## DEPARTMENT OF CHEMISTRY

# B.Sc. Chemistry
# Courses offered 2017 – 2020

| Semester | Course | Subject code | Paper | Hours/ week | Credits |
|---|---|---|---|---|---|
| I | **Part I** | TL1711/ FL1711 | Language | 6 | 3 |
| | **Part II** | GE1711/ GE1712/ GE1713/ GE1714 | General English (A Stream / B Stream/ C Stream/ B. Com & Com. Sc.) | 6 | 3 |
| | **Part III** | CC1711 | Major Core I – Inorganic Chemistry - I | 4 | 4 |
| | | CC17P1 | Major Practical I – Volumetric Analysis - I | 2 | - |
| | | CA1711 | Allied I – Theory: General Chemistry | 4 | 4 |
| | | CA17P1 | Allied I – Practical – Volumetric and Organic Analysis | 2 | - |
| | **Part IV** | AEC171 | AECC – Ability Enhancement Compulsory Course: English Communication | 2 | 2 |
| | | CNM171 | NMEC – Molecules of Life | 4 | 2 |
| | | VEC171 | Foundation course – Value Education - I | - | - |
| II | **Part I** | TL1721/ FL1721 | Language | 6 | 3 |
| | **Part II** | GE1711/ GE1712/ GE1713/ GE1714 | General English (A Stream / B Stream/ C Stream/ B. Com & Com. Sc.) | 6 | 3 |
| | **Part III** | CC1721 | Major Core II – Physical Chemistry - I | 4 | 4 |
| | | CC17P1 | Major Practical I - Volumetric Analysis – I | - | 2 |
| | | CC17P2 | Major Practical II - Volumetric Analysis - II | 2 | 2 |
| | | CA1721 | Allied I – Theory: Inorganic and Physical Chemistry | 4 | 4 |
| | | CA17P1 | Allied I – Practical : Volumetric and Organic Analysis | 2 | 2 |
| | **Part IV** | AEC172 | AECC – Ability Enhancement Compulsory Course: Environmental Studies | 2 | 2 |
| | | CNM172 | NMEC **–** Fuel Chemistry | 4 | 2 |
| | | VEC172 | Foundation course – Value Education - I | - | 1 |
| | **Part V** | CER172 | Certificate Course | - | 1 |
| | **Part I** | TL1731/ FL1731 | Language | 6 | 3 |
| | **Part II** | GE1731/ GE1732/ | General English (A Stream / B Stream/ C Stream) | 6 | 3 |

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| **III** | | GE1733 | | | |
| | **Part III** | CC1731 | Major Core III – Organic Chemistry - I | 4 | 4 |
| | | CC1732 | Major – Elective - I<br>(a) Dairy Chemistry<br>(b) Nutritional Chemistry<br>(c) Applied Electro Chemistry | 4 | 3 |
| | | CC17P3 | Major Practical III – Organic Preparation and Determination of Physical Constants | 2 | - |
| | | CA1731 | Allied II – Theory: General Chemistry | 4 | 4 |
| | | CA17P1 | Allied II – Practical : Volumetric and Organic Analysis | 2 | - |
| | **Part IV** | SBC173/ SBC174 | SBC – Yoga / Computer Education | 2 | 2 |
| | | VE173 | Foundation course – Value Education – II | - | - |
| | **Part V** | SLP173 | Service Learning Programme (SLP): RUN | - | 1 |
| **IV** | **Part I** | TL1741/ FL1741 | Language | 6 | 3 |
| | **Part II** | GE1731/ GE1732/ GE1733 | General English (A Stream / B Stream/ C Stream) | 6 | 3 |
| | **Part III** | CC1741 | Major Core IV – Organic Chemistry - II | 4 | 4 |
| | | CC1742 | Major – Elective - II<br>(a) Industrial Chemistry<br>(b) Polymer Chemistry<br>(c) Pharmaceutical Chemistry | 4 | 3 |
| | | CC17P3 | Major Practical III – Organic Preparation and Determination of Physical Constants | - | 2 |
| | | CC17P4 | Major Practical IV – Organic Analysis | 2 | 2 |
| | | CA1741 | Allied II – Theory: Inorganic and Physical Chemistry | 4 | 4 |
| | | CA17P1 | Allied II – Practical – Volumetric and Organic Analysis | 2 | 2 |
| | **Part IV** | SBC173/ SBC174 | SBC – Yoga / Computer Education | 2 | 2 |
| | | VEC174 | Foundation course – Value Education - II | - | 1 |
| | **Part V** | STP174 | Student Training Programme (STP) | - | 1 |
| **V** | **Part III** | CC1751 | Major Core V- Organic Chemistry - III | 5 | 5 |
| | | CC1752 | Major Core VI - Inorganic Chemistry - II | 5 | 5 |
| | | CC1753 | Major Core VII - Physical Chemistry - II | 6 | 5 |
| | | CC1754 | Major – Elective - III<br>(a) Green Chemistry<br>(b) Applied Chemistry<br>(c) Leather Chemistry | 4 | 3 |
| | | CC17P5 | Major Practical V & VI – Organic Estimation and Inorganic Semi-micro Analysis | 8 | - |
| | **Part IV** | CSK175 | *SBC – Chemistry for Competitive Exam | 2 | 2 |

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|---|---|---|---|---|---|
| | | HRE175 | Foundation Course - Human Rights Education (HRE) | - | 1 |
| **VI** | **Part III** | CC1761 | Major Core VIII - Organic Chemistry -IV | 5 | 5 |
| | | CC1762 | Major Core IX - Inorganic Chemistry -III | 5 | 5 |
| | | CC1763 | Major Core X - Physical Chemistry - III | 6 | 5 |
| | | CC1764 | Major – Elective - IV<br>(a) Bio Chemistry<br>(b) Instrumental methods<br>(c) Forensic Chemistry | 4 | 3 |
| | | CC17P5 | (a) & (b) Major Practical V – Organic Estimation and Inorganic Semi-micro Analysis | - | 4 |
| | | CC17P6 | Major Practical VI – Gravimetric Analysis and Inorganic complex preparation | 4 | 3 |
| | | CC17P7 | Major Practical VII – Physical Chemistry | 4 | 3 |
| | **Part IV** | CSK176 | *SBC – Project | 2 | 2 |
| | | WSC176 | Foundation Course - Women's Studies (WS) | - | 1 |
| | | | **TOTAL** | **180** | **140+3** |

## B.Sc. Programme Outcomes (POs)

| PO No. | Upon completion of B.Sc. Degree Programme, the graduates will be able to : |
|---|---|
| PO - 1 | Apply the acquired scientific knowledge to face day to day needs. |
| PO - 2 | Create innovative ideas through laboratory experiments. |
| PO - 3 | Carry out field works and projects independently and in collaboration with other institutions and industries. |
| PO - 4 | Reflect upon green initiatives and take responsible steps to build a sustainable environment. |
| PO - 5 | Face challenging competitive examinations that offer rewarding careers in science and education. |
| PO - 6 | Impart communicative skills and ethical values. |
| PO - 7 | Equip students with hands on training through various courses to enhance entrepreneurship skills. |

## B.Sc. Chemistry Programme Specific Outcomes (PSOs)

| PSO | Upon completion of B.Sc. Chemistry, students will be able to: | PO No. |
|---|---|---|
| PSO - 1 | Understand the fundamentals, theories and principles of Organic, Inorganic and Physical chemistry. | 1 |
| PSO - 2 | Analyse physical and chemical properties of chemical compounds and their uses. | 1 |
| PSO - 3 | Interpret the mechanism of various chemical reactions. | 2 |
| PSO - 4 | Synthesise organic and inorganic compounds using classical and modern methods. | 2 |
| PSO - 5 | Design and carry out scientific experiments, record and interpret the results with accuracy. | 2 |
| PSO - 6 | Use concepts, tools and techniques related to chemistry to other branches of science. | 3 |
| PSO - 7 | Develop skills in the safe-handling of chemicals and their usage in day today life. | 1 |
| PSO - 8 | Appreciate the applications of chemistry and to know its role in medicine, research, agriculture and industry. | 3 |
| PSO - 9 | Explore new areas of research both in chemistry and allied fields of science and technology across the globe. | 3 |
| PSO - 10 | Communicate clearly the results of scientific work in oral, written and electronic formats to the society. | 6 |
| PSO - 11 | Identify chemistry as an integral part of science for addressing social, economic and environmental problems. | 4 |
| PSO - 12 | Develop entrepreneurial skills, empowered to fulfil the professional requirement and become self-dependent. | 7 |

## Course Outcomes (COs)

**Semester : I** **Major Core I**

**Name of the Course : Inorganic Chemistry I**

**Course code : CC1711**

| CO - No. | Course Outcome<br>Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Remember the fundamental principles of inorganic chemistry | PSO - 1 | R |
| CO - 2 | Understand the basic terminology of quantum chemistry | PSO - 6 | U |
| CO - 3 | Identify similarities and differences in the periodic properties | PSO - 1 | R |
| CO - 4 | Predict chemical bonding and molecular geometry | PSO - 3 | C |
| CO - 5 | Construct MO diagram of simple molecules | PSO - 1 | C |
| CO - 6 | Predict the position and properties of an element in periodic table | PSO - 1 | C |
| CO - 7 | Evaluate the characteristics of S-block elements | PSO - 2 | E |

**Semester : I & III** **Allied**

**Name of the Course : General Chemistry**

**Course code : CA1711**

| CO - No. | Course Outcome<br>Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Know about the filling of electrons in atomic orbital | PSO - 1 | R |
| CO - 2 | Understand the principles behind atomic structure | PSO - 1 | U |
| CO - 3 | Interpret the characteristics of ionic Compounds | PSO - 3 | An |
| CO - 4 | Deduce the shapes of molecules using VSEPR theory | PSO - 5 | E |
| CO - 5 | Analyse the reaction intermediates | PSO - 2 | An |
| CO - 6 | Differentiate the types of organic reactions | PSO - 2 | An |

**Semester : I NMEC**

**Name of the Course : Molecules of Life**

**Course code : CNM171**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the functions of nutrients like carbohydrates, vitamins and minerals in the body | PSO - 6 | U |
| CO - 2 | Remember the principles of metabolism | PSO - 3 | R |
| CO - 3 | Differentiate and know the functions of DNA and RNA | PSO - 8 | Ap |
| CO - 4 | Classify and estimate aminoacids, carbohydrates and proteins | PSO - 11 | E |
| CO - 5 | Correlate the pathways of enzymes and lipids | PSO - 3 | U |
| CO - 6 | Aware of the diseases caused by lack of vitamins | PSO - 11 | Ap |
| CO - 7 | List out the industrial and medical applications of enzymes | PSO - 9 | R |
| CO - 8 | Generalize toxicity of various minerals in the body | PSO - 8 | Ap |

**Semester : II Major Core II**

**Name of the Course : Physical Chemistry I**

**Course code : CC1721**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Define types of molecular velocities | PSO - 1 | R |
| CO - 2 | Calculate different degrees of freedom | PSO - 5 | E |
| CO - 3 | Predict physical properties of liquids | PSO - 2 | An |
| CO - 4 | Diferentiate addition and Constitutive properties | PSO - 5 | E |
| CO - 5 | Distinguish between amorphous and crystalline solids | PSO - 2 | An |
| CO - 6 | To analyse the types and diffraction | PSO - 2 | An |

| | | | |
|---|---|---|---|
| | patterns of crystals | | |
| CO - 7 | To evaluate the hydrolysis of salts and its results. | PSO - 5 | E |
| CO - 8 | Collect the properties of Colloidal systems | PSO - 5 | C |

**Semester : II & IV Allied**
**Name of the Course : Inorganic & Physical Chemistry**
**Course code : CA1721**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Know the different types of hydrogen | PSO - 2 | U |
| CO - 2 | Interpret the hardness of water | PSO - 3 | Ap |
| CO - 3 | Differentiate extraction of metals and electro refining processes. | PSO - 2 | An |
| CO - 4 | Calculate the enthalpy of chemical reactions | PSO - 2 | An |
| CO - 5 | Recognise various electrolytes and types of electrolytic reactions. | PSO - 1 | U |
| CO - 6 | Know and apply the use of radioactive elements in day-today life. | PSO - 6 | Ap |
| CO - 7 | Collect information about the properties of radioactive rays | PSO - 5 | C |
| CO - 8 | Calculate the age of earth | PSO - 6 | Ap |

**Semester : II NMEC**
**Name of the Course : Fuel Chemistry**
**Course code : CNM172**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Evaluate the difference between renewable and non renewable sources | PSO - 2 | An |
| CO - 2 | Understand and describe the advantages of solid, liquid and gaseous fuel | PSO - 1 | U |
| CO - 3 | Differentiate fuel sources, purification process, and their uses in day today life. | PSO - 6 | Ap |
| CO - 4 | Identify the sources of petroleum | PSO - 11 | E |

| | | | |
|---|---|---|---|
| | products and refining processes. | | |
| CO - 5 | Differentiate homogenous and heterogeneous propellants | PSO - 2 | An |
| CO - 6 | Predict the Composition of natural and artificial gaseous fuels | PSO - 2 | An |
| CO - 7 | Develop the possibilities of Conserving renewable energy | PSO - 12 | C |
| CO - 8 | Discuss about nuclear fuel and its applications. | PSO - 8 | Ap |

**Semester : III Major Core III**
**Name of the Course : Organic Chemistry I**
**Course code : CC1731**

| CO | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the nomenclature of organic molecules based on IUPAC system | PSO - 1 | U |
| CO - 2 | Identify the mechanism of organic reactions | PSO - 3 | Ap |
| CO - 3 | Interpret the shapes of molecules with hybridization | PSO - 1 | Ap |
| CO - 4 | Analyze the electron displacement effects in organic Compounds | PSO - 1 | E |
| CO - 5 | Synthesize hydrocarbons, alkyl halides, alcohols and ethers | PSO - 4 | C |
| CO - 6 | Differentiate Markownikoff and Anti- Markownikoff addition | PSO - 3 | An |
| CO - 7 | Know the different types of organic reactions | PSO - 1 | U |

**Semester : III Elective I (a)**

**Name of the Course : Dairy Chemistry**
**Course code : CC1732**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recall the physical properties of milk | PSO - 2 | An |
| CO - 2 | Identify the various factors affecting the quality of milk | PSO - 11 | U |
| CO - 3 | Assess the microbiology of milk | PSO - 12 | An |

| | | | |
|---|---|---|---|
| CO - 4 | Propose various methods to pasteurize milk | PSO - 12 | C |
| CO - 5 | Employ the methods of manufacture of special milks | PSO - 8 | Ap |
| CO - 6 | Correlate the acidity, moisture Content and fat Content of milk products | PSO - 2 | An |
| CO - 7 | Estimate the amount of lactose in milk | PSO - 12 | E |
| CO - 8 | Recall milk proteins, milk carbohydrates and milk vitamins | PSO - 1 | R |

**Semester : III Elective I (b)**

**Name of the Course : Nutritional Chemistry**
**Course code : CC1733**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the different kinds of essential nutrients | PSO - 1 | U |
| CO - 2 | Illustrate the energy released from the carbohydrate | PSO - 5 | C |
| CO - 3 | Generalize the functions of proteins | PSO - 2 | An |
| CO - 4 | Compare the role of vitamins in retaining the health | PSO - 8 | Ap |
| CO - 5 | Analyse the ingredients of Cold and hot beverages | PSO - | E |
| CO - 6 | Differentiate DNA and RNA | PSO - 2 | An |

**Semester : III Elective I (c)**
**Name of the Course : Applied Electro Chemistry**

**Course code : CC1734**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the basic principles involved in the Electrolysis | PSO - 1 | U |
| CO - 2 | Differentiate between Electrometallurgy and Hydrometallurgy | PSO - 2 | An |
| CO - 3 | Interpret the different methods of Electroplating | PSO - 3 | Ap |
| CO - 4 | Compare the different power sources | PSO - 8 | E |

| | | | |
|---|---|---|---|
| CO - 5 | Predict corrosion and types of coating | PSO - 6 | C |
| CO - 6 | Explain the special features of electro –organic synthesis | PSO - 1 | U |

**Semester : IV Major Core IV**
**Name of the Course : Organic Chemistry II**

**Course code : CC1741**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the different methods of preparation and properties of organic Compounds | PSO - 1 | U |
| CO - 2 | Interpret the mechanistic pathway of chemical reactions | PSO - 3 | Ap |
| CO - 3 | Differentiate aromatic and non aromatic Compounds | PSO - 2 | An |
| CO - 4 | Analyse the stability of different cycloalkanes | PSO - 2 | An |
| CO - 5 | Synthesise an organic Compound from other compound. | PSO - 4 | C |
| CO - 6 | Apply reaction mechanism to different reactions | PSO - 3 | Ap |

**Semester : IV Elective II (a)**
**Name of the Course : Industrial Chemistry**

**Course code : CC1742**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recognize the process of refining and manufacture of petrochemicals | PSO - 4 | R |
| CO - 2 | Grasp the uses of petrochemicals | PSO - 2 | U |
| CO - 3 | Identify the methods of manufacture of fertilizers and agrochemicals | PSO - 4 | R |
| CO - 4 | Classify protective coatings based on their properties | PSO - 2 | An |
| CO - 5 | Analyze the toxic chemicals in various industries | PSO - 8 | An |
| CO - 6 | Interpret the applications of chemical compounds industries | PSO - 8 | Ap |

**Semester : IV** **Elective II (b)**
**Name of the Course : Polymer Chemistry**

**Course code : CC1743**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Differentiate between monomers and polymers | PSO - 1 | U |
| CO - 2 | Identify natural and synthetic polymers | PSO - 6 | Ap |
| CO - 3 | Apply polymers in different fields | PSO - 6 | Ap |
| CO - 4 | Determine the physical and mechanical properties of polymers | PSO - 5 | Ap |
| CO - 5 | Interpret the properties of polymers and their applications | PSO - 2 | Ap |
| CO - 6 | Understand the methods of polymerization reaction | PSO - 2 | U |
| CO - 7 | Compare the types of polymers | PSO - 2 | Ap |

**Semester : IV** **Elective II (c)**
**Name of the Course : Pharmaceutical Chemistry**

**Course code : CC1744**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Grasp the characteristics and types of various drugs | PSO - 1 | U |
| CO - 2 | Extract and synthesize drugs | PSO - 4 | E |
| CO - 3 | Compare the action of various drugs | PSO - 2 | An |
| CO - 4 | Identify common diseases their causes and treatment | PSO - 2 | An |
| CO - 5 | Interpret blood grouping and Rh factor | PSO - 3 | Ap |
| CO - 6 | Appreciate the applications of synthesized drugs | PSO - 8 | Ap |

**Semester : V Major Core V**
**Name of the Course : Organic Chemistry III**
**Course code : CC1751**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Identify the methods of preparation, properties and reaction mechanism of phenols. | PSO - 4 | U |
| CO - 2 | Prepare and analyze the reactions of poly nuclear hydrocarbons | PSO - 4 | C |
| CO - 3 | Recognize the classification, preparation and properties of heterocyclic Compounds | PSO - 1 | R |
| CO - 4 | Evaluate the importance and structure of carbohydrates | PSO - 6 | E |
| CO - 5 | Understand the inter conversions of carbohydrates | PSO - 1 | U |
| CO - 6 | Pharmacological activities of drugs | PSO - 8 | C |
| CO - 7. | Synthesise various drugs | PSO - 4 | C |
| CO - 8. | Evaluate the synthetic uses of drugs | PSO - 5 | E |

**Semester : V Major Core VI**
**Name of the Course : Inorganic Chemistry II**
**Course code : CC1752**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Identify the P-block elements in the periodic table. | ` PSO - 1 | R |
| CO - 2 | Analyze the properties of P- block elements | PSO - 2 | An |
| CO - 3 | Compare inorganic and organic polymers | PSO - 2 | U |
| CO - 4 | Explain the different metallurgical processes | PSO - 8 | Ap |
| CO - 5 | Compare the stability of different atomic nuclei. | PSO - 7 | E |
| CO - 6 | Illustrate principle of atom bomb and nuclear reactor. | PSO - 1 | Ap |

**Semester : V Major Core VII**
**Name of the Course : Physical Chemistry II**
**Course code : CC1753**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | List out various types of dilute solutions | PSO - 1 | R |
| CO - 2 | Determine the various colligative properties | PSO - 2 | R |
| CO - 3 | Calculate the molar mass using colligative properties | PSO - 4 | An |
| CO - 4 | Illustrate the different types of systems using thermodynamics | PSO - 2 | Ap |
| CO - 5 | Interpret and Correlate the laws of thermodynamics | PSO - 2 | AP |
| CO - 6 | Calculate the various kinds of energy | PSO - 5 | An |
| CO - 7 | Compare the entropy change of difficult processes | PSO - 2 | E |
| CO - 8 | Assess the absolute entropy of solids, Liquids and gases | PSO - 5 | E |
| CO - 9 | Create the group multiplication table | PSO - 3 | C |
| CO - 10 | Assign point groups to simple molecules | PSO - 4 | C |

**Semester : V Elective III (a)**
**Name of the Course : Green Chemistry**
**Course code : CC1754**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Know the principles of green chemistry | PSO - 1 | R |
| CO - 2 | Design green synthesis | PSO - 5 | C |
| CO - 3 | Interpret green method for organic synthesis | PSO - 3 | E |
| CO - 4 | Synthesize various Compounds by Microwave and ultrasound assisted methods | PSO - 4 | C |
| CO - 5 | Analyze the important techniques and directions in practicing green chemistry | PSO - 2 | An |
| CO - 6 | Identify the importance of Green chemistry in day to day life | PSO - 8 | Ap |

**Semester : V Elective IV (b)**
**Name of the Course : Applied Chemistry**
**Course code : CC1755**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Develop fuel cells | PSO - 5 | C |
| CO - 2 | Synthesise nano Compounds | PSO - 4 | E |
| CO - 3 | List out the fundamental principles of nano chemistry | PSO - 1 | U |
| CO - 4 | Identify various chemotherapeutic agents | PSO - 2 | An |
| CO - 5 | Compare octane and cetane rating | PSO - 2 | An |
| CO - 6 | Apply C++ operators in chemistry | PSO - 6 | Ap |
| CO - 7 | Distinguish between homogeneous and heterogenous propellants | PSO - 2 | An |

**Semester : V Elective III (c)**
**Name of the Course : Leather Chemistry**
**Course code : CC1756**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Identify different types of leather | PSO - 9 | R |
| CO - 2 | Understand the Composition of hides and skins | PSO - 1 | U |
| CO - 3 | Analyse the effect of tanning agents | PSO - 3 | An |
| CO - 4 | Apply the methods of processing of leather | PSO - 6 | Ap |
| CO - 5 | Discuss about tannery effluents and treatment | PSO - 1 | U |

**Semester : V SBC**
**Name of the Course : Chemistry for competitive examination**
**Course code : CSK175**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recognize and remember theories of atoms | PSO - 1 | U |
| CO - 2 | Predict chemical bonding | PSO - 2 | C |
| CO - 3 | Analyse the Composition and constituents of atmospheric air | PSO - 8 | An |
| CO - 4 | Measure the hardness of water | PSO - 5 | E |

| | | | |
|---|---|---|---|
| CO - 5 | Differentiate between metals and non metals | PSO - 2 | U |
| CO - 6 | Analyse the chemical Compounds present in polymers, drugs and fertilizers | PSO - 11 | An |

**Semester : VI Major Core VIII**
**Name of the Course : Organic Chemistry IV**
**Course code : CC1761**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recognize optical activity and the types of isomerism | PSO - 1 | R |
| CO - 2 | Interpret the principles of spectroscopy and photochemistry | PSO - 3 | Ap |
| CO - 3 | Apply spectral rules to calculate $\lambda_{max}$ values | PSO - 6 | Ap |
| CO - 4 | Evaluate different spectra | PSO - 5 | E |
| CO - 5 | Apply IR spectra in functional group analysis | PSO - 6 | C |
| CO - 6 | Know the medicinal importance and elucidate the structure of alkaloids | PSO - 8 | C |
| CO - 7 | Classify, differentiate and synthesise various dyes | PSO - 2 | An |

**Semester : VI Major Core IX**
**Name of the Course : Inorganic Chemistry III**
**Course code : CC1762**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Name the coordination Compounds | PSO - 1 | A |
| CO - 2 | Explain the theories of coordination Compounds | PSO - 1 | U |
| CO - 3 | Predict the colour, magnetic properties and geometry of coordination Compounds | PSO - 2 | C |
| CO - 4 | Analyse the nature of bonding in coordination Compounds | PSO - 3 | An |
| CO - 5 | Minimize the errors in chemical estimation | PSO - 5 | An |
| CO - 6 | Employ the methods to separate the inner transition elements | PSO - 4 | Ap |
| CO - 7 | Compare the properties of | PSO - 2 | An |

| | | | |
|---|---|---|---|
| | lanthanides and actinides | | |
| CO - 8 | Explain the principles of gravimetric analysis | PSO - 1 | U |

**Semester : VI Major Core X**
**Name of the Course : Physical Chemistry III**
**Course code : CC1763**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recall phase rule. | PSO - 1 | R |
| CO - 2 | Understand phase diagrams | PSO - 1 | C |
| CO - 3 | Differentiate various photochemical processes | PSO - 4 | U |
| CO - 4 | Interpret Jablonski diagram | PSO - 4 | Ap |
| CO - 5 | Apply the electrochemical principles in batteries | PSO - 3 | Ap |
| CO - 6 | To deduce the expressions of rate constant | PSO - 5 | An |
| CO - 7 | Evaluate pH using electrodes. | PSO - 5 | E |
| CO - 8 | Elucidate the structure of molecules using spectral data | PSO - 8 | C |

**Semester : VI Elective IV (a)**
**Name of the Course : Bio Chemistry**

**Course code : CC1764**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the classification of carbohydrates, components in blood and metabolism in biological systems | PSO - 1 | U |
| CO - 2 | Classify and interpret various lipids, their biochemical importance and properties | PSO - 2 | Ap |
| CO - 3 | Classify the different amino acids | PSO - 3 | An |
| CO - 4 | Compare DNA and RNA | PSO - 3 | E |
| CO - 5 | Determine the rate of enzymatic reactions | PSO - 5 | An |
| CO - 6 | Describe the industrial and medical applications of enzymes | PSO - 8 | U |
| CO - 7 | Identify the structure and biochemical functions of cholesterol in real life. | PSO - 3 | An |

**Semester : VI Elective IV (b)**
**Name of the Course : Instrumental Methods of Analysis**

**Course code : CC1765**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recognize the principle of adsorptions | PSO - 1 | U |
| CO - 2 | Choose specific adsorbents for chemical reaction | PSO - 2 | An |
| CO - 3 | Analyze the factors affecting chromatography | PSO - 2 | An |
| CO - 4 | Categorize the different analytical methods | PSO - 3 | E |
| CO - 5 | Evaluate $\lambda_{max}$ for benzene and its derivatives | PSO - 5 | E |
| CO - 6 | Identify concept of Flame photometry | PSO - 1 | U |
| CO - 7 | Apply techniques of IR spectroscopy to identify the functional groups | PSO - 8 | Ap |

**Semester : VI Elective IV (c)**
**Name of the Course : Forensic Chemistry**
**Course code : CC1764**

| CO - No. | Course Outcome Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | List out the principles governing forensic science | PSO - 1 | U |
| CO - 2 | Differentiate toxic chemicals | PSO - 2 | An |
| CO - 3 | Create mobile forensic science laboratories | PSO - 5 | C |
| CO - 4 | Categorize physical evidence | PSO - 2 | An |
| CO - 5 | Predict the methods used for the collection of finger prints | PSO - 3 | E |
| CO - 6 | Distinguish the cordage and rope metallic fragments | PSO - 3 | E |

**Semester : VI SBC**

**Name of the Course : Project**

**Course code : CSK176**

| CO - No. | Upon completion of course students will be able to | PSO | CL |
|---|---|---|---|
| CO - 1 | Choose the relevant topic | PSO - 9 | U |
| CO - 2 | Survey the literature | PSO - 11 | Ap |
| CO - 3 | Collect / measure data | PSO - 8 | E |
| CO - 4 | Tabulate and interpret the data | PSO - 10 | Ap |
| CO - 5 | Conclude the inference | PSO - 10 | C |

**Semester : I Major Practical I**

**Name of the Course : Volumetric Analysis I**

**Course code : CC17P1**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the concepts of quantitative analysis | PSO - 1 | U |
| CO - 2 | Recognize the indicators , acid and bases used in volumetric analysis | PSO - 1 | U |
| CO - 3 | Estimate the amount of substance present in a given solution | PSO - 5 | E |
| CO - 4 | Develop practical skill | PSO - 5 | C |
| CO - 5 | Utilize the mathematical skills doing calculation | PSO - 10 | Ap |

**Semester : II Major Practical II**

**Name of the Course : Volumetric Analysis II**

**Course code : CC17P2**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the concepts of quantitative analysis | PSO - 1 | U |
| CO - 2 | Recognize the indicators , acid and bases used in volumetric analysis | PSO - 7 | U |
| CO - 3 | Estimate the amount of substance present in a given solution | PSO - 5 | E |
| CO - 4 | Develop practical skill | PSO - 5 | C |
| CO - 5 | Utilize the mathematical skills doing calculations | PSO - 10 | Ap |

**Semester : III Major Practical III**

**Name of the Course : Determination of physical Constant and organic preparation**

**Course code : CC17P3**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the conversion of one Compound to another | PSO - 1 | U |
| CO - 2 | Utilize different methods of preparation of organic Compounds | PSO - 9 | Ap |
| CO - 3 | Synthesis compounds by hydrolysis, halogenation, acetylation, benzoylation, nitration, oxidation and condensation | PSO - 10 | C |
| CO - 4 | Synthesis of diazo Compounds through coupling reaction | PSO - 10 | C |
| CO - 5 | Prepare pure organic substance by recystallisation | PSO - 3 | A |
| CO - 6 | Measure exact melting and boiling point of organic substances | PSO - 5 | E |

**Semester : III Major Practical IV**

**Name of the Course : Organic Analysis**

**Course code : CC17P4**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand different functional groups of organic Compounds | PSO - 1 | U |
| CO - 2 | Detect elements other than carbon | PSO - 3 | An |
| CO - 3 | Differentiate aliphatic and Compounds | PSO - 3 | An |
| CO - 4 | Distinguish unsaturated and saturated organic Compounds | PSO - 3 | An |
| CO - 5 | Confirm the functional group by preparing a solid derivative | PSO - 10 | C |

**Semester : V Major Practical V**

**Name of the Course : Organic Estimation and Inorganic Semimicro Analysis**

**Course code : CC17P5**

| CO - No. | Upon completion of course students will be able to | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand the principles of estimation of organic functional groups | PSO - 1 | U |
| CO - 2 | Estimate different organic substances | PSO - 5 | An |
| CO - 3 | Estimate the number of hydroxyl groups | PSO - 5 | E |
| CO - 4 | Calculate the weight of phenol, aniline, ethyl methyl ketone etc. | PSO - 5 | E |

**Semester : VI Major Practical VI**

**Name of the Course : Gravimetric Analysis and Inorganic Complex preparation**

**Course code : CC17P6**

| CO - No. | Upon completion of course students will be able to: | PSO - | CL |
|---|---|---|---|
| CO - 1 | Know the various forms of Complexes | PSO - 1 | U |
| CO - 2. | Understand the medium of precipitation | PSO - 1 | U |
| CO - 3 | Develop skill in doing gravimetric estimation | PSO - 7 | C |
| CO - 4 | Estimate various ions from their salts | PSO - 5 | E |
| CO - 5 | Prepare inorganic Complexes | PSO - 5 | C |

**Semester : VI Major Practical VII**
**Name of the Course : Physical Practical**

**Course code : CC17P7**

| CO - No. | Upon completion of course students will be able to: | PSO - | CL |
|---|---|---|---|
| CO - 1 | Understand and remember the principles of physical experiments | PSO - 1 | U |
| CO - 2 | Determine physical constants | PSO - 5 | An |
| CO - 3 | Interpret the graphical data | PSO - 3 | An |
| CO - 4 | Develop the practical skill and minimize errors | PSO - 7 | C |
| CO - 5 | Compare the strength of different acids | PSO - 2 | An |
| CO - 6 | Evaluate the unknown concentration | PSO - 5 | E |

**Semester : II & IV Allied Practical I**
**Name of the Course : Volumetric Estimation and organic analysis**

**Course code : CA17P1**

| CO - No. | Upon Completion of course students will be able to: | PSO - | CL |
|---|---|---|---|
| CO - 1 | Recognize the indicators used in volumetric analysis | PSO - 1 | U |
| CO - 2 | Estimate the amount of substance present in the sample solution | PSO - 4 | E |
| CO - 3 | Develop practical skills | PSO - 7 | E |
| CO - 4 | Understand and remember the concepts and theory of Qualitative and Quantitative analysis | PSO - 1 | U |
| CO - 5 | Utilizing the mathematical skills in doing calculations | PSO - 5 | Ap |
| CO - 6 | Employ suitable methods to minimize errors | PSO - 5 | Ap |