

# **B.Sc. Chemistry**

## **Course Outcome**

### **Semester 1**

#### **CH1CRT01- General and Analytical Chemistry**

**CO1-** Develop the scientific aptitude of students and critical thinking and equip them in pursuing chemistry as a career.

**CO2-** Learn fundamental idea regarding the elements of chemistry and periodic properties of atoms.

**CO3-** Develop scientific skills, observation and interpretation and evaluation of chemical analysis.

**CO4-** To have an insight on the separation, purification and isolation of compounds.

**CO5-** Enabling students to handle basic statistical tools for analyzing data.

### **Semester 2**

#### **CH2CRT02 – Theoretical and Inorganic Chemistry**

**CO1-** Understand atomic structure, electronic configuration and various rules for the filling up of electrons.

**CO2-** Explain the formation of different types of bonds and the various atom models

**CO3-** Understand Molecular Orbital theory of bonding, hydrogen bonding and applications.

**CO4-** Study the periodic properties of s and p block elements.

**CO5-** Learn about the transition metals, lanthanides and their applications.

### **Semester 1 and 2 Core Practical**

#### **CH2CRP01- Volumetric Analysis**

**CO1-** To prepare a standard solution.

**CO2-** To do neutralization titrations- acidimetry and alkalimetry.

**CO2-** To use complexometric titrations in volumetric analysis.

**CO3-** To do Redox titrations using  $\text{KMnO}_4$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$  etc.

### **Semester 3**

#### **CH3CRT03- Organic Chemistry- I**

CO1- Having a basic idea about organic chemistry including naming of organic compounds and other fundamental concepts.

CO2- Various electronic displacement effects, cleavage of bonds, reagents, reactive intermediates and types of organic reactions.

CO3- Learn to distinguish various organic molecules and predict their applications

CO4- Understand Optical isomerism and Geometrical isomerism with conformational analysis.

CO5- Learn the reactions of alkanes, alkenes, alkynes and alkyl halides

CO5- Fundamental concepts of aromaticity- benzene, naphthalene, anthracene and aryl halides.

CO6- Introduction to pericyclic reactions with example

#### **Semester 4**

##### **CH4CRT04- Organic Chemistry- II**

CO1- Learn the chemistry of alcohols, phenols, ethers, aldehydes, ketones, formaldehyde, acetaldehyde, acetone, benzaldehyde, benzophenone, carboxylic acids, sulphonic acids and their derivatives.

CO2- Study various name reactions.

#### **Semester 3 and 4 - Core Practicals**

##### **CH4CRP02- Qualitative Organic Analysis**

CO1- Develop skills required for the qualitative analysis of organic compounds

CO2- Learn the preparation of different organic compounds.

#### **Semester 5**

##### **CH5CRT05- Environmental Studies and Human Rights**

CO1- Understand the multifaceted nature of environmental studies and become aware of the various resources and how to handle them effectively.

CO2- Recognize the harmful effects of pollution, find solutions to the problems and to become a socially responsible person.

CO3- Enable to get an idea about population explosion, related problems and to understand various environmental movements.

CO4- Get awareness about ecological stress posed upon ecosystems by the presence of chemicals.

CO5- Understand the very fact human rights system.

CO6- Understand the human rights advocacy

##### **CH5CRT06- Organic Chemistry- III**

**CO1-** Study the preparation and reactions of various nitrogen containing compounds like aromatic and aliphatic amines diazonium salts.

**CO2-** Learn the various heterocyclic compounds and their synthetic applications.

**CO4-** Learn preparation and reactions of active methylene compounds used in the synthesis of various industrially significant compounds.

**CO5-** Study the structure, reactivity and biological importance of carbohydrates.

**CO6-** Study the classification of drugs, structure, therapeutic uses and mode of action of antibiotics, sulpha drugs, antipyretics, analgesics, antimalarials, antacids, anti-cancer drugs ,anti-HIV agents, psychotropic drugs.

**CO7-** Have an awareness of the drug addiction and abuse.

**CO8-** Study the fundamental and advanced applications of dyes and polymers.

### **CH5CRT07- Physical Chemistry- I**

CO1- Derive kinetic theory of gases and application of kinetic gas equation.

CO2- Get basic idea about Maxwell distribution of molecular velocities

CO3- Study the intermolecular forces in gases, liquids and solids.

CO4- Students will be able to go deep in crystallography

CO5- Study various defects in solids

CO6- Study theories of adsorption.

### **CH5CRT08- Physical Chemistry- II**

CO1- Learn fundamentals of classical and quantum mechanics.

CO2- Understand the applications of quantum mechanics to various systems

CO3- Study valence bond and molecular orbital theory

CO4- Study the principle and applications of microwave, IR, NMR, ESR and Raman spectroscopy.

CO5- Get the ability to identify organic compounds by analysis and interpretation of spectral data

### **CH5OPT01- Chemistry in Everyday Life**

CO1- Understand the different classes of food additives like preservatives, flavours, sweetners, emulsifying agents, antioxidants and leavening agents.

CO2- Detailed study of Soaps and detergents, their differences in action and environmental impact

CO3- Study of cosmetics to get an awareness about the damages that cosmetics can do to human body.

CO4- Introduction about plastics, paper and dyes and the environmental aspects of their uses.

CO5- Detailed study of classification of drugs, structure, their therapeutic uses, and mode of action and abuse.

CO7- Learn the use of fertilizers and their environmental hazards.

CO8- Study the introduction to nanomaterials and the various terminologies involved in nanochemistry.

## Semester 6

### **CH6CRT09- Inorganic Chemistry**

CO1- Understand the classification and structural aspects of coordination compounds.

CO2- Study Crystal field theory and enable the students to interpret the splitting pattern of tetrahedral and octahedral complexes.

CO3- Learn SN1 and SN2 reactions and their mechanisms.

CO4- Understand the classification, properties and applications of organometallic compounds

CO5- Understand the role of metals in biological systems

CO7- Study preparation, and properties of Boron compounds, interhalogen and noble gas compounds

### **CH6CRT10- Organic Chemistry- IV**

CO1- Learn in detail the chemistry of natural products like terpenoids and alkaloids

CO2- Study the chemistry and mode of action of soaps and detergents,

CO3- Study the fundamentals of fats and oils, vitamins, lipids, hormones and steroids

CO4- Understand the structure and functions of enzymes, amino acids, proteins and nucleic acids.

CO5- Study the fundamentals of rotational, vibrational and mass spectrometry

CO6- Elementary idea of supramolecular systems

CO7- Study organic photochemistry and rotational and vibrational spectroscopy.

CO8- Elucidate the structure of compounds from spectral data

### **CH6CRT11- Physical Chemistry- III**

CO1- Understand basic concepts of thermodynamics

CO2- Learn first law, second law and third law in detail

CO3- Study Law of mass action and chemical equilibria

CO4- Equipped in predicting the direction of a chemical reaction

CO5- Detailed study of ionic equilibrium, Buffer solutions, its mode of action

CO6- Construct phase diagrams and study the equilibrium exists between various states of matter. and apply principles phase diagram to separation processes and for property modification of different type of system.

CO7- Study how to determine the speed and rate of a chemical reaction and the effect of various parameters on reaction rate

CO8- Study the basic idea about catalysis

### **CH6CRT12- Physical Chemistry- IV**

CO1- Understand the mechanism of electrical conductance, theories of electrical conductance, and conductometric titrations

CO2- Design different types of electro chemical cell and able to calculate its potential.

CO3- Familiarise with electro analytical methods and corrosion of metals.

CO3- Understand basic principles of photochemistry and group theory.

### **CH6CBT01 - Polymer Chemistry**

CO1- Classify polymers and explain the configuration of polymers and properties like glass transition temperature and melting point of polymers

CO2-Illustrate the preparation, properties and applications of polymers

CO3-Interpret the mechanism of polymerization

CO4-Acquaint various polymer processing technologies and explain thermal methods of analysis of polymers

CO5-Know the recent advances in polymer chemistry

### **Semester V & VI Practicals**

#### **CH6CRP03- Qualitative Inorganic Analysis.**

CO1-Apply the theoretical concepts while performing experiments.

CO2- Acquire practical skill to analyse the anions and cations qualitatively present in a mixture of inorganic salts

CO3-Able to design, carry out, record and analyze the results of chemical experiments

CO4-Learns the effective usage of chemicals

#### **CH6CRP04- Organic Preparations and Laboratory Techniques.**

CO1-Apply the theoretical concepts while performing experiments.

CO2- Acquire practical skill in preparing organic compounds and in their purification by crystallisation

CO3- Acquire the habit of working safely with the chemicals and handling of equipment

CO4-Chromatographic techniques will enable the students to develop the skills to purify impure organic compounds.

#### **CH6CRP05- Physical Chemistry Practicals.**

CO1- Acquire practical skill in physical chemistry experiments such as Cryoscopy, Transition Experiments, Phase Rule Experiments, Conductometric titrations , Potentiometric titrations , colorimetry and Chemical Kinetics

CO2- Able to carry out and record these experiments in a skillful manner

#### **CH6CRP06- Gravimetric Analysis.**

CO1- Make use of standardised procedures for the Gravimetric analysis

CO2- Learn the skills of Precipitation process, digestion, filtration, incineration etc.

CO3- Able to design, carry out, record and analyze the results of chemical experiments

## **COMPLEMENTARY COURSE IN CHEMISTRY**

### **Semester 1**

#### **CH1CMT01- Basic Theoretical and Analytical Chemistry**

CO1- State the fundamental assumptions of atomic theory and explain the quantum mechanical model of the atom

CO2- To study atomic structure and fundamental concepts in chemistry.

CO3- Understand chromatographic techniques which will enable the students to develop the skills to purify impure organic compounds.

CO4- Understand the fundamentals of principles of analytical chemistry.

### **Semester 2**

#### **CH2CMT02- Basic Organic Chemistry**

CO1- Understand some fundamental aspects of organic chemistry.

CO2- Study mechanism of some organic reactions, classification of polymers, structure and uses of some commercial and natural polymers.

### **Semester 1 and 2 Complementary Chemistry Practicals**

#### **CH2CMP01- Volumetric Analysis**

CO1- Enabling students to manage neutralization titrations- acidimetry and alkalimetry.

CO2-. Enabling students to manage oxidation reduction (Redox) titrations like permanganometry, dichrometry, iodimetry and iodometry.

### **Semester 3**

#### **CH3CMT04- Inorganic and Organic Chemistry**

CO1- Promote understanding facts and concepts in inorganic and organic chemistry.

CO2- Basic understanding of nuclear chemistry and heterocyclic compounds and various types of food additives, cosmetics and drugs.

CO3- To study the surface chemistry of materials and phase equilibrium.

#### **CH4CMT06- Advanced Bio organic Chemistry**

CO1- An introduction to natural products like terpenoids and alkaloids.

CO2- Lipids are an important compound found in nature. Fats and oils, their properties soaps and

detergents and their mode of action are also discussed here.

CO3- A brief study of vitamins, steroids and hormones are included here.

CO4- Classification of amino acids, peptides and proteins, their structure and reactions are also studied here.

CO5- Basic concepts of nucleic acids, living systems, enzymes and supramolecular systems are also discussed here.

### **Semester 3 and 4 Complementary Chemistry Practicals**

#### **CH4CMP03- Organic Chemistry Practicals**

CO1- Equipping students for the qualitative analysis of organic compounds.

CO2- Indulging in experiments make the students more focused and oriented in both the theory and observation of the experiment.

CO3- Preparation of the derivatives of different compounds will make the students more completion.

