adani University

Department of Doctoral Studies

Syllabus for Adani University Research Entrance Test (ARET)

Computer Science and Engineering

Faculty of Engineering Sciences and Technology

1. Mathematical Logic, Sets and Relations, Mathematical Induction and Discrete Probability, Permutations and Combinations, Probability, Bayes' Theorem, Groups, Isomorphism, Graph Theory, Boolean Algebra, Linear Programming.
2. Computer System Organization, Digital Logic, Gates, Digital Circuits, Decoders, Multiplexers, Registers and Counters, Number Systems, Registers Transfer, Arithmetic and Logic Operations, Instruction Cycle, Assembly language Mnemonics, Instruction Set Design, Parallel Processing, Pipeline Processing, Vector Processing, Memory Hierarchy, Cache Design, I/O Design
3. Programming Paradigms, Languages and their Constructs - C, C++, Object-Oriented Programming, Web Programming Languages, Java
4. Data Structures, Recursion. Arrays, Stacks, Queues, Linked Lists, Trees, Binary Search Trees, Binary Heaps, Graphs, Searching, Sorting, Hashing. Asymptotic Worst-Case Time and Space Complexity. Algorithm Design Techniques
5. Databases, Data Modeling - Schema and ER Diagrams, Views, Characteristics of DB, SQL, Canonical Forms, Normalization, Transaction Processing, Concurrency
6. Regular Expressions and Finite Automata. Context-Free Grammars and Push-Down Automata. Regular and Context-Free Languages, Pumping Lemma. Turing Machines and Undecidability, Lexical Analysis, Parsing, Syntax-Directed Translation, Compilers
7. System Calls, Processes, Threads, Inter-Process Communication, Concurrency and Synchronization. Deadlock. CPU and I/O Scheduling. Memory Management and Virtual Memory. File Systems
8. Concepts of Networking, Protocols and Standards, Switching, Error Detection and Correction, Routing Algorithms and Protocols, Layers and their Services, Wireless Protocols
9. AI and ML Fundamentals, Logic, Propositional, Predicate, Supervised Learning, Regression and Classification Problems, Unsupervised Learning, Search, Reasoning under Uncertainty

Signature of HoD