

**K.L.E Society's
Raja Lakhamagouda Science Institute (Autonomous), Belagavi**

(PO's/PSO's/CO's)

Program: M. Sc. Chemistry (PG03A01)

Programme Outcomes

- PO1: Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts, theoretical principles and experimental findings in chemistry and its different subfields.
- PO2: Skilled communicator: Ability to transmit complex technical information relating to chemistry in a clear and concise manner in writing and orally.
- PO3: Critical thinker and problem solver: Ability to employ critical thinking and efficient problem-solving skills in the four basic areas of chemistry.
- PO4: Sense of inquiry: Capability for asking relevant/appropriate questions relating to issues and problems in the field of chemistry, and planning, executing and reporting the results of an experiment or investigation.
- PO4: Ethical awareness/reasoning: Avoiding unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, and appreciate environmental and sustainability issues.
- PO6: Lifelong learners: Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling.

Programme Specific Outcomes

- PSO1: Demonstrate a fundamental/systematic or coherent understanding of the academic field of chemistry, its different learning areas and applications, and its linkages with related disciplinary areas/subjects.
- PSO2: Demonstrate a procedural knowledge that creates different types of professionals related to chemistry area of study, including research and development, teaching and government and public service.

PSO3: Demonstrate a skill in areas related to specialization area relating the subfields and current developments in the academic field of chemistry.

PSO4: Demonstrate subject-related and transferable skills that are relevant to chemistry-related job trades and employment opportunities.

Course Outcomes

Semester I

Course Type	Course Code	Course Title	Course Outcome
DSC-I	AC01	Inorganic Chemistry-I	CO1: Understand the basic concepts, nature and properties of ionic, covalent and metallic bonding. CO2: Know about preparative methods of Boranes, Carboranes and Metallocarbene's CO3: Understand the importance, classification and properties of non-aqueous solvents. CO4: Able to do statistical data and evaluation
DSC-II	AC02	Organic Chemistry-I	CO1: Learn the fundamentals of reaction mechanisms. CO2: Gain insights into Aliphatic Nucleophilic Substitution reactions. CO3: Distinguish between type of addition and elimination reactions. CO4: Learn the stereochemical principle, enantiomeric relationship and R, S nomenclature.
DSC-III	AC03	Physical Chemistry-I	CO1: Students able to know atomic structure, molecular structure and properties, as well as chemical reactivity CO2: Students able know the different types thermodynamics derivations. CO3: Students able to know conductance properties, specific conductance, theory of ionic conductance in solutions CO4: Understand Kinetics of polymerization and Thermodynamics of polymer solutions
DSC-IV	AC04	Spectroscopy-I	CO1: Students able to know interaction of radiation with matter-adsorption, emission, reflection, & remission. CO2: Students able know basic theoretically concept of IR & Raman spectroscopy.
DSC	AC05	Analytical & Industrial Chemistry	CO1: Ability to analyze the separation system of multi-components mixtures CO2: Ability to analyze general principles and classification of chromatographic methods. CO3: To know different types of corrosion & factors effect on rate of corrosion CO4: Understand the processing of petroleum

DSC-I Practical	AC06	Inorganic Chemistry practical-I	CO1: Able to know the Ore Analysis, of like Haematite & Pyrolusite. CO2: Able to know the Alloy Analysis.
DSC-II Practical	AC06	Organic Chemistry practical-I	CO1: Preparation of acetanilide from aniline CO2: Preparation of bromo-acetanilide from acetanilide CO3: Preparation of hydrolysis of p-bromoacetanilide top-bromoaniline CO4: Preparation of p-nitro acetanilide from acetanilide
DSC-III Practical	AC08	Physical Chemistry practical-I	CO1: Analysis of binary mixture of two miscible liquids by viscometer and the relation between viscosity of solution and electrical conductivity CO2: To determine the percentage composition of unknown mixture of A and B liquids by Abbe's refractometer by graphical method CO3: To determine the percentage composition of unknown mixture of A and B liquids by Abbe's refractometer by formula method

Semester II

Course Type	Course Code	Course Title	Course Outcome
DSC-I	BC01	Inorganic Chemistry-II	CO1: Understand the concept of symmetry and point group of molecules CO2: Understand the concept of coordination compound CO3: Understand the concept of organometallic compounds and its classification CO4: Study the structure and functions iron and copper protein
DSC-II	BC02	Organic Chemistry-II	CO1: Gain the potential of organic reagents. CO2: Gained knowledge on elaborated photochemical reactions of carbonyl compounds. CO3: Describe Electrocyclic reactions mechanisms and stereo aspects. CO4: Study the structure activity and drug targets.
DSC-III	BC03	Physical Chemistry-II	CO1: To know the multiple structure of alkali spectra CO2: Understand the electromagnetic radiation and its interaction with matter CO3: Know the derivation of Gibbs-Duhem, Duhem-Margules equations CO4: Knowledge of Electro kinetics phenomenon & Enzyme catalysis
DSC-IV	BC04	Spectroscopy-II	CO1: To know the basic concept of UV-Visible Spectroscopy & applications of binary mixtures, measurement of dissociations constraints of acids & bases. CO2: Understand the theory of NMR & ¹³ C-NMR spectroscopy.
DSC	BC05	Computer & C	CO1: Understand the concept of computer, history and generation of computers,

		Programming-I	characteristics of computer, classification of computer, uses of computer CO2: Introduction, Importance of 'C', Basic structure of 'C' program, sample 'C' Programs, Executing a 'C' Program.
DSC-I Practical	BC06	Inorganic Chemistry practical-II	CO1: Qualitative analysis of ternary mixtures containing one rare cation and one interfering anion. CO2: $K_3[Al(C_2O_4)_3]_3 \cdot H_2O$ & $[Cu(thiourea)_3]_2SO_4 \cdot H_2O$ CO3: Estimation of Copper in tris-thiourea copper(I)sulphate by Iodometric method
DSC-II Practical	BC06	Organic Chemistry practical-II	CO1: Systematic qualitative analysis of binary mixture (solid+solid, solid+liquid) Chemical equations to be discussed for all tests. CO2: Fractional crystallization: Separation of mixture of naphthalene and biphenyl.
DSC-III Practical	BC08	Physical Chemistry practical-II	CO1: To study the phase equilibrium between benzene, ethane and water ternary system CO2: To determine the Association constant of a carboxylic acid (benzoic acid) in an organic solvent (toluene). CO3: Kinetics of acid catalysed hydrolysis of methyl acetyl and determination of energy activation

Semester III

Course Type	Course Code	Course Title	Course Outcome
DSC-I	CC01	Inorganic Chemistry-III	CO1: Understand the concept Terms, Microstates and Know various selection rules CO2: Able to understand the concepts of ligand substitution reactions in octahedral and square planar complex CO3: Understand the synthesis and properties CO4: Able to understand the concept of solid distribution in solvents
DSC-II	AC02	Organic Chemistry- III	CO1: Learn the applications of organic reagents in organic synthesis and studied the functional group transformations. CO2: Gained knowledge on elaborated photochemical reactions of carbonyl compounds. CO3: Describe sigmatropic rearrangement and learn the ene- reactions. CO4: Study the structure activity and drug targets.
DSC-III	AC03	Physical Chemistry- III	CO1: Able know structure factor calculation of the material CO2: Knowledge of Carbon nanotube: synthesis, properties & its applications

			CO3: Able to know the derivation of Buler-Volmer, Tafel equations CO4: Students able to know the properties & photochemical process
DSC-IV	AC04	Spectroscopy- III	CO1: Learn about introduction, basic theory of Mass spectroscopy. CO2: Knowledge about Combined applications of spectroscopy methods.
DSC	BC05	Computer & C Programming- II	CO1: Able to know Arrays & Character Arrays and strings. CO2: Able know User defined functions & Structure and union
DSC-I Practical	AC06	Inorganic Chemistry practical- III	CO1: Nitrogen, phosphorous and sulphur compounds: Hydrides, oxides and oxy acids of nitrogen, phosphorous, sulphur and halogens. CO2: Binary sulphur nitrides: S_4N_4 , $S_4N_4H_4$, S_2N_2 and $(SN)_x$. P-O and P-S cage compounds.
DSC-II Practical	AC06	Organic Chemistry practical- III	CO1: Students able to know Organic Estimations CO2: Students able to know Multi step organic preparation
DSC-III Practical	AC08	Physical Chemistry practical- III	CO1: Verify the degree of Debye-Huckel and Onsager equivalent conductance for electrolytes (NaCl, HCl) and determine the constant. CO2: To determine the energy of activation by studying the kinetics of acid catalysed hydrolysis of methyl acetate. CO3: To determine the molecular weight of high polymer PVA from viscosity measurements

Semester IV

Course Type	Course Code	Course Title	Course Outcome
DSC-I	DC01	Inorganic Chemistry-IV	CO1: Understand the different types of bonding concept (Ionic, Covalent, Coordinate, Metallic) CO2: Know the importance of nuclear chemistry and its applications CO3: Understand the basic concepts of electroanalytical techniques CO4: Acquire knowledge of experiment conditions and methodology
DSC-II	DC02	Organic Chemistry- IV	CO1: Study the synthesis of natural products, drugs and their nomenclature. CO2: Determine the complex structure of steroids. CO3: Learn retro synthesis to identify the reverse path for the synthesis of target molecule. CO4: Study the classification, function, analysis of carbohydrates, proteins and

			nucleic acids.
DSC-III	DC03	Physical Chemistry- IV	CO1: Understand the semi-conductors CO2: Able to know the concept of activity & selectivity of the catalysis CO3: Understand the kinetic of surface reactions CO4: Students able to know the crosslinking reactions
DSC-IV	DC04	Spectroscopy- IV	CO1: Understand the basic principle interaction between spin and magnetic field, origin of spectral line intensity. CO2: Students able to know Nuclear Quadruple Resonance and Mossbauer spectroscopy.
DSC-I Practical	DC05	Inorganic Chemistry practical-IV	CO1: Able to know the Ore Analysis, of like Haematite & Pyrolusite. CO2: Able to know the Alloy Analysis.
DSC-II Practical	DC06	Organic Chemistry practical-IV	CO1: Able to know the Analysis of Cement (SO ₃). CO2: Determination distant of radioactive element using GM counter (Demonstration).
DSC-III Practical	DC07	Physical Chemistry practical-IV	CO1: To determine the molecular radius of glycerol by viscosity method CO2: To determine the molar refraction of methyl acetate, ethyl acetate, n-hexane and CCl ₄ and hence to calculate the refraction of C, H and Cl atom CO3: To know the Equivalent conductance of infinite dilution of weak electrolyte (CH ₃ COOH) by Kohlrausch's