DIGITAL SYSTEM DESIGN

UNIT I:

Introduction to VHDL, design units, data objects, signal drivers, inertial and transport delays, delta delay, VHDL data types, concurrent and sequential statements.

UNIT II:

Subprograms – Functions, Procedures, attributes, generio, generate, package, IEEE standard logic library, file I/O, test bench, component declaration, instantiation, configuration.

UNIT III:

Combinational logic circuit design and VHDL implementation of following circuits – first adder, Subtractor, decoder, encoder, multiplexer, ALU, barrel shifter, 4X4 key board encoder, multiplier, divider, Hamming code encoder and correction circuits.

UNIT IV:

Synchronous sequential circuits design – finite state machines, Mealy and Moore, state assignments, design and VHDL implementation of FSMs, Linear feedback shift register (Pseudorandom and CRC)

UNIT V:

Asynchronous sequential circuit design – primitive flow table, concept of race, critical race and hazards, design issues like metastability, synchronizers, clock skew and timing considerations.

UNIT VI:

Introduction to place & route process, Introduction to ROM, PLA, PAL, Architecture of CPLD (Xilinx / Altera).

TEXT BOOKS:

1. VHDL – 3rd Edition – Douglas Perry – TMH
2. Fundamentals of Digital Logic with VHDL design – Stephen Brown, Zvonko Vranesic – TMH.
3. Digital Design Principles – Fletcher.
4. VHDL Synthesis – J Bhasker.
5. VHDL Primer – J Bhasker – Pearson Education.

REFERENCE BOOKS:

1. Digital System Design Using VHDL – Chales H. Roth.
2. Digital System Design – John Wakerley.
3. VHDL – Zainalabedin Navabbi.
4. VHDL – D. Smith.

Digital System Design: Practicals based on above syllabus.

ADVANCED MICROPROCESSOR & MICROCONTROLLERS

UNIT I:

Introduction to 16 bit microprocessor, 8086 / 8088 CPU architecture, memory organization, interfacing addressing modes, Instruction set, programming examples, pseudo opcode, assembler directives.

UNIT II:

Interfacing of peripheral 8255, 8253 & 8251. Interfacing of ADC & DAC, stepper motor, and serial communication standards RS232, IC Bus.

UNIT III:

Architecture, organization operation & interfacing of 8259, ICWs, OCWs, Cascading 8279 – keyboard display mode, sensor matrix mode, command words and programming DTMF transceiver (Mittel 8880), real time clock: DS 1307, EEPROM.

UNIT IV:

8086 / 88 maximum mode, 8087 architecture, 80386 architecture, real and protected mode, 8237 DMA controllers, organization, control words.

UNIT V:

Introduction to 8051 family architecture, pin diagram, operation, ports, addressing modes, internal & external memory, SFR, flags, organization, counters and timers, serial communication.

UNIT VI:

8051 instruction set interrupts; programming exercises for interlaced with keyboard, LED matrix time delays, serial communications

NAME OF BOOKS RECOMMENDED:

1. Programming & Interfacing of 8086 / 8088, D.V. Hall, TMH.
2. Intel Reference Manuals, Microprocessor & Microcontroller: Intel
3. Advances Microprocessor & peripherals. A. K Ray (TMH)
4. Microcontrollers – Peatman, Mc Graw Hill.
5. Microcontrollers – Ayala (TMH).
6. Microprocessors 8086 / 88 Family Prog. Interfacing: Liu, Gibson

PRACTICAL: Practical based on above syllabus

COMPUTER COMMUNICATION NETWORK.

UNIT I:

Network & Services. Communication Network Approaches to network Design, Types of Network, Two stages, and three stages Network, Time Division Switching, and Time Multiplexed Switching. Time Multiplexed Time Switching.

UNIT II:

LAN Network and Medium Access Layer: LAN structure, random access, multiple access protocols, IEEE standard 802 for LAN & MAN High speed LANS, FDDI, fast Ethernet.

UNIT III:

Application and Layered Architecture: OSI reference model, TECP / IP protocol, IP packets, IP addressing, subnet addressing, address resolution and reveres resolution, TCP / IP utilities.

UNIT IV:

Physical Layer and Data Link Layer: Transmission media, wireless transmission, X.25 network, narrow band and Broadband ISDN, ATM.

Data link Layer design, Error detection and correction Elementary data link protocols, and sliding window protocols.

UNIT V:

Network layer and Transport Layer: Network layer design, Routing, congestion, Internetworking Transport layer design issues, and Transport services primitives. Internet transport protocol, wireless TCP and UDP.

UNIT VI:

Application Layer: Network security, Cryptography, secret key, public – key, digital signature, Domain Name system, Electronic Mail system, Multimedia, Real Time Transport protocol.

BOOKS:

1. Telecommunication Switching systems & Networks by Vishwanathan.
2. Communication Networks by Leon – Gracia, Indra Widjaja.
3. Computer Communication by W. Stanlling.
4. Computer Networks Tanenbaum.

OPTICAL COMMUNICATION

UNIT I:

Principle of optical communication – Attributes and structures of various fibers such as step index, graded index mode and multi mode fibers. Propagation in fibers – ray mode, Numerical aperture and multi path dispersion in step index and graded index fibers. Material dispersion and frequency response.

UNIT II:

Electromagnetic wave equation in step index and graded index fibers modes and power flow in fibers. Manufacture of fibers and cables, fiber joints, splices and connectors.

UNIT III:

Signal degradation in fibers – Attenuation, material dispersion, wave guide dispersion, pulse broadening, mode coupling.

UNIT IV:

Optical sources – LED and LASER structures and properties. Sources Launching and coupling.

UNIT V:

Photo detector – Pin and Avalanche Photo – detectors. Structures and Properties.

UNIT VI:

Transmission link – Point to point links, WDM, Data buses, star and T – Coupler, NRZ, RZ, and block codes. Measurement in optical fibers – Attenuation, dispersion, Refractive index profile and optical source characteristic measurements.

BOOKS:

1. Optical fiber communication, principles and practice: John M Senior PH International Service)
2. Optical fiber communication: B Keiser (McGraw Hill)
3. Optical communication system: J Gower (prentice Hall of India)
4. Optical fiber system: Kao (Tata McGraw Hill)

ELECTIVE II

DIGITAL IMAGE PROCESSING

UNIT I:

Digital Image representation, elements of digital image processing systems. Sampling and quantization: simple image model, basic relationship between pixels and image geometry.

UNIT II:

Image transforms – introduction to Fourier transform, DFT, properties of 2 – dimensional DFT, FET other separable image transforms – DCT, DST, Walsh, Haar, start transform.

UNIT III:

Image enhancement – Basic gray level transformations, Histogram processing enhancement using arithmetic / logic operations, spatial filtering, smoothing and sharpening filters, smoothing frequency domain filter, sharpening frequency domain filters.

UNIT IV:

Image Compression – fundamental, image compression models, information theory error – free compression, lossy compression, Image compression standards.

UNIT V:

Image segmentation – Detection of discontinuities, Edge linking and boundary detection, and thresholding region based segmentation.

UNIT VI:

Representation and description – Representation, boundary descriptors, Regional Descriptors.

BOOKS:

1. Digital Image processing R. C. Gonzaalez, R. E. Woods, Pearson Edition, 2nd edition
2. Fundamentals of digital image processing. A. K. Jain (PHI).

SATELLITE COMMUNICATION

UNIT I:

Introduction: Origin of Satellite communication, Current state of satellite communication. Orbital aspect of satellite communication: Orbital mechanism, equation of orbit, locating satellite in orbit, orbital elements, and orbital perturbation. Space craft subsystem: Attitude and orbit control system, Telemetry tracking and command power system, and communication subsystem.

UNIT II:

Satellite link design: System noise temperature and T / T ratio, down link design, domestic satellite system, uplink design, design of satellite link for specified (C / N).

UNIT III:

Multiple access techniques: FDMA, FDM / FM / FDMA, effects of inter modulation, companded FDM / FM / FDMA, TDMA, TDMA frame structure and design, TDMA synchronization and timing, code division multiple access, SS transmission and reception; Applicability of CDMA to commercial system, multiple access on board processing SCPS system, digital speech interpolation system, DAMA.

UNIT IV:

Propagation on satellite: Earth's path – propagation effects, atmospheric absorption, Scintillation effects, Land and Sea multipath, Rain and ice effects, Rain drop distribution, calculation of attenuation. Rain effects on Antenna noise temperature.

UNIT V:

Encoding and forward error correction: Error detection and correction, channel capacity, error detecting codes, linear block codes, error correction with linear block codes, performance of block error correction codes, convolution codes, cyclic codes, BCH and codes, error detection on satellite links.

UNIT VI:

Earth Station technology: Earth Station design; antennas tracking, LNA, HPA, RF multiplexing, factors affecting orbit utilization, tracking, equipment for earth station.

BOOKS:

1. Satellite Communication by T. Pratt.
2. Satellite Communication by D. C. Agrawal.
3. Satellite Communication by Dennis Roddy.
4. Satellite Communication by T. T. Hai.

MOBILE COMMUNICATION

UNIT I:

The cellular concept, Evolution of mobile radio communication, Cellular telephone system, frequency reuse, channel assignment and handoff strategies, interference and system capacity, trunking and grade of service,. Improving capacity in cellular system.

UNIT II:

The mobile radio environment causes of propagation path loss, causes of fading – long term and short term, definition of sample average, statistical average, probability density function, cumulative probability distribution, level crossing rate and average duration of fade, delay spread, coherence bandwidth, inter symbol interference.

UNIT III:

Modulation techniques for mobile communication: BPSK, QPSK. Transmission and detection techniques, 4 QPSK transmission and detection techniques. QAM, GMSK.

UNIT IV:

Equalization, diversity and channel coding: fundamentals of equalization, space polarization, frequency and time diversity techniques, space diversity, polarization diversity, frequency and time diversity, fundamentals of channel coding.

UNIT V :

Multiple access Techniques: Introduction to multiple access,FDMA,TDMA, spread Spectrum Multiple Access,Frequency Hope Multiple access (FHMA) ,Code Division multiple access (CDMA),Space Division Multiple access (SDMA).

UNIT VI:

GSM – global system for mobile: services and features, GSM system architecture, GSM radio subsystem, GSM channel types, GSM frame structure, signal processing GSM, introduction to CDMa, digital cellular standard.

TEXT BOOKS:

1. Wireless Communication – Principles and practice by T. S. Rappaport (Prentice Hall PTR, upper saddle river, New Jersey)
2. Mobile Communication – Design fundamentals by William C. Y. Lee, (John Willey)

REFERENCE BOOKS:

1. Wireless digital communication by Kamilo Feher (PHI)
2. Mobile Cellular communication by W. C. Y. Lee (McGraw Hill)
3. The Mobile Radio Propagation channel by J. D. Parson.

Digital System Design is the digital circuit design used in the Electronics industry especially in the VLSI field. It is the implementation of IC chips over several transistors. Digitization is now implemented in a wide range of applications, including information (computers), telecommunications, control systems, etc. Digital circuits replace many analog systems. Advantages of digital system design are as follows: It is cheaper and easier to design. Easier to store, transmit and manipulate information. Digital technology has become so widespread that it encompasses nearly all aspects of our everyday lives and we can see its use in handheld gadgets, computers, robotics etc.Â Digital Systems Design. by Ramaswamy Palaniappan. Rating DIGITAL SYSTEMS: Course Objectives and Lecture Plan. Aim: At the end of the course the student will be able to analyze, design, and evaluate digital circuits, of medium complexity, that are based on SSIs, MSIs, and programmable logic devices. Module 1: Number Systems and Codes (3). Number systems: Binary, octal, and hexa-decimal number systems, binary arithmetic. Codes: Binary code, excess-3 code, gray code, and error detection and correction codes. Module 2: Boolean Algebra and Logic Functions (5).