**Mathematical Techniques**

**Linear Algebra**

* Calculus
* Continuity and Differentiability
* Mean value Theorems
* Evaluation of Definite and Improper Integrals
* Surface and Volume Integrals
* Gauss and Green’s Theorems

**Differential equations**

* Higher Order Linear Differential Equations with Constant Coefficients
* Laplace and Fourier Transforms
* Solutions of one Dimensional Diffusion
* Wave Equations
* Laplace Equation

**Complex variables**

* Cauchy’s Integral Theorem
* Residue Theorem
* Analytic Functions
* Taylor and Laurent Series

**Probability and Statistics**

* Definitions of Probability and Sampling Theorems
* Normal and Binomial Distributions

**Numerical Methods**

* Finite Differences
* Numerical Integration
* Numerical Solutions of Linear and Non-Linear Algebraic Equations

**Computer Science and Engineering**

**Data Structures**

* Advanced Sorting Methods
* Algorithm Design Paradigms
* Complexity of Algorithm
* Depth-first and Breadth-first Algorithms
* Kinetic Data Structures

**Algorithms**

* Asymptotic analysis
* Asymptotic notation
* Basic concepts of complexity classes
* Connected components
* Dynamic programming
* Notions of space and time complexity
* Tree and graph traversals
* Worst and average case analysis
* Computational Geometry
* Growth of Functions
* Heuristic Methods

**Computation Theory**

* Regular Languages and Finite Automata
* Languages and Pushdown Automata
* Recursively Enumerable sets and Turing Machines

**Operating Systems**

* Agreement Protocols for handling Processor Failures
* Comparative Performance Analysis
* Distributed Mutual Exclusion
* Distributed Operating Systems
* Local and Global states
* Process Deadlocks
* Resource Models
* Synchronization Mechanisms
* Coordination of Processes and related Algorithms
* Failure Handling and Recovery Mechanisms
* Multiprocessor Operating Systems and related Thread Handlings
* Token and Non-token based Algorithms

**Database Systems**

* Database design
* Indexing and Hashing
* Relational model
* Storage and File Structures
* Extended Relational Model
* Mobile Databases and Web-enabled Database Systems
* Transactions and Concurrency control

**Computer Organization and Architecture**

* Cache and main memory
* CPU control design
* Design and synthesis of combinational and sequential circuits
* Instruction pipelining
* Machine instructions and addressing modes
* Number representation and computer arithmetic
* Secondary storage
* Structured Memory Design for Parallel Systems

**Software Engineering**

* Team Software Process
* Systems Modeling Language
* Requirement and feasibility analysis
* Process Models- Iterative
* Planning and managing the project
* Personal Software Process
* Domain specific modeling
* Software architecture and design patterns
* Software reliability and Advanced testing techniques
* Aspect oriented programming

**Computer Networks**

* LAN technologies
* Application layer protocols
* Flow and error control techniques
* Introduction to intelligent networking
* Performance analysis of networks

Source: <http://entrance-exam.net/syllabus-for-phd-in-computer-science-entrance-exam/#ixzz54UhsbDTn>