# DR. V. S. KRISHNA GOVT. DEGREE COLLEGE (A)

# VISAKHAPATNAM

## DEPARTMENT OF CHEMISTRY

## COURSE OUTCOMES

**2018 – 2019**

Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE
(AUTONOMOUS)
NODAL RESOURCE CENTRE & AU CENTRE FOR RESEARCH
Maddilapalem, Visakhapatnam – 530013, Andhra Pradesh.
0891-2553262, https://www.drvskrishnagdc.edu.in

# Effective Batch 2016-2019

## SEMESTER- 5

## PAPER-5: INORGANIC, PHYSICAL & ORGANIC CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Students will gain proficiency in the IUPAC nomenclature of coordination compounds. They will be able to explain and apply Werner's theory and Sedgwick's concept of coordination. |
| CO2 | Students will identify and differentiate between structural and stereoisomerism in coordination compounds. They will understand the stereochemistry of complexes with coordination numbers 4 and 6. |
| CO3 | Students will learn about different types of magnetic behavior and how to calculate magnetic moments using the spin-only formula. They will understand the experimental determination of magnetic susceptibility using the Gouy method. |
| CO4 | Students will determine the composition of complexes using Job's method and the mole ratio method. |
| CO5 | Students will be proficient in the nomenclature and classification of nitro hydrocarbons. They will understand the structure and tautomerism of nitroalkanes. Students will learn the preparation methods of nitroalkanes and their reactivity, including halogenations, reactions with nitrous acid, Neff reaction, Mannich reaction, Michael addition, and reduction. |
| CO6 | Students will classify and name aliphatic and aromatic amines, including primary, secondary, tertiary amines, and quaternary ammonium compounds. Students will understand the first law, including internal energy, enthalpy, and heat capacities. |

## SEMESTER- 5

## PAPER-6 : INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Students will differentiate between labile and inert metal complexes. They will understand SN1 and SN2 mechanisms for ligand substitution reactions. Also, Substitution Reactions in Square Planar Complexes |
| CO 2 | Students will learn the biological significance of essential elements like Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn, and Cl. They will understand the structure and functions of key metalloporphyrins, such as hemoglobin, myoglobin, and chlorophyll. |
| CO 3 | Students will define the order and molecularity of reactions.<br>They will derive rate constants for first, second, third, and zero-order reactions and understand their significance. |
| CO 4 | Students will learn about the aromatic character and structures of five-membered ring compounds like furan, thiophene, and pyrrole. |
| CO 5 | Students will provide evidence for cyclic structures of glucose and fructose. They will understand methods for interconversion between different monosaccharides, such as the Kiliani-Fischer method and Ruff degradation. |
| CO 6 | Students will classify amino acids into alpha, beta, and amma categories, and identify natural and essential amino acids. |

## SEMESTER- 6

## PAPER-7C: GREEN CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand the importance of Green chemistry and Green synthesis. |
| CO 2 | Engage in Microwave assisted organic synthesis |
| CO 3 | Demonstrate skills using the alternative green solvents in synthesis. |
| CO 4 | Demonstrate and explain enzymatie catalysis. |
| CO 5 | Analyse alternative sources of energy and carry out green synthesis. |
| CO 6 | Carry out the cheniical method of nanomaterial synthiesis. |

## SEMESTER- 6

## PAPER-8C1: ORGANIC SPECTROSCOPIC TECHNIQUES

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Gain a comprehensive understanding of the principles and theoretical background of NMR, UV, and visible spectroscopy |
| CO 2 | Develop the ability to interpret and analyze spectral data for identifying chemical structures |
| CO 3 | Learn to apply spectroscopic techniques in various fields such as medical diagnostics and reaction kinetics |
| CO 4 | Acquire knowledge of advanced NMR techniques and their practical applications. |
| CO 5 | Develop skills in chemical analysis using electronic spectroscopy and understand the practical implications of Beer-Lambert's law and its deviations |

## SEMESTER- 6

## PAPER-8C2: ADVANCED ORGANIC REACTIONS

| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO 1 | Gain a comprehensive understanding of the principles and mechanisms of organic photochemistry. |
| CO 2 | Learn detailed mechanisms of advanced photochemical reactions, including Norrish cleavages and photoreductions |
| CO 3 | Develop proficiency in the use of protecting groups for alcohols, carboxylic acids, and carbonyl compounds |
| CO 4 | Acquire in-depth knowledge of classical synthetic reactions like the Mannich reaction, Robinson annulation, and the Wittig reaction. |
| CO 5 | Understand and apply new synthetic reactions such as the Baylis-Hillman reaction, olefin metathesis, and various coupling reactions (Heck, Suzuki, Stille, Sonogashira, Click) |

## SEMESTER- 6

## PAPER-8C3: PHARMACEUTICAL AND MEDICINAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO 1 | Develop a comprehensive understanding of key terms and concepts in pharmaceutical and medicinal chemistry. |
| CO 2 | Learn to accurately name and classify drugs based on their chemical structure and therapeutic activity. |
| CO 3 | Gain knowledge of the synthesis and therapeutic activities of various chemotherapeutic, psycho-therapeutic, and pharmacodynamic drugs. |
| CO 4 | Understand the principles of pharmacodynamics and pharmacokinetics and their application in drug development and therapy. |
| CO 5 | Acquire knowledge about the immune system's response to HIV, the replication of retroviruses, and the current strategies for the investigation, prevention, and treatment of AIDS. |

# Effective Batch 2017-2020

## SEMESTER- 3

## PAPER-3: INORGANIC & ORGANIC CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO 1 | To understand the electronic configuration, variable valence, magnetic properties, catalytic properties and ability to form complexes. |
| CO2 | Overview of properties like malleability, ductility, conductivity, etc.Explanation of conductors, semiconductors, and insulators based on band structure. |
| CO3 | Calculation and significance of EAN.Structures of metal carbonyls of vanadium (V), chromium (Cr), manganese (Mn), iron (Fe), cobalt (Co), and nickel (Ni). |
| CO4 | General electronic configuration and specific examples.To diffentiate between Lanthanide and actinides Contraction and Explain its consequences. |
| CO5 | Primary, secondary, and tertiary alcohols.Common and IUPAC naming conventions. Mechanism and application in synthesizing primary alcohols. |
| CO6 | Naming aliphatic and aromatic aldehydes and ketones. Understanding of common names and IUPAC nomenclature. |

## SEMESTER- 4

## PAPER-4: SPECTROSCOPY & PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO 1 | Definition and mathematical expression. Limitations of Beer-Lambert Law. Concepts of transmittance, absorbance, and molar absorptivity. |
| CO 2 | Types of molecular spectra. Energy levels of molecular orbitals (σ, π, η). Selection rules for electronic spectra.<br>Types of electronic transitions in molecules. Effect of conjugation. Concepts of chromophore and auxochrome. |
| CO 3 | Modes of vibrations in diatomic and polyatomic molecules.<br>Characteristic absorption bands of various functional groups. Interpretation of IR spectra for Alkanes, Aromatic compounds, Alcohols, Carbonyls, and Amines (one example each). |
| CO 4 | Nuclear magnetic resonance and its basic principles. Equivalent and non-equivalent protons. Position of NMR signals. Chemical shift, spin-spin splitting, and coupling constants. Applications of NMR with examples: Ethyl bromide, Ethanol, Acetaldehyde, 1,1,2-tribromoethane, Ethyl acetate, Toluene, and Acetophenone. |
| CO 5 | Specific conductance and equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions and Kohlrausch's law. |
| CO 6 | Single electrode potential and sign convention. Reversible and irreversible cells. Nernst Equation. |

## SEMESTER- 5

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| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO3 | Students will learn about different types of magnetic behavior and how to calculate magnetic moments using the spin-only formula. They will understand the experimental determination of magnetic susceptibility using the Gouy method. |
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| CO 4 | Acquire knowledge of advanced NMR techniques and their practical applications. |
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| Learning Outcomes: On Completion of the course, the students will be able to | |
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| CO 1 | Gain a comprehensive understanding of the principles and mechanisms of organic photochemistry. |
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| CO 3 | Develop proficiency in the use of protecting groups for alcohols, carboxylic acids, and carbonyl compounds |
| CO 4 | Acquire in-depth knowledge of classical synthetic reactions like the Mannich reaction, Robinson annulation, and the Wittig reaction. |
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| Learning Outcomes: On Completion of the course, the students will be able to | |
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# Effective Batch 2016-2021

## SEMESTER- 1

## PAPER-1: INORGANIC AND ORGANIC CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Explain the methods of synthesizing diborane and higher boranes. Describe the structural features and bonding in diborane and various higher boranes. |
| CO2 | Classify oxides based on their chemical behavior (acidic, basic, amphoteric, neutral). Distinguish between different types of oxides (simple, mixed, peroxide, superoxide) |
| CO3 | Explore recent advances and innovative uses of lithium and magnesium alkyls in chemical research.Analyze case studies of complex syntheses involving these organometallic compounds, understanding their role in modern chemistry. |
| CO4 | Develop critical thinking skills to analyze and predict the outcomes of various organic reactions. Solve problems related to bond polarization, reactivity, and stability of organic molecules. |
| CO5 | Explain the mechanism of halogen addition to alkenes. Perform and predict the products of halogen addition reactions. |

## SEMESTER – 2

## PAPER- 2 PHYSICAL & GENERAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | To know the elements of symmetry in crystals, Definition of lattice point and space lattice. Description of the unit cell, the smallest repeating unit in the crystal lattice. Overview of Bravais lattices and different crystal systems |
| CO2 | To distinguish between the Deviation of real gases from ideal behavior, Understanding the temperature change of a real gas when it expands or is compressed without any heat exchange with the environment |
| CO3 | To differentiate between the structural states of matter. Understand the unique properties of liquid crystals and their applications. |
| CO4 | Application to ideal solutions where the partial vapor pressure of each component is directly proportional to its mole fraction in the solution.Deviations from Raoult's law due to solute-solvent interactions. |
| CO5 | Overview of colloids and their importance in various fields.Techniques for preparing sols, such as dispersion methods and condensation methods. |
| CO6 | To understand the Wedge, Fischer, Newman, and Saw-Horse formulae for depicting three-dimensional structures of molecules. |

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## SEMESTER- 6

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# VISAKHAPATNAM

## DEPARTMENT OF CHEMISTRY

## COURSE OUTCOMES

### 2019 – 2020

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## PAPER-7B: ENVIRONMENTAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand the environment functions and how it is affected by human activities. |
| CO 2 | Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystem services. |
| CO 3 | Engage in simple and advanced analytical tools used to measure the different types |
| CO 4 | Explain the energy crisis and different aspects of sustainability of pollution. |
| CO 5 | Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life. |

## SEMESTER- 6

## PAPER-8C1: ORGANIC SPECTROSCOPIC TECHNIQUES

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Gain a comprehensive understanding of the principles and theoretical background of NMR, UV, and visible spectroscopy |
| CO 2 | Develop the ability to interpret and analyze spectral data for identifying chemical structures |
| CO 3 | Learn to apply spectroscopic techniques in various fields such as medical diagnostics and reaction kinetics |
| CO 4 | Acquire knowledge of advanced NMR techniques and their practical applications. |
| CO 5 | Develop skills in chemical analysis using electronic spectroscopy and understand the practical implications of Beer-Lambert's law and its deviations |

## SEMESTER- 6

## PAPER-8C2: ADVANCED ORGANIC REACTIONS

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Gain a comprehensive understanding of the principles and mechanisms of organic photochemistry. |
| CO 2 | Learn detailed mechanisms of advanced photochemical reactions, including Norrish cleavages and photoreductions |
| CO 3 | Develop proficiency in the use of protecting groups for alcohols, carboxylic acids, and carbonyl compounds |
| CO 4 | Acquire in-depth knowledge of classical synthetic reactions like the Mannich reaction, Robinson annulation, and the Wittig reaction. |
| CO 5 | Understand and apply new synthetic reactions such as the Baylis-Hillman reaction, olefin metathesis, and various coupling reactions (Heck, Suzuki, Stille, Sonogashira, Click) |

## SEMESTER- 6

## PAPER-8C3: PHARMACEUTICAL AND MEDICINAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Develop a comprehensive understanding of key terms and concepts in pharmaceutical and medicinal chemistry. |
| CO 2 | Learn to accurately name and classify drugs based on their chemical structure and therapeutic activity. |
| CO 3 | Gain knowledge of the synthesis and therapeutic activities of various chemotherapeutic, psycho-therapeutic, and pharmacodynamic drugs. |
| CO 4 | Understand the principles of pharmacodynamics and pharmacokinetics and their application in drug development and therapy. |
| CO 5 | Acquire knowledge about the immune system's response to HIV, the replication of retroviruses, and the current strategies for the investigation, prevention, and treatment of AIDS. |

# DR. V. S. KRISHNA GOVT. DEGREE COLLEGE (A)

# VISAKHAPATNAM

## DEPARTMENT OF CHEMISTRY

## COURSE OUTCOMES

**2020 – 2021**

Dr.V.S.KRISHNA GOVT. DEGREE COLLEGE
(AUTONOMOUS)
NODAL RESOURCE CENTRE & AU CENTRE FOR RESEARCH
Maddilapalem, Visakhapatnam – 530013, Andhra Pradesh.
0891-2553262, https://www.drvskrishnagdc.edu.in

## SEMESTER- 1

## COURSE-1: INORGANIC AND PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understanding the basic concepts of p-block elements |
| CO2 | Understanding the basic concepts of p-block elements, Understand the uses of silicones and interhalogen compounds |
| CO3 | Differentiate solid, liqid and gases in terms of intermolecular Interactions |
| CO4 | Students can able to understand the concept of conductors and insulators |
| CO5 | Classify the differences and similarites between various d block elements and similarity are able to compare and differentiate 4f&5f block elements |
| CO6 | Learn the structures of various types of crystals |
| CO7 | Learn the structures of various types of crystals, Understand the concepts of critical phenomenon and deviations from Ideal behaviour |
| CO8 | Understand the abnormal molecular weights of solutes are connected by using Van't Hoff factor |

## SEMESTER – 2

## COURSE- 2 ORGANIC & GENERAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Illustrating methodologies for the synthesis of alkanes, alkenes and alkynes. Draw the various conformations of alkanes and cycloalkanes and predict the relative stabilities. Describe different types of additions and elimination reactions in unsaturated hydrocarbons. |
| CO2 | Recognise the type of mechanism & intermediates involved in the given organic reaction. Predict the regiospecificity of several alkene addition reactions using Markovnikov's rule. Understand the concept of aromaticity and identifies the aromatic compounds. |
| CO3 | Explain the various electrophilic substitutions in aromatic compounds.Interpret the effect of substituents on orientation and reactivity of benzene.Interpret the effect of substituents on orientation and reactivity of benzene. |
| CO4 | Understand the metal-ligand interactions and reactivity in metal complexes using HSAB.Predict the hybridisation and geometries of the molecule.Define and explain surface- and interfacial phenomena.Write the inter conversions between different molecular representations. |
| CO5 | Know the relation between symmetry and chirality.Calculate the number of optical isomers for the given chiral compound.Assign D/L, R/S, cis-trans or E/Z configuration to the given compound |

## SEMESTER- 3

## COURSE III (ORGANIC & SPECTROSCOPY CHEMISTRY)

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand preparation, properties and reactions of haloalkanes, haloarenes and axygen containing functional groups. |
| CO2 | Use the synthetic chemistry learning this course to do functional group transformations. |
| CO3 | To propose plausible mechanisms for any relevant reaction. |
| CO4 | Understand preparation, properties and reactions of haloalkanes, haloarenes and oxygen containing functional groups. |
| CO5 | Use the synthetic chemistry learning this course to do functional group transformations. To propose plausible mechanisms for any relevant reaction |

## SEMESTER- 4

## COURSE-IV INORGANIC CHEMISTRY, ORGANIC & PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Classify organometallic Compounds based on the C-M bonding types.Explain the preparation and structural aspects of Metal carbonyls.Explain the preparation and structural aspects of Metal carbonyls |
| CO 2 | Explain the structures of glucose and fructose NEZCO, Draw the scheme of reactions for inter conversion of one carbohydrate to another carbohydrate. Classify and explain the physical and chemical properties of amino acids.Explain the structure of protein. |
| CO 3 | Describe the aromatic character, preparation methods, and chemical properties of Furan, Pyrrole, Thiophene, and Pyridine. Explain the concept of quantum efficiency and mechanisms of photochemical reactions. |
| CO 4 | Explains Tautomerism in nitro compound.Explain the basic nature, preparation methods, and chemical properties of amines.Discuss about the laws of absorption of light energy by molecules and the subsequent photo chemical reactions |
| CO 5 | Specific conductance and equivalent conductance. Variation of equivalent conductance with dilution. Migration of ions and Kohlrausch's law. |

## SEMESTER- 4

## COURSE – V: INORGANIC & PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand the concepts of boundary conditions and quantization, probability distribution, most probable values, uncertainty and expectation values |
| CO2 | Application of quantization to spectroscopy |
| CO3 | Various types of spectra and the structure determination. |
| CO4 | Describe and analyze electrochemical cells |

## SEMESTER- 5

## COURSE – 6D: ENVIRONMENTAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand the environment functions and how it is affected by human activities. |
| CO 2 | Acquire chemical knowledge to ensure sustainable use of the world's resources and ecosystems services. |
| CO 3 | Engage in simple and advanced analytical tools used to measure the different types |
| CO 4 | Explain the energy crisis and different aspects of sustainability of pollution. |
| CO 5 | Analyze key ethical challenges concerning biodiversity and understand the moral principles, goals and virtues important for guiding decisions that affect Earth's plant and animal life. |

## SEMESTER- 5

## PAPER-7D: GREEN CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Understand the importance of Green chemistry and Green synthesis. |
| CO 2 | Engage in Microwave assisted organic synthesis |
| CO 3 | Demonstrate skills using alternative green solvents in synthesis. |
| CO 4 | Demonstrate and explain enzymatic catalysis |
| CO 5 | Analyse alternative sources of energy and earry out green synthesis. |
| CO 6 | Carry out the chemical method of nanomaterial synthesis. |

# DR. V. S. KRISHNA GOVT. DEGREE COLLEGE (A)

# VISAKHAPATNAM

## DEPARTMENT OF CHEMISTRY

## COURSE OUTCOMES

**2021 – 2022**

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0891-2553262, https://www.drvskrishnagdc.edu.in

## SEMESTER- 1

## COURSE-1: INORGANIC AND PHYSICAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO1 | Understanding the basic concepts of p-block elements |
| CO2 | Understanding the basic concepts of p-block elements, Understand the uses of silicones and interhalogen compounds |
| CO3 | Differentiate solid, liqid and gases in terms of intermolecular Interactions |
| CO4 | Students can able to understand the concept of conductors and insulators |
| CO5 | Classify the differences and similarites between various d block elements and similarity are able to compare and differentiate 4f&5f block elements |
| CO6 | Learn the structures of various types of crystals |
| CO7 | Learn the structures of various types of crystals, Understand the concepts of critical phenomenon and deviations from Ideal behaviour |
| CO8 | Understand the abnormal molecular weights of solutes are connected by using Van't Hoff factor |

## SEMESTER – 2

## COURSE- 2 ORGANIC & GENERAL CHEMISTRY

| Learning Outcomes: On Completion of the course, the students will be able to | |
|---|---|
| CO 1 | Illustrating methodologies for the synthesis of alkanes, alkenes and alkynes. Draw the various conformations of alkanes and cycloalkanes and predict the relative stabilities. Describe different types of additions and elimination reactions in unsaturated hydrocarbons. |
| CO2 | Recognise the type of mechanism & intermediates involved in the given organic reaction. Predict the regiospecificity of several alkene addition reactions using Markovnikov's rule. Understand the concept of aromaticity and identifies the aromatic compounds. |
| CO3 | Explain the various electrophilic substitutions in aromatic compounds.Interpret the effect of substituents on orientation and reactivity of benzene.Interpret the effect of substituents on orientation and reactivity of benzene. |
| CO4 | Understand the metal-ligand interactions and reactivity in metal complexes using HSAB.Predict the hybridisation and geometries of the molecule.Define and explain surface- and interfacial phenomena.Write the inter conversions between different molecular representations. |
| CO5 | Know the relation between symmetry and chirality.Calculate the number of optical isomers for the given chiral compound.Assign D/L, R/S, cis-trans or E/Z configuration to the given compound |

## SEMESTER- 3

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## SEMESTER- 4

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# VISAKHAPATNAM

## DEPARTMENT OF CHEMISTRY

## COURSE OUTCOMES

**2022 – 2023**

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