

## **B.Sc. CHEMISTRY PROGRAMME**

### **Programme Specific Outcomes (PSOs)**

| PSOs | Program Specific Outcomes                                                                                                                                                         |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PSO1 | To understand basic facts and concepts in chemistry                                                                                                                               |
| PSO2 | To apply the principles of chemistry                                                                                                                                              |
| PSO3 | To appreciate the achievements in chemistry and to know the role of chemistry in nature and in society                                                                            |
| PSO4 | To familiarize with the emerging areas of chemistry and their applications in various spheres of chemical sciences and to apprise the students of its relevance in future studies |
| PSO5 | To develop skills in the proper handling of instruments and chemicals                                                                                                             |
| PSO6 | To familiarize with the different processes used in industries and their applications                                                                                             |
| PSO7 | To develop an eco-friendly attitude by creating a sense of environmental awareness                                                                                                |
| PSO8 | To be conversant with the applications of chemistry in day-to-day life                                                                                                            |

### **COURSE OUTCOMES (COS)**

### **CORE COURSE OUTCOMES (COs)**

#### **THEORY**

#### **CORE COURSE- I**

**Course Code: CHE1B01 Theoretical and Inorganic Chemistry- I**

| Cos | Course Outcome Statements                            |
|-----|------------------------------------------------------|
| CO1 | To apply the methods of a research project           |
| CO2 | To understand the principles behind volumetry        |
| CO3 | To analyse the characteristics of different elements |
| CO4 | To distinguish between different acid base concepts  |
| CO5 | To analyse the stability of different nuclei         |

#### **CORE COURSE- II**

**Course Code: CHE2B02 Theoretical and Inorganic Chemistry- II**

| Cos | Course Outcome Statements                                                                                    |
|-----|--------------------------------------------------------------------------------------------------------------|
| CO1 | To understand the importance and the impact of quantum revolution in science                                 |
| CO2 | To understand and apply the concept that the wave functions of hydrogen atom are nothing but atomic orbitals |
| CO3 | To understand that chemical bonding is the mixing of wave functions of the two combining atoms               |
| CO4 | To understand the concept of hybridization as linear combination of orbitals of the same atom                |
| CO5 | To inculcate an atomic/molecular level philosophy in the mind                                                |

### CORE COURSE – III

Course Code: CHE3B03 PHYSICAL CHEMISTRY - I

| Cos | Course Outcome Statements                                                                    |
|-----|----------------------------------------------------------------------------------------------|
| CO1 | To understand the properties of gaseous state and how it links to thermodynamic systems      |
| CO2 | To understand the concepts of thermodynamics and it's relation to statistical thermodynamics |
| CO3 | To apply symmetry operations to categorize different molecules                               |

### CORE COURSE-IV

Course Code: CHE4B04 ORGANIC CHEMISTRY – I

| Cos | Course Outcome Statements                                       |
|-----|-----------------------------------------------------------------|
| CO1 | To apply the concept of stereochemistry to different compounds. |
| CO2 | To understand the basic concepts of reaction mechanism          |
| CO3 | To analyse the mechanism of a chemical reaction                 |
| CO4 | To analyse the stability of different aromatic systems.         |

### CORE COURSE- VI

Course Code: CHE5B06 INORGANIC CHEMISTRY – III

| Cos | Course Outcome Statements                                                                  |
|-----|--------------------------------------------------------------------------------------------|
| CO1 | To understand the principles behind qualitative and quantitative analysis                  |
| CO2 | To understand basic processes of metallurgy and to analyse the merits of different alloys. |
| CO3 | To understand the applications of different inorganic polymers                             |
| CO4 | To analyse different polluting agents.                                                     |
| CO5 | To apply the principles of solid waste management                                          |

### CORE COURSE- VII

Course Code: CHE5B07 ORGANIC CHEMISTRY – II

| Cos | Course Outcome Statements                                                                                |
|-----|----------------------------------------------------------------------------------------------------------|
| CO1 | To understand the difference between alcohols and phenols.                                               |
| CO2 | To understand the importance of ethers and epoxides.                                                     |
| CO3 | To apply organometallic compounds in the preparation of different functional groups.                     |
| CO4 | To apply different reagents for the inter conversion of aldehydes, carboxylic acids and acid derivatives |
| CO5 | To apply active methylene compounds in organic preparations.                                             |

## CORE COURSE- VIII

Course Code: CHE5B08 PHYSICAL CHEMISTRY – II

| Cos | Course Outcome Statements                                                                                  |
|-----|------------------------------------------------------------------------------------------------------------|
| CO1 | To apply the concept of kinetics, catalysis and photochemistry to various chemical and physical processes. |
| CO2 | To characterise different molecules using spectral methods.                                                |
| CO3 | To understand various phase transitions and its applications.                                              |

## CORE COURSE- IX

Course Code: CHE6B09 INORGANIC CHEMISTRY – IV

| Cos | Course Outcome Statements                                          |
|-----|--------------------------------------------------------------------|
| CO1 | To understand the principles behind different instrumental methods |
| CO2 | To distinguish between lanthanides and actinides                   |
| CO3 | To appreciate the importance of CFT                                |
| CO4 | To understand the importance of metals in living systems           |
| CO5 | To distinguish geometries of coordination compounds                |

## CORE COURSE – X

Course Code: CHE6B10 ORGANIC CHEMISTRY – III

| Cos | Course Outcome Statements                                                         |
|-----|-----------------------------------------------------------------------------------|
| CO1 | To elucidate the structure of simple organic compounds using spectral techniques. |
| CO2 | To understand the basic structure and tests for carbohydrates.                    |
| CO3 | To understand the basic components and importance of DNA.                         |
| CO4 | To understand the basic structure and applications of alkaloids and terpenes.     |
| CO5 | To distinguish different pericyclic reactions                                     |

## CORE COURSE – XI

Course Code: CHE6B11 PHYSICAL CHEMISTRY – III

| Cos | Course Outcome Statements                                                                            |
|-----|------------------------------------------------------------------------------------------------------|
| CO1 | To understand the basic concepts of electrochemistry.                                                |
| CO2 | To understand the importance of colligative properties.                                              |
| CO3 | To relate the properties of materials/solids to the geometrical properties and chemical compositions |

## CORE COURSE –XII

Course Code: CHE6B12 Advanced and Applied Chemistry

| Cos | Course Outcome Statements                                                                |
|-----|------------------------------------------------------------------------------------------|
| CO1 | To understand the importance of nanomaterials.                                           |
| CO2 | To appreciate the importance of green approach in chemistry.                             |
| CO3 | To understand the uses and importance of computational calculations in molecular design. |
| CO4 | To understand the role of chemistry in human happiness index and life expectancy.        |

## CHEMISTRY ELECTIVE CORE COURSE- III (Theory)

Course Code: CHE6B13(E3) MEDICINAL AND ENVIRONMENTAL CHEMISTRY

| Cos | Course Outcome Statements                                    |
|-----|--------------------------------------------------------------|
| CO1 | To understand the importance of drugs in human health.       |
| CO2 | To understand the facts about common diseases and treatment. |
| CO3 | To identify the presence of toxic substances in atmosphere.  |
| CO4 | To identify the presence of toxic substances in atmosphere.  |

## PRACTICAL

### PRACTICAL – I

Course Code: CHE6B14(P) PHYSICAL CHEMISTRY PRACTICAL

| Cos | Course Outcome Statements                                                                                        |
|-----|------------------------------------------------------------------------------------------------------------------|
| CO1 | To enable the students to develop analytical skills in determining the physical properties (physical constants). |
| CO2 | To develop skill in setting up an experimental method to determine the physical properties.                      |
| CO3 | To understand the principles of Refractometry, Potentiometry and Conductometry.                                  |

### PRACTICAL – II

Course Code: CHE6B15(P) ORGANIC CHEMISTRY PRACTICAL

| Cos | Course Outcome Statements                                                            |
|-----|--------------------------------------------------------------------------------------|
| CO1 | To enable the students to develop analytical skills in organic qualitative analysis. |
| CO2 | To develop talent in organic preparations to ensure maximum yield.                   |
| CO3 | To apply the concept of melting or boiling points to check the purity of compounds.  |
| CO4 | To analyse and characterise simple organic functional groups.                        |
| CO5 | To analyse individual amino acids from a mixture using chromatography.               |

## PRACTICAL – III

Course Code: CHE6B16(P) INORGANIC CHEMISTRY PRACTCAL-II

| Cos | Course Outcome Statements                                                                |
|-----|------------------------------------------------------------------------------------------|
| CO1 | To enable the students to develop analytical skills in inorganic quantitative analysis   |
| CO2 | To understand the principles behind gravimetry and to apply it in quantitative analysis. |
| CO3 | To understand the principles behind colorimetry and to apply it in quantitative analysis |

## PRACTICAL – IV

Course Code: CHE6B17(P) INORGANIC CHEMISTRY PRACTCAL-III

| Cos | Course Outcome Statements                                                                                |
|-----|----------------------------------------------------------------------------------------------------------|
| CO1 | To enable the students to develop skills in inorganic quanlitative analysis.                             |
| CO2 | To understand the principles behind inorganic mixture analysis and to apply it in quanlitative analysis. |
| CO3 | To analyse systematically mixtures containing two cations and two anions.                                |

## PROJECT

Course Code: CHE6B18(Pr) PROJECT WORK

| Cos | Course Outcome Statements                                 |
|-----|-----------------------------------------------------------|
| CO1 | To understand the scientific methods of research project. |
| CO2 | To apply the scientific method in life situations.        |
| CO3 | To analyse scientific problems systematically             |

## OPEN COURSE

OPEN COURSE- I (Theory)

Course Code: CHE5D01 ENVIRONMENTAL CHEMISTRY

| Cos | Course Outcome Statements                                               |
|-----|-------------------------------------------------------------------------|
| CO1 | Recall the technical/scientific terms involved in pollution.            |
| CO2 | Understand the causes and effects of air pollution.                     |
| CO3 | Understand the sources, types and effects of water pollution.           |
| CO4 | Describe water quality parameters.                                      |
| CO5 | Know soil, noise, thermal and radioactive pollutions and their effects. |
| CO6 | Study various pollution control measures                                |

|     |                                           |
|-----|-------------------------------------------|
| CO7 | Understand the basics of green chemistry. |
|-----|-------------------------------------------|

## COMPLEMENTARY COURSE

### Theory Course- I

Course Code: CHE1C01- GENERAL CHEMISTRY

| Cos | Course Outcome Statements                                                         |
|-----|-----------------------------------------------------------------------------------|
| CO1 | To understand and to apply the theories of quantitative and qualitative analysis. |
| CO2 | To understand the theories of chemical bonding.                                   |
| CO3 | To appreciate the uses of radioactive isotopes.                                   |
| CO4 | To understand the importance of metals in biological systems.                     |

### Theory Course- II

Course Code: CHE2C02 - PHYSICAL CHEMISTRY

| Cos | Course Outcome Statements                                                   |
|-----|-----------------------------------------------------------------------------|
| CO1 | To understand the importance of free energy in defining spontaneity.        |
| CO2 | To realise the theories of different states of matter and their implication |
| CO3 | To understand the basic principles of electrochemistry.                     |

### Theory Course- III

Course Code: CHE3C03 - ORGANIC CHEMISTRY

| Cos | Course Outcome Statements                                                                                |
|-----|----------------------------------------------------------------------------------------------------------|
| CO1 | To understand the basic concepts involved in reaction intermediates.                                     |
| CO2 | To realise the importance of optical activity and chirality.                                             |
| CO3 | To appreciate the importance of functional groups and aromatic stability                                 |
| CO4 | To understand the basic structure and importance of carbohydrates, nucleic acids, alkaloids and terpenes |

### Theory Course- IV

Course Code: CHE4C04 - PHYSICAL AND APPLIED CHEMISTRY

| Cos | Course Outcome Statements                                                             |
|-----|---------------------------------------------------------------------------------------|
| CO1 | To understand the basic concepts behind colloidal state and nanochemistry.            |
| CO2 | To understand the importance of green chemistry and pollution prevention.             |
| CO3 | To appreciate the importance of different separation methods and spectral techniques. |
| CO4 | To understand the extent of chemistry in daily life.                                  |

## PRACTICAL

Course Code: CHE4C05(P) CHEMISTRY PRACTICAL

| Cos | Course Outcome Statements                                            |
|-----|----------------------------------------------------------------------|
| CO1 | To understand the basic concepts of inter group separation.          |
| CO2 | To enable the students to develop analytical and preparation skills. |