 204Tl, 210Pb and 137Cs sources in Al foils using G.M. Counting system.

CO 4 : Able to verify the Bohr's frequency condition and Moseley's law using MCA based NaI(Tl) scintillation detector.

CO 5 : Understand the defects present in metals and semiconductors using positron annihilation lifetime parameters.

M.Sc. Semester – III

Electronics & Communication Practical –II

CO 1: Implement Use of crystal oscillator and frequency division circuits

CO 2: Conduct Analog and digital optical fiber experiments

CO 3 : Study of staircase generator using 4-bit counters and decade counter with 7-segment display

CO 4 : Study Phase locked loop ICs and characteristics

M.Sc. Semester – III

Condensed Matter Physics Practical – II

CO 1: It helps to experimentally measure the ratio of fundamental constants like e and kB.

CO 2: The ferromagnetic to paramagnetic phase transition in a metallic sample can be carried out.

CO 3 : The experimental determination of electrical resistivity of semiconductor by four probe method can be understood

CO 4 : The magneto-resistance effect in a semiconductor can be determined.

M.Sc. Semester – III

Atomic & Molecular Physics Practical – II

CO 1: How to set up experiments using hands-on experience & different techniques.

CO 2: How to analyze data & interpret them.

CO 3 : How to connect class room learning with lab experience to reduce the gap in understanding.

M.Sc. Semester – III

Practical Nuclear & Particle Physics –II

CO 1: Understand the mass attenuation coefficient of 2260 keV and 545 keV beta particles in Al foils using 90Sr - 90Y source using G.M. Counting system.

CO 2: Determine the half-life of 116In nucleus by observing the beta activity with time using G.M. Counting System

CO 3 : Learn the gamma ray attenuation coefficient for different absorbers using NaI(Tl) gamma ray spectrometer using 137Cs source.

CO 4 : Determine the end point energy of beta particles from 204Tl source using

Nomogram method using G. M. Counting System.

CO 5 : Estimate the K x-ray fluorescence yield and K x-ray production cross section in silver target using 57Co source using MCA based NaI(Tl) scintillation spectrometer.

M.Sc. Semester – IV
Classical Electrodynamics

CO 1: Understand the architecture of 8085 microprocessor which completes the basic foundation necessary to understand how CPU works and communicates with RAM, ROM and external devices.

CO 2: Get information about execution of each commands written in language form. This includes knowledge of arithmetic operations, looping, stacking, etc.

CO 3 : Understand Interfacing peripherals of 8085 microprocessor with 7-segment display, analog to digital system vice-versa, additional input/output devices etc., incorporated to account the applications.

CO 4 : Gain knowledge about 8051 microcontroller architecture to programming, the complete idea of execution of commands, instructions to interfacing with external input/output devices.

M.Sc. Semester – IV

CO 1: Understand the basic postulate of statistical mechanics, different types of ensembles, fundamental differences between micro states and macro states.

CO 2: Learn about different types of partition functions for the system of particles and apply these to calculate important thermodynamical quantities.

CO 3 : Learn the fundamental differences between classical and quantum statistics and learn about postulates of quantum statistical mechanics.

CO 4 : Formulate the quantum statistical distribution laws,viz. Fermi-Dirac(FD) and Bose-Einstein(BE) statistics and origin of Bose -Einstein condensation and its applications.

CO 5 : Understand fluctuations in ensembles and quantum gases and their analysis.

CO 6 : Describe the theoretical basis of Brownian motion on the basis of Langevin approach. Understand the concept of random walk, Einstein relation for mobility and diffusion, time dependence of fluctuations, their spectral analysis and applications in noises.

CO 7 : Understand the reversible and irreversible thermodynamic processes, analysis of On sager reciprocity relations in thermo electric phenomena.

CO 8 : Understand the Saha theory of ionization of aga sin thermal equilibrium to the temperature and pressure.

CO 9 : Understands uper fluid properties and quantum theory of 3 Heand mixture of 3He-4He.

StatisticalandThermalPhysics

M.Sc. Semester – IV

Electronics&Communication-III

CO 1: Understand the architecture of 8085 microprocessor which completes the basic foundation necessary to understand how CPU works and communicates with RAM, ROM and external devices.

CO 2: Get information about execution of each commands written in language form. This includes knowledge of arithmetic operations, looping, stacking, etc.

CO 3 : Understand Interfacing peripherals of 8085 microprocessor with 7-segment display, analog to digital system vice-versa, additional input/output devices etc., incorporated to account the applications.

CO 4 : Gain knowledge about 8051 microcontroller architecture to programming, the complete idea of execution of commands, instructions to interfacing with external input/output devices.Will be able to implement the above practically with the help of Numerical problems solving.

M.Sc. Semester – IV

Condensed Matter Physics – III

CO 1: The course offers a good understanding on the basics of semiconductors. Theoretical understanding of charge transport in semiconductors can be

understood.

CO 2: It also helps to clear the basic concepts on the effect of external fields on the electron transport in a crystalline state.

CO 3 : It makes is clear how the working of basic devices like pn-junction, Gunn diode, laser diode etc. can be understood.

CO 4 : Finally, the course gives an idea on the importance oflow dimensional semiconductors, their synthesis and the formation ofelectronic devices.

M.Sc. Semester – IV

Atomic and Molecular Physics - III

CO 1: Interpretation of vibrational IR and Raman spectra of polyatomic molecules.

CO 2: Methods of determining vibrational properties of polyatomic molecules based on IR and Raman spectra.

CO 3 : How to apply combined analysis of vibrational & electronic spectra for characterizing vibrational properties that may be correlated to identification of molecules, structure and other phenomena.

M.Sc. Semester – IV

Nuclear & Particle Physics – III

CO 1: Learn the evidences for nuclear shell structure and understand the energy levels according to the infinite square well potential and harmonic oscillator potential.

CO 2: Get knowledge about the collective nuclear model, vibrational energy levels of even nuclei and rotational energy levels of deformed even-even nucleus.

CO 3 : Know the concept of cross section and apply it to resonance theory of scattering and absorption and learn the Briet –Wigner formula for scattering and reaction.

CO 4 : Understand the principle of detailed balance–optical model–mean free path – optical potential and its parameters for elastic scattering.

CO 5 : Understand the plane wave Born approximation (PWBA) and its predictions of angular distributions, distorted wave Born approximation (DWBA) and spectroscopic factors.

CO 6 :	Learn the importance of heavy ion reactions, formation compound nucleus, fusionof heavy ions and formation of super heavy nuclei in heavy ion reactions.
CO 7 :	Understand the Feynman diagrams, leptonic, semi leptonic and non-leptonic processes, verification of electromagnetic and weak interactions.
CO 8 :	learn about the intermediate vector bosons: W and Z bosons, their masses and range of weak interactions, charged weak interactions of quarks: Cabibbo factor, CPT theorem

M.Sc. Semester – IV

Electronics & Communication – IV

M.Sc. Semester – IV

CO 1:	Upon completion of this course, the students will be able to-Get a complete knowledge of use of modulation in electronic communication, amplitude modulation, the instrumentation and techniques of amplitude modulation,transmitters and receivers used in amplitude modulation and their functioning
CO 2:	Understand theory of frequency modulation, FM instrumentation, its advantages over AM, experimental techniques of FM, etc.
CO 3 :	Learn the basics of pulse modulation, types of pulse modulation, pulse amplitude modulation, pulse position modulation, pulse width modulation and other methods that form basis of Digital Communication.
CO 4 :	Deal with communication techniques which lie in the base band region with explanation of inter symbol interference, pulse data transmission, scrambling and descrambling, pulse shaping, etc.
CO 5 :	Will be able to implement the above practically with the help of Numerical problems solving.

Condensed Matter Physics – IV

CO 1:	The experimental discovery and various experimental properties of superconductors can be understood.
CO 2:	The concept and predictions of fundamental BCS theory of superconductivity can be studied.
CO 3 :	The concepts, classification, and important properties of new materials like amorphous semiconductors, polymers and liquid crystals can be explored.
CO 4 :	Nanoscience is emerging branch of Physics, its concepts, importance,

characterizations are studied and selected applications will be explored.

M.Sc. Semester – IV

Atomic & Molecular Physics IV

CO 1: Principles, working and scientific and practical applications of different laser types.How design parameters will produce lasers.

CO 2: How intense lasers can be used to produce nonlinear optical effects & their exploitation in the working of lasers.

CO 3 : How nonlinear Raman effects can be produced by intense laser as radiation sources combined with physical optics. In addition, wide ranging applications in spectroscopy and other fields.

CO 4 : How high-resolution spectroscopy is achievable based on principles of nonlinear effects, lasers and physical optics.

M.Sc. Semester – IV

Nuclear & Particle Physics – IV

CO 1: Learn the theory of nuclear fission, evidence for the existence of second well in fission isomers, nuclear fission with heavy ions and nuclear fission-fission time scale.

CO 2: Understand the basic nuclear fusion processes, controlled thermonuclear reactions and magnetic confinement systems for controlled thermonuclear fusion.

CO 3 : Learn the slowing down of neutrons by elastic collisions, logarithmic decrement in energy, thermalization, slowing down power and moderating ratio.

CO 4 : Understand the theory of diffusion of neutrons, spatial distributions of neutron flux in different mediums, reflections of neutrons – Albedo.

CO 5: Learn about Fermi age equation, correction for absorption, resonance escape probability, pile equations, buckling: critical size for spherical and rectangular piles.

CO 6: Know the classification of beta transition on the basis of ft values and learn the selection rules, detection of neutrino and its properties.

CO 7 : Learn the symmetry breaking in beta decay, the relevance of pseudoscalar quantities, Wu-Ambler experiment, fall of parity conservation and discovery of

W and Z bosons

CO 8 : Understand the gamma decay transition probability for single particle transition in nuclei-Weisskopf'sestimates: comparison with experimental values.

CO 9: Learn the lifetime measurements and understand the angular correlation for dipole- dipole transitions, gamma-gamma correlation and polarization of gamma radiation.

M.Sc. Semester – IV

Electronics & Communication Practical – III

CO 1: Implement 8085 microprocessor interfacing – stepper motor interface
Cary out ADC and DAC circuit interfacing

CO 2: Implement 8085 Programming – mathematical operations, block transfer and sorting of 8-bit and 16-bit data

CO 3 : Understand the use of code conversion methods. Study8085interruptsandsubroutines

M.Sc. Semester – IV

Condensed Matter Physics Practical – III

CO 1: Indexing of tetragonal and hexagonal patterns can experimentally realize.

CO 2: Precise lattice parameters on the experimentally recorded X-ray patterns can be studied.

CO 3 : Characterization of solar cell, magnetic materials and skin depth in metals can be carried out.

CO 4 : Many other experiments to measure the basic properties of dielectrics and ferroelectrics can be carried out under this course.

M.Sc. Semester – IV

Atomic & Molecular Physics Practical – III

CO 1: How to setup experiments using hands-on experience &different techniques.

CO 2: How to analyze data &interpret them.

CO 3 : Howtoconnectclassroomlearningwithlabexperiencetoreducethegapinunderstanding.

M.Sc. Semester – IV

Nuclear & Particle Physics Practical –III

CO 1: Understand the Z2 dependence of external bremsstrahlung radiations using NaI(Tl)gamma ray spectrometer using 90Sr – 90Y beta source.

CO 2: Design and construct the double coincidence circuit using transistors, study its output wave form and determine its resolving time.

CO 3 : Understand the energy spectrum of beta particles using 204Tl source and determinethe end point energy of beta particles from 204Tl using Si(Li) detector spectrometer.

CO 4 : Determine the K shell internal conversion coefficient αK of 137Ba using NaI(Tl) gamma ray spectrometer.

CO 4 : Determine the half-life of 40K using GM counting system and to analyze the results.Determine the range of 1.150 MeV beta particles from 210Pb by Feather's method usingG.M. counting system with unknown source 204Tl.

CO 5 : Determine the effective atomic number of brass by measuring gamma ray attenuation coefficient using NaI(Tl) gamma ray spectrometer.

M.Sc. Semester – IV

Project in Electronics & Communication

Co1: Implement a Project in analog/digital electronics under guidance of a supervisor

M.Sc. Semester – IV

Project in Solid State Physics

CO 1: Project helps students to search the research problem.

CO 2:It also helps tocarry out the systematic research work on individual topics with the help of research mentor.

CO 3:Students also leans how present,prepare and if possible to publish their finding in the projects work.

M.Sc. Semester – IV

Project in Atomic & Molecular Physics

CO 1: How the methodology (i.e. selecting a problem, understanding theoretical & empirical principles, set up experiments, conduct measurements, etc) should be adopted to execute the work.

CO 2: How to work in a team while remain active to learn independently.

CO 3 : How scientific method works to successfully carry out project work.

CO 4 : How to use advanced analytical techniques for a chosen project topic.

M.Sc. Semester – IV

Project in Atomic & Molecular Physics

CO1: How a detailed study of one aspect of the subject should be studied.

M.Sc. Semester – IV

Project in Nuclear and Particle Physics

CO 1: Demonstrate knowledge and understanding of the scientific principles, gain experience in researchable to design the nuclear physics research project.

CO 2: Understand need of literature review to decide the research problem and understand the synthesis methods and characterization techniques for different applications.

CO 3 : Understand and get familiar with operation of various instruments and software forcharacterizations, data collection and analysis of results using computer programs.

CO 4 : Understand how to analyze, interpret the experimental data, make conclusions based on the results and able to write are search article and scientific research project.

CO 5 : They will understand the research methodology and will help them in their future research career.

M.Sc. Semester – IV

Modern Physics

CO 1: Learn nature of black body spectrum, classical radiation laws and their limitations; Laws of photoelectric effect and Einstein photoelectric equation and Compton effect.

CO 2: Understand the atomic structure, matter waves, Quantum Physics and its applications. Acquire knowledge about nuclear structure and Molecular structure, quantum statistics, F-D and B-E distributions. Lasers action its characteristics.

CO 3 : Acquire knowledge about nuclear fission/fusion nuclear reactor stellar energy and their applications.

M.Sc. Semester – IV

Instrumental Methods

CO 1: Understand the basic principles of working of Digital voltmeter, electronic multimeter, digital multimeter, power meter, electronic LCR meter and cathode ray oscilloscope.

CO 2: Learn about UV/Visible absorption spectrometry and gain knowledge of about Single/double beam spectrometer. Infrared absorption spectroscopy, sample techniques etc.

CO 3 : Understand the basic principles of Fluorescence and Phosphorescence, energy level diagram, Fluorimeter construction, working its applications.

Learn about radioactivity and its applications as well as nuclear Physics applications

M.Sc. Semester – IV

Physics of Nanomaterials

CO 1: The course offers a good understanding on the basics of nanoscience.

The course offers a good understanding basic quantum Mechanics.

CO 2: It also helps to synthesis and characterization of nano-materials using SEM, TEM, STEM, AFM and Diffraction techniques.

CO 3 : Learn about properties of nano-materials like electrical mechanical, band structures etc.