adani University

Department of Doctoral Studies

Syllabus for Adani University Research Entrance Test (ARET)

Department of Information and Communication Technology

Faculty of Engineering Sciences and Technology

Data Structures and Algorithms: Asymptotic worst-case time and space complexity, Recursion, Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs. Divide and Conquer: General method, Binary search, Maximum and Minimum, Merge sort, Quick sort, Selection sort, Strassen's Matrix multiplication

Operating System: Processes, threads, inter-process communication, concurrency, and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems. Database: ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms.

Microprocessor & Microcontroller: 8-bit microprocessor (8085): architecture, programming, memory and I/O interfacing, Schematic and Pin diagrams, Pin functions, Bus Organization, Programming model of 8051.

Signals & Systems: Sampling theorem and its applications, Interpolation of discrete-time signals, LTI systems and properties, causality, Discrete-time signals: discrete-time Fourier transform (DTFT), DFT, FFT, Fourier series and Fourier transform representations, Z-transform.

Analog & Digital Communication: Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, circuits. Information theory: entropy, mutual information, and channel Information & Communication Technology & capacity theorem; Digital communications: PCM, ASK, PSK, FSK, QAM, matched filter receiver, Fundamentals of error correction, Basics of TDMA, FDMA and CDMA

Digital Logic: Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Architecture and Organization: Machine instructions and addressing modes. ALU, data- path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory, and secondary storage; I/O interface (interrupt and DMA mode).

Wireless Sensor Network: Introduction to sensor networks: Key definitions of sensor networks, sensor network architecture, unique constraints and challenges, advantages of sensor network, driving applications, issues in design of sensor network, data dissemination and gathering, MAC protocols for sensor network, location discovery

9/10/24

Signature of HoD/Dean