

## **B.Sc. Chemistry Course outcomes**

❖ After completion of the course the student is able to,

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

- Understand general characteristics of p-block elements.
- Improve the level of understanding in synthesis and structure of important compounds of p-block elements and organometallic compounds.
- Become familiar with structural theory in organic chemistry, different types of organic reactions and mechanism, hydrocarbons and aromatic compounds.

### **Course practicals: Simple salt analysis**

- The students will get skill in the qualitative analysis of simple inorganic salts.

### **Course -II: Physical and General Chemistry**

- Understand different states of matter, laws of symmetry, defects in crystals, ideal and non-ideal solutions.
- Provide an insight into applications of liquid crystals as LCD-devices.
- Study Van der Waals equation of state, Joule-Thomson effect, Bragg's law, Nernst-distribution law, Raoult's law and Henry's law.
- Understand the concepts of surface chemistry and different theories of chemical bonding.
- To classify stereo isomers based on symmetry criteria, learn about D, L; R, S; E, Z- nomenclature of stereochemistry.

### **Course practicals -II: Analysis of mixture salts**

- The students will acquaint with qualitative analysis of inorganic salt mixtures.

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

- Understand the general characteristics of d-block elements and f-block elements with special reference to magnetic properties, oxidation states and complex formation capacity.

- Study lanthanide contraction and its consequences,
- Know the classification, structures and shapes of metal carbonyls.
- Understand EAN rule and its application.
- Distinguish between lanthanides and actinides.
- Understand different theories of bonding in metals, become familiar with conductors, semiconductors and insulators and its applications.
- Learn  $SN^1$ ,  $SN^2$  mechanism and its stereo chemistry.
- Study and understand nomenclature, classification, preparation, physical & chemical properties of hydroxyl compounds, carbonyl compounds, carboxylic acids and its derivatives and active methylene compounds.

**Course practicals-III: Titrimetric analysis and organic functional group reactions.**

- Develop skills for quantitative estimation of Fe(II) and Cu(II) using titrimetric analysis and studying organic functional group reactions.

**Course -IV: Spectroscopy and Physical Chemistry**

- Understand the basic features of electronic, infrared and proton magnetic resonance spectroscopy.
- Study types of electronic transitions, chromophore and auxochrome, Beer-Lambert's law, single & double beam spectrophotometer.
- Interpret IR spectra from the characteristic absorption bands of various functional groups.
- Study principle and applications of  $H^1$ -NMR spectroscopy.
- Get skill to elucidate the structures of simple organic molecules on the basis of IR and NMR spectroscopy.
- Provide an insight into Arrhenius theory, Oswald's dilution law, Kohlrausch's law, Debye-Huckel Onsager theorem and Hittorff's method.
- Learn concepts of single electrode potential, reference electrode, Nernst equation and emf of cell.
- Understand the concept of phase diagrams of one & two component systems and its application in daily life.

#### **Course practicals-IV: Physical Chemistry and IR spectral analysis.**

- Develop skills in doing experiments on determining critical solution temperature and performing conductometric titrations.
- Analyze the Infrared spectra of different functional groups.

#### **Course -V: Inorganic, Physical and Organic Chemistry**

- Know IUPAC nomenclature, bonding theories, stereochemistry of coordination compounds.
- Understand stability, spectral and magnetic properties of metal complexes.
- Become familiarize with nomenclature, classification, preparation and properties of Nitrohydrocompounds.
- Get insights into synthesis, physical properties, basic characteristics and chemical properties of nitrogen compounds.
- Understand the concepts of thermodynamics and its laws.
- Practice problems on efficiency of Carnot cycle, enthalpy and entropy changes.

#### **Course practicals-V: Organic chemistry**

- Develop skills for qualitative analysis of organic functional groups.
- Acquire skills in determination of melting and boiling points of organic compounds and its derivatives.

#### **Course -VI: Inorganic, Physical and Organic Chemistry**

- Improve the level of understanding of reactivity of metal complexes.
- Understand the structure & functions of Hemoglobin, Myoglobin and Chlorophyll.
- Derive rate constants for zero, 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> order reactions.
- Learns factors affecting rates of reaction and half-life period of reaction.
- Understand laws of photochemistry, fluorescence, phosphorescence and reasons for low & high quantum yield with examples.
- Import sound knowledge on chemistry of carbohydrates, heterocyclic compounds, amino acids and proteins.

### **Course practicals-VI: Physical chemistry**

- To develop skills in determination of rate constant, surface tension and viscosity of organic liquids.
- To verify Freundlich isotherm through adsorption studies.

### **Course -VII (A): Analytical methods in Chemistry**

- Study the theories of acid-base, redox, complexometric, iodometric and precipitation titrations.
- Practice the methods of expressing accuracy and precision, standard deviation and confidence limits.
- Understand principle, process and applications of solvent extraction and ion-exchange separation.
- Discuss principles, procedure and applications of chromatographic techniques like paper chromatography, thin layer chromatography, column chromatography, and HPLC.

### **Course practicals-VII (A):**

- Provide training to student in determination of Zinc and Magnesium using volumetric analysis.
- Develop skills in identification of amino acids by paper chromatography.

### **Course -VIII (A)-1: Polymer Chemistry**

- Learn the classification of polymers and mechanism of polymerization.
- Understand different techniques of polymerization methods to determine molecular weight of polymer.
- Get insight into concept of glass transition temperature and factors affecting it.
- Give awareness on different polymer additives.
- Understand and praise applications of polymers in various fields.

### **Course practicals -VIII (A)-1:**

- To get skill in preparation of Aspirin, Paracetamol, Acetanilide, Barbutaric acid and Phenyl-azo  $\beta$ -naphthol.

### **Course -VIII (A)-2: Instrumental methods of analysis.**

- Discuss the classification of analytical methods and types of instrumental methods.
- Understand the principle, instrumentation, and applications of Infra red spectroscopy and UV-visible spectroscopy.
- Get well versed with different chromatographic techniques and its applications.
- Understand the principle, instrumentation and applications of Mass spectrometry, NMR-spectroscopy, Potentiometry, Voltammetry and X-ray analysis.

### **Course practicals -VIII (A)-2:**

- Understand the principles of green chemistry.
- Apply the principles of green chemistry in preparation of acetamide, adipic acid, nitration of phenol and 1,1'-bi-2-naphol (BINOL).
- Acquire skill in performing green Diels-alder reaction and green benzil-benzilic acid rearrangement.

### **Course -VIII (A)-3: Analysis of Drugs, Foods, Dairy products and Bio-chemical analysis**

- Understand the analysis of analgesics, anti-pyretic, anti-malarial and anti-biotics.
- Know the structure and analysis of anti-histamine drugs and sedatives.
- Gain knowledge on structure and analysis of anti-epileptic, anti-convulsant, cardiovascular drugs, diuretics and prevacid.
- Become familiar with flavoring agents, analysis of milk and milk products.
- Get awareness and become continuous about different adulterants in food products.
- Get knowledge on clinical analysis of blood.

**Course practicals-VIII (A)-3:**

- Encourage the students towards research.
- Become familiarize with handling of chemicals, glassware, apparatus and instruments.
- Gain knowledge on structural elucidation with spectral and chromatographic techniques.
- Improve the analytical thinking and data interpretation capabilities of students.