BHARATHIAR UNIVERSITY, COIMBATORE
Scheme of Examination (CBCS PATTERN)
M.Sc. Electronics and Communication Systems
(Effective from the academic Year 2010-2011)

Semester	*Study Components*	*Course title*	*Ins. hrs/ week*	*Examination*				*Credit*
				Dur.Hrs	*CIA*	*Univer. Marks*	*Total Marks*	
I	*Paper I*	*Instrumentation and Control Systems*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper II	*MEMS and Power Electronics*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper III	*8051 Micro Controller with C Programming*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper IV	*Telecommunication and Fiber Optics*	*4*	*3*	*25*	*75*	*100*	*4*
	Practical I	*Electronics and Communication Systems Lab*	*5*	-	-	-	-	-
	Practical II	*Embedded Systems and Real Time Operating Systems Lab*	*5*	-	-	-	-	-
	Elec. Paper I		*4*	*3*	*25*	*75*	*100*	*4*
II	*Paper V*	*Signals and Systems*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper VI	*Wireless Communications and Networks*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper VII	*Embedded Systems and Real Time Operating Systems*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper VIII	*Computer Communication and Networks*	*4*	*3*	*25*	*75*	*100*	*4*
	Practical III	*Electronics and Communication Systems Lab*	*5*	*4*	*40*	*60*	*100*	*4*
	Practical IV	*Embedded Systems and Real Time Operating Systems Lab*	*5*	*4*	*40*	*60*	*100*	*4*
	Elect. Paper II		*4*	*3*	*25*	*75*	*100*	*4*
30 days industrial training in an ELECTRONICS Industry								
III	*Paper IX*	*Digital Signal Processing*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper X	*Digital Image Processing*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper XI	*VLSI Design and VHDL Programming*	*4*	*3*	*25*	*75*	*100*	*4*
	Paper XII	*Nano Science and Technology*	*4*	*3*	*25*	*75*	*100*	*4*
	Practical V	*DSP AND DIP Lab*	*5*	*4*	*40*	*60*	*100*	*4*
	Practical IV	*VLSI Lab*	*5*	*4*	*40*	*60*	*100*	*4*
	Elect.Paper III		*4*	*3*	*25*	*75*	*100*	*4*
IV	*Project*	*Project work and Viva-voce*	*10*	-	-	*250**	*250*	*10*
	Elective : Practical		*5*	*4*	*40*	*60*	*100*	*4*
Total							*2250*	*90*
** Project report – 200 marks; Viva voce- 50 Marks*								

List of Group Elective papers (Colleges can choose any one of the Group papers as electives)

	GROUP A	*GROUP B*	*GROUP C*
Paper I/ Sem I	*Web Technologies*	*Electronic Test Instruments*	*Basic VLSI Design*
Paper II/Sem II	*Relational Data Base Management Systems*	*Analytical Instrumentation*	*ASIC Design*
Paper III/Sem III	*LINUX and Shell Programming*	*Virtual Instrumentation*	*VLSI Design Using Verilog*
Paper IV/Sem IV	*RDBMS and LINUX Lab*	*Instrumentation Lab*	*VLSI System Design Lab*

SEM – I Core Paper – I

INSTRUMENTATION AND CONTROL SYSTEMS

Subject Description: This course presents the concept of Instrumentation and basic principles involved in the control systems. It contains the different types of transducers and digital instruments.

Goals : To enable the students to learn the fundamentals of Instrumentation and control systems and its application scenarios.

Objectives : After successful completion of the course, the students should have
Understood Instrumentation, digital meters and measurements.
Understood the concept of Control systems and its usage in Instrumentation.
Learnt the compensation techniques in the Control systems

Contents :

UNIT I DIGITAL INSTRUMENTS

Digital Multimeter – Digital frequency meter – Digital measurement of time - Digital measurement of mains frequency – Digital taco meter – Digital phase meter – Digital capacitance meter.

UNIT II TRANSDUCER AND MEASUREMENT

TRANSDUCER: Resistive transducer- Inductive transducer –Capacitive transducer – Load cell- Piezoelectric – Photo electric transducers – Temperature transducer.

MEASUREMENT: Measurement of Linear Displacement using LVDT –Measurement of rotary displacement using RVDT – Hall Effect Principle, operation and application – Optical encoders.

UNIT III CONCEPTS OF CONTROL SYSTEM

Introduction – Open and Closed Loop Systems – Examples – Elements of closed loop systems – Linear and Nonlinear system - Effect of feedback on Overall gain, Stability, Sensitivity and Noise – Analysis of Physical system: Electrical and Thermal system – Transfer function of closed loop system – Block diagram algebra and reduction – Signal flow graphs – Mason's gain formula – fuzzy logic- case study: washing machine control.

UNIT IV TIME RESPONSE ANALYSIS & STABILITY IN TIME AND FREQUENCY DOMAIN

First order system: Impulse and Step input analysis – Second order system analysis – Study state error – Stability Analysis: Routh Hurwitz Criterion – Root locus method – Construction and Application - Nyquist Stability Criterion – Bode diagrams – Polar plot.

UNIT V COMPENSATION TECHNIQUES

Principles of PI, PD and PID compensation – Cascade and feedback compensation, lag, lead, lag-lead Compensation. Design of cascade compensators – Using Bodes's plot.

TEXT BOOKS

1. "Modern Control Engineering" Katsuhiko. Ogata. Pearson Education Asia, Fourth edition, 2002
2. "Automatic Control Systems" BENJAMIN C.KUO, PHI, 1995
3. "Automatic Control Systems" S.N.VERMA, Khanna Publisher, 1999
4. "Electronic Instrumentation " H.S.KALSI, TMH - 2nd Edition, 2002.
5. " A Course in Electrical and Electronic Measurements & Instrumentation " A.K.SAWHNEY, Dhanpat Rai Publication

SEM – I Core Paper – II

MEMS AND POWER ELECTRONICS

Subject Description: This course presents the overview and working principles of MEMS, fabrication and Microsystems design, AC voltage controller, D.C choppers, Inverters and Power supplies.

Goals : To enable the students to learn the techniques and working principles of microsystems and to study the different types of Power electronic circuits and their applications.

Objectives : After successful completion of the course, the students should have
Understood the concept of Microsystem fabrication & design
Understood Power electronic devices, circuits and its applications.

Contents :

UNIT I: OVERVIEW AND WORKING PRINCIPLES OF MEMS

MEMS and Microsystems – Typical MEMS and Microsystems products – Microsystems and Microelectronics –Miniaturization – Applications of Microsystems –Micro sensors, Microactuation, Micro grippers, Micro motors, Micro accelerometer.

UNIT II: FABRICATION & MICROSYSTEM DESIGN

Ions and Ionization – Doping – Diffusion process – Scaling Laws for Electrical design – Substrate and wafers – Silicon as a substrate – Silicon compounds – Piezoresistors – Piezocrystals - Photolithography – Ion implantation – Diffusion – Oxidation – PVD – Etching – Surface micromaching – LIGA process - Microsystem Design Considerations – Use of CAD tool in Microsystems design.

UNIT III: POWER ELECTRONIC DEVICES & CIRCUITS

Review of operations: SCR, TRIAC, DIAC, IGBT, Power Diodes, MOSFET and UJT.

Thyristor communication techniques: Introduction – Natural commutation –Forced commutation – Self commutation – Impulse commutation – Response pulse commutation – External pulse commutation – complementary commutation.

Controlled Rectifiers: Principle of Phase controlled converter – Single-Phase full converter – Single-phase semi converter – Principle of Three phase half wave converter.

UNIT IV: AC VOLTAGE CONTROLLER AND DC CHOPPERS

AC Voltage Controller: Introduction – Principle of On / Off Control – Principle of Phase Control – Single Phase Bi-Directional Controllers with Resistive Loads - Cyclo Converters – Single Phase Cyclo converters**.**

DC Choppers: Introductions – Principles of Step down Operation – Step down With RL load – Principle of Step up Operation-Switch Mode Regulators: Buck Regulator – Boost Regulator – Buck Boost Regulator – Cuk Regulator.

UNIT V: INVERTERS AND POWER SUPPLIES

Inverters: Introduction – Principle of Operation – Single Phase Bridge Inverter – Three-Phase Inverter –PWM voltage control.

Power Supplies: Introduction – DC Power Supplies – Switched Mode DC Power Supplies (SMPS) – AC Power Supplies – UPS- AC & DC static switches –static circuit breaker - A.C & D.C Solid state relays.

TEXT BOOKS

1. "MEMS & Micro Systems Design and Manufacture" – Tai-Ran-Hsu, TMH, 2002 Edition.
2. "Power Electronics, Circuits, devices and Applications", MUHAMMED RASHID, Prentice Hall Edition, 2nd Edition, 1999.
3. "Power Electronics" by Bimbra, Anna University –Reference book.

SEM – I Core Paper – III

8051 MICROCONTROLLER WITH C PROGRAMMING

Subject Description : This subject presents the architecture, Programming in ALP & C and real world applications of the 8051 microcontroller.

Goals : To enable the students to learn the instruction set, programming, and interfacing concepts of microcontroller.

Objectives : On successful completion of the course the students should have :

Developed the programming skills in 8051ALP & C

Understood the concept of 8051microcontroller based system design

Contents :

UNIT I : OVERVIEW AND INSTRUCTION SET

Microcontrollers and embedded processors – microcontrollers for embedded systems – over view of 8051 family – 8051 instruction set and registers

UNIT II : ASSEMBLY PROGRAMMING ADDRESSING MODES

8051 assembly programming – program counter – ROM – data types – directives – flag bits – PSW registers – register bank – stack – loop and jump instructions – I/O port programming – addressing modes

UNIT III : ARITHMETIC AND LOGICAL OPERATIONS IN ALP & C

Arithmetic instructions and programs – unsigned addition and subtraction – unsigned multiplication and division – logic instructions and programs – single bit instructions and programming

Programming with C : Data types – time delay programming – I/O programming – logic operations – arithmetic operations

UNIT IV : 8051 INTERRUPTS & PERIPHERALS

Basic registers of timer – programming of 8051 timer – counter programming – 8051 serial communication – 8051 connection to RS232 – 8051 serial communication programming – programming timer interrupts – 8051 interrupts – programming external hardware interrupts – programming with serial communication interrupts – peripheral and interrupt programming in C

UNIT V : REAL WORLD APPLICATIONS

LCD Interfacing – keyboard interfacing – parallel and serial ADC interfacing – DAC interfacing – sensor interfacing and signal conditioning – RTC interfacing – relays and optoisolator interfacing – stepper motor interfacing - DC motor interfacing and PWM

TEXT BOOK

1. "THE 8051 MICROCONTROLLER AND EMBEDDED SYSTEMS USING ASSEMBLY AND C " by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, PHI, 2nd edition 2006

SEM – I Core Paper – IV

TELECOMMUNICATION AND FIBER OPTICS

Subject Description: This course presents the telecommunication transmission system, digital switching system, transmission networks, and fiber optic communications.

Goals : To enable the students to learn telecommunication switching systems and fiber optic communication systems.

Objectives : After successful completion of the course ,the students should have
Understood the concept of telecommunication switching system
Understood the concept of optical fiber communication systems.

Contents :

UNIT I: TELECOMMUNICATION AND TRANSMISSION SYSTEMS

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

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

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

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

UNIT V: OPTICAL FIBER COMMUNICATION

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.

TEXT BOOKS

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

SEM – II Core Paper –V

SIGNALS AND SYSTEMS

Subject Description: This course presents the basic principles of signals & systems, transforms and its properties, sampling of CT and DT signals.
Goals : To enable the students to learn the basic principles, operations and concepts of signals and systems.
Objectives : After successful completion of the course ,the students should have
Understood the concept of signals and systems.
Learnt the applications of transforms and its properties.
Learnt the Sampling of CT and DT signals.

Contents :

UNIT I: INTRODUCTION
Continuous Time (CT) and Discrete Time (DT) signals – classification of CT and DT signals – Basic CT and DT signals – Signal Operations – Representation of signals by impulses

UNI II : CONTINUES TIME & DISCRETE TIME SYSTEMS
Properties – Linear Time Invariant (LTI) system – Linear Shift Invariant(LSI) systems - Properties – Continuous and discrete convolution – CT systems representation by differential equations – DT systems representation by differential equations.

UNIT III: FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS
Fourier series analysis of periodic signals – properties of Continuous Time Fourier series (CTFS)– Convergence of CTFS - Representation of periodic signals by Continuous time Fourier transform (CTFT) – properties of CTFT– Convergence of CTFT – Frequency response of systems characterized by differential equations.

UNIT IV: FOURIER ANALYSIS OF DT SIGNALS AND SYSTEMS
Fourier series representation of DT periodic signals (DTFS) – Properties of DTFS - representation of aperiodic signals by DTFT – properties of the DTFT – Frequency response of systems characterized by differential equations.

UNIT V : SAMPLING, LAPLACE TRANSFORM & Z TRANSFORMS

Sampling: Introduction – sampling theorem – reconstruction of a signal from its samples using interpolation – Aliasing – DT processing of a CT signal – sampling of DT signals

Laplace Transform: Introduction – Laplace transform – region of convergence for LT – Inverse Laplace Transform – properties of Laplace transform

Z Transform: Introduction – z-transform – region of convergence for z-transform – Inverse z-Transform – properties of z-Transform

TEXT BOOK

1. Alen V Oppenheim Alen S. Wilsky and Hamid Nawab S "Signals and Systems", second Edition, PHI, New Delhi, 1997

REFERENCES:

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

SEM – II Core Paper – VI

WIRELESS COMMUNICATIONS AND NETWORKS

Subject Description: This course presents the encoding techniques, coding methods, satellite communication, cellular communication and wireless LANs.
Goals : To enable the students to learn the technology of wireless communication and networks.

Objectives : After successful completion of the course ,the students should have
Understood the concept of encoding techniques.
Understood the concept of satellite and cellular networks.
Learnt wireless LAN technology.

Contents :

UNIT I: TECHNOLOGY AND SIGNAL ENCODING TECHNIQUES

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

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
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
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
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.

TEXT BOOKS
1. "WIRELESS COMMUNICATIONS AND NETWORKS" by WILLIAM STALLINGS – 2002 – PEARSON EDUCATION ASIA

SEM – II Core Paper – VII

EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS

Subject Description : This subject presents the architecture & Programming of PIC16F877 microcontroller, and Micro C/OS-II RTOS functions.

Goals : To enable the students to learn the instruction set, programming, and interfacing concepts of PIC16F877 microcontroller and RTOS based system design.

Objectives :
On successful completion of the course the students should have :
Developed the programming skills in PIC16F877 microcontroller.
Understood the concept the RTOS.
Understood the concept embedded system design

Contents :

UNIT I: INTRODUCTION TO EMBEDDED SYSTEMS
Definition and classification – Overview of microprocessor, Microcontroller, and DSP – exemplary high performance processors – CISC and RISC architecture – hardware unit in an

embedded system- software embedded into a system – exemplary applications – embedded systems on a chip and in VLSI circuit

UNIT II: PIC 16F87X MICROCONTROLLERS

Device overview – architecture – memory organization – status register – option register – INTCON register – PCON register – I/O ports – data EEPROM – instruction set: Byte oriented operations – Bit oriented operations – Literal and Control operations

UNIT III: PERIPHERAL FEATURES OF 16F87X MICROCONTROLLERS

TIMER0 Module – TIMER1 Module – TIMER2 Module – Capture/Compare/PWM Modules – I2 C transmission and reception – USART – ADC Module - Special features of the CPU : oscillator selection – power on reset – power up timer – oscillator start up timer – brown out reset – interrupts – watchdog timer – SLEEP

UNIT IV: REAL TIME OPERATING SYSTEMS

Definitions of process, tasks, and threads – Operating system services – goals – structures- kernel – process management – memory management – device management – file system organization and implementation – I/O sub systems – interrupt routine handling in RTOS – RTOS task scheduling models – handling of task scheduling – latency – deadlines – round robin scheduling – cyclic scheduling – preemptive – critical session – static real time scheduling – IPC and synchronization – use of semaphore – priority inversion – deadlock – IPC using signals – mutex-flag- message queues – mailboxes – pipes- virtual sockets – remote procedure calls

UNIT V: RTOS Programming Tools: Micro C/OS-II and Vxworks

Study of Micro C/OS-II – VxWorks – other popular RTOS – RTOS system level functions – task service functions – time delay functions – memory allocation related functions – semaphore related functions – mailbox related functions – queue related functions case studies of programming with RTOS – understanding case definition - multiple tasks and their functions – creating a list of tasks- functions and IPCs – exemplary coding steps

TEXT BOOKS

1. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint, 2003.
2. PIC 16F87X data book, Microchip Technology Inc., 2001

SEM – II Core Paper – VIII

COMPUTER COMMUNICATION AND NETWORKS

Subject Description: This subject presents data communication, various standards in networks with architectures and protocols.

Goals : To enable the students to learn the computer networks for today's needs.

Objectives : After successful completion of the course ,the students should have
Understood the concept of data communication
Developed their skills in networking

Contents :

UNIT I: DATA COMMUNICATION

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

Layered Architecture – OSI model –functions of layers – Data link control protocols – ARQ-Stop 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

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

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

UNIT V: UPPER OSI LAYERS

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

TEXT BOOK

1. “DATA COMMUNICATION AND NETWORKING” BEHROUS. A.FOROUZAN, 2ND EDITION, TATA MCGRAW HILL, 2000.

REFERENCE BOOKS

1. “ISDN – Concepts, Facilities and Services” GARY C. KESSLAR 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.

PRACTICAL – I

ELECTRONICS & COMMUNICATION SYSYEMS LABORATORY

ELECTRONICS lab

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

COMMUNICATION SYSTEMS lab

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

PRACTICAL – II

EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS 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

SEM – III Core Paper – IX

DIGITAL SIGNAL PROCESSING

Subject Description: This course presents the basic principles of processing of digital signals and its applications, design of discrete filters and its concepts.

Goals : To develop the students to learn the new techniques, solutions and a demand for knowledgeable communication professionals who have a firm grasp of the background theory and technologies.

Objectives : After successful completion of the course ,the students should have

Understood essential grounding in signal processing
Learnt the uses of DSP in satellite and communication technologies.
Recognized the future trends in DSP

Contents :

UNIT I: STRUCTURES FOR DISCRETE TIME SYSTEMS
Introduction – block diagram and signal flow graph representation of Linear co-efficient difference equation – basic structure for IIR system – basic network structures for FIR systems – Lattice structures – zero input cycles in fixed point realization of IIR digital filters

UNIT II: COMPUTATION OF DISCRETE FOURIER TRANSFORM
Introduction – efficient computation of DFT – Decimation in Time FFT algorithms – Decimation in Frequency algorithms – implementation of FFT algorithms – FFT algorithms for composite N

UNIT III: FILTER DESIGN TECHNIQUES
Introduction – design of discrete time IIR filters from continuous time filters – frequency transformation of low pass IIR filters – design of FIR filters by windowing – comments on IIR and FIR digital filters

UNIT IV: ANALYSIS OF FINITE WORD LENGTH EFFECTS
Introduction – quantization process and errors – analysis of co-efficient quantization effects – analysis of co-efficient quantization effects in FIR filters – A/D conversion noise analysis – low sensitivity digital filters – limit cycle in IIR filters – round of errors in FFT algorithms

UNIT V: DIGITAL SIGNAL PROCESSOR
TMS320C50 family overview – key features – architectural overview – functional block diagram – internal memory organization – CALU – system control – PLU – interrupts – addressing modes – Instruction set

TEXT BOOKS

1. P. Ramesh babu, “Digital signal processing”,2nd edition-Scitech publication.
2. John G.Proakis, Dimitris G. Manolakis, D.Sharma, “Digital signal processing principles, Algorithms, and Applications” –Pearson Education, 2006.
3. Oppenheim A. V and Schaffer RW, Buck C “Discrete Time Signal Processing”, PHI, 1999.
4. Andreas Antoniou, “Digital signal processing” Tata McGraw Hill Publication, edition 2006.
5. TMS 320C5X users guide, Texas instruments, 1993.
6. TMS320C67x/C67x+ DSP CPU and Instruction Set - Reference Guide.

SEM – III Core Paper – X

DIGITAL IMAGE PROCESSING

Subject Description: This course presents the fundamentals of Digital Image Processing and image transforms, image enhancement and image encoding, analysis and computer version.

Goals : To enable the students to learn the basic principles of Image processing and analysis and computer vision of image.

Objectives : After successful completion of the course ,the students should have
Understood essential grounding in "Image processing"
Learnt the uses and wide range of application scenarios.

Contents :

UNIT I: DIGITAL IMAGE FUNDAMENTALS

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

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

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

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

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.

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

SEM – III Core Paper – XI

VLSI DESIGN AND VHDL PROGRAMMING

Subject Description: This course presents the fundamentals of IC fabrication and VHDL Programming.
Goals : To develop the students to learn the basic steps involved in the IC fabrication and modeling techniques using VHDL.
Objectives : After successful completion of the course ,the students should have
.Understood the concept of IC fabrication technology.
Developed the programming skills in VHDL
Learnt the Design of FPGA's and CPLD.

Contents :

UNIT I: INTRODUCTION AND BAISC CONCEPT OF VHDL
History of VHDL – capabilities of VHDL – hardware abstraction – basic terminology – entity declaration - architecture body declaration – Basic language elements – identifiers – Data objects– Data type operators.

UNITII: BEHAVIORAL MODELING TECHNIQUES OF VHDL
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.

UNITII: DATA FLOW & STRUCTURAL MODELING TECHNIQUES OF VHDL
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

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

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.

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

SEM – III Core Paper – XII

NANO SCIENCE AND TECHNOLOGY

UNIT I : INTRODUCTION AND CLASSIFICATION

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

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 self-organisation – Preparation, safety and storage issues.

UNIT III : GENERIC METHODOLOGIES FOR NANOTECHNOLOGY

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 : NANOELECTRONICS AND INTEGRATED SYSTEMS

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

UNIT V : NANODEVICES AND APPLICATIONS

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, colulomb blockade devices.

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).

SEM – III Core Practical – III

PRACTICAL – III

DSP and DIP LABORATORY

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

SEM – III Core Practical – IV

PRACTICAL – IV
VLSI LABORATORY

1. Design and implementation of logic gates
2. Design and implementation of half adder & full adder
3. Design and implementation of half subtractor & full subtractor
4. Design and implementation of Encoder & decoder
5. Design and implementation of 4 bit & 8 bit multiplexer
6. Design and implementation of flip flops
7. Design and implementation of up/down counters

8. Design and implementation of shift register
9. Design and implementation of ALU
10. Design and simulation of Programmable Logic Array
11. Design and simulation of Traffic light Controller
12. Design and simulation of Real time clock
13. USART Implementation
14. State machine – Eg. Moore model

GROUP A ELECTIVE SEM - I

PAPER I : WEB TECHNOLOGIES

Subject Description: This course presents the concept of internet, web technology and security issues.
Goals : To enable the students to learn web technology for information management.
Objectives : After successful completion of the course ,the students should have
Understood the concept of internet
Understood the concept of web technologies.
Developed the skills for information management.
Contents :

UNIT I

Internetworking concepts – Devices: Repeaters – Bridges – Routers – Gateways – Internet topology Internal Architecture of an ISP – IP Address – Basics of TCP – Features of TCP – UDP.

UNIT II

DNS – Email – FTP – HTTP – TELNET- Electronic commerce and Web technology – Aspects – Types – E-procurement models – Solutions – Supply chain management – Customer Relationship Management – Features Required for enabling e-commerce –Tiers – Concepts of a Tier

UNIT III

Web page – Static Web pages – Dynamic Web pages – DHTML – CGI – Basics of ASP technology – Active Web pages - User Sessions: Sessions and session Management – Maintaining state information - Transaction Management: Transaction Processing monitors – object Request Brokers – Component transaction – monitor – Enterprise Java Beans.

UNIT IV

Security issues: Basic concepts – cryptography – Digital signature – Digital certificates – Security Socket Layer (SSL) – Credit card Processing Models – Secure Electronic Transaction –

3D Secure Protocol – Electronic money. Electronic Data Interchange: Overview of EDI – Data Exchange Standards – EDI Architecture – EDI and the Internet

UNIT V

Extensible Markup Language (XML) – Basics of XML – XML Parsers – Need for a standard – Limitations of Mobile Devices – WAP Architecture – WAP stack – Object Technology.

TEXT BOOK

1. Achyat.S.Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill Pub. Co, Delhi, 2006.

REFERENCES

1. Ellote Rusty Harold, "Java Network Programming", O'Reilly Publications, 1997.
2. Jason Hunter, William Crawford, "Java Servlet Programming", O'Reilly Publications, 1998.

GROUP A ELECTIVE SEM - II

PAPER II : RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Subject Description: This course presents the background of SQL, object relational Databases, and application of RDBMS.

Goals : To enable the students to learn the concept of Database management, Information systems, and its and applications.

Objectives : After successful completion of the course ,the students should have
Understood the concept of RDBMS
Developed the skills in Database management

Contents :

UNIT I : INTRODUCTION

Purpose of Database systems- View of Data-Data Models-Database Languages-Transaction Management-Storage Management Database Administrator- Database Users-System Structure. **ENTITY Relationship Model:** Basic concepts-keys-Entity Relationship Diagram, Weak Entity sets, E-R Features. **Data Modeling and Normalization**: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams - Denormalization – Another Example of Normalization.

UNIT II : ORACLE TABLES

DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table.

UNIT-III: WORKING WITH TABLE: DATA MANAGEMENT AND RETRIEVAL
DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records -restricting Data with WHERE clause –Sorting – **Functions and Grouping**: Built-in functions –Grouping Data.

UNIT-IV: MULTIPLE TABLES:
Join & Set operators- Join-set operators. **Sub queries:** Sub query-EXIST and NOT EXIST operators. **PL/SQL: A Programming Language:** Block Structure –Comments – Data Types – – Variable Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators.

UNIT V: CONTROL STRUCTURES AND EMBEDDED SQL
Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation in PLSQL .**PL/SQL Cursors and Exceptions:** Cursors-Type of Cursors-Cursors Variables-Exceptions. Triggers.

TEXT BOOK
Abraham Silberschatz, Henry F.Korth,S.Sudharson, "Database Concepts", Tata McGraw Hill International Editions-1997.

Reference Books:
1. Alexis Leon and Mathews Leon,"Database Management Systems"Vikas pub
2. Elmasri Navathw, "Fundamentals of Database Systems", Pearson Education pub, 3rd Edition 2001.

GROUP A ELECTIVE SEM - III

PAPER III: LINUX & SHELL PROGRAMMING

UNIT I: WELCOME TO LINUX
Overview of LINUX-Additional Features in LINUX .**The LINUX Operating System:** Logging In-Working with the shell.

UNIT II: LINUX SYSTEM START UP & SHUTDOWN
Introduction Brief outline of X86 LINUX booting process. **System Logging:** Logging – Accounting-Available Graphical Tools.

UNIT III: FILE FILTERS
File Related Commands-Introduction to Piping –Some other means of joining commands- awk commands.

UNIT IV: SHELL PROGRAMMING
Introduction-programming constructors. **The Shell:** Command line-Standard Inputs & Standard output-Filename Generation/pathname expansion.

UNIT V: THE VIM EDITOR
Introduction to Vim features-Command Mode: Moving the cursor-Deleting & changing text - Input mode. **Computing C & C++ Programs under LINUX:** Introduction to C Compiler-

Computing a Multi source C Program-How main is executed on LINUX-Compiling single source C++ Program

Text Book

1. Mark G. Sobell, "**A Programming Guide to LINUX Commands, Editors and shell programming**", Pearson Education (Unit I,2nd Half Unit IV,1st half Unit V)
2. N.B. Venkateswarlu," **Introduction to LINUX: Installation and Programming** BS Publications (Unit II,III,Ist half Unit IV, 2nd Half Unit V)

GROUP A ELECTIVE: SEM - IV

PRACTICAL: RDBMS AND LINUX LABORATORY

RDBMS LABORATORY

1. Creating Tables and writing simple Queries using
a) Comparison Operators, b) Logical Operators, c) Set Operators, d) Sorting and Grouping

2. Creation of Reports using Column format

3. Writing Queries using built in functions

4. Updating and altering tables using SQL.

5. Creation of Students Information table and write PL/SQL Block find the Total, Average marks and Results.

6. Write a PL/SQL block to prepare the Electricity Bill.

7. Splitting the table: Write a PL/SQL block to split the students information table into two, one with the Passed and other failed.

8. Joining the Tables-Write a PL/SQL Block to join two tables, First table contain Roll Number, Name, Total and Second Table contains the Roll. No and Address.

9. Create a Database Trigger to check the data validity of Record.

10. Recursive Functions write a Recursive Function to find a) Factorial of N

b).Fibonacci Series with N terms.

11. Write a Recursive function to create as sequence of Roll nos using sequence.

12. Write a Database Trigger to implement the Master Detail Relationship.

13. Front and tools.

14. High level programming language extension

15. Menu Design.

16. Data definition, Manipulation of base tables and views.

LINUX LABORATORY

1. Write a Shell script to Wish the User according to Present Time.(i.e GOOD MORNING,GOOD AFTERNOON etc)
2. Write a shell program to print the sum of all digits
3. Write a shell program which informs as soon as a specified user whose name is given along the command line is logged into the system
4. Write a shell program to print the following series

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
6 6 6 6 6 6
```

5. Write a shell program which takes a source file name & directories names as command line arguments & print the message.
6. Write a shell script which removes empty files from PWD & changes other file time stamps to current time
7. Write a shell program which reads a digit & prints its BCD code
8. Write a shell program which reads a filename along the command line & prints frequency of the occurrence of words
9. Write shell script to see current date time username & current directories.
10. Write script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument

GROUP B ELECTIVE SEM – I

PAPER I : ELECTRONIC TEST INSTRUMENTS

UNIT I ANALOG METERS

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

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

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

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

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.

TEXT BOOKS

1.Albert D. Herlfrick & 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,

GROUP B ELECTIVE SEM – II

PAPER II : ANALYTICAL INSTRUMENTATION

Unit 1: Colorimetry And Spectrophotometry

Special methods of analysis- Beer-Lambert law-colorimeters - UV-ViS spectrophotometers-Single and double beam instruments-Sources and detectors-IR Spectrophotometers-Types-

Attenuated total reflectance flame photometers- Atomic absorption spectrophotometers-sources and detectors-FTIR spectrophotometers-Flame emission photometers.

Unit 2: Chromotography

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

Unit 3: Industrial Gas Analyzers and Pollution Monitoring Instruments

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 4: pH Meters and Dissolve Component Analyzers

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

UNIT 5: Radio Chemical and Magnetic Resonance Techniques

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.

Text Books:

1.R.S.Khandpur,"Handbook of Analytical Instruments"Tata Mc Graw Hill publishing Co. Ltd.2003.
2.H.H.Willard, L.L.Merrit, 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,"Prinicples of Instrumental Analysis" Harper and Row publishers, 1974.

GROUP B **SEM – III**

PAPER III : **VIRTUAL INSTRUMENTATION**

UNIT I : INTRODUCTION

General functional description of a digital instrument - Block diagram of a Virtual Instrument - Physical quantities and Analog interfaces - Hardware and Software - User interfaces - Advantages of Virtual instruments over conventional instruments - Architecture of a Virtual instrument and its relation to the operating system

UNIT II : SOFTWARE OVERVIEW

LabVIEW - Graphical user interfaces - Controls and Indicators - 'G' programming - Labels and Text - Shape, Size and Color - Owned and free labels - Data type, Format, Precision and representation - Data types - Data flow programming - Editing - Debugging and Running a Virtual instrument - Graphical programming palettes and tools - Front panel objects - Functions and Libraries.

UNIT III : PROGRAMMING STRUCTURE

FOR loops, WHILE loops, CASE structure, formula nodes, Sequence structures - Arrays and Clusters - Array operations - Bundle - Bundle/Unbundle by name, graphs and charts - String and file I/O - High level and Low level file I/O's - Attribute modes Local and Global variables. **OPERATING SYSTEM AND HARDWARE OVERVIEW:** PC architecture, current trends, Operating system requirements, Drivers – Interface Buses – PCI Bus – Interface cards – specification – Analog and Digital interfaces – Power, Speed and timing considerations.

UNIT IV : HARDWARE ASPECTS

Installing hardware, Installing drivers - Configuring the hardware - Addressing the hardware in LabVIEW - Digital and Analog I/O function - Data Acquisition - Buffered I/O - Real time Data Acquisition.

UNIT V : LABVIEW APPLICATIONS

IMAQ - Motion Control: General Applications - Feedback devices, Motor Drives - Instrument Connectivity - GPIB, Serial Communication - General, GPIB Hardware & Software specifications - PX1 / PC1: Controller and Chassis Configuration and Installation.

TEXT BOOKS:

1. Garry M Johnson, "Labview Graphical Programming", Tata McGraw Hill, New Delhi, 2nd Edition, 1996.
2.Robert H.Bishop,"Learning with Lab-View" Prentice Hall, 2003.
3. Labview : Basics I & II Manual, National Instruments, 2005.

REFERENCES :

1. Lisa K Wells, "Labview for Everyone", Prentice Hall of India, New Delhi, 1996.
2. Barry Paron, "Sensor, Transducers and Labview", Prentice Hall, New Delhi, 2000.

GROUP B ELECTIVE SEM – IV

PRACTICAL : INSTRUMENTATION LAB

Any Five of the following

1. Simple fault finding of pH meters and Identification different type pH electrodes.
2. Displacement measurement using LVDT
3. Design of V-F and F-V converter
4. Instrumentation amplifier
5. Study of Strain gauges.
6. Thermocouple Compensation.
7. Thermistor Linearization transmitter design.
8. Pressure Calibration.
9. Signal conditioning circuit for any resistive / pressure transducer.
10. Signal conditioning circuit for optical encoder.

Any Five of the following using Lab View

1. Creating a simple VI to place a Digital Control
2. Navigation and Editing
3. VI to make a Degree C to Degree F Converter
4. Converting VI in to Sub VI
5. Write a programme to count Modulus 32 and display the values in decimal, octal decimal and Binary.
6. Built a VI using *while loop* that displays random numbers in to three wave form charts. (Strip, scope & Sweep)
7. Data Acquisition using Lab VIEW
8. Development of Temperature Measurement using Lab VIEW
9. Development of Virtual Instrument for Function Generator using Lab VIEW
10. Development of Virtual Instrument for Audio Signal Spectrum Analyser using Lab VIEW

GROUP C ELECTIVE : SEM – I

PAPER I: BASIC VLSI DESIGN

UNIT I: INTRODUCTION TO MOS TECHNOLOGY

Introduction to IC technology – the IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement mode transistor action – Depletion mode transistor action – nMOS fabrication – CMOS fabrication – Thermal aspects of processing – BiCMOS technology – production of E-beam masks.

UNIT II: MOS AND BI CMOS CIRCUIT DESIGN PROCESSES

MOS Layers – Stick diagrams – Design Rules and layout – General observations on the design rules – 2µm double metal, double poly – CMOS/ Bi CMOS rules – 1.2 µm single metal, single poly. CMOS rules – Layout diagrams – A brief introduction – Symbolic diagrams – Translation to mask form

UNIT III: BASIC CIRCUIT CONCEPTS

Sheet resistance concept applied to MOS transistor and invertors - Area capacitances of layers – Standard unit of capacitance Cg – Standard unit of capacitances calculation – The delay unit – inverter delays – Driving large capacitance loads – Propagation delay – Wiring capacitances.

UNIT IV: SCALING OF MOS CIRCUITS

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

UNIT V: SUBSYSTEM DESIGN AND LAYOUT

Some architectural issues Switch logic – Gate (Restoring) Logic – Examples of structured design (Combinational logic) – Some Clocked sequential circuits – Other System considerations.

Text Book:

1. Douglas A. Punknell and Kamran Eshraghian , "Basic VLSI Design" Eastern Economy Edition, III Edition.

GROUP C ELECTIVE: Sem –II

PAPER II: ASIC DESIGN

UNIT I: INTRODUCTION TO ASIC

ASIC Design – Introduction- ASIC Examples- Advantages – Types- Full custom ASIC, Semi – Custom ASIC – Standard cell – Based ASIC – GATE Array – based ASIC, -Channels gate array- Structured gate array – Field –Programmable Gate array- Programmable logic devices structure –PALs –PLDs – Programming of PALs – EPROM and EEPROM Technology – Plalsm- Programmable interconnect - Programmable Gate array – ASIC design flow

UNIT II: PROGRAMMABLE ASICS, PROGRAMMABLE ASIC LOGIC CELLS AND PROGRAMMABLE ASIC I/O CELLS

Anti fuse- Static RAM- EPROM and EEPROM technology, PREP benchmarks- Actel ACT – Xillinx LCA – Altera FLEX – Design Systems- Logic synthesis – half gate ASIC schematic entry – Low level design language – PLA tools – ENDIF – CFI design representation.

UNIT III: II PROGRAMMABLE ASIC INTERCONNECT, PROGRAMMABLE ASIC DESIGN SOFTWARE AND LOW LEVEL DESIGN ENTRY

Actel ACT – Xillinx LCA – Xilinx EPLD – Altera MAX 5000 and 7000 –Altera MAX 9000 – Altera FLEX – Design systems – logic Synthesis – half gate ASIC Schematic entry – Low level design language – PLA Tools – ENDIF – CFI Design representation.

UNIT IV: ASIC CONSTRUCTION, FLOOR PLANNING, PLACEMENT AND ROUTING

System partition – FPGA partitioning – Partitioning methods – floor planning – placement – physical design flow – global routing – detailed routing – special routing – Circuit extraction – DRC

UNIT V: BASICS OF MICRO WIND

Introduction to micro wind – features – Analog cells – Design of resisters- Capacitors- MOS capacitor – inter – Metal capacitor-Diode – Connected MOS –Simulation layout- Voltage reference using PMOS and NMOS device- Voltage reference –Current mirror – Amplifier design – Micro wind mexus : File, View,Edit ,Simulator- Compile, Analysis,Palette,Navigator window

Text Books:

1. M.J.S. Smith ," Application – Specific integrated circuit" – Addison – Wesley Longman Inc.1997
2. Andrew Brown, -"VLSI circuits and systems in silicon" Cc Graw Hill,1991
3. S.D Brown, R.J.Francis, J.Rox , Z.G.Uransesic, " Field Programmable gate arrays" Khuever academic publisher, 1992
4. S.Y.Kung, H.J.Whilo House, T.Kailath, " VLSI and Modern Signal Processing" Prentice Hall, 1985

GROUP C ELECTIVE: Sem –III

PAPER III: VLSI DESIGN USING VERILOG

UNIT – I:

Basics: Synthesis – Design Process – Logic Value System – Verilog Constructs To Gates: Continuous Assignment Statement – Procedural Assignment Statement.

UNIT – II:

Always Statement – If Statement – Inferring Latches From If Statement – Case Statement: Casex – Casez – Inferring Latches From Cases Statement – Full Case – Parallel Case – Non Constant As Case Item Loop Statement – Functions – Tasks – Using Values X And Z – Value X And Value Z

UNIT – III:

Verilog Data Types – Nets – Register – Variables –Constants – Array Of Nets Or Registers –Verilog Operators – Arithmetic – Bitwise – Reduction –Logical –Relational –Shift Conditional – Concatenation – Expressions And Operands – Operator Precedence

UNIT – IV:

Additional Features of Verilog – Arrays of Primitives and Modules – Hierarchical Dereferencing – Parameters Substitution – Procedural Continuous – Intra Assignments – In Determinant Assignments and Race Condition – Wait Statements – Fork Join Statements – Named Events – Constructs Supported By Synthesis Tools

UNIT – V:

Modeling Examples – Modeling Combinational Logic – Modeling sequential logic – modeling a memory – writing Boolean equations – Modeling a counter – Modeling a parameterized adder – Modeling a parameterized comparator – Modeling a decoder – Modeling a multiplexer.

Text Books:

1. J.Bhasker, " VERILOG HDL SYNTHESIS, A PRACTICAL PRIMER" , BS Publication, I Indian Edition.
2. Micheal D. Ciletti, " ADVANCED DIGITAL DESIGN WITH THE VERILOG HDL " , PHI publications, Indian reprint.

GROUP C ELECTIVE: SEM - IV

PRACTICAL: VLSI SYSTEM DESIGN LAB

1. Synchronous counter
2. Asynchronous counter
3. Clock divider and generator
4. FIFO Design
5. Multiplexer design
6. Encoder
7. Decoder
8. Comparator
9. Latches and flip flops
10. ALU Design
11. Parity generator
12. UART Module
13. SPI module
14. Memory module
15. Sequence detector