

**Structure & Syllabus of Post Graduate Computer Science &
Engineering Admission Test (PGCAT-IIITD) for Ph.D. CSE
Department Only.**

PGCAT-IIITD (Part-I)

PGCAT-IIITD (Part-I) will be online PAN- India in multiple cities-

- There will be 40 Multiple Choice Questions based on the syllabus of the GATE “CS” paper, with a detailed syllabus as available here. There will be four sections in PGCAT-
 - Section 1: Engineering Mathematics.
 - Section 2: Programming and Data Structures.
 - Section 3: Algorithms.
 - Section 4: Remaining topics.
- The duration of PGCAT-IIITD (Part-I) will be 02 hours.
- There will be a 20% negative marking for every wrong answer.

PGCAT-IIITD (Part-II)

- PGCAT-IIITD (Part-II) will consist of a Programming Test with language options as C/C++/Java/Python.
- The duration of PGCAT-IIITD (Part-II) will be 40 minutes.

Ph.D. CSE interview syllabus

Apart from the PGCAT, students may be asked advanced questions (based on the areas that they show interest in) during the **Ph.D. interviews as scheduled for 2nd and 3rd May 2024**. 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, Graph Theory, Computational Geometry, Quantum Computing	Specific topics in algorithms and data structures: Basics of algorithms including sorting, searching, Knowledge of Binary Search Tree, Stacks, Queues, Linked List, 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,	Linear Algebra, Signals and systems or DSP basics, Fourier Transform, ML or DL basics, Speech (Linear Prediction, MFCC, GMMs), NLP basics.
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	Language	NLP (n-gram language models), ML & DL basics / Speech (MFCC, GMMs)
Program Compilers	analysis,	Compilers, Programming ability in C/C++/Java, Data structures and algorithms
Multimedia and Computer Vision	and	Linear Algebra, Image Processing, Machine Learning basics (overfitting/underfitting), Deep Learning basics (CNNs)
Cybersecurity, and Anonymity	Privacy	Good knowledge of computer networks and/or operating systems with strong C/C++/Python programming abilities.
Operating System		Basics of processes and threads, inter process communication mechanisms, process scheduling, synchronization and race conditions, memory management, interrupts and system calls, programming in UNIX environment is preferred.
Autonomous Driving		C/C++ programming, Data Structures & Algorithms, Probability & Statistics, Linear Algebra