Sardar Vallabhbhai National Institute of Technology, Surat
Department of Computer Science Engineering
PhD Comprehensive Examination Syllabus

The examination is aimed at testing the analytical ability and depth of knowledge in fundamental subjects of CSE and area of specialization. Students are required to show depth of understanding by passing a comprehensive written exam. The problem-solving questions will be there in an exam of duration of 3 Hours. The question paper will be of 150 marks; out of which student will have to attempt for 100 marks. Students are required to obtain 60% marks in written test and 60% in the viva-voce examination for qualifying. The exam will be conducted during 3rd week of January and July respectively.

The syllabus of comprehensive exam consists of core subjects and subtopics described below:

Sr. No.	Subjects	Marks
	Fundamental Subject	
1	Data Structures	50
2	Algorithms	50
	Area Specific Subject	
3	Research area specific	50
	Total	**150**

Syllabus for the Comprehensive Exam for PhD

Sr.No.	Fundamental Subjects	Subtopics
1	Data Structures	Linear and Nonlinear data structures: Stack, Queue, Linked list, Graphs Algorithms, Binary Trees: Traversal, Heap.
2	Algorithms	Algorithm design techniques: Greedy, Divide and Conquer, Dynamic programming, NP Theory, Complexity Analysis.
	Area Specific Subject	
3	Research area specific topic	Topic content will be announced in advance depending upon the area of research specialization of a student, for example, candidate's area of research is information security then Research area specific topic will be Information Security.

Reference Text Books:

1. Tremblay, Sorenson, "An Introduction to Data Structures with Applications", 2/E, TMH, 1991
2. Cormen, Leiserson, and Rivest, Stein: "Introduction to Algorithms", 3/E, the MIT Press, 2009

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Research area specific topics

The following is the syllabus for PhD comprehensive examination to be held in the month of August 2023.

Sr. No.	Research area specific topics	Content
1	Information Security	Security Attributes, Mechanisms, Attacks. Types of Encryption Mechanisms, Authentication Mechanisms, Access Control Techniques, Designing a Security Protocol, Security Protocols in TCP/IP Protocol Stack. Design of AES, Galois fields and the related mathematics. Types of Privacy and Mechanisms.
2	Image Processing	Image Enhancement, Histogram, Image Filters, Image Transforms: DCT and Fourier Transform, Frequency and Time domain processing, Image Morphological operators
3	Distributed Computing	Scheduling algorithms, Synchronization techniques, Distributed shared memory, Agreement protocols, Deadlock handling mechanisms, Fault tolerance mechanisms.
4	Database Management System	Integrity Constrains and Normalization Theory, Indexing and Hashing mechanisms, Query processing and optimization, Concurrency control protocols, Transaction and recovery
5	Data Mining	Data Pre-processing, Classification, Clustering, Association Rule Mining, Multimedia Data Mining