SARDAR PATEL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER ENGINEERING
Written Test Syllabus for Assistant Professor in Computer Engineering

(Year 2016)

1. **Discrete Mathematics:** Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatory :counting, recurrence relations, generating functions.

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

3. **Computer Organisation and Architecture:** 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).

4. **Data Structures:** Programming and Data Structures Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

5. **Algorithms and Complexity:** Algorithms Searching, sorting, hashing. Asymptotic ,worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

6. **Theory of Computer Science:** Theory of Computation Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex-free languages, pumping lemma. Turing machines and undecidability.

7. **System Programing & Compiler Construction:** Compiler Design Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

8. **Operating Systems:** Operating System Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

9. **Database Systems:** Databases ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

10. **Computer Networks:** Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

SARDAR PATEL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING
Written Test Syllabus for Assistant Professor in Electronics and Telecommunication

(Year 2016)

Analog Communication

Amplitude Modulation and Demodulation, DSBFC, DSB suppressed carrier, Single Side Band (SSB), Angle Modulation and Demodulation, Radio Receivers, Pulse Modulation and Demodulation

Signals & Systems

Types of signals and systems, Time domain analysis of Continuous Time and Discrete Time signals and systems, Frequency domain analysis of Continuous Time and Discrete Time signals and systems (Laplace, Z, Fourier Transform and Fourier series)

Digital Communication: Information theory, Digital Modulation, Error correction codes basics

Electromagnetics: Transmission lines, Wave theory & propagation

Antennas: Fundamentals of antenna, Microstrip lines

Microwave engineering: Waveguides, Principle of microwave amplifiers and oscillators

Basics of Computer Communication Networks

OSI Layers and their functionality, TCP/IP Protocols, Types of Routers and algorithms, Switching, Ethernet and WLAN

Mobile Wireless Communications and Networks

An overview of key wireless technologies: voice, data, fixed and mobile broadband wireless systems.

Wireless system design fundamentals: channel assignment, handoffs, trunking efficiency, interference, frequency reuse, capacity planning and large-scale fading.

Path loss, small-scale fading, multipath, reflection, diffraction, scattering, shadowing, spatial-temporal channel modelling and microcell/indoor propagation.

Modulation, equalization, diversity, channel coding and speech coding.

New wireless LAN technologies: IEEE 802.11a/b, HIPERLAN etc

New 3G air interface standards, including W-CDMA, CDMA2000, GPRS, UMTS, and EDGE.

SARDAR PATEL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF ELECTRONICS ENGINEERING
Written Test Syllabus for Assistant Professor in Electronics Engineering
(Year 2016)

Networks

Network solution methods: nodal and mesh analysis; Network theorems: superposition, Thevenin and Norton's, maximum power transfer; Wye-Delta transformation; Steady state sinusoidal analysis using phasors; Time domain analysis of simple linear circuits; Solution of network equations using Laplace transform; Frequency domain analysis of RLC circuits; Linear 2-port network parameters: driving point and transfer functions; State equations for networks.

Signals and Systems

Continuous-time signals: Fourier series and Fourier transform representations, sampling theorem and applications; Discrete-time signals: discrete-time Fourier transform (DTFT), DFT, FFT, Z-transform, interpolation of discrete-time signals; LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeros, parallel and cascade structure

Electronic Devices

Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; P-N junction, MOS capacitor, MOSFET, JFET, CMOS inverter. Integrated circuit fabrication process: oxidation, diffusion, ion implantation and photolithography.

Analog Circuits

Simple diode circuits: clipping, clamping and rectifiers; Single-stage MOSFET amplifiers. Simple op-amp circuits; Active filters; Sinusoidal oscillators: criterion for oscillation, single-transistor and op-amp configurations; Function generators, wave-shaping circuits and 555 timers

Digital Circuits

Multiplexers, decoders and PLAs; Sequential circuits: latches and flip-flops, counters, shift-registers; Data converters: sample and hold circuits, ADCs and DACs; Semiconductor memories: ROM, SRAM, DRAM; 8086 architecture, programming, memory and I/O interfacing. 8051 microcontroller architecture and programming
Introduction to embedded systems and RTOS

Control Systems

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation

Electromagnetics

Electrostatics; Maxwell's equations: differential and integral forms and their interpretation, boundary conditions, wave equation, Poynting vector; Plane waves and properties: reflection and refraction, polarization, phase and group velocity, propagation through various media, skin depth; antenna types, radiation pattern, gain and directivity, return loss, antenna arrays;

Communications

Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, superheterodyne receivers, circuits for analog communications; Digital communications: PCM, DPCM, digital modulation schemes ASK, PSK and FSK

SARDAR PATEL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
Written Test Syllabus for Assistant Professor in Information Technology

(Year 2016)

1. **Discrete Mathematics:** Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups and Graphs.
2. **Digital Logic Analysis and Design:** Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).
3. **Computer Organization and Architecture:** 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).
4. **Data Structures and algorithms:** Programming and Data Structures Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs. Algorithms Searching, sorting, hashing. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.
5. **Object Oriented Methodology:** Class and objects, inheritance, polymorphism, interfaces. Applets, packages, exception handling and strings.
6. **Theory of Computer Science:** Theory of Computation Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines.
7. **Web Programming**: Web Programming: HTML, CSS, Javascript, jQuery and the Document Object Model , XML, Servlet, JSP, Web hosting: Apache, PHP and MySQL, Using HTML with PHP, forms, sessions, cookies, AJAX basics
8. **Operating Systems:** Operating System Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.
9. **Database Systems:** Databases ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.
10. **Computer Networks:** Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

SARDAR PATEL INSTITUTE OF TECHNOLOGY
DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS
Written Test Syllabus for Assistant Professor in MCA

1. **Discrete Mathematics:** Mathematical logic, Relations, Semi groups and Groups, Coding, Recurrence Relations, Graphs, Language and Finite State Machines.

2. **Algorithms and Problem Solving:** Divide and Conquer Technique, Dynamic Programming, Greedy Technique, Single –Source Shortest Paths, NP-Completeness and the P & NP Classes.

3. **Software Engineering:** SDLC, Software Analysis and Design, Requirement Engineering, Software Project Planning, Software Scheduling and Tracking, Design phase, Software Quality.

4. **Data Structure :** Performance measurement, Sorting Techniques, Searching Technique, Link list Doubly Link List, Circular link list, Multi link list, Stack, Queue, Simple queue, Double ended queue, circular queue, Priority Queue, Hashing, Trees, Heap, Graphs and traversals.

5. **System Programming and Operating System:** Compiler, Assembler, Linker, Loader, Operating system, I/O manager, Fundamentals of Operating System, Process and Thread Management, Concurrency Control, Memory Management, I/O Systems, File systems, Protection & Security

6. **Probability and Statistics:** Frequency Distribution and Measures of Central Tendency, Measures of Dispersion, Skewness and Kurtosis, Correlation and Regression, Testing of Hypothesis, Probability, Random variables, Probability Distributions.

7. **Database management System:** Entity Relation Model, Relational Model, Storage and Indexing, Schema refinement and Normal Forms, Normal Forms, Transaction processing, Security and Authorization.

For all the Departments please note:

- **Test will be objective questions of 50 marks.**
- **Duration of the test will be 1 hr.**
- **No negative marking.**
- **Date & Time of the test is as mentioned in the Notice.**