

POST GRADUATION DEPARTMENT OF CHEMISTRY

M.Sc. CHEMISTRY

Programme Outcomes(P.O.): Upon the completion of M.Sc. chemistry the students will be able to:

- PO1. Gain a thorough and logical understanding of the advance topics in chemistry.
- PO2. Join further research based projects and are also eligible for doing M. Phil and Ph.D
- PO3. Use their research skills to formulate, produce, characterize, and analyze new compounds for specific applications.
- PO4. Be equipped with practical exposure in the field of science to find new cures and discovering new molecules through a wide variety of techniques studied during the course.
- PO5. Start out in the lab and then move onto other laboratory career such as process chemistry, formulation chemistry, quality control or quality assurance. They may also move to non-laboratory careers such as teaching, regulatory affairs, project management and production.

Program specific outcome: M.Sc. II Chemistry

1. To build a scientific temper and to learn the necessary skills to succeed in research or industrial field. ·
2. To be able to define and resolve new problems in Chemistry and participate in the future development of Chemistry Course.
3. To understand the interdisciplinary nature of Chemistry and to be aware of the emerging fields in Chemistry.

Programme Specific Outcomes (P.S.O.): M.Sc. I Chemistry

1. Students have the knowledge of basic concepts of inorganic, organic and physical chemistry. Students also acquire the knowledge of some concepts of mathematics, biology and computer which can be applied in chemistry.
2. To give students a comprehensive understanding of the principles of Chemistry.
3. To gain the skill to design and carry out scientific experiments and interpret the data.

MCHE-301: Analytical - Chemistry

Course Outcomes (C.O.):-

1. This course will provide an insight into some of the fundamental concepts and principles that are very essential in the study of chemistry.
2. The students will understand the fundamental principle of various analytical techniques like chromatographic techniques, polarography and thermo-gravimetric analysis etc.
3. This course will suggest a suitable analytical method for a specific purpose, evaluate important sources of interferences and errors, and also suggest alternative analytical methods for quality assurance.
4. This course will develop skills in students like problems solving, critical thinking and analytical reasoning.

MCHE-311 Ligand Field Theory

Course Outcomes (C.O.):-

1. A broad but still detailed overview of ligand field aspects used in chemistry with a particular focus on the most advanced topics addressed by surrounding ligands.
2. Detailed aspects of co-ordination complexes not only fulfil the need of it in the field of chemistry but also in medicine, food industry, drug analysis and environmental sample analysis.
3. Concept of ligand field enriches the students with the knowledge of wave functions and term symbols which elaborates the whole geometry and spectra of complexes.

MCHE-312: Reaction mechanism of transition metal complexes

Course Outcomes (C.O.):-

The students will acquire knowledge of:

1. Formation of octahedral and square planer complexes
2. Reaction and mechanism of octahedral and square planer complexes and electron transfer reactions
3. Apply various methods to determine the stoichiometry and stability of complexes.

MCHE-313: Inorganic spectroscopy-I

Course Outcomes (C.O.):-

The students will know about the:-

1. Utility of spectroscopic methods such as IR, Raman, and Mossbauer techniques for the characterization of inorganic complexes.
2. Application of UV-Vis, FT-IR, Magnetic moment measurement to understand the inorganic compounds.
3. Purification of different inorganic complexes.
4. Planning and generalization of the scheme for determining the structure of molecules using Electronic absorption spectroscopy, Microwave, IR spectroscopy, Raman spectroscopy, NQR spectroscopy & MASS spectroscopy so that they can propose a best solution to such problems.

MCHE-321: Photochemistry and Pericyclic reactions

Course Outcomes (C.O.):-

1. The students will learn the theoretical concepts of photochemical reactions, applications of photochemistry.
2. The students will acquire knowledge of mechanism for photochemical reactions under experimental conditions.
3. The students will acquire the knowledge of molecular orbitals, symmetry elements and possibility of thermal and photochemical Pericyclic reactions.

MCHE-322: Chemistry of Natural Products

Course Outcomes (C.O.):-

The students will acquire knowledge of.

1. Importance of various natural products.
2. Structural illustration and synthesis of various natural products useful for the identification.
3. To study the fundamental concept of terpenoids, alkaloids, vitamins, lipids and steroids.
4. Elementary idea of supramolecular chemistry and Green Fluorescent Proteins.

MCHE-323:-Heterocyclic chemistry

Course Outcomes (C.O.):-

The students will acquire knowledge of:

1. Nomenclature of different heterocyclic compounds
2. Synthetic methods of three, four, five and six membered heterocyclic compounds
3. Physical & chemical reactivity of three, four, five and six membered heterocyclic compounds.
4. Biological importance of these heterocyclic compounds.

MCHE- 331: Fundamentals of Spectroscopy

Course Outcomes (C.O.):-

1. Student can examine the electronic spectra of diatomic molecules.
2. Student can examine electronic spectra of polyatomic molecules.
3. Rotational and vibrational spectra of diatomic and polyatomic molecules are examined.
4. Student can interpret the NMR and ESR data.

MCHE -332: Statistical Thermodynamics

Course Outcomes (C.O.):

Students will have achieved the ability to:-

1. Find the connection between statistics and thermodynamics.
2. Differentiate between different ensemble theories used to explain the behavior of the systems.
3. Differentiate between classical statistics and quantum statistics.
4. Explain the statistical behavior of ideal Bose and Fermi systems.

MCHE- 333: Photo and Surface Chemistry

Course Outcomes (C.O.):-

1. Student can define and explain surface- and interfacial phenomena.
2. Student can describe and explain different types of Isotherms systems.
3. Student can perform numeric calculations of surface area using BET equation.
4. Student can define photo-physical and photochemical processes.
5. Student can describe Jablonski diagram and Franck Condon Principle.

MCHE -401: Environmental Chemistry

Course Outcomes (C.O.):-

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

1. Explain the theoretical principles and the main components of selected electro-analytical and Spectrometric/Spectro-photometric methods.
2. Explain the theoretical principles of various separation techniques in chromatography and typical applications of chromatographic techniques.
3. Elaborate the Stratospheric chemistry, Ozone layer hole and ground level air pollution and health consequences.
4. Describe causes and effects of environmental pollution by energy industry and discuss some mitigation strategies.

MCHE-411 Chemistry of Organo-metallic Compounds

Course Outcomes (C.O.):-The students will acquire the knowledge of:

1. Preparation of organo-metallic compounds and homogenous catalytic synthesis of organic chemicals.
2. Bonding and chemical properties of various compounds of transition metals with hydrocarbon systems

3. Stability of organo-metallic compounds and clusters, and their applications as industrial catalysts.
4. Structure and bonding issues to understand the stability and reactivity of metal hydrides.

MCHE-412: Advanced topics in Inorganic Chemistry

Course Outcomes (C.O.):-

On completion of course the student will be able to:-

1. Gain advanced knowledge about spectroscopic terms and symbols.
2. Learn about the radioactive activity and photo nuclear reactions.
3. Synthesis of high nuclearity carbonyl clusters and their structure.

MCHE- 413: Inorganic Spectroscopy –II

Course Outcomes (C.O.):-

The students will learn about:-

1. Systematic qualitative analysis of inorganic compounds by using various spectroscopic techniques.
2. To understand the basic and advance applications of NMR and ESR for the characterization of Co-Ordination complexes.
3. Summarize various concepts involved in various spectroscopy techniques and evaluate the spectroscopic data collected for structural elucidation.
4. Estimate the required technique for solving problems related to the structure, purity and concentration of chemicals and predicts the desired outcomes based on which they can test the compatibility of process.

MCHE-421: Applications of Organic Molecular Spectroscopy

Course Outcomes (C.O.):-

The students will acquire knowledge of:-

1. IR range for different functional groups and its applications.
2. λ_{\max} for polyenes and α , β -unsaturated carbonyl compounds in UV spectroscopy and its application part.
3. Principle and various applications of $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and mass spectroscopy.
4. Solve structural problems based on UV-Vis, IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and mass spectral data.

MCHE-422: Organic Synthesis

Course Outcomes (C.O.):-

The students will acquire knowledge of:

1. Mechanistic pathway of organic reactions.
2. Retro-synthetic approach to planning organic synthesis.
3. Conversion of different functional group via rearrangement reaction

MCHE-423-Modern Synthetic Reactions and Rearrangements

Course Outcomes (C.O.):-

The students will acquire knowledge of:-

1. Experimental techniques for different catalytic reactions.
2. Physical and chemical characterization of catalysts and catalytic reaction.
3. Various reagents and their applications in various industries.
4. Write mechanism of organic reactions involving reactive intermediates and concerted processes.

MCHE-431: X-RAY Diffraction and other Techniques

Course Outcomes (C.O.):-

1. Student will define concepts such as lattice, point and space groups
2. Student can be familiar with Bragg's Law and explain its the relation to crystal structure
3. Student can examine X-ray diffraction spectra powder material.
4. Student can interpret the NQR and Mossbauer data.

MCHE -432: NANO CHEMISTRY AND ADVANCED SPECTROSCOPY

Course Outcomes (C.O.):-

1. Student will learn about the background on Nano-science, Mass Spectrometry and Photoelectron Spectroscopy.
2. Student will understand the synthesis of Nano-materials and their application and the impact of Nano-materials on environment. Apply their learned knowledge to develop Nano-material's
3. Student can examine Mass spectra of radicals, could determine weight and bond dissociation energies
4. Student can interpret the PES data.

MCHE-433:Polymer Chemistry

Course Outcomes (C.O.):-

1. Students will be able to understand the relationships between polymer molecular weight, molecular weight distribution, and the properties of polymeric materials.
2. Students will demonstrate an ability to distinguish different polymerization reactions and their mechanisms/kinetics, and learn how actual polymerization is performed in the laboratory.
3. Students will learn about polymer solvent interaction and the effect of the solvents on the dimensions of the polymers in solution.
4. Students will improve and expand their skills in performing and analyzing the thermal and mechanical properties of polymers.
5. Students will be able to describe the viscoelastic behavior of polymers with respect to their chemical structures and molecular weights.

MCHE101: Basic Inorganic Chemistry

Course Outcomes (C.O.):

1. To have a quantum mechanical treatment of chemical bonding.
2. To study the important aspects of bioinorganic chemistry.
3. To understand the various concepts of acids & bases and non-aqueous solvents.
4. The students will acquire knowledge of properties and applications of compounds of main group elements.

MCHE102: Basic Organic Chemistry

Course Outcomes (C.O.):

1. To understand the basic concepts and mechanism in organic chemistry.
2. To have a basic idea of Aromaticity, non-aromaticity and anti-aromaticity in carbocyclic and heterocyclic compounds.
3. Students will acquire knowledge about various reactive intermediates and their participation in reactions.
4. To know stereochemistry and various possible conformations of organic compounds and their effects on the rate of reaction.

MCHE103: BASIC PHYSICAL CHEMISTRY

Course Outcomes (C.O.):

1. To study advanced idea of thermodynamics.
2. To learn thermodynamic phenomenon of coupled biological reactions.
3. To provide an insight into the characteristics of different types of solutions and electrochemical phenomena.
4. To learn ionic equilibria and electrical properties of ions in solution.

MCHE105: INORGANIC CHEMISTRY LAB-I

Course Outcomes (C.O.):

1. Students are able to estimate metal ions and lig and sin prepared complexes using titration method.
2. To make the students expertize in preparation of metal complexes.
3. Students gain the knowledge about IR studies of prepared complexes.
4. Students are able to analyze total dissolved solids and chlorides in water using appropriate methods.

MCHE106: ANALYTICAL CHEMISTRY LAB

Course Outcomes (C.O.):

1. Students are able to learn the principle and working of pH meter.
2. Students are able to learn the principle and working of conductometer.
3. Students are able to find the percentage purity and strength of different solutions using different methods.
4. Students are able to learn the principle and working of potentiometer and colorimeter.

MCHE201: Coordination chemistry and Group theory

Course Outcomes (C.O.):

1. To gain an insight of the spectral and magnetic properties of metal complexes.
2. Concepts of symmetry and group theory in solving chemical structural problems.
3. Enable the students to predict the point group of important molecules. To understand the idea of space groups and to learn the theory of molecular symmetry.
4. Use of character tables, Application of symmetry and group theory in spectroscopy.
5. To gain skill to apply group theory to vibrational and electronic spectroscopy

MCHE202: Organic reaction Mechanism and Pericyclic reactions

Course Outcomes (C.O.):

1. The students will acquire knowledge of mechanistic aspects in nucleophilic substitution.
2. The students will get knowledge of mechanisms of addition reactions of C=C and C=O bonds and elimination reactions.
3. To study the molecular orbital symmetry elements and possibility of thermally and photo-chemically allowed pericyclic reactions.
4. To get an idea about the various kinetic and thermodynamic factors which control the organic reactions.

MCHE203: Quantum Chemistry and Chemical Kinetics

Course Outcomes (C.O.):

1. To impart the students concepts of the fundamentals of quantum mechanics and its applications in the study of structure of atoms, bonding in molecules.
2. To understand the requirement of approximation methods in quantum mechanics.
3. To gain insight into valance bond theory molecular orbital theory and the concept of hybridization.
4. To provide an insight into the thermodynamic and kinetic aspects of chemical reactions and phase equilibria.
5. To derive some thermo chemical equations and kinetic equations.

MCHE205: ORGANIC CHEMISTRY LAB-I

Course Outcomes (C.O.):

1. Students are able to synthesize some organic compounds.
2. Students are able to characterize synthesized organic compounds by spectral techniques.
3. To provide the knowledge to separate and purify components of organic binary mixtures.
4. Students are able to prepare suitable derivatives of different functional group compounds.

MCHE206: PHYSICAL CHEMISTRY LAB-I

Course Outcomes (C.O.):

1. Students are able to determine density of given liquids using Pyknometer.
2. Students are able to determine molecular weight of different polymers by viscosity method.
3. Students are able to detect molar refractivity of given solid.
4. Students are able to determine equilibrium constant for various reactions by Partition method

MCHE-207 CHEMISTRY FOR EVERYONE

Course Outcomes (C.O.):

- CO1. Students will be able to learn the importance of chemistry in our day to day life.
- CO2. Students will be able to learn about the role of various biomolecules.
- CO3. Students will be able to know about various types of pollution and their consequences.
- CO4. Students will have basic understanding of various methods used in water sterilization and in refining industry.

PROGRAMME OUTCOMES (PO) B.Sc. Hons Chemistry

Upon completion of the B.Sc. (Honors) Chemistry programme, students will be able to:

PO1: Comprehend the adequate knowledge about the concepts, principles and tools required for effective scientific and computer skills which the students can apply in individual and professional life.

PO2: Gain a thorough and logical understanding in fundamentals of Science and Computers for the holistic development of students.

PO3: Demonstrate high standards of actuarial ethical conduct, professional behavior, interpersonal and communication skills as well as a commitment to lifelong learning through pure and applied sciences.

PO4: Be initiated into the basics of scientific and applied research which will be helpful for the students to generate employability.

PO5: Be equipped with practical exposure in the field of science and computers.

Programme specific outcome (PSO) (B.Sc.-I Chemistry Honors)

On completion of the Programme student will be able to:

PSO1: Understand the basic concepts of inorganic chemistry, physical chemistry, organic chemistry, computer fundamentals, mechanics, electricity and magnetism.

PSO2: Demonstrate skills and competencies to conduct experiments based on simple instruments, acid-base & EDTA titrations, organic preparations, electricity, magnetism, and data base management.

PSO3: Relate their knowledge and skills to carry out research oriented learning and to develop analytical problem solving approaches.

Programme specific outcome (B.Sc.-II Chemistry Honors)

The B.Sc.-II (Chemistry Honors) Program aims to develop the following abilities.

PSO1: Students will have a thorough knowledge of fundamentals of chemistry along with thermal physics, waves, optics and programming using C along with internet technologies.

PSO2: The foundation for the higher education such as M.Sc. in chemistry is developed, as inorganic, organic, physical and analytical chemistry are the foremost important branches of chemistry.

PSO3: Students will develop skills for conducting experiments on thermal physics, waves, optics, programming language, internet technologies, quantitative estimation using the different branches of volumetric analysis as well as quantitative analysis of metal ions and anions using gravimetric method.

Programme specific outcome (B.Sc.-III Chemistry Honors)

At the completion of B.Sc. Hons. in Chemistry:

PSO1: Students will learn about the advance topics of chemistry, instruments used in chemistry, chemicals of industrial importance and basics of green chemistry.

PSO2: Students will demonstrate knowledge of spectroscopy, biomolecules and catalysis to analyze a variety of chemical compounds and phenomenon.

PSO3: Students will show that they have learned laboratory skills, enabling them to analyse chemical in a chemistry laboratory and analyze the various materials for their chemical compositions.

SEMESTER-I

BHCHE 101-T: INORGANIC CHEMISTRY-I

COURSE OUTCOMES

CO1. Students will be able to explain the atomic theory of matter, composition of the atom, which defines the identity of a given elements

CO2. Students have knowledge of relative sizes, masses, and charges of the proton, neutron, and electron, and their assembly to form different atoms.

CO3. Students can use the Periodic Table to rationalize similarities and differences of elements, including physical and chemical properties and reactivity.

CO4. Students have knowledge of various types of bonding.

BHCHE 101-P:INORGANIC CHEMISTRY –I-LAB

COURSE OUTCOMES

CO1. Students will have knowledge of various titrimetric analysis and use of analytical apparatus.

CO2. Students have knowledge of acid–base, oxidation–reduction and silver nitrate titrations.

CO3. Students know about the standardization procedures of secondary standards.

CO4. Students will be able to find hardness of water using EDTA titrations.

BHCHE 102-T: PHYSICAL CHEMISTRY I

COURSE OUTCOMES

CO1. Apply the applications of buffers in analytical chemistry and biochemical processes.

CO2. Use kinetic molecular theory to explain gas behavior.

CO3. Explain the origin of K_{eq} and its relation to fugacity and activity and apply these concepts to ideal and real solutions of electrolytes and non-electrolytes and to colligative properties.

CO4. List the methods for arriving at a plausible mechanism and/or rate law based on kinetic Information. Manipulate the gas laws to describe real and ideal gas behavior.

BHCHE 102-P: PHYSICAL CHEMISTRY -ILAB

COURSE OUTCOMES

CO1: Measure the strength and equivalence points of different types of eletrolytes by the use of pH meter.

CO2: Compare the surface tension of different detergents with concentration.

CO3: Measure the viscosity of different samples with Ostwald's viscometer.

CO4: Determine the refractive index of different liquids using refractometer

BHCHE 105 A-T : COMPUTER FUNDAMENTALS

COURSE OUTCOMES

- CO1:** Understand the various number system techniques and its conversion.
- CO2:** Understand the basic concepts of hardware & software, terminology and use of IT tools.
- CO3:** Understand the concept of word processor, presentation and spreadsheet.
- CO4:** Understand the concept of Operating system and various Office Automation tools.

BHCHE-105A-P : SOFTWARE LAB-I

COURSE OUTCOMES

After completion of this course student will able to:

- CO1:** Prepare documents, spreadsheets, make small presentations with audio, video and graphs.
- CO2:** Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker.
- CO3:** Apply different animations and transition effects to make presentation more effective.
- CO4:** Attain the knowledge about spreadsheet with formula, functions and macros etc.

BHCHE 105 B-T: MECHANICS

COURSE OUTCOMES

- CO1:** grasped the knowledge of the fundamentals of different types of frames of references and transformation laws.
- CO2:** learned conservation laws of energy and linear and angular momentum and apply them to solve problems.
- CO3:** learned the basics of potentials and fields, central forces and Kepler's laws
- CO4:** familiarize with rotational dynamics.
- CO5:** learned fundamental ideas of special theory of relativity such as length contraction and time dilation and mass –energy invariance.

BHCHE 105B-P : MECHANICS LAB

COURSE OUTCOMES

- CO1:** A working knowledge of fundamental physics and basic mechanics principles.
- CO2:** The ability to formulate, conduct, analyzes and interprets experiments in physics.
- CO3:** The students will have the working experience of Pendulums, sextant, Vanier caliper, screw gauge, traveling microscope, Maxwell needle, flywheel.
- CO4:** The students will be able to determine Youngs Modulus and Modulus of Rigidity

SEMESTER II

BHCHE 201-T: ORGANIC CHEMISTRY I

COURSE OUTCOMES

- CO1.** Predict the products of reactions of alkenes and describe the mechanisms showing how the products are formed.
- CO2.** Identify the types of isomerism in organic compounds, to identify and classify chiral centers, and explain the physical and chemical consequences of chirality.
- CO3.** Identify compounds in which resonance is important, predict the effect of resonance on the stability of compounds and reactive intermediates, and draw resonance structures.
- CO4.** Identify conjugated pi systems and explain the effect of conjugation on molecular structure and reactivity; and predict the products of reactions of dienes.

BHCHE 201-P: ORGANIC CHEMISTRY I LAB

COURSE OUTCOMES

- CO1. Students will be able to perform experiments of crystallization using Alcohol and water based solvents.
- CO2. Students will be able to determine melting and boiling point of various organic compounds.
- CO3. Students will be able to synthesize some organic dyes in lab.
- CO4. Students can easily determine mixed melting points of unknown organic compounds also.

BHCHE 202-T: PHYSICAL CHEMISTRY II

COURSE OUTCOMES

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

- CO1. Describe the Three Laws of Thermodynamics and their development.
- CO2. Determine the reversibility and irreversibility of a thermodynamic process.
- CO3. Use the Maxwell equations and other thermodynamic relations to compute thermodynamic quantities from thermodynamic data tables.
- CO4. Explain the various factors like temperature and presence of a catalyst etc. on position of chemical equilibrium.

BHCHE 202-P : PHYSICAL CHEMISTRY -II LAB

Course Outcomes

On the completion of this course, the students will be able to:

- CO1: Determine the heat capacity of different electrolytes by using calorimeter.
- CO2: Determine the basicity/proticity of a polyprotic acid by the thermochemical method.
- CO3: Separate the different mixtures by using thin layer chromatography.
- CO4: Determine the enthalpy of neutralization, hydration, and solubility of different electrolytes using calorimeter.

BHCHE 205A -T : DATABASE MANAGEMENT SYSTEM

Course Objective

The objective of the course is to understand the basics of Database Management System and to make students capable of creating database and working with it.

Course Learning Course Outcomes (C.O.):

After completion of this course students will able to:

- CO1:** Gain a good understanding of the architecture and functioning of database management systems, principles of data modelling.
- CO2:** Design ER-models to represent simple database application scenarios and Convert the ER-model to relational tables.
- CO3:** Design database and improve the database design by normalization.
- CO4:** Understand the use of structured query language and its syntax, transactions, database recovery and techniques in MySQL.

BHCHE205AP:SOFTWARE LAB II (BASED ON DATABASE MANAGEMENT SYSTEM)

COURSE OUTCOMES (C.O.):

After completion of this course students will able to:

- CO1:** Understand basic concepts of storing information in database via tables and different SQL syntaxes used with MySQL.
- CO2:** Learn how to retrieve and manipulate data from one or more tables.

CO3: Learn how to filter data based upon multiple conditions.

CO4: Update and insert data into the existing tables.

BHCHE 205B-T: ELECTRICITY AND MAGNETISM

COURSE OUTCOMES (C.O.):

CO1: understand the basic concepts of electric and magnetic field, conductors, dielectrics, inductance and capacitance.

CO2: acquire knowledge about vector analysis

CO3: understand the concept of electrostatics

CO4: understand the concept of Magnetism

CO5: gain knowledge on electromagnetic induction and its applications

BHCHE 205B-P : ELECTRICITY AND MAGNETISM LAB

COURSE OUTCOMES (C.O.):

CO1: A working knowledge of fundamental physics and different Digital Instruments

CO2: The ability to identify, formulate, and use modern physics techniques and tools, including graphs and laboratory instrumentation.

CO3: Students are able to understand Basics of measuring measuring instruments like multimeter, voltmeter, ammeter, Cathode Ray Oscilloscope, LCR circuits.

CO4: To verify Thevenin Theorem, Norton theorem and Maximum Power Transfer Theorem.

SEMESTER-III

BHCHE 301-T: INORGANIC CHEMISTRY-II

COURSE OUTCOMES

CO 1. Students will know about s & p – block elements and will learn the basic principles behind metallurgical processes.

CO 2. Detailed knowledge of acids, bases and their classification.

CO 3. Students can apply valence bond theory to determine the shapes of noble gas compounds.

CO 4. Students get knowledge about inorganic polymers.

BHCHE 301-P: INORGANIC CHEMISTRY -II LAB

COURSE OUTCOMES

CO 1. Students will be able to synthesize various inorganic complexes and have knowledge of their applications.

CO 2. Students can determine the strength and purity of some specific compounds using iodimetric titration methods.

CO 3. Students will carry out iodimetric titrations.

CO 4. Students will be able to carry out mercuration of phenol.

BHCHE 302-T: ORGANIC CHEMISTRY-II

COURSE OUTCOMES

CO 1. Students will have a thorough knowledge about the chemistry of some selected functional groups with a view to develop proper aptitude towards the study of organic compounds and their reactions.

CO 2. To enable the students to understand and study Organic reaction mechanisms.

CO 3. Enable the students to study the structure, preparation and reactivity of carbonyl compounds.

CO 4. Students will be able to study about alcohols and sulphur containing compounds in detail

BHCHE 302-P: ORGANIC CHEMISTRY -II LAB

COURSE OUTCOMES

- CO 1. To develop skills required for the qualitative analysis of organic compounds & determination of physical constants.
- CO 2. Students learn to analyze organic compounds having nitro, amine and amide functional groups.
- CO 3. Enable the students to detect extra elements in the given organic compounds.
- CO 4. Students will be able to qualitatively analyze unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols, carbonyl compounds).

BHCHE 303-T: PHYSICAL CHEMISTRY-III

COURSE OUTCOMES

- CO 1. Students will be able to determine kinetics of fast reactions.
- CO 2. To enable students to determine the order of reactions with respect to given species by applying the initial rate method and isolation method, express the rate law from the orders with respect to the species involved.
- CO 3. Enable students to predict the dependence of rate constants on temperature, calculate the activation energy and pre-exponential factors.
- CO4. Apply the steady state approximation and derive the rate law of a complex mechanism such as that found in unimolecular reactions

BHCHE 303-P: PHYSICAL CHEMISTRY -III LAB

COURSE OUTCOMES

- CO 1. Students will determine density of given liquid using pycnometer.
- CO 2. Students will determine solubility of given sample using conductometer.
- CO 3. Students will gain skills about adsorption studies.
- CO 4. Students will determine distribution coefficient of particular compound between two solvents.

BHCHE 304 : ENVIRONMENTAL AND ROAD SAFETY AWARENESS

COURSE OUTCOMES

- CO 1. Students will learn the significance of conservation of natural resources.
- CO 2. Students will become concerned to follow practices to make environment pollution free.
- CO 3. Students will become sensitized towards road safety and have the knowledge of road safety rules.
- CO 4. Students will learn about environmental policies and practices. And will also know about disaster management, environmental movements and ethics.

BHCHE 305A-T: PROGRAMMING USING C

COURSE OUTCOMES

- CO1:** Develop efficient algorithms for solving a problem
- CO2:** Understand the basic terminology used in computer programming.
- CO3:** Foundation for the higher level of programming languages.
- CO4:** Develop confidence and ability for learning needed for Computer language.

BHCHE 305A-P: SOFTWARE LAB-III

(Based On Programming Using C)

COURSE OUTCOMES (C.O.):

- CO1:** Understand the basic terminology used in computer programming.
- CO2:** Describe various Data types, Operators, Control structures, Function in C.

CO3: Understand the concepts of different user-defined data types such as Arrays, Strings, Structures, and Unions etc.

CO4: Learn Pointers and File handling techniques.

BHCHE 305B-T:THERMAL PHYSICS

COURSE OUTCOMES

CO1: become familiar with various thermodynamic process and work done in each of these processes.

CO2: have a clear understanding about reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy for various processes.

CO3: realize the importance of thermodynamical functions and their applications

CO4: Understand the Maxwell Thermodynamical relations.

CO5: Understanding Kinetic theory of gases and molecular collisions

BHCHE 305B-P: THERMAL PHYSICS LAB

COURSE OUTCOMES (C.O.):

CO1: A working knowledge of fundamental physics and basic concepts of Thermal Physics.

CO2: The ability to calculate coefficient of thermal conductivity of good and bad conductors by different methods.

CO3: The ability to measure Plancks constant and Stefan constant.

CO4: To perform various experiments based on thermo emf and thermocouple.

SEMESTER-IV

BHCHE 401-T: INORGANIC CHEMISTRY-III

COURSE OUTCOMES

CO1. Students will describe the structure and bonding theories as well as Nomenclature of co-ordination complexes.

CO 2. Recognize the role played by transition metal complexes play in Inorganic Chemistry. Explain the role of Inorganic “substances” in living systems and the use of metal ions in medicinal therapy and diagnosis.

CO 3. Describe the electronic and magnetic properties of the transition metal complexes and their kinetic studies.

CO 4. Students will learn to explain Stereochemistry of complexes.

BHCHE 401-P: INORGANIC CHEMISTRY -III LAB

COURSE OUTCOMES

CO 1. Students will be able to synthesize various inorganic complexes and have knowledge of their applications.

CO 2. Students will learn about basic principles of chromatographic techniques.

CO 3. Students will carry out separation of given mixture using column chromatography.

CO 4. The students will get training in the quantitative analysis of metal ions and anions using gravimetric method.

BHCHE 402-T: ORGANIC CHEMISTRY-III

COURSE OUTCOMES

CO1.Students will have a thorough knowledge about the chemistry of some selected functional groups with a view to develop proper aptitude towards the study of organic compounds and their reactions.

CO2.To enable the students to know about some naturally occurring organic compounds.

CO3.To enable the students to know the medicinal importance of some natural medicinal compounds.

CO4.Enable the students to study the structure, preparation and reactivity of heterocyclic compounds.

BHCHE 402-P: ORGANIC CHEMISTRY -III LAB

COURSE OUTCOMES

CO 1.Students will be able to carry out Claisen Condensation reaction to synthesize required carbonyl compound.

CO 2. To enable the students to perform Benzil-Benzilic acid rearrangements.

CO 3.To develop skills required for the laboratory preparation of organic compounds & determination of physical constants.

CO 4.Enable the students to specifically prepare oximes, anilides, iodo form & semi carbazone of some selected carbonyls.

BHCHE 403-T: PHYSICAL CHEMISTRY- IV

COURSE OUTCOMES

CO 1. Students will be able to apply the principles of electrochemistry to conductance, voltaic and electrolytic systems.

CO 2. Students will learn about various electrodes, concentration cells, fuel cells.

CO 3. Enable students to determine dipole and magnetic properties of various substances.

CO 4. Students will know about conductance and related theories.

BHCHE 403-P: PHYSICAL CHEMISTRY -IV LAB

COURSE OUTCOMES

CO 1. Students will be able to determine cell constant using conductometer.

CO 2. To enable students to determine the strength of acids and bases by applying conductometric titrations.

CO 3. Enable students to determine equivalent conductance, degree of dissociation and dissociation constant of given weak acid using conductometer.

CO 4. To enable students to determine the strength of acids and bases by applying potentiometric titrations.

BHCHE 404 : BASIC ANALYTICAL CHEMISTRY

COURSE OUTCOMES

CO 1. This course will develop skills in students like problems solving, critical thinking and analytical reasoning.

CO 2. The students will understand the fundamental principle and applications of various chromatographic techniques.

CO 3. This course will suggest suitable ways to analyse given sample of water and soil.

CO 4. Students will learn about food preservation, food processing, food adulteration & to analyse the given sample of food.

BHCHE 405A-T: COMPUTER NETWORKS AND INTERNET TECHNOLOGIES

COURSE OUTCOMES

CO1: Understand the latest trends of IT for the communication.

CO2: Familiar with the basics of Networking and how they can be used to assist in designing to meet the real life problem.

CO3: To explore the skills for developing the websites, documentation, reports and presentation.

CO4: To help the society for better interaction with business, academics and computation.

BHCHE 405A-P: SOFTWARE LAB IV

(Based On Computer Networks and Internet Technologies)

COURSE OUTCOMES (C.O.):

CO1: Describe basic syntaxes of HTML.

CO2: Learn basic concepts of internet technologies, browsers and e-mails.

CO3: Understand the HTML structuring and creating websites with style sheets.

CO4: Design a media-rich dynamic websites using text, fonts, colors, images, tables, hyperlinks and client side scripting.

BHCHE 405B-T: WAVES AND OPTICS

COURSE OUTCOMES

CO1: Understand simple harmonic motion and wave motion.

CO2: Understand phenomenon based on light and related theories. .

CO3: Understand the phenomena like reflection, refraction, interference, diffraction, polarization etc and their applications.

CO4: Understand the phenomena of interference and working of interferometers.

CO5: Understand the wave optics

BHCHE 405B-P: WAVES AND OPTICS LAB

COURSE OUTCOMES (C.O.):

CO1: Understand simple harmonic motion and wave motion.

CO2: Understand phenomenon based on light and related theories. .

CO3: Understand the phenomena like reflection, refraction, interference, diffraction, polarization etc and their applications.

CO4: Understand the phenomena of interference and working of interferometers.

CO5: Understand the wave optics

SEMESTER-V

BHCHE 501-T: ORGANIC CHEMISTRY-IV

COURSE OUTCOMES

CO1: Students will be able to determine the structure of carbohydrates, proteins, enzymes, lipids and nucleic acids.

CO2: Students can describe the mechanism of enzyme action.

CO3: Students can analyse the catabolic pathways of fat & protein. And find the interrelationship in the metabolic pathways of protein, fat and carbohydrate.

CO4: Students can get knowledge about structure and importance of pharmaceutical compounds.

BHCHE 501-P: ORGANIC CHEMISTRY LAB-IV

COURSE OUTCOMES

CO1: Students can identify and determine experimentally the different biomolecules in given samples.

CO2: Students will be able to perform volumetric analysis of Ibuprofen and Ascorbic acid tablets.

CO3: Students will be able to calculate percentage purity of some carbohydrates using Fehling and Benedict's Method.

CO4: Students will be able to find Saponification value of Oils and Fats.

BHCHE 502-T: PHYSICAL CHEMISTRY-V

COURSE OUTCOMES

CO1: apply the applications of quantum mechanics in the study of structure of atoms, bonding in molecules and molecular spectroscopy.

CO2: Explain the physical states of elementary particles and atoms in different systems based on quantum mechanics.

CO3: Explain the basic concepts of photochemistry.

CO4: Characterize the kinetics of deactivation processes and their role in the photochemical reactivity.

BHCHE 502-P: PHYSICAL CHEMISTRY LAB-V

COURSE OUTCOMES

CO1: Apply the concepts of photochemistry on different samples experimentally.

CO2: Explain how the absorption of energy by the molecules produces spectra which help in the structure determination and identification of molecules.

CO3: Determine the composition of unknown sample using Lambert – Beer Law.

CO4: Study the kinetics of different reactions using rate law equation.

BHCHE 503-T: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

COURSE OUTCOMES

CO1: Students will be able to recognize the importance of inorganic materials used in industry.

CO2: Students can analyze the applications of homogenous catalysis in industry.

CO3: Can explain the applications of fuel cells, solar cells and polymer cells.

CO4: Students will study about alloys and petroleum industry

BHCHE 503-P: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE LAB

COURSE OUTCOMES

CO 1: Students are able to analyze fertilizers, alloys and bleaching powder experimentally.

CO 2: Students are able to carry out complexometric titrations.

CO 3: Students are able to prepare inorganic complexes.

CO 4: Students are able to carry out absorption studies of prepared inorganic complexes

BHCHE 504: GREEN CHEMISTRY

COURSE OUTCOMES

CO1: Students can recognize the impact of green chemistry on human health and the environment.

CO2: Demonstrate the knowledge of the twelve principles of Green Chemistry which they can apply to a range of work places for a safer, less toxic and healthier environment.

CO3: Can be able to synthesize chemical compounds by Microwave assisted reactions in water.

CO4: Can be able to synthesize chemical compounds by Ultrasound assisted reactions

SEMESTER-VI

BHCHE 601-T: INORGANIC CHEMISTRY-IV

COURSE OUTCOMES

CO1: Students will be able to recognize the importance of organometallic compounds.

CO2: Students can analyze the applications of homogenous catalysis by organometallic compounds in Industry.

CO3: Can explain the electronic spectra of metal complexes.

CO4: Students are able to explain the mechanism of ligand substitution reactions in metal complexes.

BHCHE 601-P: INORGANIC CHEMISTRY LAB-IV

COURSE OUTCOMES

- CO 1: Students will be able to prepare complexes.
- CO 2: Students will be able to carry out spectroscopic studies.
- CO 3: Students will be able to carry out qualitative analysis of cation and anion radicals.
- CO 4: Students will be able to verify spectrochemical series.

BHCHE 602-T: ORGANIC CHEMISTRY-V

COURSE OUTCOMES

- CO1: Students can identify organic compound using UV, IR and PMR spectroscopic techniques.
- CO2: Students will qualitatively analyze unknown organic compounds containing monofunctional groups and simple bifunctional groups.
- CO3: Students can elucidate the structures of natural dyes.
- CO4: Can explain the Kinetics and mechanism of Polymerisation reactions.

BHCHE 602-P: ORGANIC CHEMISTRY LAB-V

COURSE OUTCOMES

- CO1: Students will be able to synthesize Urea Formaldehyde, Phenol Formaldehyde and Methyl Orange.
- CO2: Students will be able to extract caffeine from tea leaves.
- CO3: Students will be able to perform qualitative analysis of various organic compounds.
- CO4: Students will be able to identify the organic compounds using NMR and IR spectroscopy.

BHCHE 603: INDUSTRIAL CHEMICALS AND NOVEL INORGANIC SOLIDS

COURSE OUTCOMES

- CO1: Students can understand the hazards in handling of industrial gases & chemicals and follow safety measures while handling them.
- CO2: Students can recognize the importance of biocatalysis and nanotechnology.
- CO3: Students will be able to explain the uses of radioisotopes.
- CO4: Students can understand the interrelation between energy resources and environment.

BHCHE 604-T: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

COURSE OUTCOMES

- CO1: Understand the fundamental laws and selection rules of UV-Visible Infrared spectroscopy.
- CO2: Understand the skills in advanced methods of separation and analysis.
- CO3: Determine the amount of Na/K in a given solution flame photometrically.
- CO4: Learn the theoretical skills on thermal and electroanalytical methods for different applications.

BHCHE 604-P: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS LAB

COURSE OUTCOMES

- CO1: Distinguish organic compounds with different functional groups using IR spectroscopy.
- CO2: Have work experience of handling spectro-photometer and other instruments like flame photometer, potentiometer and pH meter etc.
- CO3: Determine the stoichiometry of metals ligand complexes using UV-Visible spectrometer.
- CO4: determine the redox potential of given ion potentiometrically.

B.Sc. Non Medical

Programme Objectives (PO)

Students of all undergraduate general degree Programmes at the time of graduation will be able to:

PO1. Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO2: Work and communicate effectively in inter-disciplinary environment, either independently or in a team, and demonstrate leadership qualities. Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO3. Recognize different value systems including your own, understand the moral dimensions of your decisions, scientific aptitude and accept responsibility for them.

PO4. Understand the issues of environmental contexts and sustainable development.

PO5. Recognize the need to engage in lifelong learning through continuing education.

Programme specific Outcomes (PSO) (B.Sc.non-medical-I)

On completion of the programme student will be able to:

PSO1: Predict stereochemistry of organic compounds such as alkanes, alkenes, arenes and diarenes.

PSO2: Gain knowledge of basics of an organic chemistry.

PSO3: Discuss debate and communicate in a clear and logical ways to understand the basic concepts of chemistry.

PSO4: Relate their knowledge and skills in carrying out independent work in the laboratories.

PSO5: Demonstrate skills to conduct laboratory experiments.

PSO6: Identify their area of interest.

PSO7: Relate their knowledge and skills in carrying out independent work in the laboratories.

PSO7: Students will be able to recall basic facts about mathematics and will be able to display knowledge of conventions such as notations, terminology.

PSO8: Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.

BSNM 103: PHYSICS MECHANICS

Course Outcomes: At the end of this course, the students will be able to:

CO1: familiarize with types of co-ordinate systems and their applications.

CO2: learned the basics of the central forces, Kepler's laws and rotational dynamics.

CO3: grasped the knowledge of the fundamentals of different types of frames of references and transformation laws. (Both Galilean and Lorentz).

CO4: learned fundamental ideas of special theory of relativity such as length contraction and time dilation and mass-energy invariance.

CO5: acquire the knowledge of simple harmonic motion (SHM), can deeply understand the undamped, damped and forced harmonic oscillations.

BSNM-104 (Paper I): ALGEBRA AND TRIGONOMETRY

Course Outcomes: At the end of this course, the students will be able to:

CO1. To recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix.

CO2. To find eigenvalues and corresponding eigenvectors for a square matrix.

CO3. To understand the importance of roots of real and complex polynomials

CO4. To learnt various methods of obtaining roots.

CO5. To understand the application of De Moivre's Theorem to solve numerical problems.

BSNM-104 (Paper II): DIFFERENTIAL CALCULUS

Course Outcomes: At the end of this course, the students will be able to:

CO1. To understand the concept of functions of one and two variables.

CO2. To understand the concept of the nth order derivative using Leibnitz theorem.

CO3. To familiarize with concavity convexity and Asymptotes.

CO4. To understand the concept of two or more variables for differential calculus.

BSNM 105: INORGANIC CHEMISTRY-I: ATOMIC STRUCTURE & CHEMICAL BONDING

Course Outcomes: At the end of this course, the students will be able to:

CO1. Understand the formation of chemical compounds by learning the concept of electrostatic attraction and repulsions between the ions, molecules and atoms.

CO2. Appreciate how chemical substances can be described in terms of structure and bond type.

CO3. Understand the concept of electro-negativity and its variation over periodic table to rationalize the nature of bonding in substances.

CO4. Understand the common themes running through ionic, covalent and metallic descriptions of chemical bonding.

CO5. Gain knowledge about the electronic

BSNM-105: ORGANIC CHEMISTRY-I: GENERAL ORGANIC CHEMISTRY & ALIPHATIC HYDROCARBONS

Course Outcomes: At the end of this course, the students will be able to:

CO1. Classify the organic molecules by their functional groups and identify fundamental properties associated with these functional groups.

CO2. Predict and explain patterns in stability, shape, hybridization, reactivity and product formation when resonance or conjugation applies to a reactant, intermediate or final product.

CO3. To predict products including their stereochemistry in the reactions of alkanes, alkenes, dienes and arenes.

CO4. Learn the IUPAC names of alkanes, alkenes and aromatics including cyclic molecules.

BSMN 105-A: FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course Outcomes: After completion of this course students will able to:

CO1: To understand the basic concepts, terminology of IT and familiar with the use of IT tools.

CO2: To Learn and explore new IT techniques in various applications and to identify the issues related to security.

CO3: To learn working knowledge of hardware and software of computer.

CO4: To learn the various features of MS-Office.

SECOND SEMESTER

BSNM 203: PHYSICS ELECTRICITY AND MAGNETISM

On successful completion of the course students would have:

CO1: Gain knowledge on the vector analysis.

CO2: Understand the concept of electrostatics and its applications on conductors and dielectrics.

CO3: Understand the concept of magnetism and magnetic materials such as paramagnetic, diamagnetic and ferromagnetic substances.

CO4: Gain knowledge on electromagnetic induction and its applications.

CO5: Acquire the knowledge of electromagnetic waves and Maxwell's equations.

BSNM-204 (PAPER III): SEQUENCE AND SERIES

Course Outcomes: at the end of this course, the students will be able to:

CO1: To assimilate the notions of limit of a sequence and convergence of a sequence of real numbers.

CO2: To recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.

CO3: To test the convergence and divergence of an infinite series of real numbers

CO4: To give knowledge of different kinds of convergence criterion for series

CO5: To give knowledge of different kinds of tests for convergence/ divergence.

BSNM-204 (Paper IV): PLANE AND SOLID GEOMETRY

Course Outcomes: at the end of this course, the students will be able to:

CO1: To understand the properties of ellipse, parabola and hyperbola.

CO2: To be well-versed with sphere, cone and cylinder

CO3: To enable the students to aware the applications of plane and solid geometry.

BSNM-205: PHYSICAL CHEMISTRY- I: THERMODYNAMICS & EQUILIBRIA

Course Outcomes: at the end of this course, the students will be able to:

CO1. Describe why concentration of reactants and products don't changes at equilibrium stage.

CO2. Describe the set of conditions where a chemical reaction can reasonably be treated as an irreversible and reversible reaction.

CO3. Deal with thermal equilibrium using Zeroth law of thermodynamics.

CO4. Predict the feasibility of a reaction on the basis of concept of entropy and Gibbs free energy

BSNM-205: ORGANIC CHEMISTRY-II: FUNCTIONAL ORGANIC CHEMISTRY

Course Outcomes: At the end of this course, the students will be able to:

CO1. Identify the difference between various organic compounds on the basis of functional groups attached and their respective properties.

CO2. Acquire the knowledge of various industrial chemical reactions.

CO3. Draw structures of various organic compounds on the basis of hybridization and MOT.

CO4. Gain knowledge about the standard conditions for occurrence of organic reactions.

BSNM 205-A: DATABASE MANAGEMENT SYSTEM

Course Outcomes: After completion of this course students will be able to:

CO1: Gain a good understanding of the architecture and functioning of database management systems, Principles of data modeling and normalization techniques.

CO2: Explore the components of relational database management system.

CO3: Understand the use of structured query language and its syntax, transactions, database recovery and techniques for query optimization.

CO4: Acquire the practical knowledge of MySQL.

Programme specific outcome (PSO) (B.Sc.-II non-medical)

The B.Sc.-II programme includes two core courses of Physics such as Thermal physics (including statistical mechanics), wave and optics. The programme aims to develop the following abilities:

- POS I: Read, understand and interpret physical information – verbal, mathematical and graphical.
- POS II: The foundation for the higher education such as M.Sc. in Sciences is developed, as Thermal and Statistical Physics along with Wave and Optics are the foremost important subjects of pure sciences.
- POS III : Students will be able to apply their skills and knowledge i.e., translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.
- POS IV: Students will be able to apply multivariable calculus tools in physics, economics, optimization, and understanding the architecture of curves and surfaces in plane and space.
- PSO V: Predict the chemical structure and reactions organic compounds such as carbocyclic acids and amines.
- PSO VI: Gain knowledge of basics of an Electro-chemistry.
- PSO VII: Basics of C language and data structure can be grasped which are useful for understanding other languages in the discipline of computer science.

BSNM 302: PHYSICS THERMAL PHYSICS AND STATISTICAL MECHANICS

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

CO1: become familiar with various thermodynamic process and work done in each of these processes.

CO2: have a clear understanding about reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy various processes.

CO3: realize the importance of Thermo-dynamical functions and applications of Maxwell's relations.

CO4: familiarize in depth about statistical distribution and have basic ideas of Maxwell Boltzmann, Bose-Einstein and Fermi Dirac Statistics and their applications.

BSNM 303: MATHEMATICS (PAPER V): Integral Calculus

Course Outcomes: After completion of this course students will able to:

CO1: To analyze and find integral of hyperbolic function, rational function, trigonometric function and logarithmic function.

CO2: To understand the concept of Improper Integral and multiple integral.

CO3: To understand the concept of partition and fundamental concept of Riemann Integrability.

BSNM 303: MATHEMATICS (PAPER VI): DIFFERENTIAL EQUATIONS-I

The Primary objective of this course is:

CO1: To know about solutions of first and higher order differential equations.

CO2: To exhibit the techniques for obtaining solutions to ordinary differential equations.

CO3: To investigate the qualitative and quantitative behavior of solutions of system of differential equations.

CO4: To develop interests in solving a number of problems related to model natural phenomena, engineering systems and many other situations.

BSNM 304: CHEMISTRY

PHYSICAL CHEMISTRY-II (SOLUTIONS, PHASE EQUILIBRIUM AND ELECTROCHEMISTRY)

CO1: To understand the ideal and non-ideal solutions.

CO2: To learn the phase diagram of various mixtures.

CO3: To understand the basic concept of conductance.

CO4: To learn the fundamentals of electrochemistry.

BSNM 304: CHEMISTRY: ORGANIC CHEMISTRY-III (CARBOXYLIC ACIDS AND AMINES)

CO1: To learn the various routs for carboxylic and its derivative synthesis.

CO2: To understand the basic preparation of Amino acids and proteins (biomolecules).

CO3: To learn the mechanism of organic reactions.

CO4: To learn the basics of carbohydrate chemistry.

BSNM 304 A: COMPUTER SCIENCE PROGRAMMING USING

After completion of this course students will able to:

CO1: Describe basics, various Data types, operators in C.

CO2: Explain, Control Structures, Functions in C.

CO3: Understand the concepts of different user-defined data types such as arrays, structures etc.

CO4: Learn pointers and summarize the different File handling operations.

BSNM 402: PHYSICS WAVES AND OPTICS

On successful completion of the course students will be able to:

CO1: understand the basics of the methods to solve problems of geometrical optics.

CO2: use the principles of wave motion and superposition to explain the physics of polarization, interference and diffraction.

CO3: understand the basics of Lasers.

CO4: Solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.

BSNM 403: MATHEMATICS PAPER VII: REAL ANALYSIS

CO1: This course is designed to provide knowledge about Riemann integrals and convergence. Their applications are also included to clear the topic to students.

CO2: The aim of this course is to make the students familiar with the use of vectors and vector calculus so that they may employ the same in an effective manner to various applications in science subjects and to exhibit the techniques of solving ordinary and partial differential equations.

CO3: To understand the concept of sequence and series of functions.

BSNM 403: MATHEMATICS PAPER VIII: DIFFERENTIAL EQUATIONS-II

To know about solutions of first and higher order partial differential equations.

CO1: To exhibit the techniques for obtaining solutions to ordinary differential equations.

CO2: To investigate the qualitative and quantitative behavior of solutions of system of differential equations.

CO3: To develop interests in solving a number of problems related to model natural phenomena, engineering systems and many other situations.

CO4: To understand how to extract information from partial derivative models in order to interpret reality.

CO5: To identify real phenomena as models of partial derivative equations.

CO6: To apply the concepts of the course in real life problems.

BSNM 404: CHEMISTRY (i): INORGANIC CHEMISTRY II (TRANSITION METAL COORDINATION CHEMISTRY)

CO1: To learn the basic properties of d block elements.

CO2: To learn the basic properties of f-block elements.

CO3: To learn the coordinate chemistry and nomenclature of coordinate complexes.

CO4: To learn the fundamentals of crystal field theory.

BSNM 404: PHYSICAL CHEMISTRY-III (STATES OF MATTER & CHEMICAL KINETICS)

CO1: To understand the principles of kinetic theory of gases.

CO2: To understand the basic concept of surface tension and viscosity.

CO3: To understand the solid structure of various crystals and basic techniques to identify the crystal structure.

CO4: To understand the fundamental concept of chemical kinetics of various reactions.

BSNM 404 A: COMPUTER SCIENCE DATA STRUCTURES

CO1: After completion of this course students will able to:

CO2: To access how the choices of data structure & algorithm methods impact the performance of program.

CO3: To solve problems based on different data structure & also write programs. And know about the basic concepts of Array and Linked-list.

CO4: Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and Graphs.

CO5: Learn various searching and Sorting algorithms.

B.SC. NON MEDICAL-III

Programme specific outcomes

At the completion of B. Sc. Non-Medical, students are able to:

PSO-1.Demonstrate a rigorous understanding of the core theories & principles of physics, which includes solid state physics, digital and analog circuits, & quantum mechanics along with nuclear physics.

PSO-2.Understand the fundamental theory of nature at small scale & levels of atom & sub-atomic particles.

PSO-3.Work effectively and safely in a laboratory environment and use technologies/instrumentation techniques to gather and analyze data and work in teams as well as independently.

PSO-4.Compete for the various competitive examination based on chemistry in various government as well as corporate sectors like DRDO, SSC, FCI, PSPCL, UPSC. And will be able to grasp an enormous job opportunities after completing their graduation at all levels of pharmaceutical, food industries.

PSO-5.Students will be able to utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.

PSO-6.The programme will strengthen the mathematical ability, abstract intelligence and orient them towards higher mathematics and research.

SEMESTER-V

BSNM 502: PHYSICS: QUANTUM MECHANICS

Course Learning Outcomes:

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

CO1: the basics of formalism of wave mechanics

CO2: gain knowledge about Uncertainty Principle

CO3; Schrodinger Wave equation

CO4: hydrogen atom problem

CO5: atoms in electric and magnetic fields.

BSNM 502: PHYSICS PAPER: SOLID STATE PHYSICS

Course Learning Outcomes:

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

CO1: The crystal structures

CO2: Elementary lattice dynamics and magnetic properties of matter

CO3: Dielectric properties of materials

CO4: Elementary band theory

CO5: Superconductivity

BSNM 503: Paper IX-ABSTRACT ALGEBRA

Course Learning Outcomes:

On completion of this course, the student will be able to

CO-1. Link the fundamental concepts of groups and symmetries of geometrical objects.

CO-2. Explain the significance of the notions of cosets, normal subgroups, and factor groups.

CO-3. Understand the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.

CO-4. Learn the concept of Homomorphism and Isomorphism in Groups and Rings.

BSNM 503: Paper X (Option I)- DISCRETE MATHEMATICS

Course Learning Outcomes:

On completion of this course, the student will be able to

CO-1. Learn about partial ordered set and applications.

CO-2. Understand about Boolean algebra and Boolean functions, logic gates, switching circuits and their applications.

CO-3. Understand concepts of various graphical concepts and familiarize with their applications.

BSNM 503: Paper X (OPTION II) - LAPLACE AND FOURIER TRANSFORMS

Course Learning Outcomes:

On completion of this course, the student will

CO-1. Be familiarized with Fourier transforms of functions belonging to L class, relation between Laplace and Fourier transforms.

CO-2. Have Knowledge about piece wise continuous functions, Dirac delta function, Laplace transforms and its properties.

CO-3. Recognize of the concepts of the course in real life problems.

BSNM 504: CHEMISTRY

INORGANIC CHEMISTRY-III: BIOINORGANIC & ORGANOMETALLIC CHEMISTRY

Course Learning Outcomes:

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

CO1. Predict the structure and stability of organometallic cluster compounds based on the electron count and explain the chemical behavior and reactivity of organometallic compounds.

CO2. Develop practical skills in the preparation of organometallic compounds and their precursors.

CO3. Apply the EAN concept and Wade's rules to any organometallic system and predict its stability, structure and bonding.

CO4. Illustrate the catalytic cycle using an organometallic compound as a catalyst for industrial synthesis of some organic compounds.

BSNM504: CHEMISTRY

PHYSICAL CHEMISTRY-IV: QUANTUM CHEMISTRY AND MOLECULAR SPECTROSCOPY

Course Learning Outcomes:

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

CO1. Apply principles of microwave, infrared and electronic spectroscopies to identify the fingerprint region of small molecules in gas and solution phases.

CO2. Understand the laws of absorption of light energy by molecules and the subsequent photochemical reactions

CO3. Explain the quantum numbers and their importance in depicting wave functions like radial wave function and angular wave functions.

CO4. Construct Jablonski diagram and explain the various photo-physical processes

BSNM 504-A: COMPUTER SCIENCE: OBJECT ORIENTED PROGRAMMING USING C++

Course Learning Outcomes:

After completion of this course students will be able to:

CO1: Able to Understand OOPs Concept, C++ language features, basics and functions.

CO2: Able to understand and apply the concepts of classes, objects, constructors & destructors in program design.

CO3: Able to design & implement various forms of inheritance and polymorphism.

CO4: Able to analyse and explore various stream classes, I/O operations, exception and file handling.

SEMESTER VI

BSNM602: PHYSICS VI: DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION

Course Learning Outcomes:

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

CO1: have a basic knowledge digital-circuits.

CO2: grasp the knowledge of semiconductor diodes and their applications.

CO3: understand the transistors and their properties.

CO4: understand operational amplifiers and their applications.

CO5: acquire the knowledge of rectifiers and Zener diode.

BSNM 602: PHYSICS VI
NUCLEAR AND PARTICLE PHYSICS

Course Learning Outcomes:

After successful completion of the course, the student is expected to have knowledge about

CO1: General properties of nuclei and Nuclear Models

CO2: Radioactivity Decays and Nuclear Reactions

CO3: Interaction of Nuclear Radiations with Matter

CO4: Nuclear Detectors and accelerators

CO5: Particle Physics

BSNM-603: MATHEMATICS

Paper XI: LINEAR ALGEBRA

Course Learning Outcomes:

On completion of this course, the student will be able to

CO-1. Understand the concept of vector spaces, subspaces, bases, dimension and their properties.

CO-2. Understand the relationship between matrices & linear transformations and their applications.

CO-3. Learn properties of Rank & Nullity and realize the importance of linear transformation and its canonical form.

BSNM-603 : MATHEMATICS

Paper XII (Option I): MECHANICS

Course Learning Outcomes:

On completion of this course, the student will be able to

CO-1. Familiarize with subject matter, which has been the single center, to which were drawn mathematicians, physicists, astronomers, and engineers together.

CO-2. Understand the necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body and their applications.

CO-3. Familiarize the concept of motion with constant acceleration and freely falling body and their applications.

CO-4. Know about the inclined motion and variable acceleration and their applications and understand the concept of Simple Harmonic Motion and curvilinear motion and their applications.

BSNM-603: MATHEMATICS

Paper XII (Option II) LINEAR PROGRAMMING

Course Learning Outcomes:

On completion of this course, the student will be able to

CO-1. Understand how to analyze and solve linear programming models in real life situations.

CO-2. Provide graphical solutions to linear programming problems in two variables.

CO-3. Know about the relationships between the Primal and Dual problems

CO-4. To acquaint to students to Transportation and Assignment along with their Applications.

BSNM 604:CHEMISTRY**INORGANIC CHEMISTRY-IV: METAL COMPLEXES AND HSAB THEORY****Course Learning Outcomes:**

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

- CO1.** Depict the electronic spectra of transition metal complexes.
- CO2.** Understand the various factors involved in stabilising the transition metal complexes.
- CO3.** Determine the strength of acids and bases by using the concept of levelling effect.
- CO4.** Evaluate term symbols and microstates which are further useful in depicting the electronic transitions in transition metal complexes

BSNM 604: ORGANIC CHEMISTRY-IV**ORGANIC SPECTROSCOPY, HETEROCYCLIC COMPOUNDS AND POLYMERS****Course Learning Outcomes:**

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

- CO1.** Describe the structure, diverse reactions and syntheses of pyrrole, furan, thiophene and pyridine heterocycles.
- CO2.** Describe the principles of IR, UV and NMR spectroscopy.
- CO3.** Predict the structures of organic compounds based on the given ¹H NMR, IR and UV data.
- CO4.** Determine the molecular weight, PDI, degree of polymerization of polymers.

BSNM 604-A: COMPUTER SCIENCE:**COMPUTER NETWORKS AND INTERNET TECHNOLOGIES**

Course Learning Outcomes: After completion of this course students will be able to:

- CO1:** Describe how communication works in computer networks and to understand the basic terminology of computer networks, reference models and transmission media.
- CO2:** Learn basic concepts of internet technologies, browsers and e-mails.
- CO3:** Understand the basics of HTML, its structuring and creating websites with style sheets.
- CO4:** Design a media-rich dynamic websites using text, fonts, colors, images, tables, hyperlinks and client side scripting.

BSNM 604-A: COMPUTER SCIENCE:**SOFTWARE LAB –VI (Based on COMPUTER NETWORKS AND INTERNET TECHNOLOGIES)**

Course Learning Outcomes: After completion of this course students will be able to:

- CO1:** Describe basic syntaxes of HTML.
- CO2:** Learn basic concepts of internet technologies, browsers and e-mails.
- CO3:** Understand the HTML structuring and creating websites with style sheets.
- CO4:** Design a media-rich dynamic websites using text, fonts, colors, images, tables, hyperlinks and client side scripting.