



RANI CHANNAMMA UNIVERSITY

VIDYASANGAMA, NATIONAL HIGHWAY-04,
BELAGAVI-591156

- **PROGRAMME OUTCOMES(POs)**
- **PROGRAMME SPECIFIC OUTCOMES(PSOs)**
- **COURSE OUTCOMES(COs)**

DEPARTMENT OF CHEMISTRY

(2019-20)

Attainment of Program outcomes

- Able to acquire firm knowledge over fundamental theories, concepts of all branches of Chemistry and able to apply them to societal development and advanced studies.
- Able to work in the pure, interdisciplinary and multidisciplinary areas of chemical sciences and its applications.
- Able to develop analytical thinking and apply the same for the understanding of underlining principles, proposing mechanism, problem solving, identification of chemical species/ composition and arriving to logical conclusion.
- Able to gain knowledge in classical laboratory techniques and be able to use modern instrumentation, so that they can analyze the samples for scientific understanding of day-to-day problems and perform new experiments, obtain experimental data and its interpretation through scientific and chemical principals.
- Able to integrate knowledge learned in Chemistry and chemical sciences to various Industrial needs including production and quality control.
- Able to access, search and use the chemical literature and also able to work on spreading the scientific temper for social, economic, environmental and sustainable development of society.
- Able to apply the theoretical and experimental knowledge of chemistry for solving the local to global issues for the holistic development of mankind and preserve the environment.

Program Specific Outcomes

On successful completion of this Program, students will have the ability to:

- Understand the fundamental knowledge about the basic concepts and applications of chemical and scientific theories.
- Analyze chemical problems and think critically to find the solutions
- Understand and get familiar with various branches of chemistry, such as inorganic, organic, physical, environmental, polymer etc.
- Understand and apply the techniques for the quantitative and qualitative analysis of chemicals in laboratories and in industries.
- Present scientific and technical information resulting from laboratory experimentation in both written and oral formats.
- Work effectively and safely in a laboratory environment.
- Synthesize, isolate, characterize compounds using laboratory equipments and instrumentation techniques.
- Develop problem solving and analytical skills needed for applying chemical concepts
- Apply knowledge to build up small scale industry for developing endogenous product.




CHAIRMAN
DEPARTMENT OF CHEMISTRY
RANI CHANNAMMA UNIVERSITY
VIDYASANGAMA
BELAGAVI-591156

Course outcomes for each Semester and paper wise

Semester	Course Paper	Course Outcomes
Semester-I Revised Syllabus	Course Paper I (Inorganic Chemistry)	After successful completion of the inorganic course, students will be able to 1) apply principles in molecular theory and bonding models to the study of inorganic compounds; 2) describe the chemistry of main group and transition metal elements and their compounds 3) understand and apply the concepts of formation, bonding and structure of transition metal coordination complexes 4) apply the principles of acid base, metal-carbonyl, nitrosyl, nitrogen compounds and their bonding 5) apply the knowledge of quantitative analysis for the determination of metals from ores/alloys.
	Course Paper II (Organic Chemistry)	After successful completion of the organic course, students will be able to 1) identify functional groups and their characteristic reactions and illustrate reaction mechanisms; 2) demonstrate the basic principles of various organic addition and elimination reactions. 3) describe the mechanism, product formation, reaction conditions of various substitution reactions. 4) understand isomerism and stereochemistry of organic molecules and apply that in identifying the molecular structure. 5) understand different purification techniques in organic chemistry like recrystallization, distillation, steam distillation and extraction.
	Course Paper-III (Physical Chemistry)	After successful completion of the physical course, students will be able to 1) understand the studies of classical and quantum mechanical phenomenon and apply the various equations based on suitable principles. 2) understand the applications statistical thermodynamics 3) understanding the concept of electrochemistry, its laws, fundamentals and applications of batteries as storage materials 4) describe the synthesis, characterization of various types polymers 5) apply the principle and handling of pH meter, potentiometer, conductivity meter.
	Course Paper IV (Spectroscopy)	After successful completion of the Spectroscopy course, students will be able to 1) understand the interaction of radiation with matter and demonstrate Raman spectroscopic methods. 2) understand the theoretical aspects and interpretation of IR and UV-vis spectroscopy



Mangal
CHAIRMAN
 DEPARTMENT OF CHEMISTRY
 RANI CHANNAMMA UNIVERSITY
 VIDYASANGAMA
 BELAGAVI-591156

	Course V (Analytical Chemistry)	After successful completion of the Analytical course, students will be able to 1) apply the various data and instrumental analysis and analyzing the various errors, 2) demonstrate various chromatographic methods in the purification of organic molecules 3) apply the separation techniques and thermal methods of analysis to demonstrate various analytical methods 4) Understand the instrumentation and principle of polarography, cyclic voltametry and coulometry
Semester II Revised Syllabus	Course I (Inorganic Chemistry)	After successful completion of the inorganic course, students will be able to 1) understand the point groups of molecules and symmetry considerations for optical activity and dipole moment. 2) demonstrate the mechanism, kinetics and reactivity of coordination complexes of variable geometry 3) describe the solids and their types with various crystallographic systems including defects and alloy systems. 4) understand the fundamental principles of nuclear reactors and applications of radioactivity 5) demonstrate the knowledge of qualitative analysis of inorganic mixtures and synthesis of coordination complexes.
	Course II (Organic Chemistry)	After successful completion of the organic course, students will be able to 1) identify various named organic reactions with various metal catalysts and various types of bond formation 2) understand the oxidation and reduction reactions with various inorganic oxidizing and reducing agents. 3) learn various rearrangement reactions involving nucleophile, electrophile and free radicals. 4) apply the knowledge on various heterocyclic and photochemical conversions. 5) demonstrate the systematic qualitative analysis of binary mixture and various separation techniques
	Course III (Physical Chemistry)	After successful completion of the physical course, students will be able to 1) describe the application of quantum mechanical principles and study of molecules. In order to understand matter at its most fundamental level. 2) explain the properties of a system from the statistical behavior of its components. 3) demonstrate kinetic studies different catalytic, chain parallel and reversible reactions 4) enable the students to acquire proper knowledge about photochemical reactions with mechanism




CHAIRMAN
 DEPARTMENT OF CHEMISTRY
 RANI CHANNAMMA UNIVERSITY
 VIDYASANGAMA
 BELAGAVI-591156

Semester III Old Syllabus		5) demonstrate the kinetic studies of chemical reactions and handling of pH meter, colorimeter.
	Course IV (Spectroscopy-II)	After successful completion of the spectroscopy course, students will be able to 1) analyze the structure of organic molecules, using ^1H , ^{13}C , NMR spectroscopy, and able to solve structural problems. 2) demonstrate the structural determination of organic compounds by mass spectroscopic techniques.
	Course I (Inorganic Chemistry)	After successful completion of the inorganic course, students will be able to 1) to gain the fundamental knowledge about the color and magnetic properties of the complexes 2) demonstrate basic principles, mechanism, stereochemistry and bonding of organometallic compounds and their industrial applications in catalytic reactions. 3) understand of Bioinorganic Chemistry: Use of metals in biological systems, various aspects of coordination chemistry related to bioinorganic research. 4) describe the various functions of metals in biological system, medicinal research and as transport and storage materials. 5) Apply the metal complex theory knowledge in synthesizing, characterizing, estimating metals and anions.
	Course II (Organic Chemistry)	After successful completion of the organic course, students will be able to 1) demonstrate the applications of different reagents in organic synthesis and functional group transformation. 2) understand the fundamental knowledge of photochemistry of some organic molecule properties and synthesis. 3) apply the basic principles of electrocyclic and sigmatropic pathway of stereoselective nature in synthesis of organic molecules. 4) get the insight into selected class of diseases, mode of action, mechanism of infection, SARs studies and targeting molecule synthesis are studied. 5) demonstrate the theoretical knowledge acquired, in the multi step synthesis and estimation of organic molecules
	Course III (Physical Chemistry)	After successful completion of the physical course, students will be able to 1) understand superconductive materials, and how it is crucial to develop new applications for superconductors over semiconductors and its properties. 2) understand the atomic spectra and atomic structure, how some points have been more extensively treated than




CHAIRMAN
 DEPARTMENT OF CHEMISTRY
 RANI CHANNAMMA UNIVERSITY
 VIDYASANGAMA
 BELAGAVI-591156

		<p>others that might appear more important from the point of view of atomic spectra alone.</p> <ol style="list-style-type: none"> 3) appreciate the vibrant role of homogeneous and heterogeneous catalysts in chemical reaction 4) describe new scientific insights provided by in situ experimental and theoretical techniques capable of characterizing surfaces and interfaces under working conditions. 5) demonstrate the functions of refractometer, conductometer and apply computational methods in data processing.
	Course IV (Spectroscopy)	<p>After successful completion of the spectroscopy course, students will be able to</p> <ol style="list-style-type: none"> 1) understand the basic principles of EPR and IR spectroscopy and apply this knowledge in analyzing the spectra of inorganic molecules 2) describe the basic principles of Mossbauer and NQR spectroscopy and apply the acquired knowledge in analyzing the spectra of inorganic molecules
Semester IV Old syllabus	Course I (Inorganic Chemistry)	<p>After successful completion of the inorganic course, students will be able to</p> <ol style="list-style-type: none"> 1) understand the various non-transition cluster molecules, carbenes and chemistry of f-block elements. 2) demonstrate the chemistry of materials which include fuel analysis, fuels, explosives, metal hydrides and carbides and silicone. 3) describe the electrical, conductivity of various solid electrolytes and Li-ion battery. 4) gain the fundamental knowledge on magnetic and optical properties of various metal oxides, alloys, spinels etc. 5) apply the theoretical knowledge gained in analyzing the cement, resins and estimating the metal complexes using spectrophotometric, volumetric and gravimetric methods
	Course II (Organic Chemistry)	<p>After successful completion of the organic course, students will be able to</p> <ol style="list-style-type: none"> 1) demonstrate the design and synthesis of active organic molecules based on retrosynthetic analysis. 2) understand the reactive functional group based temporary protecting groups and structure and functions of bioorganic polymers. 3) get insight into natural products naming and structure functions of alkaloids, terpenes and Antibiotics. 4) understand the fundamental knowledge on natural products of steroids, prostaglandins and vitamins and their classification, IUPAC naming, structure, synthesis and functioning. 5) demonstrate the theoretical knowledge acquired in isolating various organic molecules and use various




CHAIRMAN
 DEPARTMENT OF CHEMISTRY
 RANI CHANNAMMA UNIVERSITY
 VIDYASANGAMA
 BELAGAVI-591155

		instrumental methods to analyze, identify the structure of organic compounds.
	Course III (Physical Chemistry)	<p>After successful completion of the physical course, students will be able to</p> <ol style="list-style-type: none"> 1) understand the fundamental knowledge and significance of on partial molar properties, activity coefficients. 2) demonstrate the basic principles of nanomaterials and applictiaon of various nanomaterials and liquid crystals. 3) describe the chemical kinetics, rate equations of chain reactions, decompositions and polymerization reactions. 4) understand an apply electroplating, corrosion, electrode process in biological and non-biological systems and their industrial applications. 5) demonostrate the kinetic studies on acid and base catalyzed reactions and determining the activation energy, partial molar properties, electroplating and the band gap of semiconductor
	Course IV (Spectroscopy)	<p>After successful completion of the physical course, students will be able to</p> <ol style="list-style-type: none"> 1) understand the basic principles of flame emission spectroscopy, chiroptical spectroscopy and apply the knowledge to illustrate the structures of molecules 2) demonstrate the usage of molecular luminience and photoelectron spectroscopic methods in designing and applying these methods in elucidating the structure of molecules.




CHAIRMAN
 DEPARTMENT OF CHEMISTRY
 RANI CHANNAMMA UNIVERSITY
 VIDYASANGAMA
 BELAGAVI-591156