

All candidates will be tested on the foundational aspects of computer science, its core subjects, programming ability, and specific topics related to the intended areas of interest.

The foundational topics belongs to the following subjects (GATE level): Data Structures, Algorithms (including Graphs), Discrete Mathematics, Probability, Databases, Operating System, Computer Networks.

The students will also tested for their programming ability. Every student is expected to be able to write simple 50-line programs (for example, performing linear algebraic operations on a matrix, implementing sorting algorithms, solving string-based problems).

Apart from the above, students may be asked advanced questions based on the areas that they show interest in. The area-wise topics are listed below.

Area of interest	Additional topics based on the area of interest
Distributed Computing	OS, Computer Architecture, C/C++ Programming
Machine Learning	Statistics (A/B testing, distributions), Machine Learning (overfitting / underfitting, linear & logistic regression, decision trees)
Algorithms, Theoretical Computer Science	Specific topics in algorithms: Divide and conquer, dynamic programming, basic graph algorithms. Specific topics in basic discrete maths: Recurrence, induction, relations and functions, permutations and combinations including counting techniques, graph theory. Specific topics in mathematics: Topics usually covered during XI-XII & UG curriculum, including probability, linear algebra, algebra, calculus. Specific topics in formal language and automata theory: Regular languages, finite automata, context free languages, context free grammar.
Computer Networks	Basic network utilities like ping, traceroute, ssh, etc., Computer networks (networking stack (TCP/IP), networking protocols, routing algorithms, congestion control, networking delays, etc), OS (processes/threads, multithreading, scheduling, etc), DSA (time/space complexity, etc), DBMS (serializability, fault tolerance, etc.)
Human-Computer Interaction	Statistics, Programming - mobile/web systems (publisher-subscriber model, etc.), concepts related to design thinking, qualitative research methods
Speech and Audio Processing,	Fourier Transform, Signals and systems or DSP basics, NLP (n-gram language models), ML & DL basics / Speech (MFCC, GMMs)
Machine learning	Linear Algebra, Statistics, programming in C/C++
Computer Graphics	Linear algebra, Computer graphics, Computational geometry, C/C++ programming
Databases and Data Science	Linear Algebra, Statistics, DBMS (serializability, fault tolerance, etc.)
Natural Language Processing	NLP (n-gram language models), ML & DL basics / Speech (MFCC, GMMs)
Program analysis	Compilers, Programming ability in C/C++/Java
Multimedia and Computer Vision	Linear Algebra, Image Processing, Machine Learning basics (overfitting/underfitting), Deep Learning basics (CNNs)
Cybersecurity, Privacy and Anonymity	Computer Networks, operating systems, C/C++ programming