

Ph.D. Entrance Syllabus for Engineering

Quantitative Aptitude

Bar graphs, pie charts, tables, 2D & 3D plots, maps, Numerical Computation - Ratios, percentages, exponents, logarithms, Combinatorics - Permutations and combinations, number series, Mensuration & Geometry - Areas, volumes, surface area of 2D and 3D shapes

Analytical and Spatial Aptitude

Logical Reasoning - Deduction, induction, analogy, numerical relations, Spatial Aptitude - Shape transformations (translation, rotation, mirroring), paper folding, assembling/disassembling of 3D structures

Linear Algebra & Probability

Matrices - Algebra of matrices, rank, determinants, LU decomposition, Linear Equations - Solutions of linear systems, eigenvalues, eigenvectors, Probability - Axioms, conditional probability, Bayes' theorem, independence

Statistics and Data Analysis

Descriptive Statistics - Mean, median, mode, standard deviation, variance, skewness, kurtosis, Inferential Statistics - Hypothesis testing (z, t, chi-squared), confidence intervals, Data Visualization - Scatter, box, bar, pie, and line plots, Result Interpretation.

Electrical and Electronics

Electrical quantities, Ohm's law, Kirchoff's laws, passive and active components, circuits, series and parallel connections, logic gates.

Programming and Logic

Flowcharts and algorithmic thinking, Programming, Variables, data types, loops, conditions, Number systems, Binary, decimal, hexadecimal, Basic problem-solving and logic development.

Mechanical Systems & Machines

Machines, levers, pulleys, gears, cams, laws of motion, force, work, power, and energy, Metals, polymers, composites, SI and CI engines concepts, Manufacturing processes - Casting, machining, welding.

Control, Automation & Modern Engineering Applications

Feedback, open-loop & closed-loop, sensors and actuators, microcontrollers, mechatronics systems, embedded systems, electric vehicles, computers in automation, AI/ML in modern systems.

Operating Systems: Process management, memory management, file systems, and concurrency control

Computer Networks: Network fundamentals, protocols, and architectures

Data Structures and Algorithms: Analysis and design of algorithms, data structures, and software design patterns

Computer Architecture: Processor design, memory hierarchy, and parallel processing

Digital Logic Design: Combinational and sequential circuits, digital logic families, and memory devices

Software Engineering: Software design, development, testing, and maintenance

Security and Hacking techniques