



**Sabarmati University, Ahmedabad
DEPARTMENT OF RESEARCH AND DEVELOPMENT**

Ph.D. PROGRAMME

Ph.D. ENTRANCE TEST (REAT) SYLLABUS DECEMBER, 2025
SUBJECT: COMPUTER SCIENCE
(SECTION- B)

UNIT–I: Discrete Mathematics & Mathematical Foundations

Mathematical logic, propositional logic, predicate logic, normal forms, sets, relations, functions, partial ordering, lattices, Boolean algebra, graph theory, trees, connectivity, planar graphs, combinatorics, permutations, combinations, recurrence relations, probability theory, random variables, linear algebra, matrices, vector spaces, eigenvalues.

UNIT–II: Data Structures, Algorithms & Theory of Computation

Arrays, stacks, queues, linked lists, trees, graphs, searching techniques, sorting techniques, hashing, collision resolution, algorithm design techniques, divide and conquer, greedy method, dynamic programming, time complexity, space complexity, NP-completeness, finite automata, regular expressions, context-free grammars, pushdown automata, Turing machines, decidability, computability.

UNIT–III: Computer Architecture, Operating Systems & Computer Networks

Computer organization, instruction cycle, memory hierarchy, cache memory, pipelining, RISC architecture, CISC architecture, process management, CPU scheduling, deadlocks, memory management, virtual memory, file systems, OSI model, TCP/IP model, LAN, MAN, WAN, routing algorithms, congestion control, network security basics.

UNIT–IV: Databases, Software Engineering & Web Technologies

DBMS concepts, ER model, relational model, SQL, normalization, transaction management, concurrency control, data warehousing, data mining basics, software development life cycle, software design, software testing, software maintenance, HTML, CSS, JavaScript, web services, cloud computing fundamentals.

UNIT–V: Artificial Intelligence, Machine Learning & Research Trends

Artificial intelligence concepts, problem solving, search algorithms, breadth first search, depth first search, best first search, A* algorithm, AO* algorithm, hill climbing, knowledge representation, reasoning, machine learning basics, supervised learning, unsupervised learning, perceptron learning algorithm, neural networks basics, natural language processing basics, data science overview, big data concepts, cyber security, blockchain technology, research methodology, recent trends in computer science.