



# DANTULURI NARAYANA RAJU COLLEGE

(Autonomous)

BHIMAVARAM, W.G.DIST, ANDHRA PRADESH, INDIA, PIN- 534202.

(Accredited at 'B<sup>++</sup>' level by NAAC)

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

## CHEMISTRY

### SEMESTER-I

#### COURSE – 1 (INORGANIC AND PHYSICAL CHEMISTRY)

CO	COURSE OUTCOMES	LEVEL
CO1	Identify key characteristics of p-block elements.	L1
CO2	Compare and contrast solids, liquids, and gases based on intermolecular forces.	L2
CO3	Utilize gas laws, pH balance, and electrolytic concepts in advanced chemistry applications.	L3
CO4	Explore characteristics of d-block and f-block elements.	L2
CO5	Explain differences in thermal and electrical conductivity of metals.	L2
CO6	Evaluate stability of various oxidation states in metals.	L2

#### COURSE – 2 (ORGANIC AND GENERAL CHEMISTRY)

CO	COURSE OUTCOMES	LEVEL
CO1	Explain the differential behaviour of organic compounds using fundamental concepts.	L2
CO2	Formulate mechanisms for organic reactions by analyzing reactant properties	L4
CO3	Identify mechanisms in key organic reactions like Free Radical Substitution, Electrophilic Addition, and Electrophilic Aromatic Substitution	L2
CO4	Analyze and describe the stereochemical properties of organic compounds and their reactions.	L4
CO5	Understand reaction mechanisms of 1,2 and 1,4 additions in alkenes.	L2



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## COURSE – 3 (ORGANIC CHEMISTRY AND SPECTROSCOPY)

CO	COURSE OUTCOMES	LEVEL
CO1	Explain the differential behaviour of organic compounds using fundamental concepts	L2
CO2	Describe synthesis, properties, and reactions of haloalkanes, haloarenes, and oxygen-containing functional groups.	L3
CO3	Apply synthetic chemistry knowledge to perform functional group transformations. Propose mechanisms for relevant chemical reactions.	L4
CO4	Explore the reactivity differences in alkyl, allyl, benzyl, and aryl halides	L3
CO5	Spectroscopy to analyze simple organic molecules.	L4

## COURSE – 4 ( INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY)

CO	COURSE OUTCOMES	LEVEL
CO1	Explain the laws of light energy absorption and subsequent photochemical reactions.	L2
CO2	Analyze quantum efficiency and photochemical reaction mechanisms.	L1
CO3	Describe inter conversions between aldoses and ketoses	L2
CO4	Differentiate between fluorescence and phosphorescence.	L2
CO5	Interpret the first and second laws of thermodynamics.	L2

## COURSE – 5 (INORGANIC AND PHYSICAL CHEMISTRY)

CO	COURSE OUTCOMES	LEVEL
CO1	Interpret concepts of boundary conditions, quantization, probability distributions, and expectation values	L2
CO2	Apply quantization principles to spectroscopic techniques	L3
CO3	Identify various spectral types and their applications in structural determination	L3
CO4	Explain the theories underlying the trans effect	L2
CO5	Compare the Job and mole-ratio methods in chemical analysis.	L2
CO6	Outline the components and significance of phase diagrams	L2



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## COURSE – 6 (ENVIRONMENT CHEMISTRY)

CO	COURSE OUTCOMES	LEVEL
CO1	Interpret how human activities impact environmental functions.	L2
CO2	Apply chemical knowledge to promote sustainable resource and ecosystem services use	L3
CO3	Utilize analytical tools to assess various types of environmental pollution	L3
CO4	Discuss the implications of the energy crisis and various sustainability aspects.	L2
CO5	Evaluate ethical dilemmas related to biodiversity and apply moral principles to decision-making affecting Earth's biota	L4

## COURSE – 7 (GREEN CHEMISTRY AND NANO TECHNOLOGY)

CO	COURSE OUTCOMES	LEVEL
CO1	Comprehend the significance of Green chemistry and Green synthesis	L2
CO2	Participate in Microwave assisted organic synthesis	L3
CO3	Demonstrate proficiency with alternative green solvents in synthesis	L3
CO4	Explain the principles and applications of enzymatic catalysis	L3
CO5	Investigate alternative energy sources and perform green synthesis.	L4
CO6	Execute nano material synthesis via chemical methods	L3

## COURSE -1 ANALYSIS OF SALT MIXTURELAB

CO	COURSE OUTCOMES	LEVEL
CO1	Understand the basic concepts of qualitative analysis of inorganic mixture	L2
CO2	Use glassware, equipment, and chemicals, and follow experimental procedures in the laboratory	L3
CO3	Apply the concepts of common ion effect, solubility product, and concepts related to qualitative analysis	L3



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## COURSE – 2 VOLUMETRIC ANALYSIS LAB

CO	COURSE OUTCOMES	LEVEL
CO1	Use glassware, equipment, and chemicals and follow experimental procedures in the laboratory	L3
CO2	Understand and explain the volumetric analysis based on fundamental concepts learned in ionic equilibria	L2
CO3	Learn and identify the concepts of standard solutions, primary, and secondary standards	L1
CO4	Facilitate the learner to make solutions of various molar concentrations	L4

## COURSE – 3 ORGANIC PREPARATIONS AND IR SPECTRAL ANALYSIS LAB

CO	COURSE OUTCOMES	LEVEL
CO1	How to use glassware, equipment, and chemicals and follow experimental procedures in the laboratory	L3
CO2	How to calculate limiting reagent, theoretical yield, and percent yield	L3
CO3	How to engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately	L3
CO4	How to dispose of chemicals in a safe and responsible manner	L3
CO5	How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration	L3
CO6	How to create and carry out workup and separation procedures	L6
CO7	How to critically evaluate data collected to determine the identity, purity, and percent yield of products and to summarize findings in writing in a clear and concise manner.	L5



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## COURSE – 4 ORGANIC QUALITATIVE ANALYSIS LAB

CO	COURSE OUTCOMES	LEVEL
CO1	Use glassware, equipment, and chemicals and follow experimental procedures in the laboratory	L3
CO2	Determine melting and boiling points of organic compounds	L4
CO3	Understand the application of concepts of different organic reactions studied in the theory part of organic chemistry	L2

## COURSE – 5 COURSE CONDUCTOMETRIC AND POTENTIOMETRIC TITRIMETRY LAB

CO	COURSE OUTCOMES	LEVEL
CO1	Use glassware, equipment, and chemicals and follow experimental procedures in the laboratory	L3
CO2	Apply concepts of electrochemistry in experiments	L3
CO3	Be familiar with electroanalytical methods and techniques in analytical chemistry which study an analyte by measuring the potential (volts) and/or current (amperes) in an electrochemical cell containing the analyte.	L2

## COURSE – 6D ENVIRONMENTAL CHEMISTRY LAB

CO	COURSE OUTCOMES	LEVEL
CO1	List out, identify, and handle various equipment in Chemistry lab	L1
CO2	Learn the procedures of preparation of standard solutions	L2
CO3	Demonstrate skills in operating instruments	L3
CO4	Acquire skills in handling spectrophotometer	L3
CO5	Analyse water and soil samples	L4



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## COURSE – 7D GREEN CHEMISTRY LAB

CO	COURSE OUTCOMES	LEVEL
CO1	Identification of various equipment in the laboratory	L1
CO2	Acetylation of 10 amine by green method: Preparation of acetanilide	L3
CO3	Rearrangement reaction in green conditions: Benzil - Benzilic acid rearrangement	L3
CO4	Radical coupling reaction: Preparation of 1,1-bis-2-naphthol	L3
CO5	Green oxidation reaction: Synthesis of adipic acid	L3
CO6	Preparation and characterization of biodiesel from vegetable oil/waste cooking oil	L3
CO7	Preparation and characterization of Nanoparticles of gold using tea leaves	L3
CO8	Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide	L3
CO9	Photo reduction of Benzophenone to Benzopinacol in the presence of sunlight.	L3