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.

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Course: CH-101 :Semester I

Course Name: Physical Chemistry

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

CO1: Apply thermodynamic principles to physical and chemical processes. CO2: Understand relation between free energy and equilibrium.

CO3: Explain concept of ionization ,hydrolysis and related concepts such as common ion effect, hydrolysis constant, ionic product and solubility product.

Course: CH-201

Semester I Course Name:

Inorganic Chemistry

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

CO1: Explain different theories and principles to revel of atomic structure, origin of quantum mechanics and time independent Schrodinger equation with meaning of various terms in it

CO2: Explain rules for filling electrons in various orbitals ,periodic table ,periodicity in properties

such as atomic and ionic size ,ionization energies etc.

CO3:Explain angular and radial part of hydrogenic wave

functions . CO4: Attainment of stable electronic

configurations.

CO5: Understand definition of various types of bonds ,characteristics of ionic bond ,summarize Born-Land equation and Born-Haber cycle.

Course: Chemistry Practical – I & II(CH-103 & CH-203)

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

CO1: prepare normal and molar solution.

CO2: calculate molecular weight, equivalent weight, normality, and molarity.

CO3: Identifying and utilizing different glasswares for appropriate use.

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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