BHARATHIAR UNIVERSITY, COIMBATORE

Scheme of Examination (CBCS PATTERN)

M.Sc., Electronics and Communication System

(Effective from the academic Year 2012-2013)

I	Paper I	Telecommunication and Fiber Optics	4	3	25	75	100	4
	Paper II	Instrumentation and Control Systems	4	3	25	75	100	4
	Paper III	8051 Micro Controller with C Programming	4	3	25	75	100	4
	Paper IV	MEMS and Power Electronics	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	Computer Communication 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	Simulation Programs with IC Emphasis	4	3	25	75	100	4
	Practical I	Electronics and Communication Systems Lab	5	4	40	60	100	4
	Practical II	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	MATLAB Programming	4	3	25	75	100	4
	Paper XI	VLSI Design and VHDL Programming	4	3	25	75	100	4
	Paper XII	Virtual Instrumentation	4	3	25	75	100	4
	Practical III	DSP AND VLSI Design Lab	5	4	40	60	100	4
	Practical IV	Virtual Instrumentation Lab	5	4	40	60	100	4
	Elect.PaperIII:		4	3	25	75	100	4
IV	Paper XIII	Wireless Communication and Networks	4	3	25	75	100	4
	Paper XIV	Nanoelectronics and Nanosystems	4	3	25	75	100	4
	Project	Project work and Viva-voce	--	--	40	60*	100	4
	Elective : Practical		5	4	20	30	50	2
Total							2250	90

Project report – 50 Marks; Viva voce – 10 Marks;

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

	GROUP A **INFORMATION TECHNOLOGY**	*GROUP B* ***ELECTRONIC MEDIA***	*GROUP C* ***VLSI SYSTEMS DESIGN***
Paper I/ Sem I	*Web Technologies*	*Principles of acoustics and sound engineering*	*Basic VLSI Design*
Paper II/Sem II	*Relational Data Base Management Systems*	*Applied electronics for Electronic media*	*ASIC Design*
Paper III/Sem II	*LINUX and Shell Programming*	*DigitalImage processing*	*VLSI Design Using Verilog*
Paper IV/Sem IV	*RDBMS and LINUX Lab*	*Electronic media lab*	*VLSI System Design Lab*

SEM – I Core Paper – I

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 – I Core Paper – II

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
Understand 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 TRANSDUCER AND MEASUREMENT

Transducer: Resistive transducer- Inductive transducer –Capacitive transducer – Load cell-Piezoelectric – Photo electric transducers – Temperature transducer.
Measurement: Measurement standards-Measurement of Linear Displacement using LVDT – Measurement of rotary displacement using RVDT – Hall Effect Principle, operation and application.

UNIT -II DIGITAL INSTRUMENTS

Performance Characteristics of instruments- Digital Multi meter – Digital frequency meter – Digital measurement of time - Digital measurement of mains frequency – Digital taco meter – Digital phase meter – Digital capacitance meter.

UNIT-III CONCEPTS OF CONTROL SYSTEMS

Introduction to control systems-Human elements in control systems-block diagram fundamentals-open loop control system-closed loop control systems- Linear and Nonlinear Systems- Effect of feedback on Overall gain, Stability, Sensitivity and Noise-Physical system representation: Electrical Systems and thermal system.

UNIT-IV

Introduction to Block diagrams-Block diagram reduction-Signal flow graph-Signal flow graph algebra-construction of signal flow graph from block diagram- Mason's gain formula-Time Response Analysis of First and second order systems-Steady state Error.

UNIT-V

Stability Analysis of Control System: Bode plot- Routh Hurwitz criterion-Root Locus-Nyquist Criterion- Principles of P-PI-PD-PID Controllers- Cascade and feedback compensation, lag, lead, lag-lead Compensation.

Reference:

1. H.S.KALSI, "***Electronic Instrumentation***", TMH - 2nd Edition, 2002.
2. A.K.SAWHNEY, "***A Course in Electrical and Electronic Measurements & Instrumentation***",
Dhanpat Rai Publication.
3. S.N. VERMA, "***Automatic Control Systems***", Khanna Publishers.
4. A.NAGOOR KANI, "***Control Systems***", RBA Publications.

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 : 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**

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, UJT and PUT-Serial and Parallel Connections of SCR.
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.

"Power Electronics" by Bimbra

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-1 CLASSIFICATION OF SIGNALS AND SYSTEMS

Continuous Time Signals (CT Signals)- Discrete Time Signals (DT Signals)- Step- Ramp- Pulse- Impulse- Exponential- Classification of CT and DT Signals- Periodic and A periodic-Random Signals- CT Systems and DT Systems-Classification of System- Linear Time Invariant System.

UNIT-2 ANALYSIS OF CT SIGNALS

Fourier series Analysis-Spectrum of CT Signals- Fourier Transform and Laplace Transform in Signal Analysis.

UNIT -3 LTI-CT SYSTEMS

Differential Equation- Block Diagram Representation- Impulse Response- Convolution integral- Frequency Response- Fourier Methods and Laplace Transforms in Analysis- State Equation and Matrix.

UNIT -4 ANALYSIS OF DT SIGNALS

Spectrum of DT Signals- Discrete Time Fourier Transform (DTFT) - Discrete Fourier Transform (DFT)-Properties of Z-Transform in signal Analysis.

UNIT-5 LTI-DT SYSTEMS

Difference Equation-Block Diagram Representation- Impulse Response-Convolution Sum-Frequency Response FFT and Z-Transform analysis-State Variable and Matrix.

REFERENCES:

1. J.JEBASTINE and J.VENU GOPALA KRISHNAN, "Signals and Systems", SRI Krishna Publications, Chennai.
2. Alen V Oppenheim Alen S. Wilsky and Hamid Nawab S "Signals and Systems", second Edition, PHI, New Delhi, 19.
3. Michael J Roberts, " Signals and Systems Analysis using transform methods and MATLAB", Tata McGraw-Hill, 2003
4. Haykin.S and Barry Van Veen, "Signals and Systems", John willy and Sons Inc., 2002.
5. Samir S Soliman and Srinath MD, " Continuous and discrete signals and systems" Second Edition, PHI, 2003.
6.. Lathi B.P., "Linear Systems and Signals". Oxford University Press Inc., 2003.

SEM – II **Core Paper –VI**

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.

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**

SIMULATION PROGRAM WITH IC EMPHASIS

Objective

- To gain familiarity with PSPICE, and to review in greater detail.
- To investigate the use of the industry-standard circuit simulation tool PSpice.

Contents:

Unit – I Introduction

Introduction – Descriptions of Spice – Types of Spice – Types of Analysis – Simulation software tools – Pspice Platform – Pspice schematic Vs OrCAD Capture – Limitations of PSpice. - Circuit Description: Input files –Element values – Nodes – Circuit Elements – Sources

Unit – II DC Circuit Analysis

Output Variables – PSpice Output Commands – Format of Output Files – Examples of Spice Simulation – OrCAD Capture – Layout – PSpice A/D – Probe – Importing – DC Circuit Analysis: Resistors – Modeling of Elements – Operating Temperature – Independent DC Sources – Dependent Sources – DC Output Variables – Types of Output – Types of DC Analysis

Unit – III Transient Analysis

Capacitors and Inductors – Modeling of Transient Sources - Transient Sources – Transient Output Variable – Commands – Transient Analysis – Switches - AC Circuit Analysis: AC Output Variables – Independent AC Sources – AC Analysis.

Unit - IV Semiconductor Devices

Diode Characteristics in SPICE– BJT Characteristics in SPICE – JFET Characteristics in SPICE - MOSFET Characteristics in SPICE.

Unit – V Operational Amplifier

Inverting and Non-inverting Amplifier – Active Filters: Low Pass Filters - High Pass Filters - Band Pass Filters – Band Reject Filters.

Text Books

1. Muhammad H. Rashid, "***Introduction to PSpice using OrCAD for Circuits and Electronics***", Prentice Hall of India Private Limited, New Delhi, 3rd Edition, 2005.
2. John O. Attia, "***PSPICE and MATLAB for Electronics an Integrated Approach***", CRC Press, 1st Edition, 2002.
3. Dr. A.S Aravina murthy, "***Fundamentals of Electric Circuits with Pspice***", Sanguine Technical Publishers, Bangalore, 2009.

Core practical-I

PRACTICAL-I

ELECTRONICS & COMMUNICATION SYSTEMS LABORATORY

Electronics Lab

1. Summing and differential Amplifier using Op-Amp.
2. Inverting and Non-Inverting Amplifier using Op-Amp.
3. Instrumentation Amplifier.
4. Frequency response of LPF and HPF using Op-Amp.
5. Frequency response of narrow Band-Pass and Wide-Band-Pass filter using Op-Amp.
6. Frequency response of Notch Filter using Op-Amp.
7. Frequency response of Integrator using Op-Amp.
8. Frequency response of Differentiator using Op-Amp.
9. Zero-Crossing detector and schmittriger.
10. Phase Shift and Wien Bridge Oscillator using Op-Amp.
11. Astable ,Monostable and Bistable Multivibrators using Timer.
12. Low and high Voltage regulator using IC LM723.
13. Characteristics of SCR.
14. Characteristics of DIAC and TRIAC.
15. Characteristics of UJT and Relaxation Oscillator.
16. Switching circuit of TRIAC and DIAC.
17. Half wave Power Control using Thyristor(SCR).
18. Commutation Technique (Any Two).
19. Single Phase Inverter and Converter.
20. Switching Regulators.

Communication Systems Lab

1. Generation and Detection of AM.
2. Generation and Detection of FM.
3. Generation and Detection of PAM.
4. Generation and Detection of PWM.
5. Generation and detection of PCM.
6. Generation of ASK, FSK and PSK.
7. Generation of PSK, QPSK and DPSK.
8. Delta and Adaptive Delta Modulation.
9. Radiation Pattern of Antennas.
10. IR transmitter and Receiver.
11. PIN and Laser Diode Characteristics.
12. Reflex Klystron characteristics using microwave bench.
13. Gunn Diode Oscillator.
14. Digital fiber optic Tx and Rx.
15. Analog fiber optic Tx and Rx.

Core Practical – II

PRACTICAL – II

EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS LABORATORY

1. Writing and testing programs involving arithmetic, logical and BIT oriented Instructions.
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

Objective

- Digital signal processing has become a part of many embedded systems.
- To make the student learn, Theory of DSP, design of digital signal processing applications and an introduction to DSP processors.

Unit – I Signals and Systems

Introduction – Signals, System and Signal Processing – Classification of Signals – Concept of frequency in continuous time and discrete time signals – Analog to Digital and Digital to Analog Conversion .

Unit – II Structures for Discrete Time Systems

Introduction – Discrete Time Signals – Discrete Time Systems – Analysis of Discrete time linear time invariant systems – Implementation of discrete time systems – z-transform – Inverse of z-transform.

Unit – III Computation of Discrete Fourier Transform

Introduction – Frequency analysis of continuous time signals – Frequency analysis of discrete time signals – Frequency domain characteristics of linear time invariant systems (LTI) – Frequency response of LTI systems – Discrete fourier transform – FFT algorithms.

Unit – IV 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 – V TMS 320C 5416 overview

Introduction – TMS320C5416 overview – Key features – Architectural overview – Functional block diagram - Internal Memory organization – CALU – System Control – PLU – Interrupts.

Text Books

1. Sanjith K. Mitra, "**Digital Signal Processing – A computer Based Approach**" Tata McGraw Hill, 1997.
2. John G. Proakis and Dimitris G. Manolakis, "**Digital Signal Processing – Principles, Algorithms and Applications**", John Wiley & sons Inc., 1999.
3. B. Venkataramani and M. Bhaskar, "**Digital Signal Processors – Architecture, Programming and Applications**", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
4. P. Ramesh Babu, "**Digital Signal Processing**", Scitech Publications, 2nd Edition, 2003.
5. TMS 320C5X - Users guide, Texas instruments, 1993.
6. www.ti.com/in – TMS 320C5416 User Manuals.

SEM – III Core Paper – X

MATLAB PROGRAMMING

Objective

- To introduce the MATLAB for numerical computations and in particular familiarizing with the Matlab, basic commands through the Command window and output through the Graph window.

Contents:

Unit – I Introduction

Mat lab environment – Help future – Types of files – Platform – Search path – Matlab commands – Constants, Variables and Expressions: Character set – Data types – Constants and Variables – Operators – Hierarchy of operators – Built-in functions – Assignment statement.

Unit – II Vectors and Matrices

Scalars and vectors – Entering data in matrices – Line continuation – matrix subscripts/indices – Multidimensional matrices and arrays – Matrix manipulation – Generation of special matrices – Matrix and array operations – Functions with array inputs – Structure arrays – Cell arrays.

Unit – III I/O Statements and Graphics

Data input – Interactive inputs – Reading/Storing file data – Output commands – Low level input-output functions - Mat lab Graphics: Two dimensional plots – Multiple plots – Style options – Sub plots – Specialized two dimensional plots – Three dimensional plots.

Unit – IV Control Structures and Mat lab Programming

Loops – Branches control structures – Matlab Programming: Matlab Editor – Matlab Programming – Function Subprograms – Types of functions – Function handling – Errors and warnings – Matlab debugger.

Unit – V Simulink

Introduction – Starting simulink – Simulink modelling – Solvers – Simulating a model – Using variables from matlab – Data import/export – State space modelling and simulation – Simulation of non-linear systems – obtaining state space model – Creating subsystems – Masked subsystems.

Text Books

1. Rajkumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, "***MATLAB and its Applications in Engineering***", Pearson Education, 1st Edition, 2009.
2. Matlab Manual from Mathworks.

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'SANDCPLD

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.
2. Jr. Charles H.Roth, "DIGITAL SYSTEM DESIGN USING VHDL", Brooks/Cole Thomson Learning PWS Publishing, ISBN-981-240-052-4

SEM – III **Core Paper – XII**

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.

SEM – III **Core Practical – III**

PRACTICAL – III

DSP and VLSI Design LAB

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

VHDL LAB

1. NOR and NAND as a Universal gates.
2. Solving of Boolean equations.
3. Half Adder and Full Adder.
4. Half Subtractor and Full Subtractor.
5. Encoder.
6. Decoder.
7. Multiplexer.
8. De-multiplexer.
9. Latches and Flip-Flops.
10. ALU Design.
11. Parity Generator.
12. 2-bit Comparator.
13. Synchronous Counter.
14. Asynchronous Counter.
15. Shift Registers.
16. Clock divider and generator.
17. FIFO Design.
18. UART Module.
19. SPI Module.
20. Memory Module.
21. Sequence Detector.
22. Design and Simulation of Programmable logic Array.
23. Design and simulation of Traffic light controller.
24. Design and simulation of Real time clock (RTC).
25. State machine-Eg. Moore model.

SEM – III **Core Practical – IV**

VIRTUAL INSTRUMENTATION LAB

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 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

SEM – IV **Core Paper – XIII**

WIRELESS COMMUNICATION 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. WILLIAM STALLINGS, "WIRELESS COMMUNICATIONS AND NETWORKS" by – 2002 – PEARSON EDUCATION ASIA

SEM – IV **Core Paper – XIV**

NANO ELECTRONICS AND NANO SYSTEMS

UNIT I INTRODUCTION, SURVEY OF MODERN ELECTRONICS

Development of Micro Electronics- silicon technology-Scaling- Resonant-Tunneling diodes and transistors-Single Electron transistors- Need for New Concepts in Electronics- integrated optoelectronics-From Microelectronics towards Bimolecular Electronics.

UNIT II BASIC CONCEPTS OF ELECTROMAGNETIC WAVES AND QUANTUM MECHANICS

Electromagnetic Waves and Maxwell's Equations, Duality of Electron, Schrödinger Equation, Eigenvalue Problem and Electron in Quantum Well, Electrons in Multiple Quantum Wells. Super lattices Artificial Atoms: Quantum Dots, Molecules, Energy LevelSplitting, Chemical Bonds,Optical Transitions and Lasers

UNIT III ROLE OF PATTERN FORMATION IN NANOELECTRONICS

High Resolution Lithography, Dip-Pin Lithography, NEMS, Nano-Electromechanical Systems, Self-Assembly structures – Chemically Directed Self-Assembly, Surface-Layer Proteins in nanolithography

UNIT IV TRADITIONAL LOW-DIMENSIONAL SYSTEMS

Quantum Well cascade Lasers and other Quantum-Well Devices, Quantum Wires, Quantum Dots and Quantum Dot molecules, Quantum Dot Based cellular Automata, Coulomb Effects, Single Electron Devices Nanoscale sensors and Actuators.

UNIT V NEWLY EMERGING NANOSTRUCTURES

Challenges and Potential Applications of Inorganic Hetero structures, Quantum Dots Embedded in organic Matrix, organic light emitting diodes, Quantum Wire Interconnects, DNA and Peptides, Fullerenes and carbon nanotubes, Molecular Electronics Materials and Biomolecules, Future Integrated circuits: Quantum computing

Text Books:

1. K. Goser, P.Glosekotter& J.Dienstuhl, " Nanoelectronics and nanosystems" springer int. Ed.
2. C.P. Poole and F.J.Owens, " Introduction to nanotechnology",John Wiley & Sons,2003
3. M.A. Ratner and D.Ratner, " Nanotechnology ; a gentle introduction to the next big idea" ,Prentice Hall,2002
4. Nanometer structures:theory,modeling and simulation" Editor:Akhlesh Lakhtakia, ASME Press
5. S.E.Lyshevski,"Nano-and micro-electrochemical systems fundamentals of nano and microengineering ,2004.

GROUP A ELECTIVE **SEM - 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

Database Concepts: Introduction to database-Relationships-Database management system-the relational database model-Integrity rules-Theoretical Relational languages.

Database Design: Data modeling-Dependency-Database design-Normal forms-Dependency diagram-Demoralization-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, and 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:

1. NILESH SHAH, "**Database System Using Oracle**", Second Edition-PHI Learning Private Limited-New Delhi

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 student 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 no 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.

a) 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: PRINCIPLES OF ACOUSTICS AND SOUND ENGINEERING

Objectives: To train the students on professional level studio equipments and integrating all audio production chain line.

UNIT – I

Perception of sound - hearing sensitivity - frequency range- sound- wave length; the speed of sound; measuring sound; psychoacoustics , Room acoustics- means of control – treatments - dBA and dBC concepts ; musical sounds, noise - signal - dynamic range - pitch - harmonics- equalization-reverberation time, Sabine formula.

UNIT – II

Basic set-up of recording system-analog, digital, microphone - Audio signal amplifier, power amplifier - balanced –unbalanced – mic level inputs, Line level inputs - cables and connectors, impedance matching , interference, equipment inter-connection –input, out meters-the essence of Sound engineering.

UNIT – III

Theory of microphones – Microphone as a Transducer - Types - direction - pick up pattern, phantom power, noise, choosing the right mike –Line and signals levels- MIDI Signals Generation and simulation –Basic Recording medium - Sound reproduction devices – Power amplifier – Speaker - cross over - time code, Synchronization - care and handling

UNIT – IV

Mixing console - Echo and reverberation - special effects units- equalizers & compressors, plug-ins - digital recording software - Input devices - Storage - Output devices - file transfer protocols- networking of studio -streaming - basics of broadcasting- AM, FM, mobile radio, internet radio.

UNIT – V

Introduction to digital sound basics PCM sampling rate types resolution bit rates signal to noise ratio - Over view of digital sound for Films VCD /CDs/ DVDS recording and reproduction principle requirements of multi channel sound DTS, Dolby digital, DVD.

Text Books

1. Michael Talbot-Smith, “Broadcast Sound Technology”, Oxford: Focal Press, 2002.
2. Francis Rumsey and Tim Mick, “Sound and Recording: An Introduction”, Oxford: Focal Press.
3. John Watkinson, “An Introduction to Digital Audio”, Oxford: Focal Press.
4. Francis Rumsey, “MIDI System and Control”, Oxford: Focal Press.
5. Alec Nisbet, “The Sound Studio”, Oxford: Focal Press, 2004.
6. Tim Amyes, “Audio Post-production in Video and Film”, Oxford: Focal Press, 2001.

GROUP B ELECTIVE **SEM: II**

PAPER II: APPLIED ELECTRONICS FOR ELECTRONIC MEDIA

Objectives:

- To learn the evolution of technologies of electronic media.
- To understand the basics of broadcasting technologies.
- To know the radio and TV transmission standards and systems.
- To introduce students to the emergent technologies in electronic media.

UNIT – I EVOLUTION

Development of Broadcasting and Cable television – Rise of the Internet and deployment of broadband services – regulatory philosophy - leading to dramatic changes in telecommunication industry – Developments and changes in new media – telephony to radio, mobile radio to visual radio, geo-stationary satellites, direct broadcasting satellites, narrowcasting, cable television, DTH – Types of television sets.

UNIT – 2 BROADCASTING BASICS

Analog radio, Digital radio, satellite radio, Audio blogging – RSS – Pod safe music - Analog television, digital television, cable television, Working principle of video camera, Consoles, Video hosting / Download services, Internet radio and television, Digital media production, sound and vision, Image capture techniques, Web-based social interaction.

UNIT – 3 TRANSMISSION STANDARDS AND SYSTEMS

NTSC, PAL, SECAM, IPTV, HDTV, ATSC Digital television, Transmission/Reception lines and other equipments, various modes of receiving systems, FM and TV antenna towers, translators and repeaters, transmitter remote controls. Cell phone media production: SMS, MMs, Cell phone media delivery: streaming and video on demand.

UNIT – 4 TRANSMITTER SYSTEMS

Satellite distribution, Uplink terminals, Transmitter power system equipments, Masts, Towers and Antennas, Earth station types, Uplink earth stations, Downlink earth stations, Outside broadcasting vehicles and mobile control room, Microwave links for OB and ENG, Power generators and Electrical system for OB, Battery systems.

UNIT – 5 MOBILE AND EMERGENT TECHNOLOGIES

Information technology: computer storage, computer networks, Internet streaming, web streaming, Audio and video streaming, Flash streaming, MP3 streaming (radio), Peer to Peer distribution, Digital video broadcasting via satellite services to Handhelds (DVB-SH) Technology, Wifi and Wi Max, podcasting, iPod, Information superhighways, Interactive portals.

TEXT BOOKS

1. Graham Jones, “A Broadcast Engineering Tutorial for Non-Engineers”, Focal Press, 2005.
2 Brian Winston, “Media Technology and Society: A History: From the Telegraph to the Internet”, Rutledge, 2000.

REFERENCES

1. EPJ Tozer, "Broadcasting Engineering Reference Book", Focal Press, 2004.
2. Borko Furht and Syed A. Ahson, "Handbook of Mobile Broadcasting", Taylor & Francis, 2008.

GROUP B ELECTIVE **SEM: III**

PAPER III: DIGITAL IMAGE PROCESSING

UNIT – I DIGITAL IMAGE FUNDAMENTALS

Elements of Visual Perception: Structure of the human eye- image formation in the eye- brightness adaptation and discrimination- Image sensing and acquisition: Image acquisition using a single sensor- sensor strips- sensor arrays- Image sampling and Quantization: basic concepts in sampling and quantization- representing digital images- spatial and intensity resolution- image interpolation- Some basic relationships between pixels: neighbors of a pixel- distance measures.

UNIT – II INTENSITY TRASFORMATIONS AND SPATIAL FILTERING

Background: basics of intensity transformations and spatial filtering- Some basic intensity transformation functions: image negatives- log transformations- power-law (gamma) transformations- piecewise-linear transformation functions- Histogram Processing: local histogram processing- Fundamentals of Spatial Filtering: mechanics of spatial filtering- spatial correlation and convolution- vector representation of linear filtering- generating spatial filter masks.

UNIT – III IMAGE RESTORATION AND RECONSTRUCTION

A model of the image degradation/restoration process- Noise Models: spatial and frequency properties of noise- some important noise probability density functions- periodic noise- estimation of noise parameters- Restoration in the presence of noise only-spatial filtering: mean filters- order-statistic filters- adaptive filters- Periodic noise reduction by frequency domain filtering: band reject filters- band pass filters- notch filters- optimum notch filtering.

UNIT – IV IMAGE COMPRESSION

Fundamentals: coding redundancy- spatial and temporal redundancy- irrelevant information- image compression models- Some basic compression methods: Huffman coding- Golomb codes - Arithmetic coding- LZW coding- Bit-plane coding- Digital image watermarking.

UNIT – V IMAGE SEGMENTATION

Fundamentals- Point, Line and Edge Detection: detection of isolated points- line detection- basic edge detection- more advanced techniques for edge detection- Region-Based Segmentation: region growing- region splitting and merging- Use of motion in segmentation: spatial techniques- frequency domain techniques.

Text Books

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd edition Pearson Education, 2008.

GROUP B ELECTIVE **SEM: IV**

PRACTICAL: ELECTRONIC MEDIA LAB

1. Study of dynamics and condenser microphones with regards to placement, frequency response, gain etc.
2. Listen, study and analyze different types of music from different parts of the globe.
3. Inside a PC and a MAC.
4. Installing O.S hardware and basic software for recording.
5. Connecting different storage media to Computers and their usage.
6. Study of basic recording of sound using a P.C and Microphones.
7. Networking of Computers.
8. Study of DAW.
9. Working on PROTOOLS8.
10. Working on LOGIC9PRO.
11. Working with MIDI Controller.
12. Mastering and authoring CD's and DVD's.
13. Image Sampling-Zooming and Shrinking operations.
14. Basic gray level transformations: Image Negative, Power law and log transforms.
15. 2-D Discrete Fourier Transform and Walsh transform.
16. Image contrast Enhancement by Histogram Equalization Technique.
17. Spatial Image Filtering: Low pass and High pass Filtering.

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: 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. NOR and NAND as a Universal gates.
2. Solving of Boolean equations.
3. Half Adder and Full Adder.
4. Half Subtractor and Full Subtractor.
5. Encoder.
6. Decoder.
7. Multiplexer.
8. De-multiplexer.
9. Latches and Flip-Flops.
10. ALU Design.
11. Parity Generator.
12. 2-bit Comparator.
13. Synchronous Counter.
14. Asynchronous Counter.
15. Clock divider and generator.
16. FIFO Design.
17. UART Module.
18. SPI Module.
19. Memory Module.
20. Sequence Detector.