

AFFILIATED INSTITUTIONS
ANNA UNIVERSITY : : CHENNAI – 600 025.

R-2009

I TO IV SEMESTERS (FULL TIME) CURRICULUM and SYLLABI
M.SC. ELECTRONIC SOFTWARE (2 YEARS)

SEMESTER I

Sl. No.	Course Code	Course Title	L	T	P	C
THEORY						
1	MA 9330	<u>Numerical Method in Electronics</u>	3	1	0	4
2	EX 9311	<u>Microprocessors</u>	3	0	0	3
3	EX9312	<u>8051 Micro Controller and its Applications</u>	4	0	0	4
4	EX 9313	<u>Basic VLSI Design</u>	3	0	0	3
5	EX 9314	<u>Digital System Design using VHDL</u>	3	1	0	4
6	E – I	Elective	3	0	0	3
PRACTICALS						
7	EX9316	<u>General Electronics & 8051 Microcontroller Lab</u>	0	0	3	2
8	EX9317	<u>VLSI Lab I</u>	0	0	3	2
Total =25						
SEMESTER II						
Sl. No.	Course Code	Course Title	L	T	P	C
THEORY						
1	EX 9321	<u>Instrumentation and Control Systems</u>	3	0	0	3
2	EX 9322	<u>MEMS and Power Electronics</u>	3	0	0	3
3	EX 9323	<u>Signals and Systems</u>	3	0	0	3
4	EX 9324	<u>Data Communication and Networks</u>	3	0	0	3
5	EX 9325	<u>Digital Circuit Analysis & Digital Signal Processing</u>	4	0	0	4
6	E - II	Elective	3	0	0	3
PRACTICALS						
7	EX 9326	<u>Power Electronics Lab</u>	0	0	3	2
8	EX 9327	<u>Communication Systems Lab</u>	0	0	3	2
Total=23						
SEMESTER III						
Sl. No.	Course Code	Course Title	L	T	P	C
THEORY						
1.	EX 9331	<u>Embedded Systems and Real Time Operating Systems</u>	4	0	0	4
2.	EX 9332	<u>Digital Image Processing</u>	3	0	0	3
3.	EX 9333	<u>Hardware - Software Co-Design</u>	3	0	0	3
4.	EX 9334	<u>Advanced Microprocessors and Microcontrollers</u>	3	0	0	3
5.	E - III	Elective	3	0	0	3
6.	E - IV	Elective	3	0	0	3
PRACTICALS						
7.	EX 9335	<u>DSP and DIP Laboratory</u>	0	0	3	2
8.	EX 9336	<u>Embedded Systems and Real Time Operating Systems</u>	0	0	3	2
Total = 23						

SEMESTER IV						
Sl. No.	Course Code	Course Title	L	T	P	C
1.	EX9341	Project Work	0	0	16	32
Total = 32						
List of Electives						
Sl. No.	Course Code	Course Title	L	T	P	C
1.	EX 9001	<u>Telecommunication and Fiber Optics</u>	3	0	0	3
2.	EX 9002	<u>Wireless Communications and Networks</u>	3	0	0	3
3.	EX 9003	<u>VLSI Design and VHDL Programming</u>	3	0	0	3
4.	EX 9004	<u>Nano Science and Technology</u>	3	0	0	3
5.	EX 9005	<u>Neural Networks and its Applications</u>	3	0	0	3
6.	EX 9006	<u>VLSI Design using VERILOG</u>	3	0	0	3
7.	EX 9007	<u>ASIC Design</u>	3	0	0	3
8.	EX 9008	<u>Analytical Instrumentation</u>	3	0	0	3
9.	EX 9009	<u>Electronic Test Instruments</u>	3	0	0	3
10.	EX 9010	<u>PC Based System Design</u>	3	.0	0	3
11.	EX 9011	<u>CMOS VLSI Design</u>	3	0	0	3
12.	EX 9012	<u>Planning & Management of Electronics industries</u>	3	0	0	3

MA9330

NUMERICAL METHOD IN ELECTRONICS

L T P C
3 1 0 4

UNIT I ITERATIVE METHODS 12

Introduction, Beginning an iterative method, the method of successive bisection, the method of false position, Newton-Raphson iterative method, Scant method, comparison of iterative methods. Implementation strategies.

UNIT II SOLUTION OF SIMULTANEOUS EQUATIONS 8

Introduction, Existence of solution, solution by elimination, the Gauss elimination method, pivotal condensation, Ill condition equation, Gauss-Seidel iterative method, Gauss-Jordan method, Matrix method, Gauss-Jordan Matrix inversion, Implementation strategies.

UNIT III INTERPOLATION 8

Introduction, Linear interpolation, Polynomial interpolation, Lagrange interpolation, Newton interpolation, difference tables, truncation errors in interpolation, Implementation strategies.

UNIT IV NUMERICAL INTEGRATION 7

Introduction, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Gaussian quadrature, Implementation strategies.

UNIT V NUMERICAL DIFFERENTIATIONS AND SOLUTION OF DIFFERENTIAL EQUATIONS 10

Introduction, Differentiation by polynomial fit, higher order Derivative, errors in Numerical Differentiation, Implementation strategies. Introduction, Solution by Taylor's Series, Euler's Method, Modified Euler's Method, Predictor-Corrector Method, Runge-Kutta Method, Implementation strategies.

L : 45 T: 15 TOTAL: 60 PERIODS

Reference Books:

1. Introduction Methods of Numerical Analysis:

S S Sastry, PHI Publications

2. Computer oriented Numerical Methods:

V Rajaraman, PHI Publication.

3. Computer oriented Statistical and Numerical Methods:

E Balagurusamy, Macmillan India Ltd T P C

EX9311

MICROPROCESSORS

L T P C
3 0 0 3

UNIT I 9

Introduction – Comparison of Micro Computers, Mini Computers and Large Computers – The 8085 microprocessor – Architecture – Example of an 8085 based Microcomputer – Memory Interfacing.

UNIT II 9

The 8085 Programming Model – Instruction Classification – Formats – Instruction Set – Assembly Language Programming – Example Programs.

UNIT III 9

Interfacing Input/Output Devices. Interrupts – 8085 interrupts – Interrupt Controller – DMA Transfer – DMA Controller.

UNIT I MOS AND BI-CMOS CIRCUIT DESIGN PROCESSES 9

MOS Layers –Stick Diagrams –Design Rules and Layout –General Observations on the Design Rules –2um Double Metal, Double Poly. CMOS/Bicomos Rules –1.2um Single Metal, Single Poly. CMOS Rules –Layout Diagrams –A Brief Introduction –Symbolic Diagrams –Translation to Mask Form.

UNIT II BASIC CIRCUIT CONCEPTS 9

Sheet resistance (Rs) –Sheet resistance concept applied to MOS transistors and inverters –Area capacitances of layers –Standard unit of capacitance Cg –Standard unit of capacitances calculation –The delay unit –Inverter delays –Driving large capacitive loads –Propagation delay –Wiring capacitances.

UNIT III SCALING OF MOS CIRCUITS 9

Scaling models and scaling factors –Scaling factors for device parameters –Some discussion on and limitations of scaling.

UNIT IV SUBSYSTEM DESIGN AND LAYOUT 9

Some architectural issues –Switch logic –Gate (restoring) logic –Examples of structured design (combinational logic) –Some clocked sequential circuits –Other system considerations.

UNIT V ILLUSTRATION OF THE DESIGN PROCESS– COMPUTATIONAL ELEMENTS 9

Some observations on the design process –Regularity –Design of an ALU subsystem –A further consideration of adders –Multipliers.

TOTAL : 45 PERIODS**BOOKS FOR STUDY:**

1. BASIC VLSI DESIGN “Douglas A. Punknell & Kamran Eshraghian” – Eastern Economy Edition, IIIrd Edition

UNIT I 12

Specification of Combinational Systems Using VHDL, Introduction to VHDL, Basic Language Element of VHDL, Behavioral Modeling, Data Flow Modeling, Structural Modeling, Subprograms and Overloading, VHDL Description of Gates.

UNIT II 12

Description and Design of Sequential Circuits Using VHDL, Standard Combinational Modules, Design of a Serial Adder With Accumulator, State Graph for Control Network, Design of a Binary Multiplier, Multiplication of a Signed Binary Number, Design of Binary Divider.

UNIT III 12

Register –Transfer Level Systems, Execution Graph, Organization of System, Implementation of RTL Systems, Analysis of RTL Systems, and Design of RTL Systems

UNIT IV**12**

Data Subsystems, Storage Modules, Functional Modules, Data Path, Control Subsystems, Micro Programmed Controller, Structure of a Micro Programmed Controller, Micro Instruction Format, Micro Instruction Sequencing, Micro Instruction Timing, Basic Component of a Micro System, Memory Subsystem.

UNIT V**12**

I/O Subsystem, Processors, Operation of the Computer and Cycle Time. Binary Decoder, Binary Encoder, Multiplexers and Demultiplexers. Floating Point Arithmetic –Representation of Floating Point Number, Floating Point Multiplication.

TOTAL : 60 PERIODS**BOOK FOR STUDY:**

1. J. Bhaskar, "A VHDL Primer", Addison Wesley, 1999.

REFERENCE BOOK:

2. C. H. Roth, "Digital System Design Using VHDL", PWS Publishing.
3. J. F. Wakerly, "Digital Design-Principles and Practices". PHL.
4. Z. Navabi, "VHDL-Analysis and Modeling of Digital Systems", MGH.

EX9316**GENERAL ELECTRONICS & 8051 MICROCONTROLLER LAB****L T P C
0 0 3 2****Any 15 Experiments**

1. AM Modulation and Detection
2. FM Modulation and Detection
3. ASK Modulation and Detecting
4. PWM and PPM Modulation and Detection
5. PAM Modulation and Detection
6. DC to DC converter
7. DC Voltage Regulator Design
8. DC Chopper
9. Modular SMPS Design
10. Switching Regulators
11. Addition and subtraction of 8bit /16 bit data.
12. Multiplication of 8 and 16 bit data
13. Ascending and Descending order
14. Checksum/CRC error calculations programming
15. Keypad/Seven segment display interfacing
16. LCD Interfacing
17. Hardware and software time delay generation
18. UART Programming
19. ADC interfacing
20. DAC Interfacing

TOTAL : 45 PERIODS

REFERENCES

1. Michael J Roberts, " Signals and Systems Analysis using transform methods and MATLAB",
2. Tata McGraw- Hill, 2003
3. Haykin.S and Barry Van Veen, "Signals and Systems", John willy and Sons Inc., 2002
4. Samir S Soliman and Srinath MD, " Continuous and discrete signals and systems" Second Edition, PHI, 2003
5. Edition, PHI, 2003
6. Lathi B.P., "Linear Systems and Signals". Oxford University Press Inc., 2003

EX9324

DATA COMMUNICATION AND NETWORKS

**L T P C
3 0 0 3**

UNIT I DATA COMMUNICATION 9

Introduction – Basic terms and concepts – Line configurations – Topology – Transmission media – MODEM: Standard and types – Analog and Digital transmission: Encoding and modulating – Channel capacity - Base band and Broad band - Transmission impairments – Multiplexing – Error Detection and control :CRC.

UNIT II STANDARD ARCHITECTURE AND PROTOCOLS 9

Layered Architecture – OSI model –functions of layers – Data link control protocols – ARQStop and wait, Sliding window, Go back N and Selective repeat– Asynchronous protocol: X Modem, Y Modem, Kermit – Synchronous protocol: BSC, SDLC, HDLC- TCP/IP model, SMTP, HTTP and FTP.

UNIT III NETWORK STANDARDS 9

LAN: Standard, Protocol, IEEE 802 Standards – ETHERNET, LLC, MAC, CSMA/CD, Token Ring – Token bus – FDDI – ALOHA, Wireless LAN Technology, Hub, Bridge, Router,gateway, X.25.Protocols: SLIP, PPP, LCP – Optical network – SONET, WAN - MAN-Basic Concept and standards.

UNIT IV ISDN 9

Introduction: Services – IDN – Channels – User interfaces – ISDN layers –Broad band ISDN – Frame relay – ATM: concept and architecture – ISDN Protocol: Physical layer protocol, Dchannel Data link layer and layer 3 protocols, Network signaling systems, SS7 protocol.

UNIT V UPPER OSI LAYERS 9

Session layer protocols, Presentation layer – Encryption / Decryption, Data security, Encryption/ Decryption, Authentication, Data compression, Application Layer Protocols – MHS, File Transfer, Virtual Terminal, CMIP.

TOTAL : 45 PERIODS

TEXT BOOK

1. "Data Communication and Networking" Behrouz. A.Forouzan, 2nd edition, Tata Mcgraw Hill, 2000.

REFERENCE BOOKS

1. "ISDN – Concepts, Facilities and Services" GARY C. Kessler and Peter Southwick, Mcgraw Hill, 3rd Edition, 1997.
2. "Data and computer communication" by William Stallings, 6th edition, Pearson education,2000
3. "Computer Networks" Andrew S.Tanenbaum, 3rd edition, Prentice Hall of India, 1996.

UNIT I BOOLEAN ALGEBRA AND K-MAP 12

Postulates, identities, De-morgan's Theorem, Simplification of some logical expression using Boolean expression from given circuit, Literal, Minterm, Maxterm, Standard product of sum & sum of product . Three four & four to five variable K-map and simplification. Numericals POS & SOP obtaining logic systems K-map Arithmetic & code converters circuits .

UNIT II SEQUENTIAL & COMBINATIONAL LOGIC CIRCUIT 12

Different types of FFs, Designing of Synchronous & Asynchronous counters, Natural & truncated counters, regular & irregular counters, Design of counters using chips, Designing of Presettable counters, Serial to Parallel converter & Parallel to serial converter using registers, Multiplexer & Demultiplexer & their application.

UNIT III DIGITAL APPLICATIONS 12

Decimal counting, Multiplexed display, Dynamic display, Frequency measurement using counter, speed measurement. Digital voltmeter, sound recording & play back system.

Digital signal Processing

Advantage of DSP, application areas, Basics of DSP operations, convolutions, correlations, digital filtering, discrete transformation & modulation DSP chips, real world application of DSP, e.g. Audio application, telecommunication application, Biomedical application.

UNIT IV ANALOG INTERFACING USING DIGITAL SIGNAL PROCESSING 12

Block diagram of real time system, Sampling of low pass & high pass signals, Uniform & Nonuniform quantization and encoding , over sampling in A/D conversion , D/A conversion process , Anti-aliasing filtering, over sampling in D/A conversion, limitation of real time signal processing with analog signals, Applications.

UNIT V DIGITAL SIGNAL PROCESSING APPLICATIONS 12

Digital Audio Mixing, Speech synthesis and recognition, Compact Disk Audio system, Digital cellular Mobile Telephone, Set-top box Television reception , Fetal ECG monitoring, DSP based closed loop anesthesia.

TOTAL : 60 PERIODS

REFERENCE BOOKS:

1. **Digital Signal Processing (IInd Ed):** Emmanuel C. Ifeachor & Barriew.
2. **Digital Electronics & Logic Design:** N.G.Palan , Technova Publications.
3. **Digital Design:** M. Morris Mano, Pearson Publication.
4. **Digital Electronics :** D. C. Green, Pearson Education , Asia.

EX9326

POWER ELECTRONICS LAB

**L T P C
0 0 3 2**

1. V to I & I to V Converters
2. Load cell & Instrumentation amplifier
3. Displacement & Angular displacement measurement
4. Inductive & capacitive pick up measurement
5. Voltage/Current measurement using Hall effect sensors
6. Flow measurement
7. Frequency response of first order low pass filter
8. Frequency response of second order systems
9. Frequency response of Peaking amplifier
10. Thermistor control of quench oil temperature
11. Strip tension controller
12. Position control systems – open loop – closed loop
13. SCR, DIAC & TRIAC Characteristics
14. UJT characteristics & UJT as a saw tooth wave generator
15. Firing angle control using Thyristors
16. Commutation Techniques (any two)
17. Single phase inverter & converter (20W)
18. Switching Regulators

TOTAL : 45 PERIODS

EX9327

COMMUNICATION SYSTEMS LAB

**L T P C
0 0 3 2**

1. LED Characteristics at 850 nm & 1300 nm
2. PIN diode & Laser Diode characteristics
3. Analog fiber optic transmitter & receiver
4. Digital fiber optic transmitter & receiver
5. Radiation pattern of Dipole & Yagi-Uda antennas
6. Radiation pattern of Loop & Array antennas
7. Generation and Detection of PAM & PWM
8. Generation and Detection of PCM
9. IR Transmitter & Receiver
10. ASK & FSK Transmitter and Receiver
11. PSK, QPSK & DPSK
12. Delta and Adaptive delta modulation
13. Study of GPS and GSM Modules
14. Impedance and power measurement by Smith chart
15. Radiation Pattern by Horn antenna
16. Alignment of Satellite receiver
17. Gunn Diode oscillator
18. Reflex Klystron characteristics using microwave bench

TOTAL : 45 PERIODS

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Elements of a digital image processing system – structure of the human eye – image formation and contrast sensitivity – sampling and quantization – neighbors of pixel – distance measure – photographic film structure and exposure – film characteristics – linear scanner – video camera – image processing applications.

UNIT II IMAGE TRANSFORMS 9

Introduction to Fourier transform – DFT – properties of two-dimensional FT – separability, translation, periodicity, rotation, average value – FFT algorithm – Walsh transform – Hadamard transform – discrete cosine transform.

UNIT III IMAGE ENHANCEMENT 9

Definition – spatial domain methods – frequency domain methods – histogram – modification techniques – neighborhood averaging – median filtering – low pass filtering – averaging of multiple images – image sharpening by differentiation and high pass filtering.

UNIT IV IMAGE ENCODING 9

Objective and subjective fidelity criteria – basic encoding process – the mapping – the quantizer – the coder – differential – encoding – contour encoding – run length encoding – image encoding – relative to fidelity criterion – differential pulse code modulation.

UNIT V IMAGE ANALYSIS AND COMPUTER VISION 9

Typical computer vision system – image analysis techniques – spatial feature extraction – amplitude and histogram features – transforms features – edge detection – gradient operators – boundary extraction – edge linking – boundary representation – boundary matching – shape representation.

TOTAL : 45 PERIODS**TEXT BOOK**

1. Rafael C. Gonzalez, Paul Wintz, "Digital Image Processing", Addison-Westley Publishing Company, 1987
2. Rafael C. Gonzalez, Richard E Woods "Digital Image Processing", Pearson, 2001

UNIT I SYSTEM SPECIFICATION AND MODELLING 9

Embedded Systems , Hardware/Software Co-Design , Co-Design for System Specification and Modelling , Co-Design for Heterogeneous Implementation - Processor Synthesis , Single-Processor Architectures with one ASIC , Single-Processor Architectures with many ASICs, Multi-Processor Architectures , Comparison of Co-Design Approaches , Models of Computation ,Requirements for Embedded System Specification .

UNIT II HARDWARE/SOFTWARE PARTITIONING 9

The Hardware/Software Partitioning Problem, Hardware-Software Cost Estimation, Generation of the Partitioning Graph , Formulation of the HW/SW Partitioning Problem , Optimization , HW/SW Partitioning based on Heuristic Scheduling, HW/SW Partitioning based on Genetic Algorithms .

REFERENCES:

1. Daniel Tabak , " Advanced Microprocessors" McGraw Hill.Inc., 1995
2. James L. Antonakos , " The Pentium Microprocessor " Pearson Education , 1997.
3. Steve Furber , " ARM System –On –Chip architecture " Addison Wesley , 2000.
4. Gene .H.Miller ." Micro Computer Engineering ," Pearson Education , 2003.
5. John .B.Peatman , " Design with PIC Microcontroller , Prentice hall, 1997.
6. James L.Antonakos , " An Introduction to the Intel family of Microprocessors " Pearson Education 1999.
7. Barry.B.Breg," The Intel Microprocessors Architecture , Programming and Interfacing " , PHI,2002.
8. Valvano "Embedded Microcomputer Systems" Thomson Asia PVT LTD first reprint 2001.
Readings: Web links www.ocw.nit.edu www.arm.com

EX9335**DSP AND DIP LABORATORY****L T P C
0 0 3 2****USING TMS320C5X/TMS320C54XX/TMS320C67XX/MATLAB**

1. Study of addressing Modes of DSP using simple examples
2. Arithmetic operations
3. DFT computations
4. FFT Computations
5. Convolution of two discrete signals
6. Correlation of two discrete signals
7. Quantization noise
8. Waveform generation
9. Solving differential equations
10. Solving z-transform
11. Voice storing & Retrieval
12. FIR Filter design
13. IIR filter design
14. Generation of signals
15. Amplitude Modulation & FFT response
16. Impulse, Step, Exponential & Ramp functions
17. Frequency sampling method
18. Image Sampling – Zooming & Shrinking Operations
19. Basic Gray Level Transformations: Image Negative, Power law and log transforms
20. . 2-D Discrete Fourier Transform and Walsh Transform
21. Image Contrast Enhancement by Histogram Equalization Technique
22. . Spatial Image Filtering: Low pass and high pass filtering

TOTAL : 45 PERIODS

LABORATORY

1. Writing and testing programs involving arithmetic, logical and BIT oriented intr.
2. Programming using interrupts
3. Programs for measuring frequency using input capture and output compare mode
4. Square wave generation using ports
5. Key interfacing
6. LED Interfacing
7. Seven segment display interfacing
8. Solid state relay interfacing using interrupts
9. Traffic light control system
10. ADC interface
11. DAC interface
12. Stepper motor interface
13. Timer/Counter operation
14. Serial port interfacing using RS232C
15. Digital clock
16. Object counter
17. Water level controller
18. Flow measurement
19. Temperature measurement
20. DC motor driving via H bridge
21. LCD interface
22. PWM generation
23. PIC to PIC communication using I2 C bus
24. Semaphore & flag related functions
25. Queue & Mailbox related functions
26. Memory related functions
27. Embedded system for an adaptive cruise control system in a car
28. Embedded system for a smart card

TOTAL : 45 PERIODS**UNIT I TELECOMMUNICATION AND TRANSMISSION SYSTEMS 9**

Signal characteristics – elements of communication – switching system – criteria for design of telecommunication system – types and advantage of telecommunication standards – telephone system – Transmission Systems: simplex – half duplex – full duplex – four wire circuit – echo canceller/suppressor – characteristics and limiting factors of subscriber loop design – space division multiplexing – frequency division multiplexing – time division multiplexing – evaluation of PSTN – Basics Of Switching System: requirements and basic elements of switching system – simple manual exchange – strowger switching system – crossbar exchange – stored program control exchange – message switching – circuit switching – reed relays.

UNIT II DIGITAL SWITCHING SYSTEM 9

Evaluation of digital switching system – digital transmission and its advantages – digital signal encoding formats – asynchronous and synchronous transmission - space division switching – time division switching – analog TDS and Digital TDS – space & time switching – time & space switching – STS &TST switching.

UNIT III CALL PROCESSING & SIGNALING TECHNIQUES 9

Basic steps of call processing – hardware configuration of digital switching system – software organization – early electronic switching system (ESS) – Signaling Techniques: classification – in channel signaling: DC signaling – multi frequency AC signaling – voice frequency AC signaling – PCM signaling – common channel signaling – SS7 network architecture.

UNIT IV TELEPHONE AND TRANSMISSION NETWORK ORGANIZATION 9

Network planning – types of networks – numbering plan – asynchronous and synchronous time division multiplexing – wave length division multiplexing – dense WDM – digital subscriber line technology – SONET/SDH: SONET network layers – frame format – SONET multiplexing – SONET topologies – SDH

UNIT V OPTICAL FIBER COMMUNICATION 9

A basic fiber optic system – Frequencies – Fiber optic Cables – Refraction – Numerical Aperture – Graded index cables – Single mode – Multi mode – Cable Constructions – Cable losses – Connectors – Light Sources – Light Detector – Systems Components – Advantages and Disadvantages.

TOTAL : 45 PERIODS

TEXT BOOKS

1. “Telecommunication Switching and Networks” by P. Gnanasivam, PHI, 2004
2. Robert J Schoenbeck “ELECTRONIC COMMUNICATIONS MODULATION AND TRANSMISSION”, PHI, 1999

**EX9002 WIRELESS COMMUNICATIONS AND NETWORKS L T P C
3 0 0 3**

UNIT I TECHNOLOGY AND SIGNAL ENCODING TECHNIQUES 9

Antennas: types – propagation modes – line of sight transmission – fading in the mobile environment – signal encoding techniques: criteria – ASK- FSK – BFSK – MFSK – PSK – BPSK – QPSK – multilevel PSK – AM modulation – Angle modulation – PCM - delta and adaptive delta modulation

UNIT II CODING AND ERROR CONTROL 9

Error detection – parity check – cyclic redundancy check – block error correction codes – hamming code – cyclic codes – BCH code – reed-Solomon codes – block interleaving – convolution codes – decoding – turbo coding – automatic repeat request – flow control – error control.

UNIT III SATELLITE COMMUNICATION 9

Satellite parameters and configurations – satellite orbits – GEO – MEO – LEO – frequency bands – transmission impairments – satellite footprint – atmospheric attenuation – satellite network – configuration – capacity allocation- Multiplexing : FDM – TDM.

UNIT IV CELLULAR WIRELESS NETWORKS 9

Principles of cellular networks: organization – frequency reuse – operation – mobile radio propagation effects – handoff – power control – traffic engineering – first generation analog – AMPS – second generation – TDMA – mobile wireless TDMA design consideration - CDMA – mobile wireless CDMA design considerations – soft hand off – IS-95 – third generation systems – wireless local loop.

UNIT V WIRELESS LANS 9

Over view: Wireless LAN applications – Wireless LAN requirements – Wireless LAN technology – Infrared LANs – Spread Spectrum LANs – Narrow band microwave LANs – IEEE 802 Architecture – IEEE 802.11 Architecture.

TOTAL : 45 PERIODS

TEXT BOOK

1. “Wireless Communications and Networks” by William Stallings –2002 – Pearson Education Asia

EX9003

VLSI DESIGN AND VHDL PROGRAMMING

**L T P C
3 0 0 3**

UNIT I INTRODUCTION AND BAISC CONCEPT OF VHDL 9

History of VHDL – capabilities of VHDL – hardware abstraction – basic terminology – entity declaration - architecture body declaration – Basic language elements – identifiers – Data objects– Data type operators.

UNIT II BEHAVIORAL MODELING TECHNIQUES OF VHDL 9

Behavioral modeling: Entity declaration – architecture declaration – process statements variable assignment statements – signal assignments statements – Wait statement – IF statement – Case statement – Null statement – Loop statement – Exit statement – Next statement Assertion statement – Report statements – More on signal assignment statement – multiple process – postponed process.

UNIT III DATA FLOW & STRUCTURAL MODELING TECHNIQUES OF VHDL 9

Data flow style of modeling: Concurrent signal assignment statement versus signal assignment – Delta delay revisited – Multiple drivers – Conditional signal assignment statement – Selected signal assignment statement – The unaffected value – Block statement- Concurrent assertion statement.

Structural modeling: Component declaration – Component instantiation – Resolving signal value – examples – Half adder – Full adder – Four to one multiplexers – Decoders and encoders.

UNIT IV ADVANCED FEATURES IN VHDL 9

Generics – configuration – configuration specification – Configuration declaration – Default rules – Conversion functions – Direct instantiation – Incremental binding – Sub programs – Sub program overloading - operator overloading - signatures – default value of parameters – package declaration - package body – design file – design libraries.

UNIT V DESIGN OF FPGA’S AND CPLD 9

State machine start – programmable logic arrays – programmable array logic devices – altera max 7000 CPLD’S – Xilinx interconnection – Xilinx logic – Xilinx 3000 series FPGA’s – Altera complex programmable logic devices – CPLD’S.

TOTAL : 45 PERIODS

TEXT BOOKS

1. J.Bhasker,“VHDL PRIMER”, Low price Edition, 2001 PHI 3.Charles H.Roth, Jr.”DIGITAL SYSTEM DESIGN USING VHDL”, Brooks/Cole Thomson Learning PWS Publishing,ISBN-981-240-052-4

UNIT I INTRODUCTION AND CLASSIFICATION 9

Classification of nanostructures, nanoscale architecture – Effects of the nanometre length scale – Changes to the system total energy, changes to the system structures, vacancies in nanocrystals, dislocations in nanocrystals – Effect of nanoscale dimensions on various properties – Structural, thermal, chemical, mechanical, magnetic, optical and electronic properties – effect of nanoscale dimensions on biological systems.

UNIT II NANOMATERIALS AND CHARACTERIZATION 9

Fabrication methods – Top down processes – Milling, lithographics, machining process – Bottom-up process – Vapour phase deposition methods, plasma-assisted deposition process, MBE and MOVPE, liquid phase methods, colloidal and solgel methods – Methods for templating the growth of nanomaterials – Ordering of nanosystems, self-assembly and selforganisation – Preparation, safety and storage issues.

UNIT III GENERIC METHODOLOGIES FOR NANOTECHNOLOGY 9

Characterisation: General classification of characterisation methods – Analytical and imaging techniques – Microscopy techniques - Electron microscopy, scanning electron microscopy, transmission electron microscopy, STM, field ion microscopy, scanning tunnelling microscopy, atomic force microscopy.

UNIT IV NANO ELECTRONICS AND INTEGRATED SYSTEMS 9

Basics of nanoelectronics – Single Electron Transistor – Quantum Computation – tools of micronanofabrication – nanolithography – quantum electronic devices – MEMS and NEMS – Dynamics of NEMS – limits of integrated electronics.

UNIT V NANODEVICES AND APPLICATIONS 9

Nanomagnetic materials – Particulate nanomagnets and geometrical nanomagnets – Magneto resistance – Probing nanomagnetic materials – Nanomagnetism in technology – Carbon nanotubes – fabrication- applications – Organic FET, organic LED's – Organic photovoltaics – Injection lasers, quantum cascade lasers, optical memories, electronic applications, coulomb blockade devices.

TOTAL : 45 PERIODS**REFERENCES:**

1. Kelsall Robert W, Ian Hamley, Mark Geoghegan, "Nanoscale Science and Technology", Wiley Eastern, 2004.
2. Michael Kohler, Wolfgang, Fritzsche, "Nanotechnology: Introduction to Nanostructuring Techniques", 2004.
3. William Goddard, Donald W Brenner, "Handbook of Nano Science Engineering and Technology", CRC Press, 2004.
4. Bharat Bhushan, "Springer Handbook of Nanotechnology", 2004.
5. Charles P Poole, Frank J Owens, "Introduction to Nanotechnology", John Wiley and Sons, 2003.
6. Mark Ratner, Danial Ratner, "Nanotechnology: A Gentle Introduction to the Next Big Idea", Pearson, 2003.
7. Gregory Timp, "Nanotechnology", Springer-Verlag, 1999.
8. Jan Korvink & Andreas Greiner, Semiconductors for Micro and Nanotechnology – an introduction for Engineers, Weinheim Cambridge: Wiley-VCH (2001).

EX9005	NEURAL NETWORKS AND ITS APPLICATIONS	L T P C 3 0 0 3
UNIT I	INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS	9
Neuro-physiology - General Processing Element - ADALINE - LMS learning rule - MADALINE - MR2 training algorithm.		
UNIT II	BPN AND BAM	9
Back Propagation Network - updating of output and hidden layer weights -application of BPN – associative memory - Bi-directional Associative Memory - Hopfield memory - traveling sales man problem.		
UNIT III	SIMULATED ANNEALING AND CPN	9
Annealing, Boltzmann machine - learning - application - Counter Propagation network - architecture -training - Applications.		
UNIT IV	SOM AND ART	9
Self organizing map - learning algorithm - feature map classifier - applications - architecture of Adaptive Resonance Theory - pattern matching in ART network.		
UNIT V	NEOCOGNITRON	9
Architecture of Neocognitron - Data processing and performance of architecture of spacio - temporal networks for speech recognition.		
TOTAL : 45 PERIODS		

REFERENCES:

1. J.A. Freeman and B.M.Skapura , "Neural Networks, Algorithms Applications and Programming Techniques", Addison-Wesely,2003.
2. Laurene Fausett, "Fundamentals of Neural Networks: Architecture, Algorithms and Applications", Prentice Hall, 1994

EX9006	VLSI DESIGN USING VERILOG	L T P C 3 0 0 3
UNIT I	SAMPLE AND HOLD CIRCUITS	9
Sampling switches, Conventional open loop and closed loop sample and hold architecture, Open loop architecture with miller compensation, multiplexed input architectures, recycling architecture switched capacitor architecture.		
UNIT II	SWITCHED CAPACITOR CIRCUITS AND COMPARATORS	9
Switched-capacitor amplifiers, switched capacitor integrator, switched capacitor common mode feedback. Single stage amplifier as comparator, cascaded amplifier stages as comparator, latched comparators.		
UNIT III	DIGITAL TO ANALOG CONVERSION	9
Performance metrics, reference multiplication and division, switching and logic functions in DAC, Resistor ladder DAC architecture, current steering DAC architecture.		
UNIT IV	ANALOG TO DIGITAL CONVERSION	9
Performance metric, Flash architecture, Pipelined Architecture, Successive approximation architecture, Time interleaved architecture.		

UNIT I COLORIMETRY AND SPECTROPHOTOMETRY 9

Special methods of analysis- Beer-Lambert law-colorimeters - UV-Vis spectrophotometers- Single and double beam instruments-Sources and detectors-IR Spectrophotometers- Types M. Attenuated total reflectance flame photometers- Atomic absorption spectrophotometers-sources and detectors-FTIR spectrophotometers-Flame emission photometers.

UNIT II CHROMOTOGRAPHY 9

Different techniques- Gas chromatography- Detectors- Liquid chromatographs- Applications- High pressure liquid chromatographs-Applications.

UNIT III INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS 9

Types of gas analyzers-Oxygen, NO₂ and H₂S types, IR analyzers, thermal conductivity analyzers, analysis based on ionization of gases. Air pollution due to carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide estimation-dust and smoke measurements.

UNIT IV pH METERS AND DISSOLVE COMPONENT ANALYZERS 9

Principle of pH measurement, glass electrodes, hydrogen electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors, dissolved oxygen analyzer-sodium analyzer-silicon analyzer.

UNIT V RADIO CHEMICAL AND MAGNETIC RESONANCE TECHNIQUES 9

Nuclear radiations – Detectors - GM Counter - Proportional counter - Solid state detector - Gamma cameras - X-ray spectroscopy - Detectors- Diffractometers -Absorption meters - Detectors NMR-Basic principles-NMR spectrometer-Applications. Mass spectrometers - Different types - Applications.

TOTAL : 45 PERIODS

TEXT BOOKS:

- 1.R.S.Khandpur,"Handbook of Analytical Instruments"Tata Mc Graw Hill publishing Co. Ltd.2003.
- 2.H.H.Willard, L.L.Meritt, J.A.Dean, F.A.Settle,"Instrumental methods of analysis" CBS publishing & distribution, 1995.

REFERENCES:

- 1.Robert D.Braun,"Introduction to Instrumental Analysis"Mc Graw Hill, Singapore,1987
- 2.G.W.Ewing,"Instrumental Methods of Analysis" Mc Graw Hill 1992.
- 3.DA Skoog and D.M.West,"Principles of Instrumental Analysis" Harper and Row publishers, 1974.

UNIT I ANALOG METERS 9

D.C,A.C voltmeters, ammeters, multimeter,power meter,Q-meter,true RMS meter, vector impedance meter, vector voltmeter, component measuring instrument.

UNIT II SIGNAL SOURCES 9

Sine wave generator-Frequency synthesized sine wave generator-Sweep frequency generator,pulse and square wave generator-Function generator-Wave analyzer-Applications-Harmonic distortion analyzer-Spectrum analyzer-Applications- Audio Frequency generator-Noise generator.

UNIT III OSCILLOSCOPES 9

General purpose oscilloscope-Screens for CRT graticules-Vertical & horizontal deflection systems- Time base operation, triggers – sweep control, z axis input – Delay line-Multiple trace-Dual beam & dual trace-Probes-Oscilloscope techniques-special oscilloscopes-Storage oscilloscope-sampling oscilloscope-digital CRO.

UNIT IV DIGITAL INSTRUMENTS 9

Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count-Digital voltmeter-Types-Automatic polarity indication, automatic ranging, and auto zeroing-DMM-Microprocessor based DMM-DPM-swept – spectrum analyzer-network analyzer-discharge analyzer- logic probes-logic analyzer.

UNIT V DISPLAY AND RECORDING DEVICES 9

Bar graph display-Segmental and dot matrix display-X-Y recorders, magnetic tape recorders-Digital recording-Data loggers-Interference and screening-Electrostatic and electromagnetic interference & earth loops.

TOTAL : 45 PERIODS

TEXT BOOKS

- 1.Albert D. Herfrick & William D. Cooper, “Modern electronic Instrumentation & Measurement Techniques” Prentice Hall of India,2002.
- 2.A.J.Bouwens, 'Digital Instrumentation" Tata Mc Graw Hill, 1997.
- 3.RobertA.Witte,'Electronic Test Instruments,Theory and applications' Prentice Hall, 1993.

REFERENCE BOOKS

- 1.B.M.Oliver and J.M.Cage,"Electronic Measurements & Instrumentation" Mc Graw Hill International Edition, 1975.
- 2.Joseph, J.Carr,"Elements of Electronic Instrumentation & Measurements" III edition, Pearson Education,2003.
- 3.C.S.Rangan, G.R.sarma, V.S.V.Mani,"Instrumentation Devices & systems" Tata Mc Graw Hill, 2002
- 4.D.A.Bell, "Electronic Instrumentation and Measurements" Prentice Hall of India,2002.
- 5.Rajendra Prasad,"Electronic Measurements and Instrumentation", Khanna Publishers, Delhi,2003.
- 6.B.R.Gupta,"Electronics and Instrumentation"S.Chand Co. (P)Ltd., Delhi,

**EX9010 PC BASED SYSTEM DESIGN L T P C
3 0 0 3**

UNIT I MOTHER BOARD OF IBM PC 9

Components Of IBM PC: System Unit –Monitor –Input Devices –Printers –Interfaces –I/O Buses –Parallel and Serial Bus –USB Motherboard Components: Introduction – Microprocessor –Support Chips –Memory – Support Functions –I/O Buses, System Resources: Interrupt Requests –DMA Channels –I/O Address –Utilization Of System Resources.

UNIT II DRIVERS 9

Introduction –Principles of Magnetic Storage: Medium for Magnetic Storage – Read/Write Operations –Data Encoding Format. FDD: Floppy Disk Drive –Construction – Floppy Disk Controller 8272A –FDC Interface. HDD: Drive Construction –HDD Interface. IDE Interface: Pins and Signals –Registers –Command Execution Protocol –Commands –Medium Organization –EIDE Interface. SCSI Interface: SCSI Configuration –Variations –Signals – Wiring Techniques –Cables and Connectors –Termination –Phase – Commands and Messages.

UNIT III PERIPHERALS 9

Introduction –Video Display System: CRT Display –Video Display Adapters –LCD Monitors – Keyboard –Keyboard Organization –Keyboard Interface. BIOS Keyboard Service, Mouse: Mouse Interface Types –Mouse Modes of Operation –BIOS Mouse Services. Printer: Types –Printer Interface.

UNIT IV I/O BUSES 9

Introduction-ISA Bus: Pins, Signals and Expansion Board Design of 8-Bit and 16 Bit ISA Bus-EISA Bus: Features –Pins And Signals, PCI Bus: Features –PCI System –Pins And Signals- PCI Expansion Boards –AGP.

UNIT V PARALLEL, SERIAL AND USB PORT 9

Parallel Port: Introduction –Parallel Port –SPP –EPP –ECP. Serial Port: Pins and Signals of Serial Port –The UART. USB Port: Introduction –Features –USB System –USB Transfer – USB Controller.

TOTAL : 45 PERIODS

TEXT BOOKS

1. N.Mathivanan, "Microprocessor, PC Hardware and interfacing", PHI ISBN-81-203-2317-3
2. B.Govindarajulu, "IBM PC and Clones", TMH, ISBN-0-07-460136-9

EX9011

CMOS VLSI DESIGN

**L T P C
3 0 0 3**

UNIT I INTRODUCTION TO CMOS CIRCUITS 9

MOS Transistors –MOS Transistor Switches –CMOS Logic –Circuit and System – Representations –MOS, Transistor Theory –Introduction –MOS Device Design Equations The Complementary CMOS Inverter –DC –Characteristics –Static Load MOS Inverters –The Differential Inverter –The Transmission Gate –The Tri State –Inverter –Bipolar Devices.

UNIT II CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION 9

Introduction –Resistance Estimation Capacitance Estimation –Inductance –Switching Characteristics CMOS –Gate –Transistor Sizing –Power Dissipation –Sizing Routing Conductors –Charge Sharing –Design Margining, Reliability.

UNIT III CMOS CIRCUIT AND LOGIC DESIGN 9

CMOS Logic Gate Design –Basic Physical Design of Simple Gate –CMOS Logic Structures –Clocking Strategies –I/O Structures –Low Power Design.

UNIT IV SYSTEMS DESIGN AND DESIGN METHOD 9

Design Strategies CMOS Chip Design Options –Design Methods –Design Capture Tools– Design Verification –Tools –Design Economics –Data Sheets –CMOS Testing – Manufacturing Test Principles –Design Strategies for Test –Chip Level Test Techniques System Level Test Techniques –Layout Design for Improved Testability.

UNIT V CMOS SUB SYSTEM DESIGN 9

Data Path Operations –Addition/Subtraction –Parity Generators –Comparators – Zero/One Detectors –Binary Counters –ALUs –Multiplication –Shifters –Memory Elements – Control FSM –Control Logic Implementation.

TOTAL : 45 PERIODS

TEXT BOOKS

1. Nell H. E. Weste and Kamran Eshraghian, "Principles of CMOS VLSI Design", 2nd Edition, Addison Wesley, 1998.
2. Jacob Backer, Harry W. Li and David E. Boyce, "CMOS Circuit Design, Layout and Simulation", Prentice Hall of India, 1998.

EX9012 PLANNING & MANAGEMENT OF ELECTRONICS INDUSTRIES L T P C 3 0 0 3

UNIT I DATA PROCESSING IN ELECTRONICS INDUSTRY 10

Need & utility of market research for the electronics products, Data types: Primary and secondary, Data collection methods: Dictated material, Questionnaire, observation & interview, Telephone messages, document, Sampling techniques, Data analysis techniques, Classifying information: alphabetically, Numerically, Chronologically, by subject, department or product.

UNIT II PROJECT PLANNING 8

Setting of new project, generation of alternative solutions, Evaluating the proposal, Feasibility report, Defining project plan, project report, registration procedure, Various catalyst organization, Raising finance, source of finance, finance proposal, assistance through SIDB, State government, IDBI etc, Strategic planning, system strategy, equipment acquisition, Developing the infrastructure, upgrading existing system.

UNIT III PLANNING OF NEW ELECTRONICS INDUSTRY 8

Management concepts, planning, organizing, staffing, direct, co-ordination, control as applied to electronics industry, Environmental effects. Financial crises & their remedies, sales crises & their remedies, report preparation, import ants of codification, Types of codes. Management report preparation, input & output forms, validation & data dictionary.

UNIT IV MARKETING STRATEGY AND MANAGEMENT 7

Marketing its strategy, product, packaging and new product development and pricing methods, promotion through advertising, Sales promotion, personal selling, publicity, distribution network for industrial product, export planning & management of electronics products.

UNIT V QUALITY MANAGEMENT IN ELECTRONICS INDUSTRY AND OPTIMIZATION TECHNIQUES 12

ISO certification series, TQM, Kaizen, Modern concepts of quality management, Customer satisfaction, Productivity, etc Assignment problems, Transportation problems, Optimal solutions, Simplex method, minimization & maximizations by simplex method, Criticle path method and PERT.

TOTAL : 45 PERIODS

REFERENCES

1. Principle and Practical of Management.
2. Entrepreneurship and small-scale industries.
3. Marketing Management
4. Research Methodology
5. operation research