BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.

M.Sc. ELECTRONICS Course Structure under CBCS

(For the candidates admitted from the academic year 2016-2017 onwards)

Updated on 31.08.2018

Sem	Course	Title	Inst. Hours/ Week	Credit	Exam Hours	Marks Internal	Marks Externa	Total
I	Core Course–I (CC)	Design of Analog circuits	6	4	3	25	75	100
	Core Course–II (CC)	Design of Digital Circuits	6	4	3	25	75	100
	Core Course–III (CC)	Signals and Systems	5	4	3	25	75	100
	Core Course–IV(CC)	VLSI Design and VHDL Programming	5	4	3	25	75	100
	Core Practical – I (CP)	Electronics I(P)	8	4	4	40	60	100
	Total		**30**	**20**				**500**
II	Core Course–V (CC)	Microcontroller 8051 and IDE	6	5	3	25	75	100
	Core Course–VI (CC)	Electromagnetic Theory	6	5	3	25	75	100
	Core Practical – II (CP)	Electronics II (P)	8	4	4	40	60	100
	Elective Course–I (EC)	Optoelectronics/Medical Electronics	5	5	3	25	75	100
	Elective Course–II (EC)	Digital communication/ Embedded Linux With RTOS	5	5	3	25	75	100
	Total		**30**	**24**				**500**
III	Core Course–VII (CC)	Microcontroller PIC and MPLab	6	5	3	25	75	100
	Core Course–VIII (CC)	Digital Signal Processor	6	5	3	25	75	100
	Core Practical – III (CP)	Electronics III (P)	8	4	4	40	60	100
	Elective Course–III (EC)	Microcontroller ATMEGA and IDE/Wireless Communication	5	5	3	25	75	100
	Elective Course–IV (EC)	Mobile Communication/ CAD and PCB Design	5	5	3	25	75	100
IV	**Total**		**30**	**24**				**500**
	Core Course–IX (CC)	ASIC and FPGA Design	5	5	3	25	75	100
	Core Course–X (CC)	Programmable Digital Signal Processor	5	5	3	25	75	100
	Core Practical – IV (CP)	Electronics IV (P)	8	4	4	40	60	100
	Elective Course–V (EC)	Memsand Nano Electronics/ Programmable Logic Controller and SCADA	5	4	3	25	75	100
	Project		7	4	3	25	75	100
	Total		**30**	**22**				**500**
	Grand Total		**120**	**90**				**2000**

Core Paper	-	10
Core Practical	-	4
Elective	-	5
Project	-	1

Note:

1. Theory	Internal	25 marks	External	75 marks
2. Practical	”	40 marks	”	60 marks

3. Separate passing minimum is prescribed for Internal and External

a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)
c) The passing minimum not less than 50% in the aggregate.

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CORE COURSE I

DESIGN OF ANALOG CIRCUITS

OBJECTIVE

To learn the designing concepts of Analog circuits.

UNIT I TRANSISTORS

Introduction to semiconductors-Transistor construction-Transistor operation common base configuration-Common emitter configuration-Common collector configuration-Comparison of configuration-Voltage divider bias-Eber's Moll model of transistor-H parameters: meaning of H parameters-Analysis formulas-CE analysis-Miller effect capacitance-High frequency response BJT amplifier.

UNIT II JFET AND MOSFET JFET:

Structure-Biasing-Drain curve-Transconductance curve-MOSFET: depletion type MOSFET-Biasing depletion type-Applications of depletion type-Enhancement type MOSFET-Biasing enhancement type-Applications of enhancement-VMOS.

UNIT III OPERATIONAL AMPLIFIERS

Introduction-Differential Amplifier-Single-input Balancedoutput and Single-input Unbalanced-output Differential amplifier-Block diagram of Op-Amp-The ideal Op-amp-Equivalent Circuit-Ideal voltage transfer curve-Offset voltage-Offset current-CMRR-Slew rate-Open loop op-amp configuration-Voltage series feedback amplifier-Voltage shunt feedback amplifier-Frequency response-Compensation Network-High frequency opamp equivalent circuit-Open loop voltage gain and closed loop frequency response.

UNIT IV OPERATIONAL AMPLIFIER AND ITS APPLICATIONS

Summing, scaling and averaging amplifier-Instrumentation Amplifier-Integrator-Differentiator-Filters-First order low-pass and high-pass Butterworth filter-Band pass filter-Band reject filter-All pass filter-Oscillator-Principle-Square wave, triangular wave generator-Comparator-Zero crossing detector-Schmitt trigger-Sample and hold circuit-V to I with floating & grounded load-Low voltage ac voltmeter.

UNIT V OPTO ELECTRONIC AND POWER DEVICES

Photo Diode-Photo transistor-Solar cells-LED-LCD–Laser-Semiconductor Lasers- PNPN Diode-SCR-IGBT-555 Timer and applications-Astable-Monostable-Bistablemultivibratos.

TEXT BOOKS:

1. Robert Boylstead and Louis Nashelstky, "Electronics Devices and Circuit Theory", 8th Edition, Prentice Hall India.
2. Ramak an tA.Gayakwad , "Op-Amps and Liner Integrated Circuits', Third Edition. Prentice Hall India.
3. AngsumanSarkar, Chandan Kumar Sarkar, Solid State Microelectronic and Optoelectronic Devices, Universities Press (India) Pvt Ltd, 2012

REFERENCE BOOK:

1. Malvino A.P, "Principles of Electronics", 5th Edition, Tata McGrawHill Publishing Company Limited, New Delhi.

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CORE COURSE II

DESIGN OF DIGITAL CIRCUITS

OBJECTIVE

To learn about the designing principle of digital circuits.

UNITI LOGIC FUNCTIONS AND COMBINATIONAL LOGIC DESIGN

Logic map-K-maps-Four variables-SOP - Prime implicant determination Tabular Method: Binary adders: Full adder, Ripple carry adder, Carry lock ahead adder, Binary Subtractor, Multiplexers: Multiplexers as general purpose logic circuit, Decoders and Encoders: De multiplexers, n to 2n line decoder, Tree decoder, Decoder as general purpose logic circuits &code conversion, Read only memory-Other LSI programmable logic.

UNIT II SEQUENTIAL CIRCUIT COMPONENTS

Introduction to sequential circuits-Latches and Flip flops: SR Latch, Timing problems and clocked SR Latches, JK Latch, Master slave Latch, Delay flip flop, T flip flop, Flip flop Excitation Requirements-Registers: Serial load shift registers, Parallel load shift register, Parallel to serial conversion, Universal registers.

UNIT III SYNCHRONOUS SEQUENTIAL MACHINES & DESIGN

Basic concepts - State assignments - General design procedure - State equivalence and machine minimization - Machines with finite spans - Synchronous counters-Algorithmic state machines - Asynchronous inputs.

UNIT IV FAULT DIAGNOSIS, TESTING AND A SIMPLE COMPUTER DESIGN

Introduction - Fault detection and location - Fault detection table-Compact testing techniques-Signature analysis - The scan path testing technique - Designing for testability - Building blocks - Register transfer language - Macro and Micro operations - Design of control unit - Programming computer.

UNIT V LABVIEW FOR DIGITAL CIRCUITS

Getting started with Lab VIEW virtual instruments: Building a virtual instrument-Launching Lab VIEW-Opening a new VI from a template-Adding a control to front panel-Changing a signal type Wiring objects on block diagram-Running a VI-Acquiring data and communicating with instruments.

TEXT BOOKS:

1. Norman Balabaniam, Bradly Carlson, “DIGITAL LOGIC DESIGN PRINCIPLES”, John Wiley & sons, Inc. New York.
2. Brian Holds worth, Clive woods, “DIGITAL LOGIC DESIGN”, Fourth edition, Published by Elsevier.
3. JaydeepChakravorthy, Digital Electronics and Logic Design, Universities Press (India) Pvt Ltd, 2012

REFERENCE BOOK:

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, “DIGITAL PRINCIPLES AND APPLICATIONS”, Tata McGraw-Hill Publishing Company Limited, New Delhi.

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CORE COURSE III

SIGNALS AND SYSTEMS

OBJECTIVE

To acquire the basics of Signals, Systems and Transformations.

UNIT I INTRODUCTION TO SIGNAL AND SYSTEM

Signals: Definition - Classification of signals – Basic operations on signals – Types of signals. Systems: Definition - Classification of systems - Properties of systems - Properties of continuous-time linear time-invariant (LTI) system - Properties of discrete-LTI system.

UNIT II LAPLACE TRANSFORM

Definition - Representation of signals using Laplace transform – Region of Convergence (ROC) - Properties of Laplace transform - Initial value and final value theorem - Inverse of the Laplace transform - Analysis of passive networks using Laplace transform - Solution of differential equations using Laplace transform - Relationships between Laplace transform (LT) and continuous-time Fourier transform (CTFT).

UNIT III FOURIER SERIES

Continuous-time Fourier series (CTFS): Definition - Dirichlet condition - Fourier series representation of continuous-time periodic signal - Trigonometric Fourier series - Problems - Exponential Fourier series - Problems - Properties of CTFS - Discrete-time Fourier series (DTFS): Definition - Fourier series representation of discrete- time periodic signal - Calculation of DTFS coefficient - Properties of DTFS.

UNIT IV FOURIER TRANSFORM

Continuous-time Fourier Transform (CTFT): Definition - Dirichlet condition - CTFT representation of periodic signal - Properties of CTFT - Problems. Discrete Time Fourier Transform (DTFT): Definition - DTFT representation of a periodic signal - Properties of DTFT - Problems.

UNIT V Z-TRANSFORMS

Z-Transforms (Double and Single sided) - ROC conditions - Properties - Initial and final value theorems - Relationship between the Z-transform and Discrete-time Fourier transform - Relationship between the Z-plane and S-plane - Methods of inverse Z-transforms - Power series method (long-division) - Partial-fraction method - Residual method.

TEXT BOOK

1. Poornachandra S., "Signals and System", Vijay Nicole imprints Pvt. Ltd., 2004.

REFERENCE BOOKS

1. Alan V. Opphenehim, Alan S. Willsky and Hamid nawab S., "Signals and Systems", 2nd Edition, PHI, 2004.
2. Ramesh Babu P, Ananda Natarajan R., "Signals and System", 3rd Edition, Scitech publication private limited, 2007.

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CORE COURSE IV

VLSI DESIGN AND VHDL PROGRAMMING

OBJECTIVE

The students will get exposure of VLSI Design VHDL Programming in Application field

UNIT I TRANSISTOR THEORY

nMOS Enhancement Transistor-nMOS Enhancement Transistor-Threshold Voltage: Threshold voltage equations-Body effect-MOS Device Design equation: Basic Dc equations-Second order effects-MOS Models-NMOS Inverter-Differential Inverter-Tristate Inverter –BiCMOS Inverter.

UNIT II DATA AND CONTROL FLOW IN SYSTEMATIC STRUCTURES

Two Phase Clocks-The Shift Register-Combinational Logic-Programmable Logic array-Finite state Machine

UNIT III SYSTEM STRUCTURE

OM Project - System overview-overall structure of the data path- Arithmetic Logic Unit- Registers-Buses-Parallel Shifter-Register array.

UNITIV VHDL PROGRAMMING

VHDL-History-Capabilities-Hardware Abstraction-basic Terminology-Entity Declaration-Architecture body-Configuration Declaration-Package Declaration- Basic Language elements: Identifiers-Data Objects-Data types, Operators: Behavioral Modeling: Entity Declaration-Architecture Body-Process statement-Wait statement-If-Case-Null-Loop-Exit-Next-Multiple Process-Postponed Processes

UNIT V DATA FLOW MODELING

Concurrent Signal Assignment statement-concurrent verses sequential signal assignment –Multiple drivers-Block Statement-Concurrent Assertion statement-Value of a signal.

TEXT BOOKS:

1. Douglas A. Pucknell,Kamran EshraghianBasic VLSI Design,3rdEdtion, Prentice hall of India pvt Ltd. New Delhi.
2. DouglasL.Perry, VHDL programming by example, 4Th edition Tata McGrawhill New Delhi.
3. Stephen Brown and ZvonkoVranesic, “Fundamentals of Digital Logic Design with VHDL”, Tata McGraw-Hill, 2007.

REFERENCE BOOK:

1. Wayne Wolf, “Modern VLSI design”, 4th edition, PHI, 2009

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CORE PRACTICAL I

ELECTRONICS I (P)

(Analog and Digital Circuits Lab)

Any 12 Experiments

1. Construct and study of power supply with Single and Dual - High Current regulator & Short circuit protection.
2. Construct and study of Non-inverting, Inverting amplifier using op-amp.
3. Construct and study the Integrator, Differentiator, Unit gain amplifier using op-amp.
4. Construct and study the operation of an Instrumentation Amplifier
5. Construction and study of V to I, I to V converter using op-amp.
6. Construct and study of Clipper and Clamper using op-Amp.
7. Construct and study of Comparator and Zero crossing detector using op-amp.
8. Construct and study of Window detector, Peak detector Precision rectifier.
9. FET amplifier design.
10. Construct and study of One Shot multivibrator, Square generator and VCO using IC 555.
11. Construct and study of FSK modulator & demodulator.
12. Construct and study the Power control rectifier using SCR, TRIAC and UJT.
13. Study of sensor (Thermal, optical and mechanical).
14. Design of power amplifier (Class B and C).
15. K-map design for a three variable Boolean expression.
16. Design of counters based on state machine.
17. Study of Adder, subtractor and IC based BCD adder and subtractor.
18. Study of Encoder and Decoder.
19. Study of Multiplexer and Demultiplexer
20. Study of Buffer, Latch, Transceiver.
21. Study of Shift register (SISO, SIPO, PISO & PIPO) and shift register IC.
22. Study of Parity Generators and Checkers

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CORE COURSE V

MICROCONTROLLER 8051 and IDE

OBJECTIVE

To learn about microcontroller 8051 along with a IDE
To learn about embedded C and to develop embedded application tools

UNIT I MICROCONTROLLER 8051 ARCHITECTURE

Microprocessor and Microcontroller-8051 Microcontroller hardware: 8051 Oscillator and clock-Program counter and data pointer-A & B CPU register-Flags & PSW-Internal memory-Internal RAM-Stack and stack pointer-Special function registers-Internal ROM-Input/ Output pin, ports and circuits-External memory.

UNIT II 8051 PERIPHERAL

Counter & Timer: Timer/Counter interrupts-Timing-Timer modes of operation-Counting-Serial data input/output: Serial data interrupt-Data transmission-Data reception-Serial data transmission modes Interrupts: Timer flag interrupt-Serial port interrupt-External interrupt-Reset-Interrupt control-Interrupt priority-Interrupt destination-Software generated interrupts

UNIT III ARITHMETIC AND LOGICAL OPERATIONS

Introduction-Addressing modes-Instruction set-Byte level logical operations-Bit level logical operations-Rotate and swap operations-Simple programs. Arithmetic Operations: Introduction-Flags-Increment and decrementing-Addition-Subtraction-Multiplication and Division-Simple programs. External data move-Code memory read only data move-Push & pop-Opcodes-Data exchanges-Simple programs. Jump and call instruction: Introduction-Jump and call program range-Jumps-Calls and subroutine-Interrupt and returns-More detail on interrupts-Simple programs.

UNITIV PROGRAMMING IN EMBEDDED C

Introduction, Date types in embedded C - arithmetic and logical operators - Control statements and loops in embedded C - Functions and Arrays in embedded C. Programming of input/ output ports - Programming of Timer & counters - writing interrupt service routines in Embedded C - Programming of UART and PCA Timer in embedded C.

UNIT V PROGRAM DEVELOPMENT TOOL CHAIN USING µVISION3

Integrated Development Environment (IDE)- Editor - Assembler - Compiler - Linker - Simulator and Debugger - Assembly and 'C' program development and debugging process.

TEXT BOOKS:

1. Muhammad Ali Mazidi, Janice GillispieMazidi and Rolin D. McKinlay, "The 8051Microcontroller and Embedded Systems using Assembly and C", Pearson, Second edition, 2008.
2. Michael J Pont, "Embedded C", Addison-Wesley Professional, 2002.
3. https://www.keil.com/product/brochures/uv4.pdf

REFERENCE BOOK:

1. Kenneth J. Ayala, "The 8051 Microcontroller: Architecture, Programming, and Applications", 3rd Edition, West Publishing Company, 1997.

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CORE COURSE VI

ELECTROMAGNETIC THEORY

OBJECTIVE

To familiarize the student about the concepts of electric, magnetic and electromagnetic fields and provide knowledge of antennas, Waveguides and Microwaves.

UNIT I ELECTRIC AND MAGNETIC FIELDS IN MATERIALS

Poisson's and Laplace's equation – Electric Polarization-Nature of dielectric materials- Definition of Capacitance – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current. Definition of Inductance – Inductance of loops and solenoids – Definition of mutual inductance – Energy density in magnetic fields – Nature of magnetic materials – Magnetization and permeability.

UNIT II TIME VARYING ELECTRIC AND MAGNETIC FIELDS

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form – Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form – Maxwell's four equations in integral form and differential form - Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT III ELECTROMAGNETIC WAVES AND WAVE GUIDES

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material – Wave equation for a conducting medium – Skin effect. Wave Guides: Rectangular guides – TM waves in rectangular guides – TE waves in rectangular wave guides – Impossibility of TEM wave in wave guides.

UNIT IV TRANSMISSION LINES AND ANTENNAS

Transmission lines: Basic principles - fundamentals of transmission lines – characteristic impedance – smith chart and its applications. VHF, UHF, SHF antennas: Folded dipole antenna-Yagiuda antenna – Biconical antenna – Corner reflector antenna – Helical antenna – Horn antenna – Frequency independant antennas – Microwave antennas – Lens antennas.

UNIT V MICROWAVES

Microwave Generation- Multicavity Klystron-Reflex Klystron- principle and operation of Magnetron -Travelling Wave Tubes (TWT) -Microwave Transistors--GaAsFET-Gunn Diode- PIN diode for detection of micro waves.

TEXT BOOKS:

1. W. H.Hayt& J A Buck, "Engineering Electromagnetics" TATA McGraw-Hill, 2007
2. E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems" PHI, 2006.
3. K.D.Prasad, "Antenna And Wave Propagation", SathyaPrahashan.
4. Y.Mallikarjuna Reddy," Electromagnetic Waves & Transmission Lines", University Press (India) Pvt. Ltd., 2016

REFERENCE BOOKS:

1. NarayanaRao, N, "Elements of Engineering Electromagnetics" Pearson Education, 2006.
2. Edward C.Jordan, Keith G. Balmain, "Electromagnetic Waves And Radiating Systems", PHI
3. N D Deshpande, D A Deshpande, P A Rangole, "Communication Electronics" , Tata McGraw- Hill.
4. Y.Mallikarjuna Reddy," Electromagnetic Feilds", University Press (India) Pvt. Ltd., 2013

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CORE PRACTICAL II

ELECTRONICS II (P)

(VHDL Programming Lab)

Any 16 Experiments

1. Half adder and Full adder
2. Half subtractor and Full subtractor
3. Encoder [8:3]
4. Decoder [3:8]
5. Multiplexer [8:1]
6. De-multiplexer [1:8]
7. Combinational circuit implementation for given expersion
8. D and T flip-flop
9. RS flip-flop
10. JK flip-flop
11. 4 bit UP/DOWN Counters
12. 4-bit Shift register
13. Ring counter
14. Implementation of ALU
15. Design of PLA
16. Design of PAL
17. Water Level Controller
18. DC Motor Interface
19. Seven-segment display interface
20. Solid State Relay Interface
21. Time Delay Programme
22. Digital Clock

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ELECTIVE COURSE I (A)

OPTOELECTRONICS

OBJECTIVE

To understand the concepts and application of optoelectronics

UNITI ELEMENTS OF LIGHT AND SOLID STATE PHYSICS

Wave nature of light, Polarization - Interference - Diffraction - Light Source - Review of Solid State Physics - Review of Semiconductor Physics and Semiconductor Junction Device.

UNITII DISPLAY DEVICES AND LASERS

Introduction - Photo Luminescence - Cathode Luminescence - Electro Luminescence - Injection Luminescence - Injection Luminescence - LED - Plasma Display - Liquid CrystalDisplays - Numeric Displays - Laser Emission - Absorption - Radiation - PopulationInversion - Optical Feedback - Threshold condition - Laser Modes - Classes of Lasers - Mode Locking - laser applications.

UNIT III OPTICAL DETECTION DEVICES

Photo detector - Thermal detector - Photo Devices - Photo Conductors - Photo diodes - Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR

Introduction - Analog and Digital Modulation - Electro-optic modulators - Magneto OpticDevices - Acousticoptic devices - Optical - Switching and Logic Devices.

UNITV OPTOELECTRONIC INTEGRATED CIRCUITS

Introduction - hybrid and Monolithic Integration - Application of Opto Electronic IntegratedCircuits - Integrated transmitters and Receivers - Guided wave devices.

TEXT BOOKS:

1. Pallab Bhattacharya “Semiconductor Opto Electronic Devices”, Prentice Hall of IndiaPvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, “Opto Electronics-As Introduction to materials and devices”,McGraw-Hill International Edition, 1998
3. AngsumanSarkar, Chandan Kumar Sarkar, Solid State Microelectronic and Optoelectronic Devices, Universities Press (India) Pvt Ltd, 2012

REFERENCE BOOKS:

1. S C Gupta, Opto Electronic Devices and Systems, Prentice Hal of India,2005.
2. J. Wilson and J.Haukes, “Opto Electronics-An Introduction”, Prentice Hall, 1995.

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ELECTIVE COURSE I (B)

MEDICAL ELECTRONICS

OBJECTIVE

To understand the concepts and application of electronic Instrumentation in the Medical field

UNITI HUMAN PHYSIOLOGICAL SYSTEM

Cells and their structure –Nature of Cancer Cells-Transport of Ions through cell Membrane –Resting and action potentials-Bio-electric Potentials-Nerve Tissues and Organs-Different Systems of Human body

UNIT II BIOPOTENTIAL ELECTRODES AND TRANSDUCERS

Design of Medical Instrument-Components of the biomedical Instrument system-Electrodes-Transducers: Active &Passive

UNITIII BIO POTENTIAL RECORDERS

ECG- EEG-EMG-ERG-EOG Recorders wIT - h high accuracy-Pacemaker-Heart Lung Machine-Kidney Machine.

UNITIV SPECIALIZED MEDICAL EQUIPMENT &BIO TELEMETRY

Electron Microscopes –X-Ray Tube-X-Ray Machine –Angiography-Elements of Bio-Telemetry system-Design of Bio-Telemetry System

UNITV ADVANCEINBIO-MEDICALINSTRUMENTATION

Computes in Medicine-Lasers in medicine-Endoscope-Computer Thermography-Magnetic resonance Imaging

TEXT BOOK

1. Dr.M. Arumugam, Biomedical Instrumentation, 2nd Edition, Anuradha Publications.

REFERENCE BOOK:

1. KhandpurHandbook of Bio-Medical Instrumentation

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ELECTIVE COURSE II (A)

DIGITAL COMMUNICATION

OBJECTIVE

To understand the different technologies of Digital Communication

UNITI PULSE MODULATION SYSTEMS

Sampling theorem: low pass signals, band pass signals –PAM-channel bandwidth for a PAM signal-Natural sampling –Flat top sampling-PCM-Electrical representation of binary digits-The PCM system-Companding-Multiplexing PCM signal –Differential PCM-Delta modulation

UNITII DIGITAL COMMUNICATION SYSTEM

Elements of digital communication system, the sampling theorem, aliasing error, PAM, PPM &PWM signals generation and detection Pulse code modulation, uniform and non-uniform quantization, SNR, companding characteristics, Intersymbolinterference, Nyquist criteria of zero ISI, eye pattern

UNITIII DIGITAL MODULATION TECHNIQUES

Coherent binary modulation techniques, PSK, FSK, QPSK, MSK differential pulse codemodulation, predictor, delta modulation, adaptive delta modulation, slope overload and granular noise, Mary signaling

UNITIV INFORMATION CODING

Measure of information, entropy, mutual information, Shannon's coding theorem, channelcapacity, capacity of Gaussian channel, source coding, Huffman code, channel coding, block codes,syndrome decoding, convolutional coding, code tree, spread spectrum communication: PN sequences, direct sequence and frequency hopping spread spectrum systems

UNITV MULTIPLE ACCESS TECHNIQUES

FDMA and TDMA, TDMA synchronization and timing, code division multiple access, Applicability of CDMA to commercial system, Earth's path propagation effects; satellite services for communication-Weather forecasting, remote sensing, direct to home (DTH) TV

TEXT BOOKS

1. Digital communications: Bernard Sklar (Pearson Education, Asia Publ)
2. Kennedy and George Davis, "Electronic Communication Systems",4th Edition, 1999.
3. Simon Hawkins, John Wiley, "Communication systems", 4th Edition,2001

REFERENCEBOOK

1. J. G. Proakis, "Digital Communication", 4th edition, TataMcGraw-Hill.

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ELECTIVE COURSE II (B)

EMBEDDED LINUX WITH RTOS

OBJECTIVE

To impart knowledge about Embedded Linux Support Package, Storage, Drivers and Real Time Operating System

UNITI INTRODUCTION TO EMBEDDED LINUX

Embedded Linux - Introduction - Advantages- Embedded Linux Distributions - Architecture - Linux kernel architecture - User space - Linux startup sequence - GNU cross platform Tool chain.

UNITII BOARD SUPPORT PACKAGE AND EMBEDDED STORAGE

Inclusion of BSP in kernel build procedure - The bootloader Interface - Memory Map - Interrupt Management - PCI Subsystem - Timers - UART - Power Management - Embedded Storage - Flash Map - Memory Technology Device (MTD) -MTD Architecture - MTD Driver for NOR Flash - The Flash Mapping drivers - MTD Block and character devices - Mtdutils package - Embedded File Systems - Optimizing storage space - Tuning kernel memory.

UNIT III EMBEDDED DRIVERS AND APPLICATION PORTING

Linux serial driver - Ethernet driver - I2C subsystem - USB gadgets-Watchdog timer - Kernel Modules - application porting roadmap - Programming with Pthreads - Operating System Porting Layer - Kernel API Driver - Case studies - RT Linux.

UNITIV INTRODUCTION TO REAL-TIME OPERATING SYSTEM

Tasks and Task States-Task and Data - Semaphores and Shared Data-More Operating System Services: Message Queues, Mailboxes, and Pipes-Timer Functions-Events-Memory Management-Interrupt Routines in an RTOS Environment

UNITV BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM

Overview-Principles-An Example-Encapsulating Semaphores and Queues-Hard Real-Time Scheduling Considerations-Saving Memory Space-Saving Power-Embedded Software Development Tools: Host and Target Machines-Linker/Locators for Embedded Software-Getting Embedded Software into the Target System

TEXT BOOKS:

1. P. Raghavan, Amol Lad, SriramNeelakandan, 'Embedded Linux System Design and Development', Auerbach Publications, 2005.
2. David E. Simon "An Embedded Software Primer" Pearson Publications, 1999.

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CORE COURSE VII

MICROCONTROLLER PICAND MPLAB

OBJECTIVE

To impart knowledge about the PIC microcontroller and MPLAB

UNIT I MICROCHIP PIC

PIC Microcontroller- Programming the PIC-PIC Programmers- Development Boards-Prototyping the PIC Circuit-PIC Architecture-Baseline PIC Family-PIC 10 Devices - PIC 12 Devices- PIC 14 Devices-Midrange PIC Family-PIC 16 Devices- high-performance PIC Family- PIC 18 Devices.

UNITII MID-RANGE PIC ARCHITECTURE

Processor Architecture and design-Mid-range Core features-Mid-range CPU and Instruction Set-EEPROM Data Storage-Data Memory Organization-Mid-range I/O and Peripheral Modules.

UNITIII PIC PROGRAMMING: TOOLS AND TECHNIQUES

Microchip's MPLAB-Integrated Development Environment-Simulators and Debuggers-Programmers-Engineering PIC Software-Pseudo Instructions.

UNITIV PROGRAMMING ESSENTIALS: I/P AND O/P

PIC 16F84A Programming Template-Introducing the 16F84A-Simple Circuits and Programs –Programming the Seven-Segment LED Interrupts: Interrupts on the 16F84A-Interrupt Sources-Interrupt Handlers-Interrupt Program-Sample Programs.

UNITV PERIPHERAL INTERFACING AND PROGRAMMING

LCD Programming-PIC Protocol-based Serial Program-EEPROM Devices and Interfacing-Real-Time Clocks.

TEXT BOOKS:

1. "Microcontroller Programming The Microchip PIC" by Julio Sanchez and Maria P. Canton Published by CRCPress(Taylor & Francis Group)
2. WWW. Microchip.com
3. Microchip MPLAB IDE for PIC Microcontroller

REFERENCE BOOK:

1. Design With PIC Microcontroller by JOHN B. PEATMAN Pearson Publications

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CORE COURSE VIII

DIGITAL SIGNAL PROCESSOR

OBJECTIVE

To understand DSP with their structure and application

UNITI THEORY OF DISCRETE TIME SYSTEMS.

Introduction- sequences-representation of arbitrary sequences- linear time invariant systems- Causality and stability-difference equation-frequency response-frequency response of the first order systems –frequency response of the second order systems.

UNITII FINITE DURATION IMPULSE RESPONSE FILTERS.

Digital Filters: Magnitude response and phase response of digital filters. FIR filters : Design techniques-Window techniques-rectangular window Function-Hamming window function- Hamming window function - Hanning window function-Blackman window function-Bartlet window function-Kaiser window-Design using Kaiser window function Basic structures: Basic realization block diagram and the signal flow graph Direct forms, Cascade form and linear phase form realization.

UNITIII INFINITE DURATION IMPULSE RESPONSE FILTERS.

IIR filters: Introduction-I.I.R. filler design by approximation of derivatives, Impulse invariantmethod, Bilinear transformation - Butter worth filters –ChesbyShaw filters-frequency transformation(analog and digital) Basic structures : Direct forms, Cascade form and linear phase form realization.

UNITIV EFFECTS OF FINITE WORD LENGTH IN DIGITAL FILTERS

Introduction-rounding and truncation errors - Quantization Effects in Analog to digital conversion of signals-out put noise Power from a digital system-Coefficient quantization effects in Direct form realization of I I R and FIR filters-Limit cycle oscillations-product quantization-scaling-quantization Errors in the computation of DFT .

UNIT V SPECTRAL ANALYSIS

Statistical techniques: Introduction-Energy density spectrum– Estimation of auto Correlation and power spectrum of random signals –DFT in spectral estimation– Power–spectral estimation–non –parametric methods. Bartlet Welch, Blackman and turkey methods-Quality of power spectrum estimators-parametric methods-Basics of AR, MA and ARMA models - Power spectrum estimation by AR, MA and ARMA models FFT technique : Introduction to radix 2 FFTs-some properties of radix 2-Decimation in time FFT-data shuffling and bit refusal-ecimation in frequency algorithm.

TEXT BOOKS:

1. L.R.Raliner and B.Gold Theory and application of Digital signal processing Signal processing Prentice Hall of India, New Delhi–2003
2. Digital Signal processing Tata McGraw Hill publishing Company, New Delhi-2004

REFERENCE BOOKS:

1. Allan V.Oppenheim and Ronald W Schafer Digital Signal Processing : Prenlice Hall of India-NewDelhi 2000
2. Johny-R.Johnson, Introduction to Digital signal processing –PHI, Publication, New Delhi, year -1994
3. K.S.Srinivasan, Digital signal processing. Anuradha agencies 2003 Kumbakonam

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CORE PRACTICAL III

ELECTRONICS III (P)

(8051 MICROCONTROLLER Microwave LAB)

Any 16 Experiments

1. Addition / subtraction
2. 2 . Multiplication / division
3. Block data transfer.
4. Smallest and largest of N numbers.
5. Arrange in ascending / descending order.
6. Sum of N 8 bit numbers.
7. 1's and 2's compliment of an array (8 / 16 bit).
8. UP/DOWN counter using 7 segment displays.
9. Traffic light control interface.
10. Wave form generation.
11. ADC interface.
12. DAC interface.
13. Stepper motor interface.
14. Solid State Relay Interface
15. Time Delay Programme
16. Digital Clock
17. Rolling and blinking of a message
18. LCD interface
19. DC motor interface
20. Temperature controller
21. Microwave experiments-Klystron oscillator
22. Microwave experiments-Gunn diode oscillator

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ELECTIVE COURSE III (A)

MICROCONTROLLER ATMEGA AND IDE

OBJECTIVE

To impart knowledge about ATMEGA microcontroller and programming through Arduino.

UNITI Introduction To 8-bit Microcontroller

Microcontrollers and Embedded processors, Overview of AVR family, AVR Microcontroller architecture, Register, AVR status register, ROM space and other hardware modules, ATmega32 pin configuration & function of each pin.

UNITII AVR Assembly Language Programming

Addressing modes of AVR, Data transfer Arithmetic, Logic and Compare, Rotate and Shift, Branch and Call instructions. AVR data types and assembler directives, AVR assembly language programs, AVR I/O Port Programming, Time delay loop, BCD, ASCII conversion Program, Look-up table, Bit addressability, MACROs.

UNITIII AVR Programming in C

Data types, I/O programming, logic operations, Intel HEX file, Timer programming in assembly and C, Interrupt programming in assembly and C, Serial Port programming in assembly and C.

UNITIV Peripheral Interfacing

LCD and Keyboard Interfacing, ADC, DAC and sensor interfacing, Relay, Opto-isolator and Stepper Motor Interfacing, Input capture and Wave Generator, PWM programming and DC motor control, SPI protocol and Display interfacing.

UNITV Arduino

Exploring the Arduino ecosystem - Arduino functionality - Atmel microcontroller - Programming Interfaces - General I/O and ADCs - Power Supplies - Arduino Boards - Creating Program: Downloading and Installing the Arduino IDE - Running the IDE and Connecting to the Arduino - Breaking down a program.

Text Books:

1. Muhammad Ali Mazidi, SarmadNaimi and SepehrNaimi,The AVR Microcontroller and Embedded Systems Using Assembly and C, Pearson Education, 2011
2. DhananjayGadre, Programming and Customizing the AVR Microcontroller, McGraw Hill Education, 2000

Reference Books

1. AVR ATmega32 data sheet
2. Jeremy Blum, Exploring Arduino, John Wiley & Sons Inc., 2013

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ELECTIVE COURSE III (B)

WIRELESS COMMUNICATION

OBJECTIVE

To learn the concepts of wireless communication

UNIT I SERVICES AND TECHNICAL CHALLENGES

Types of Services-Requirements for the services-Multipath propagation, Spectrum Limitations-Noise and Interference limited systems-Principles of Cellular networks-Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS

Propagation Mechanisms (Qualitative treatment) - Propagation effects with mobile radio - Channel Classification - Link calculations - Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS

Structure of a wireless communication link - Modulation and demodulation - QuadraturePhase Shift Keying - Differential Quadrature Phase Shift Keying - Offset - QuadraturePhase Shift Keying - Binary Frequency Shift Keying - Minimum Shift Keying - GaussianMinimum Shift Keying - Power spectrum and Error performance in FADING channels.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS

Principle of Diversity - Macrodiversity - Microdiversity - Signal Combining Techniques - Transmit diversity - Equalisers - Linear and Decision Feedback equalisers - Review ofChannel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCEIVER SCHEMES

Spread Spectrum Systems - Cellular Code Division Multiple Access Systems - Principle - Power control - Effects of multipath propagation on Code Division Multiple Access - Orthogonal Frequency Division Multiplexing - Principle - Cyclic Prefix - Transceiverimplementation - Second Generation(GSM, IS–95) and Third Generation WirelessNetworks and Standards

TEXT BOOKS:

1. Andreas.F. Molisch, “Wireless Communications”, John Wiley - India, 2006.
2. Simon Haykin& Michael Moher, “Modern Wireless Communications”, Pearson Education, 2007.

REFERENCE BOOKS:

1. Rappaport. T.S. “Wireless communications”, Pearson Education, 2003.
2. Gordon L. Stuber, “Principles of Mobile Communication”, Springer International Ltd.,2001.
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

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ELECTIVE COURSE IV (A)

MOBILE COMMUNICATION

OBJECTIVE

To understand the cellular concept and mobile communication
To learn fundamentals of mobile software

UNIT I CELLULAR CONCEPTS AND EQUALIZATION

Cellular telephone system - frequency reuse- channel assignment and land off strategies- elements of cellular radio system design- switching and traffic- data links and microwaves- system evaluation- interference and system capacity- Improving coverage capacity; Fundamentals of equalization- space polarization.

UNIT II MOBILE NETWORK LAYER

Mobile IP: goals- assumptions and requirements-Entities andterminology-IP packet delivery-Agent discovery-Registration –tunneling and encapsulation-Optimizations-Reverse tunneling –IPv6-IP micro-mobility support-Dynamic host configuration protocol.

UNIT III MOBILE TRANSPORT LAYER

Traditional TCP: congestion control-Slow start-Fasttransmit/fast recovery-Implications on mobility-Classical TCP improvements: indirect TCP-Snooping TCP-Mobile TCP-Fast transmit/fast recovery-Transmission/time-out freezing-selective transmission-Transaction-oriented TCP-TCP over 2.5/3G wireless networks - Performance enhancing proxies.

UNIT IV WIRELESS APPLICATION PROTOCOL (VERSION 1.X)

Architecture-Wireless datagram protocol-Wirelesstransport layer security-Wireless transaction protocol-Wireless session protocol-Wireless application environment-Wireless markup language-WML Script-Wireless telephony application –Push architecture-Push/pull services-i-mode-syncML-WAP 2.0.

UNIT V SYMBIAN OS FUNDAMENTALS

System structure - Hardware resource - Software basics-Processes- threads and Switches - Executable programs-Power management - The Kernel and E32 - Devices drivers-Timer –memory - files - Event handling-Perspectives even handling - Active objects - Multitasking and Preemption - Servers - API covered- Fundamental Types - Naming convention - Function-API- Templates - Casting - Classes- Design patterns Class diagrams and UML.

TEXT BOOKS:

1. William C. Y. Lee Mobile Cellular Telecommunication: MGH Inc., 1995
2. Jochen Schiller Mobile communication : Jochen Schiller 2nd edition, Pearson Education, 2004

REFERENCE BOOK:

1. W. C. Y. Lee, “Mobile Communication Engineering”, 2nd edition, McGraw- Hill, 1998

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ELECTIVE COURSE IV (B)

CAD AND PCB DESIGN

OBJECTIVE

To impart knowledge about the CAD and PCB basics and designing

UNITI INTRODUCTION TO COMPUTER AIDED DESIGN

Computer as design medium - Hardware/Software requirements - Representation of images - Scan conversion of primitive objects - text in graphics - Transformation - Viewing and modeling transformation in 2D and 3D - Matrix representation. Segmentation, Geometric modeling, data base management for CAD.

UNIT II COMPUTER SIMULATION OF ELECTRONIC NETWORKS

Mathematical review - Solution of simultaneous linear equations - exploiting the sparsity in matrices - DC analysis of linear networks - review of Nodal and loop analysis - DC analysis of non - linear networks - Transient analysis of linear and non - linear circuits.

UNIT III SEMICONDUCTOR DEVICE MODEL

Low frequency models for semiconductor devices - models for PN - junction diodes, AC Ebers Moll model, AC and DC transport model for BJT, Noise Modeling - Introduction to SPICE models.

UNIT IV LOGIC SIMULATION

Introduction to Hardware Description, Testing for design and manufacturing-Oscillations and other problems - fault simulation - Mixed - mode simulation: Relaxation method for transient analysis - waveform relaxation.

UNITV COMPUTER AIDED PCB DESIGN

Computer aided setup - Input Packages, setup - Libraries, Schematics Capture, Interface techniques Layout and component placement - general consideration - manual assisted and automatic placement- Conductor routing - routing problem - surface organization - Documentation.

TEXT BOOKS:

1. S. Krishnamoorthy and S Rajeev ,Computer Aided Design-Software and analytical tool NarosaPublishing House
2. R. RaghuramComputer Simulation of Electronic Circuits Wiley Eastern
3. Gerald L Ginsberg, Printed Circuit Design –McGraw Hills
4.M.M. Shah, Design of Electronic Circuits and CAD, Wiley Eastern Books

REFERENCE BOOK:

1. R.S.Khandur, Printed circuit Board Fabrication, Assembly and testing

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CORE CORESE IX

ASIC AND FPGA DESIGN

OBJECTIVES

To study the design flow of different types of ASIC, learn the architecture of different types of FPGA and gain knowledge about partitioning, floor planning, placement and routing, SoC.

UNITI INTRODUCTION TO ASICS

Types of ASICs: Full-Custom ASICs; Standard-Cell Based ASICs – Gate-Array Based ASICs – Channeled Gate Array – Channel-less Gate Array – Structured Gate Array – Field-Programmable Gate Arrays – Design Flow – Programmable ASICs: Anti-fuse – Static RAM - EPROM and EEPROM Technology – Programmable Logic Devices: PLA, PAL, CPLD, Field-Programmable Gate Arrays

UNITII ASIC PHYSICAL DESIGN

System partition – Partitioning – Partitioning methods – Interconnect delay models and Measurement of delay – Floor planning - Placement – Routing: Global routing – Detailed routing – Special routing – Circuit extraction – DRC

UNITIII LOGIC SYNTHESIS, SIMULATION AND TESTING

Synthesis: Combinational logic synthesis – FSM synthesis, **Simulation:** Types of simulation **Testing of logic circuits** Fault models – Complexity of a test set – Path sensitizing – Circuits with tree structure – Random test – Testing of Sequential circuits: Design for testability – Built-in self test

UNITIV FPGA

Field Programmable gate arrays- Logic blocks, routing architecture, Design flow technology - mapping for FPGAs, Xilinx XC4000 - ALTERA's FLEX 8000 and 10000, ACTEL's ACT-1,2,3 – Altera MAX 5000 and 7000.

UNITV SoC DESIGN

Design Methodologies – Processes and Flows - Embedded software development for SOC – Techniques for SOC Testing – Configurable SOC – Hardware / Software codesign Case
studies: Digital camera, Bluetooth radio / modem, SDRAM and USB.

Text Books:

1. M.J.S. Smith, "Application specific Integrated Circuits", Addition-Wesley, 2000.
2. S. Trimberger, "Field Programmable Gate Array Technology", Kluwer Academic Publishers, 1994.
3. FarzadNekoogar and FaranakNekoogar, "From ASICs to SOCs: A Practical Approach", Prentice Hall PTR, 2003.
4. R. Rajsuman, "System-on-a-Chip: Design and Test", Artech House Publishers, 2000

Reference Books:

1. Stephen Brown and Jonathan Rose "Architecture of FPGAs and CPLDs
2. Andrew Moore "FPGA FOR DUMMIES' Altera Special Edition

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CORE CORSE X

PROGRAMMABLE DIGITAL SIGNAL PROCESSOR

OBJECTIVE

To impart knowledge about Digital signal processor programming

UNIT I INTORODUCTION TO DIGITAL SIGNAL PROCESING

Introduction-Digital signal-processing system-sampling process- Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT)- Linear time-invariant systems- Digital filters- Decimation and interpolation- Analysis and Design tool for DSP Systems MATLAB- DSP using MATLAB.

UNITII COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS

Number formats for signals and coefficients in DSP systems- Dynamic Range and Precision- Sources of error in DSP implementations- A/D Conversion errors- DSP Computational errors- D/A Conversion Errors- Compensating filter.

UNIT III ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES

Basic Architectural features- DSP Computational Building Blocks- Bus Architecture and Memory- Data Addressing Capabilities-Address Generation UNIT - Programmability and Program Execution- Speed Issues- Features for External interfacing.

UNITIV EXECUTION CONTROL AND PIPELINING

Hardware looping- Interrupts- Stacks- Relative Branch support- Pipelining and Performance- Pipeline Depth- Interlocking- Branching effects- Interrupt effects- Pipeline Programming models.

UNITV PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices- Data Addressing modes of TMS320C54XX DSPs- Data Addressing modes of TMS320C54XX Processors- Memory space of TMS320C54XX Processors- Program Control- TMS320C54XX instructions and Programming- On-Chip Peripherals- Interrupts of TMS320C54XX processors- Pipeline Operation of TMS320C54XX Processors.

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan- Digital Signal Processing Thomson Publications, 2004.
2. Lapsley et al. DSP Processor Fundamentals, Architectures & Features –S. Chand & Co, 2000.

REFERENCE BOOKS:

1. B. VenkataRamani and M. Bhaskar, Digital Signal Processors, Architecture, Programming and Applications –TMH, 2004.
2. Jonatham Stein, Digital Signal Processing John Wiley, 2005

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CORE PRACTICAL IV

ELECTRONICS IV (P)

(PIC & AVR MICROCONTROLLER, DSP and FPGA LAB)

Any 16 Experiments

1. Arithmetic and Logical operations using ALP
2. Square wave generation
3. Interfacing LCD
4. Interfacing Stepper motor
5. Interfacing Key Board
6. Interfacing Relay
7. Angle control of Stepper motor
8. Speed control of DC motor
9. Serial Communication using RS232
10. RTC interfacing using I2C protocol
11. USB Communication
12. Study of ports in AVR microcontroller with DIP switch
13. Study of LED pattern generation using AVR microcontroller
14. Study of Matrix display using AVR microcontroller
15. Interfacing PWM in AVR microcontroller to control the speed of a DC motor.
16. Study of in-built ADC in AVR microcontroller.
17. Sampling and aliasing in PDSP kit
18. Implementation of FIR filter in PDSP kit.
19. Decoder circuit implementation in FPGA
20. Four bit counter implementation in FPGA
21. PLC based Light control circuit
22. PLC based Motor control circuit

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ELECTIVE COURSE V (A)

MEMS AND NANO ELECTRONICS

OBJECTIVE

To develop expertise in the MEMS field through studying in depth advanced micro/Nano fabrication and its application.

UNIT I MEMS INTRODUCTION

MEMS or MST - Micromachining - Materials for MEMS-Silicon compatible- Silicon, silicon dioxide and nitride - thin metal films and polymers, othermaterials - Glass and fused quartz, silicon carbide and diamond-shapememory alloys - Important material properties and physical effects.

UNIT II MICRO AND NANO FABRICATION

Processes for micromachining Processes for Micromachining - Basic ProcessTools - Epitaxy - Oxidation - Sputter Deposition - Evaporation - Chemical-Vapor Deposition - Spin-On Methods - Lithography - Etching-SupercriticalDrying - Self-Assembled Monolayer - SU-8 Photosensitive Epoxy

UNIT III MEM STRUCTURES AND SYSTEMS IN RF APPLICATIONS

Signal integrity in RF MEMS-Micro machined passive components- Micro electromechanical Resonators, Microelectromechanical switches.

UNIT IV NANO LITHOGRAPHY AND NANO MATERIALS

Introduction to Nano lithography-Cross cutting technologies- EmergingNano lithography-Carbon Nano tubes- Application of Nano tubes: for storageapplication ,for field emission , for sensor application ,and for electronicapplication - Introduction to Quantum dots-Introduction to Nano composites.

UNIT V QUANTUM COMPUTATION AND MAGNETORESISTIVEMATERIALS AND DEVICES

Nano structures for quantum computation-Quantum computation algorithms-Requirements for physical realizations of quantum computers-Introductionto magnetic materials and devices - Acronyms for AMR, GMR, TMR, BMRand CMR semiconductor spintronics.

TEXT BOOKS:

1. NadimMaluf, KirtWilliams ,“Introduction to Microelectromechanical systems engineering” 2004, Second edition, Artech house, Boston.
2. Massimiliano Di ventra, StephaneEvory and James R. Hefline,Jr.“Introduction to Nanoscale science and technology”,KluwerAcademic Publishers, 2004

REFERENCE BOOK:

1. Anupama B. Kaul, “Microelectronics to Nanoelectronics: Materials,Devices&Manufacturability” CRC press, 2013.

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ELECTIVE COURSE V (B)

PROGRAMMABLE LOGIC CONTROLLER AND SCADA

OBJECTIVE

To learn the concept and application of Programmable Logic Controller and SCADA

UNIT I PLC INTRODUCTION

Parts of PLC; Principles of operation; Modifying the operation; PLC size and application- PLC Hardware Components: The I/O section; Discrete I/O section; Analog I/O section - Special I/O modules The CPU; Programming devices

UNITII BASICS OF PLC PROGRAMMING

Processor memory organization - PLC Programming Languages - Relay type instructions- Instruction addressing - Programming Examine IF closed and Examine IF open instructions - Electromagnetic control relay - Motor starters - Manually operated switches - Mechanically operated switches - Proximity sensor: Inductive and capacitive Proximity sensor; Output control devices; Converting relay schematics into PLC ladder programs

UNITIII PLC INSTRUCTIONS

Timer Instructions: ON-Delay timer instructions; OFF-Delay timer instructions - Counter Instructions: UP Counter - Down Counter - Allen-Bradley SLC-500 PLC Instructions: Program control instructions -Data manipulation instructions - Math instructions

UNITIV APPLICATIONS OF PLC

Simple sequence control concepts - Priority determination design - Automatic packing mechanism - Automatic control of warehouse door - Automatic lubricating oil supplier - Conveyor belt motor control - Bottle label detection - Car park control - Ball sorter mechanism - Temperature control

UNITV SCADA

Convergence of Evolving Technologies - Basics of SCADA Signal Processing - Defining the Scope of SCADA Software - Use of Generalized Terminology - Typical SCADA System Architecture - Sample Application: WTP SCADA System - Life Cycle of a SCADA Project - System Graphic Displays - Process Graphic Displays - Historical Reports and Trend Displays - Special Operating Procedures

TEXT BOOKS:

1. Frank D. Petruzella, “Programmable Logic Controllers”, Tata McGraw Hill, Third edition, 2010.
2. http://www.pacontrol.com/download/OMRON-PLC-Programming.pdf
3. Stuart G. McCrad, “Designing SCADA Application Software: A Practical Approach”, Elsevier, First edition, 2013.

REFERENCE BOOK:

1.A. W. Bolton, “Programmable Logic Controllers”, Elsevier, Fifth edition Reprint, 2011.

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