

**Program Outcomes, Program Specific
Outcomes and Course Outcomes**



DEPARTMENT OF CHEMISTRY

**GOVERNMENT PATALESHWAR COLLEGE,
MASTURI, BILASPUR (C. G.) 495551**

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Naac Accredited “B” Grade

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DEPARTMENT OF CHEMISTRY
PO, PSO, & CO of UG Courses

Program Outcomes

- PO1** : Apply the knowledge and principles of science, arts and commerce to the solution of complex problems.
- PO2** : Devise solutions for intricate problems and plan system components or processes that meet the specified needs with appropriate consideration for the society, health, safety, cultural, societal and environmental considerations.
- PO3** : Use innovation-based knowledge and creative methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO4** : Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.
- PO5** : Comprehend the influence of the proficient clarifications in societal and environmental context for sustainable development.
- PO6** : Pertain ethical principles and entrust to professional ethics and responsibilities.
- PO7** : Function effectively as an individual, and in assorted teams.
- PO8** : Communicate effectively on various activities and make effective presentations.
- PO9** : Exhibit comprehension and understanding of the programmes and apply them in a multidisciplinary environment.
- PO10** : Be familiar with the need for and have the training and skill to engage in self-regulating and life-long learning in the broadest perspective of hi-tech change.

Program Specific Outcomes & Course Outcome

B. Sc.**Program Specific Outcome**

- PSO-1. Gain the knowledge of science through theory and practicals.
- PSO-2. Demonstrate, solve and an understanding of major concepts in all disciplines of science.
- PSO-3. Solve the problem and also think methodically, independently and draw a logical conclusion.
- PSO-4. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of practicals.
- PSO-5. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.
- PSO-6. To inculcate the scientific temperament in the students and outside the scientific community.
- PSO-7. Understand good laboratory practices and safety.
- PSO-8. Develop research oriented skills.
- PSO-9. make aware and handle the sophisticated instruments/equipments.

Course Outcome**Course****Outcome:** After Completion of these courses students should be able to**B. Sc. –I Year****Chemistry***Inorganic Chemistry*

- Know the structure of atom
- Knowledge of periodic properties
- Understand the nature of ionic and covalent bond.
- Study of concept of group relationship and properties of s and p block elements.
- Understand the chemistry of noble gases.
- Theoretical and practical knowledge of qualitative analysis of inorganic salts.

Organic Chemistry

- Knowledge of basic concepts of organic chemistry.
- Study of optical isomerism. Difference between geometrical and optical isomerism.
- Study of conformational analysis of alkanes.
- Chemistry of aliphatic hydrocarbons. Understanding of nature of C-C σ and π bonding.
- Concept of aromaticity.

Physical Chemistry

- Understanding of mathematical concepts for chemist.
- Study of gaseous state.
- Study of liquid state.
- Study of colloids and surface chemistry.
- Study of solid state.
- Knowledge of chemical kinetics, rate of reactions.
- Concept of homogeneous and heterogeneous catalysis.

B. Sc. II Year**Chemistry***Inorganic Chemistry (Paper Code - 0845)*

- Understanding of chemistry of elements of first transition series.
- Study of chemistry of elements of second & third transition series.
- Knowledge of oxidation and reduction. Use of redox potential data analysis of redox cycle.

	<ul style="list-style-type: none"> ➤ To know the Werner's coordination theory and its experimental verification, chelates, nomenclature, isomerism in coordination compounds, valence bond theory of transition metal complexes. ➤ Chemistry of lanthanide and actinides. ➤ Arrhenius, Bronsted-Lowry, the Lux-flood, solvent system and Lewis concepts of acids and bases. ➤ Physical properties, types and general characteristics of non- aqueous solvents.
<p style="text-align: center;"><i>Organic Chemistry(Paper Code - 0846)</i></p>	<ul style="list-style-type: none"> ➤ Knowledge of nomenclature, methods of formation, chemical reactions of Dihydric and Trihydric alcohols. ➤ Understanding of structure, bonding, physical and chemical properties and acidic character of phenols. ➤ Synthesis of epoxides. Catalysed ring opening of epoxides. ➤ Nomenclature, Structure and properties of the carbonyls group. Synthesis of aldehydes and ketones. ➤ Structure and bonding, Physical properties, acidity of carboxylic acids, effects of substituents on acid strength. Hydroxy and Halo-substituted Acids. Structure of acid chlorides, esters, amides and acid anhydrides. ➤ Preparation and Chemical properties of nitroalkanes and nitroarenes. of nitroalkanes. ➤ Reactivity, Structure and nomenclature of amines, physical properties. Stereo- chemistry of amines. Separation of mixture of primary, secondary and tertiary amines. ➤ Understanding of molecular orbital picture and aromatic character of pyrrole, furan, thiophene and pyridine, methods of synthesis and chemical reactions with emphasis on the mechanism of electrophilic substitution. Preparation and reaction of Indole, quinoline and isoquinoline. ➤ To know the classification, Structure and stereochemistry of amino acids. ➤ Structure and nomenclature of peptides. Peptide synthesis, solid - phase peptide synthesis.
<p style="text-align: center;"><i>Physical Chemistry(Paper Code - 0847)</i></p>	<ul style="list-style-type: none"> ➤ Knowledge of fundamental of thermodynamics system, surroundings etc. First Law of Thermodynamics limitation of first law. standard state, Hess's law of heat summation. Enthalpy of reaction at constant pressure and constant volume. ➤ To know the second Law of Thermodynamics, Concept of entropy, Gibbs and Helmholtz free energy variation of G and A with pressure, volume temperature, Gibbs Helmholtz equation. ➤ Gibbs Phase rule Application of phase rule to two component systems and Three component systems,

	<p>Nerst distribution law, Henry's law, application, solvent extraction.</p> <ul style="list-style-type: none"> ➤ Electrolytic Conductance, Theories of strong electrolytes, Migration of ions. ➤ Electrochemical cell or Galvanic cell, Single electrode potential, Concentration cells with & without transport, Determination of pH and pka using hydrogen and quinhydrone electrode potentiometric titrations, buffer solutions; Henderson-Hassel Equation, Hydrolysis of salts, Corrosion : type theories and prevention.
B. Sc. III Year	Chemistry
<i>Inorganic Chemistry(Paper Code-0895)</i>	<ul style="list-style-type: none"> ➤ Knowledge of metal-ligand bonding in transition metal complexes, an elementary idea of crystal field theory. ➤ Study of thermodynamic and kinetic aspects of metal complexes. A brief outline of thermodynamic stability of metal complexes, substitution reactions of square planar complexes. ➤ Knowledge of magnetic properties of transition metal complexes. spin only formula, L-S coupling, correlation of μ_s and μ_{eff}. ➤ Understanding the electronic spectra of Transition Metal Complexes. Orgel-energy level diagram for d1 and d2 states. ➤ To know the definition, nomenclature and classification of organo metallic compounds. Preparation, properties, bonding and applications of alkyls and aryls of Li, Al, Hg, Sn, & Ti. mononuclear carbonyls and nature of bonding in metal carbonyls. ➤ Study of essential and trace elements in biological processes, metalloporphyrins with special reference to hemoglobin and myoglobin. ➤ Classification of acids and bases as hard and soft. Pearson's HSAB concept. ➤ Silicones and phosphazenes as examples of inorganic polymers, nature of bonding in triphosphazenes.
<i>Organic Chemistry(Paper Code-0896)</i>	<ul style="list-style-type: none"> ➤ Study of Organometallic Compounds Organometallic compounds. ➤ Nomenclature, structural features, methods of formation and chemical reactions of thiols, thioethers, sulphonic acids, sulphonamides and sulphaguanidine. ➤ Knowledge of monosaccharides, disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose). ➤ Study of Proteins and Nucleic acids. ➤ Knowledge of Synthetic Polymers. ➤ Knowledge of Synthetic Dyes.

	<ul style="list-style-type: none"> ➤ Basic understanding of Mass spectroscopy, InfraRed Spectroscopy, UV-Visible Spectroscopy and NMR Spectroscopy.
<i>Physical Chemistry(Paper Code-0897)</i>	<ul style="list-style-type: none"> ➤ Basic understanding of quantum mechanics, DeBroglie's idea of matter waves, experimental verification Heisenberg's uncertainty principle, Sinosoidal wave equation, Operators : Hamiltonian operator, angular momentum operator, laplacian operators postulate of quantum mechanics Eigen values, Eigen function. ➤ Quantum mechanical approach of molecular orbit theory; basic idea criteria for forming M.O and A.O, LCAO approximation, calculation of energy levels from wave functions bonding and antibonding wave functions concept of σ, π, σ^*, π^* and orbitals and their characteristics. ➤ Understanding the basic principle of rotationalspectra, Vibrational spectra, Raman Spectra and electronic Spectra. ➤ Study of photo-chemistry, fluorescence, phosphorescence, non-radiative processes (internal conversion, intersystem crossing), quantum yield photosensitized reactions energy transfer processes. ➤ To know the third law of therodynamics. Physical properties and molecular structure. Dipol moment, Magnetic Properties



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