

**DEPARTMENT OF  
CHEMISTRY**

B.Sc. Chemistry

**PROGRAMME OUTCOMES:**

After completing B.Sc. Chemistry programme, students will be able to:

Knowledge Outcomes:

Students are expected to

PO1: Demonstrate and apply the fundamental knowledge of the basic principles in the fields of  
Chemistry

PO2: Create awareness and sense of responsibilities towards environment and apply knowledge  
to solve the issues related to Environmental pollution.

PO3: Apply fundamental knowledge for doing qualitative and quantitative analyses in various  
fields.

**Skill Outcomes:** It would help students to learn to

PO4: Collaborate effectively on team-oriented projects in the field of Chemistry and life sciences.

PO5: Communicate scientific information in a clear and concise manner both orally and  
in writing

PO6: Explain environmental pollution issues and the remedies thereof.

PO7: know the importance of chemistry in everyday life. They will be able to relate physical  
and chemical phenomena around us with chemical point of view.

PO8: apply the knowledge to develop the sustainable and eco-friendly technology in Industrial

Chemistry.

**Generic Outcomes:**

PO10: Have developed their critical reasoning, judgment and communication skills.

PO11: acquired a basic knowledge and skillset for becoming employable.

PO12: will enhance the scientific temper among the students so as to develop a research interest.

**COURSE OUTCOMES:**

**F. Y. B Sc. (autonomous)**

**Course Outcomes**

**22- CH-101: Paper 1: Physical and Analytical Chemistry**

CO 1: Students will be able to plot graphs of linear, exponential and logarithmic function.

CO 2: Students should be able to understand the concept of real and ideal gases.

CO 3: Student should understand the concept of ionization process in acids and bases.

CO4: Students should understand the perspectives of Analytical Chemistry.

**22- CH-102: Paper 2: Organic and Inorganic Chemistry**

CO 1: Students will learn fundamentals of organic chemistry and functional group approach for aliphatic and aromatic hydrocarbons.

CO 2: Students will learn structure of atom and hence the reactivity, various theories for chemical bonding and applications of hybridization.

**22-CH-103-Chemistry Practical-I**

CO 1: Importance of chemical safety and Lab safety while performing experiments in the laboratory.

CO 2: Techniques of pH measurements.

CO 3: Students should learn the geometry of molecules by making models.

**22-CH-201: Paper 1: Physical and Analytical Chemistry**

CO 1: Students will be able to understand theories related to atomic structure.

CO 2: Students should understand the concepts of real and ideal gases.

CO3: Student should understand the concept of ionization process in acids and bases.

CO4: Students should understand the perspectives of Analytical Chemistry.

CO5: Students will be able to apply thermodynamic principles to physical and chemical processes.

CO6: Students will be able understand the basic concepts of pH and its significance.

**CH-202: Paper 2: Organic and Inorganic Chemistry**

CO1. Students will learn Fundamentals of stereochemistry and the Concept of isomerism, types of isomers and representation of organic molecules.

- CO2. Students will learn Periodicity of elements and modern periodic law.  
CO3. Students should learn the aromaticity of benzenoid and heterocyclic compounds.  
CO4. Application of s-block elements: Industrial, biological and agricultural fields.

### **22-CH-203 Chemistry Practical-II**

- CO1: The practical course is in relevance to the theory courses to improve the understanding of the concepts.  
CO2: It would help in development of practical skills of the students.  
CO3: The student will be able to design the experiments by their own innovative ideas through experiential learning experiments and projects.

## **S.Y. B. Sc. Chemistry (CBCS 2019 Pattern)**

### **Course:CH-301 Semester III**

#### **Course Name: Physical and Analytical Chemistry**

After successfully completing this course, students will be able to:

- CO1: know about Kinetics  
CO2: know about Catalysis and process of adsorption in various applications  
CO3: know about the Volumetric Chemical analysis

### **Course : CH-401 Semester IV**

#### **Course: Physical and Analytical Chemistry**

After successfully completing this course, students will be able to:

- CO1: Phase equilibrium at different temperatures and degrees of freedom.  
CO2: know P-N, T-N diagrams.  
CO3: know liquid solution miscibility features and how they will be separable.  
CO4: understand basics of Instrumental methods of Analysis and its applications in various fields

### **Course: CH-302 Semester III**

#### **Course: Inorganic and Organic Chemistry**

After successfully completing this course, students will be able to:

- CO1: Students should be able to understand the terms related to molecular orbital theory, draw and explain MO energy level diagrams for homo and hetero diatomic molecules.

Explain magnetic property of molecule and stability of molecule on the basis of bond order.

CO2: Define different terms related to the coordination chemistry and understand and explain Werner's theory of coordination compounds.

CO3: Should able to identify and draw structures of aromatic hydrocarbons, know the synthesis and explain the reaction mechanism

### **Course:CH-402 Semester IV**

#### **Course: : Inorganic and Organic Chemistry**

After successfully completing this course, students will be able to:

CO1: know about assumptions of VBT and its application to coordination compounds and limitations of VBT

CO2: able to explain application of CFT to different types of coordinate complexes, differentiate between strong field and weak field ligands and to identify tetrahedral and square planar complexes on the basis of magnetic properties

CO3:Identify the structure of organic compounds , give IUPAC names and able to discuss synthesis reaction mechanisms

CO4: To draw the different conformations of cyclohexane and get familiar with the terms such as axial hydrogen, equatorial hydrogen, confirmation, substituted cyclohexane. Draw structures of different conformations of monosubstituted cyclohexane (axial, equatorial) and identify cis / trans isomers and hence should be able to comment upon their stability.

### **Course: Practical Chemistry (CH-303 & CH-403)**

After successfully completing this course, students will be able to:

CO1: Know about the technique Inorganic Qualitative as well as Quantitative analysis

CO2: Know about the technique of Organic Qualitative analysis

CO3: Analysis of various chemical components using different analytical techniques

**T. Y. B. Sc. Chemistry (2019 Pattern)**

**Course: CH-501 Semester V**

**Course Name: Physical Chemistry-I**

After successfully completing this course, students will be able to:

- CO1: To understand and explain Quantum mechanics using DeBroglie hypothesis, Uncertainty principle and operators
- CO2: To Understand photochemical reactions and photochemical phenomenon
- CO3: Identifying structure of the molecule on the basis of different spectroscopic technique
- CO4: Problem solving on all topics

**Course : CH-502 Semester V**

**Course: Analytical Chemistry-I**

After successfully completing this course, students will be able to:

- CO1: Know about the technique of Gravimetric analysis
- CO2: Know about the technique of Electrogravimetric analysis
- CO3: Know about standardization and validation protocol
- CO4: Know about the technique of Spectrophotometric analysis
- CO5: Know about the applications of above techniques

**Course: CH-503 Semester V**

**Course Name: Physical Chemistry**

**Practical-I**

After successfully completing this course, students will be able to:

- CO1: prepare solutions of molarity, normality, molality and density by using specific gravity bottle, etc.
- CO2: Plot graph and calculate the values necessary for different experiments.
- CO3: To know principle and working of spectrophotometer and conductometer
- CO4: Analysis of different ions and compounds using above techniques

**Course: CH-504 Semester V**

**Course Name: Inorganic Chemistry -I**

CO1: To explain the MOT of octahedral complexes with sigma and pi bonds

CO2: The basic mechanisms of ligand substitution reaction

CO3: To know the trends in periodic properties of d block elements

CO4: To understand the oxidation states and separation/preparation methods of lanthanides and actinides

CO5: To explain the differences between metal semiconductor and insulator

**Course: CH-505 Semester I**

**Course Name: Industrial Chemistry**

CO1: To understand various methods of preparation of various important chemicals.

CO2: To understand the functioning of industry and safety measures in industry.

CO3: To know how industries synthesize chemicals on large scale and industrial processes.

**Course: CH-506 Semester V**

**Course Name: Inorganic Chemistry Practical-I**

CO1: Student should be able to understand the application of gravimetry in quantitative analysis

CO2: Students should the preparation of coordinate complexes

CO3: Students should be able to identify properties of basic and acidic radicals

**Course: CH-507 Semester V**

**Course Name: Organic Chemistry-I**

After successfully completing this course, students will be able to:

CO1: To classify poly and heterocyclic hydrocarbons

CO2: To understand about nucleophilic substitutions, addition and elimination reactions and will be able to predict products in such reactions.

CO3: To study synthetic applications of active methylene compounds

**Course: CH-508 Semester V**

**Course Name: Chemistry of Biomolecules**

CO1: To understand different types of cells.

CO2: To understand different types of carbohydrates and their biochemical significance.

CO3: Students should identify various amino acids, proteins and enzymes.

**Course: CH-509 Semester V**

**Course Name: Organic Chemistry Practical-I**

CO1: Identify, separate and analyze qualitatively mixtures of organic compounds effectively.

CO2: To expose students to carry out syntheses of small organic molecules using modern instrumentation

CO3: learn the basic techniques and their use for analyses, syntheses, and research and also basic computer skills.. It would develop analytical independent thinking required for academics, research and industrial work.

**Course: CH-510 B Semester V**

**Course Name: Polymer Chemistry**

CO1: Students should know difference between natural and synthetic polymers

CO2: Should know the mechanism and techniques for polymerization

CO3: To know the industrial applications of various polymers.

**Course: CH-511 A Semester V**

**Course Name: Environmental Chemistry**

CO1: To understand the importance of biogeochemical and hydrological cycles

CO2: To know organic and inorganic pollutants

CO3: To study different parameters used for analysis of water

**Course: CH-601 Semester VI Course**

**Name: Physical Chemistry II**

After successfully completing this course, students will be able to:

CO1: Identify radioactive nuclides and write the nuclear reactions after decay of specific particles and also calculate the decay constant, half-life of radioactive nuclides.

CO2: Know the applications of various tracers used in medicines and other fields of research.

CO3: Can draw the different crystal structures and explain different elements of symmetry.

Calculate the d spacing in crystal structure and theta values in XRD analysis.

CO4: calculate the degeneracy of molecules, energy change during excitations and bond length of molecules. Uncertainty of position and momentum in microscopic particles.

CO5: know Nernst equation for electrochemical cells, calculate the E-cell of different cells and identify the oxidation and reduction half cells in the given cells

**Course: CH-602 Semester VI Course**

**Name: Physical Chemistry II**

CO1: Students should know different colligative properties

CO2: Should be able to apply rate laws to solid state reactions

CO3: To understand the electronic structure of solids, conductors and insulators

CO4: Practical significance of polymers

**Course: CH-603 Semester VI Course**

**Name: Physical Chemistry Practical - II**

CO1: To understand the concept of potential measurements for different analysis

CO2: To know the principle of pH measurements and its significance

CO3: Experimental determination of colligative properties

**Course: CH-604 Semester VI**

**Course Name: Inorganic Chemistry-II**

CO1: Should be able to define organometallic compounds and multiple bonding due to CO ligand



CO2: Should be able to differentiate between homogeneous and heterogeneous catalysis with examples

CO3: Should understand the role of iron, cobalt bioinorganic chemistry

CO4: Should know the examples of inorganic polymers and their use

**Course: CH-605 Semester VI**

**Course Name: Inorganic Chemistry-III**

CO1: Students are able to understand and apply the concept of acids and bases.

CO2: They should know the crystal structure of solids and defects in ionic solids

CO3: The synthesis of zeolites and application as catalyst in Organic reactions.

CO4: The synthesis, stabilization and application of nanoparticles.

**Course: CH-606 Semester VI**

**Course Name: Inorganic Chemistry Practical-II**

CO1: Students should know the about quantitative analysis of iodine and calcium

CO2: Students should have an idea of purification of water using ion exchange resins

CO3: Students should know about synthesis of zinc oxide nanoparticles

**Course: CH-607 Semester VI**

**Course Name: Organic Chemistry -II**

CO1: Learn basic principles of organic spectroscopy and should be able to deduce structures of molecules by exploring the given spectral data of UV, IR and PMR.

CO2: To draw the geometrical isomers of substituted cyclohexane's

CO3: Use models and draw different conformational isomers

**Course: CH-608 Semester VI**

**Course Name: Organic Chemistry -III**

CO1: To understand the concept of retrosynthetic analysis of a target molecule and

how to strategically plan synthesis of any given target.

CO2: To understand structure, reactivity of carbanions and rearrangements useful in designing organic syntheses.

**Course: CH-609 Semester VI**

**Course Name: Organic Chemistry Practical -II**

CO1: Should be able to apply spectral data of IR and PMR for interpretation of structure of MOLECULES

CO2 : Should gain practical hands-on experience of modern extraction methods.

CO3: Explain the process of chromatographic analysis

**Course: CH-610 A Semester VI**

**Course Name: Chemistry of Soil and agrochemicals**

CO1: Students should understand various components of soil and their properties

CO2: Proper understanding of chemistry of pesticides and will be inculcated among the students

**Course: CH-611 Semester VI**

**Course Name: Analytical Chemistry**

CO1: Should know the principles of HPLC, GC and AAS

CO2: Should apply theoretical principles during the practicals

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