



**Karnatak Arts, Science & Commerce College, Bidar**

ESTD. 1970  
(Affiliated to Gulbarga University)  
**College With Potential for Excellence**



## **Department of Chemistry**

### **B. Sc Chemistry Programme Outcomes**

**PO1. Advanced Technical Knowledge:** Graduates will demonstrate a deep understanding of the Core principles, theories, and concepts in chemistry, Students can solve their subjective problems Very methodically, independently and finally draw a logical conclusion. Further, the student will Be capable of applying modern technologies, handling advanced instruments and Chemistry related soft-wares for chemical analysis, characterization of materials and in separation technology.

**PO2. Problem Solving and Critical Thinking:** Graduates will possess strong analytical and problem-solving skills, allowing them to identify, analyze, and develop innovative solution to complex computational problems.

**PO3. Research and Innovation:** Graduates will be equipped with the ability to conduct independent research, explore emerging technologies, and contribute to the advancement of chemistry through innovative ideas and approaches.

**PO4. Effective Communication:** Graduates will be proficient in communicating complex technical concepts to both technical and non-technical audiences, through written reports, presentations, and effective collaboration.

**PO5. Teamwork and Collaboration:** Graduates will demonstrate the ability to work effectively in interdisciplinary teams, collaborating with individuals from diverse backgrounds to achieve common goals and solve complex problems.

**PO6. Ethical and Professional Practices:** Graduates will adhere to high ethical standards and demonstrate awareness of the social, legal, and ethical implications of chemistry in order to make responsible decisions in their professional careers.

**PO7. Lifelong Learning:** Graduates will have a passion for continuous learning and self-improvement, keeping up-to-date with the latest advancements in computer chemistry and adapting to evolving technologies throughout their careers.

**PO8. Leadership and Management Skills:** Graduates will possess the skills to lead and manage projects, teams, and resources effectively, demonstrating the ability to plan, organize, and execute complex chemistry initiatives.

**PO9. Entrepreneurial Mindset:** Graduates will develop an entrepreneurial mindset, allowing them to identify opportunities, innovate, and apply chemistry knowledge to create value in various domains, such as startups, industry, or research.

**PO10. Global and Societal Awareness:** Graduates will understand the global impact of chemistry on society, recognizing the importance of diversity, inclusivity, and sustainability in technological advancements.

### **Programme Specific Outcomes**

**PSO-1:** Students will be able to design, execute, record and analyses the results of chemical experiments.

**PSO-2:** Prepares the students for immediate entry to the workplace with sound theoretical, experimental knowledge in the area of fuels and energy, environment, health, foods, cosmetics, polymers and related multidisciplinary fields.

**PSO-3:** Become efficient in using standard operating procedures and will be well versed with the regulations for safe handling and use of chemicals.

**PSO-4:** To opt for higher education, disciplinary & multi-disciplinary research and to be a life-long learner.

**PSO-5:** Students will be able to identify chemical formulae and solve numerical problems.

**PSO-6:** Apply knowledge of chemistry to excel in the professional services to industry, research organization and institutes.

**PSO-7:** Apply principles of pharmaceutical chemistry, medicinal chemistry, analytical chemistry, organometallic chemistry, supramolecular chemistry, chemical process and laboratory skills for volumetric analysis, synthesis, separation, isolation and formulation.

**PSO-8:** Work with professional ethics in quality control and quality assurance sections of R&D sectors of different research laboratories

**PSO - 9:** Students will be able to use mathematical concepts, such as stoichiometry, to solve chemical problems and predict the outcome of reactions.

**PSO - 10:** Students will be able to understand the principles of organic and inorganic chemistry and its applications in various fields.

## B. Sc I Sem

### Course Outcomes: DSC – CHEM – 1A

Atomic Structure, chemical periodicity, bonding, general organic chemistry & aliphatic hydrocarbons.

Sl No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Apply the fundamental principle of measurement, matter, Atomic theory, chemical periodicity, chemical bonding, general chemical reactivity.	PO1, PSO4	K3
CO2	Explain the formation of different types of bonding & concept of geometry of simple molecule.	PO1 , PO7,PSO6	K2
CO3	Write Born – Hober cycle for different ionic compound.	PO1,PO3, PSO10	K2
CO4	Draw the MO energy diagram for simple molecules	PO8, PSO4	K3
CO5	Apply stereochemistry in predicting the structure and property of organic molecules.	PO1/PO6, PSO2	K3
CO6	Identify the chiral molecules and predict its actual configuration.	PO2,PO4, PSO2	K2
CO7	Analyze different energy parameters like lattice energy and salvation energy in the dissolution of ionic solids.	PO1/PO6, PSO5	K4

## B. Sc II Sem

### Course Outcomes: DSC – Chem – 1B

Chemical energetic, equilibria S- block elements and functional organic chemistry

Sl No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Write the importance laws of thermodynamics and their applications to various thermodynamic systems.	PO1 ,PSO4	K2
CO2	Explain different types of electrolytes, usefulness of conductance and ionic mobility measurement.	P07,PSO9	K2
CO3	Construct and explain the reaction, mechanism of $SN^1$ , $SN^2$ , & $SN^i$ .	PO2,PSO10	K6
CO4	Understand and gain the knowledge about the methods of determination of reaction mechanism.	PO7/PO4, PSO7	K2
CO5	Develop the skill in preparation of buffer solutions and find $p^H$ of buffer solution.	PO8, PSO2	K6

**B. Sc III Sem****Course Outcomes: DSC – Chem – 1C**

**Solution, phase equilibrium, conductance, electrochemistry, p – block elements & functional group organic chemistry**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Defines the importance of phase diagram of one component system and two component system.	PO1,PSO4	K1
CO2	Distinguish between the ideal and non ideal solution.	PO1/PO2, PSO5	K4
CO3	Illustrate the structure of glucose, fructose, sucrose, maltose and lactose and its properties.	PO7, PSO4	K3
CO4	Apply knowledge to solve problems on thermodynamic properties like G, H and S from EMF data.	PO2,PO4, PSO5	K3
CO5	Derive Clausis – Clapeyron equation and explain its importance in phase equilibria.	PO2, PSO10	
CO6	Explain preparation, properties, structure and uses of Borazole, diborane and halogens.	PO3,PO9,PSO8	K2

**B. Sc IV Sem****Course Outcomes: DSC – Chem – 1D -Coordination chemistry, states of matter & chemical kinetics.**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Design the shapes and structure of coordination complexes with co-ordination number ranging from 4 – 6	PO8, PSO1	K6
CO2	Write the electronic configuration, oxidation states, color , magnetic properties of transition element.	PO3, PSO4	K2
CO3	State and apply the laws of thermodynamics in various real life situations.	PO2,PSO4	K1
CO4	Illustrate the structure of NaCl, KCl, & CsCl	PO1,PSO1	K3
CO5	Differentiate amorphous and crystalline solids and their arrangement in crystal lattice.	PO2,PSO5	K4
CO6	Identify the lattice planes and defects in crystals, glasses and liquid crystal.	PO2,PO9,PSO6	K2

**B. Sc V Sem****Course Outcomes: DSE – Chem – 1****Analytical methods in chemistry**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Understand the colligative properties and their determination by dynamic method.	PO1,PSO7	K2
CO2	Identify various organic compound by their acquired knowledge of spectroscopy.	PO2/PO7, PSO9	K2
CO3	Explain the preparation, synthesis and reactions of heterocyclic compounds.	PO3,PSO8	K2
CO4	Develop skills in proper handling of glassware's and equipments in the qualitative and quantitative analysis.	PO3/PO5, PSO3	K6
CO5	Apply the basic principles of gravimetric to minimize the errors and improve accuracy in analysis.	PO8,PSO10	K3

**B. Sc V Sem****Course Outcomes: SEC – Chem – 1****Basic analytical chemistry**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Understand the interdisciplinary nature of analytical chemistry and concept of sampling.	PO1,PSO6	K2
CO2	Implement methods of water sampling and water purification in real life.	PO9/PO10, PSO3	K3
CO3	Design safe chemicals for water purification.	PO2/PO9, PSO2	K6
CO4	Analyze the preservatives and colouring matters present in the food product.	PO10, PSO1	K4
CO5	Define complexometric titration, chelation, chelating agen and pure water.	PO1, PO6, PSO4	K1
CO6	Students have hands on experience on the water and soil analysis.	PO3, PO9, PSO8	K4

**B. Sc VI Sem****Course Outcomes: DSE – Chem – 2****Industrial chemicals and environment**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Explain the structural determination and synthesis of alkaloids.	PO3, PSO3	K2
CO2	Elucidate the structure, classify and synthesis of few important terpenoids.	PO3, PSO2	K3
CO3	Identify the different preservative present in the food.	PO4, PO10, PSO1	K2
CO4	Explain properties, process , application, manufacture of cement, ceramics and its applications.	PO1, PO3, PSO2	K2
CO5	Develop advanced skills for manufacture of blended cement and ceramics.	PO9, PSO2	K6
CO6	Apply spectroscopy principles to analyze the problems.	PO2, PSO9	K3
CO7	Develop the ability to analyze the spectrum and arrive at the correct structure of compounds.	PO2, PO6, PSO1	K6

**B. Sc VI Sem****Course Outcomes: SEC – Chem – 3****Fuel chemistry**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Explain types, properties, distillation and chemicals derived from coal.	PO3, PO2, PSO4	K2
CO2	Understand the renewable and non renewable resources.	PO1 , PO10/PSO2	K2
CO3	Contrast the different types of petroleum products and their applications.	PO1, PO5, PSO1	K4
CO4	Defines lubricants and classify lubricants.	PO1, PSO6	K1
CO5	Recall the basic principles of distillation and apply in the process of fractional distillation.	PO1, PSO7	K1

## B. Sc I Sem

### Course Outcomes: DSC – CHEM – 1A Lab

Atomic Structure, chemical periodicity, bonding, general organic chemistry & aliphatic hydrocarbons.

Sl No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Identify and separate the components of a given mixture of two amino acids by paper chromatography.	PO3, PSO1	K2
CO2	Impart skills and knowledge in estimation of oxalic acid by titrating it with $\text{KMnO}_4$ .	PO3/PO2, PSO8	K4
CO3	Apply the basic principles of volumetric analysis and analyze the given solution.	PO2, PSO7	K3
CO4	Estimate the amount of Zn by EDTA solution.	PO2, PSO5	K3
CO5	Explain the principles of chromatography.	PO1, PO4, PSO4	K2

## B. Sc II Sem

### Course Outcomes: DSC – Chem – 1B Lab

Chemical energetic, equilibria S- block elements and functional organic chemistry

Sl No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Develop skills in the purification of organic compounds by crystallization and distillation.	PO3 & PO4, PSO3	K6
CO2	Apply acquired knowledge to solve problems for quantitative yield to be done.	PO2, PSO9	K3
CO3	Analyze the organic compounds for the determination of melting and boiling point of the compound.	PO2, PO9, PSO6	K4
CO4	Apply the basic knowledge to determine the viscosity of a given liquid using Ostwald's viscometer.	PO2, PSO4	K3
CO5	Evaluate parameters of viscosity of a liquid.	PO2, PSO2	K5

**B. Sc III Sem****Course Outcomes: DSC – Chem – 1C Lab**

**Solution, phase equilibrium, conductance, electrochemistry, p – block elements & functional group organic chemistry.**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Construct the phase diagram of a binary system using cooling curves	PO5,PO10, PSO3	K6
CO2	Understand the quantitative analysis of organic compounds like phenolic, -COOH, aldehydic etc	PO9,PSO7/PSO6	K2
CO3	Identify the mono functional group and prepare one derivative	PO3,PSO2/PSO8	K2
CO4	Differentiate reducing and non reducing sugars.	P02,PSO4	K4
CO5	Defines equivalent conductance, dissociation, dissociation constant of weak acid.	PO1,PSO1	K1

**B. Sc IV Sem****Course Outcomes: DSC – Chem – 1D Lab**

**Coordination chemistry, states of matter & chemical kinetics.**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Analyze a simple inorganic mixture containing two anions and cations.	PO3/PO7,PSO8	K4
CO2	Understand the chemical reaction involved in the detection of cation and anions.	PO1,PSO7	K2
CO3	Identify rate of chemical reaction in iodine persulphate reaction.	PO2,PO4,PSO3	K2
CO4	Apply flame photometer principle to determine concentration of Na <sup>+</sup> and K <sup>+</sup> using flame photometer.	PO5,PO8,PSO2	K3
CO5	Explain the basic principles involved in the gravimetric analysis and determine the amount present in the given solution.	PO1, PO3/PSO10	K2



**B. Sc V Sem****Course Outcomes: : DSE – Chem – 1 Lab****Analytical methods in chemistry**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Apply principle of refractometer to determine the specific and molar refractivities of two given liquids.	PO3, PSO1	K3
CO2	Identify various physiochemical parameters by conductivity bridge	PO2,PO6,PSO4	K2
CO3	Evaluate experimental data with theoretical models and interpret the data.	PO2,PO8 ,PSO9	K5
CO4	Apply colorimetric methods for accurate determination of metal ions.	PO7, PSO3	K3
CO5	Understand the basic principles of gravimetric analysis and improves the accuracy of analysis.	PO1,PSO7	K2

**B. Sc VI Sem****Course Outcomes: DSE – Chem – 2 Lab****Industrial chemicals and environment**

SI No.	Outcome Statement	PO/PSO	Cognitive Level
CO1	Identify the organic mixture of type A+B, A+N, P+B, P+N & B+N.	PO2,PSO6	K2
CO2	Analyze any one component , acid or base, phenol or base, phenol or neutral.	PO3,PSO2	K4
CO3	Understand the Lambert – Beers law and determines the concentration of solutions.	PO7,PSO1	K2
CO4	Determine equivalent conductance at infinite dilution and draw graph for equivalent conductance.	PO4,PSO4	K3
CO5	Understand the concept of conductance in electrolytic solution, electrolysis and redox reaction involved in electrode reaction.	PO1,PSO3/PSO5	K2

