SR University,Warangal

PhD Entrance Syllabus

Structure of the PhD Entrance Test (100 Marks)
Section A: Aptitude and Reasoning – Common to all candidates (50 Marks)
Section B: Subject-Specific (Chemistry) (50 Marks)

Section A: APTITUDE & REASONING (Common to ALL)

Unit–1: Verbal Reasoning

Navigating Directions and Mastering Distances, Blood Relations, Logical Puzzles and Problem Solving- Floor Based, Month and Year Based. Seating Arrangements - Circular, Linear, Decoding the Code- Letter Coding, Number Coding, Letter and Number Coding.

Unit-2: Number System

Mastering Quick Calculations, BODMAS Simplified, Exploring Numbers and Division Rule, Unit Digits Decoded, Unlocking Divisibility and Counting Zeroes, "Mastering LCM and HCF: Foundations of Factorization, Uncovering Factors, Exploring Remainders.

Unit-3: Arithmetic Ability-1

Percentages - Fraction, Decimal, Percentage Change, Concept of 'By' and 'To', Product Constancy, All About Averages, Profit & Loss Essentials, Articles, False Weight, and Discount Insights - Discount, Simple Interest: Calculations and Applications, Compound Interest: Calculations and Applications, Relationship between SI and CI.

Unit–4: Arithmetic Ability-2

Ratio, Proportion, Partnership, Problems on Ages, Time and Work - Concept of Efficiency, Smart Work with Time and work, Negative Work, Chain Rule, Pipes and Cisterns, Time, Speed & Distance, Problems based on Trains, Problems based on Boats and Streams.

Unit-5: Critical Reasoning

Analogy and Classification, Sequence and Series Logic, Syllogisms - Types of statements, Venn diagrams using statements, Method to solve problems Two Statements and Two Conclusions, EITHER-OR Conclusions, Four Statements and Two Conclusions.

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Section: B **Chemistry Syllabus for Ph.D. Admission Eligibility Test** (any 5 modules)

Module I: Chemical Kinetics. Empirical rate laws, order of reactions, Arrhenius equation, collision and transition state theory, catalysis - homogeneous and heterogeneous, enzyme catalysis and kinetic isotope effects

Module II: Thermodynamics. Classical and chemical thermodynamics, laws of thermodynamics, thermodynamic potentials, phase equilibria and phase diagrams, chemical equilibria, basics of statistical thermodynamics

Module III: Quantum Chemistry. Basic principles of quantum mechanics, Schrödinger equation and hydrogen atom, angular momentum, quantum numbers, shapes of orbitals and electronic configurations, hydrogen atom spectra, variational and perturbational methods

Module IV: Spectroscopy. Principles and applications of spectroscopic techniques including UV-Vis, IR, Raman, NMR, ESR, MS, Mössbauer, NQR, and EPR, rotational, vibrational, and electronic spectra, spectroscopy for organic, inorganic, and coordination compounds

Module V: Electrochemistry. Electrochemical cells and Nernst equation, electrode kinetics and double-layer theory, Debye-Hückel theory, surface chemistry, adsorption isotherms, colloids and electrokinetic phenomena

Module VI: Inorganic and Coordination Chemistry. Periodic properties and main group chemistry, transition metals and coordination compounds, bonding theories - crystal field, ligand fieldand MO, magnetic and spectral properties, reaction mechanisms in coordination chemistry, bioinorganic chemistry

Module VII: Chemical Bonding. Chemical bonding theories: MO, VB, and hybridization, VSEPR, molecular shape predictions, bond parameters, spectroscopic implications

Module VIII: Organic Structure, Reactivity, and Mechanisms. IUPAC nomenclature, isomerism and stereochemistry, reactive intermediates, mechanism - substitution, addition and elimination reactions, pericyclic reactions and aromaticity, name reactions and synthetic strategies

Module IX: Organic Synthesis and Natural Products. Oxidation and reduction, reagents in synthesis, selectivity in organic synthesis, protecting groups and retrosynthesis, chemistry of natural products

Module X: Interdisciplinary and Applied Chemistry. Nanotechnology, green chemistry, supramolecular chemistry, medicinal chemistry, environmental chemistry, analytical chemistry and separation techniques