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 (Mathematics) (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 Mathematics Syllabus for Ph.D. Admission Test

UNIT1: Analysis: Elementary set theory, countable and uncountable sets, Sequences and series, convergence, Continuity, differentiability, uniform continuity, mean value theorem, functions of bounded variation, Sequences and series of functions, uniform convergence, Riemann sums, ImproperIntegrals, Lebesgue measure, Functions of several variables, directional derivative, Metric spaces, compactness, connectedness, Algebra of complex numbers, complex plane, Powerseries, Analyticfunctions,CR-equations,Contourintegral,Cauchy's theorem,Cauchy'sintegral formula,Liouville's theorem,Maximum modulus principle,Taylor's and Laurent'zseries, residues, Conformal mappings, Mobius transformations.

UNIT2: Algebra: Algebra of matrices, rank of matrices, linear system of equations, Eigenvalues and Eigen vectors, Cayley-Hamilton theorem, Vector spaces, subspaces, basis, dimension, Matrix representation of linear transformations, Change of basis, canonical forms, diagonalisation, Inner product spaces, Quadratic forms and its classification, Pigeon-hole principle, inclusion-exclusion principle, divisibility in Z, Euler's Ø-function, congruences, Chinese Remainder Theorem, primitive roots, Groups, subgroups, normal subgroups, homomorphisms, cyclic groups, Cayley's theorem, class equations, Sylow theorems, Rings, ideals, unique factorization domain, principal ideal domain, Euclidean domain, Polynomial rings and irreducibility criteria, Finite and infinite Fields.

UNIT3: Differential Equations: Existence and Uniqueness of solutions of initial value problems for first ODE, singular solutions, system of first order ODE, General theory of homogenous and non-homogeneous linear ODEs of higher order, variation of parameter Method, Sturm-Liouville boundary value problem, Green's function, LagrangeandCharpitmethodsforsolvingfirstorder PDEs, Cauchy problem for first order PDEs, Classification of second order PDEs, General solution of higher order PDEs with constant coefficients, Method of separation of variables for Heat, Wave, and Laplace equations.

UNIT4: Numerical Analysis: Numerical solutions of algebraic equations, Method of iteration and Newton- Raphson method, Rate of convergence, GausseliminationandGauss-Seidelmethods, Finitedifferences, Lagrange, Hermite and spline interpolation, Numerical differentiation and integration, Numerical solutions of ODEs using Picard, Euler, modified Euler and Runge- Kutta methods.

UNIT5: Probability Theory: Sample space, Events, algebra of events, conditional probability, independent events, Baye's theorem, Random Variable and Probability distributions, Mean and Variance, Binomial, Poisson, and Normal distributions.