IV Year Syllabus Department of Electronics and Communication Engineering
(R14(R) Regulation)

SHRI VISHNU ENGINEERING COLLEGE FOR WOMEN :: BHIMAVARAM

(Autonomous)

Department of Electronics and Communication Engineering

Course Structure

(with effect from AY 2015-2016)

IV Year –I Semester

S.No	Subject Code	Subject Title	L	T	P	C	I	E	T
1	UGEC7T01	VLSI Design	3	2		4	40	60	100
2	UGEC7T02	Telecom & Computer Networks	3			3	40	60	100
3	UGEC7T03	Microcontrollers & Applications	3	2		4	40	60	100
4	UGEC7T04	Digital Image Processing	3	2		4	40	60	100
5	UGEC7T05	Optical Fiber Communication	3	1		4	40	60	100
6	UGEC7T06 UGEC7T07 UGEC7T08	**ELECTIVE-III** a. Satellite Communication b. Mechatronics c. Digital Signal Processors & Architecture	3	1		4	40	60	100
7	UGEC7P09	VLSI Lab			3	1	25	50	75
8	UGEC7P10	Microcontrollers Lab			3	1	25	50	75
9	UGBS7A01	**Technical Writing (Audit Course –III)**	3	--	--	--	--	--	--
		Total	**21**	**8**	**6**	**25**	**290**	**460**	**750**

IV Year –II Semester

S.No	Subject Code	Subject Title	L	T	P	C	I	E	T
1	UGEC8T01 UGEC8T02 UGEC8T03	**Free ELECTIVE –I** a. Digital TV Engineering b. Analog IC Design c. Optimization Techniques	3			3	40	60	100
2	UGEC8T04 UGEC8T05 UGEC8T06	**Free ELECTIVE –II** a. Radar Engineering & Navigational Aids b. Audio & Speech Processing c. Assistive Technology	3			3	40	60	100
3	UGEC8T08 UGEC8T09 UGEC8T10	**Free ELECTIVE –III** a. Wireless Sensor Networks b. Embedded & Real Time Systems c. Advanced Digital Signal Processing	3			3	40	60	100
4	UGEC8J11	Project				9	100	100	200
		Total	**9**			**18**	**220**	**280**	**500**

L – Lecture hours, T – Tutorial hours, P – Practical hours, C – Credits,

IM – Internal marks, EM – External Marks, TM – Total Marks

IV Year I-Semester Syllabus Department of Electronics and Communication Engineering
(R14(R) Regulation)

Name of the Subject: **VLSI Design**

Subject Code : **UGEC7T01**

Year / Semester : **IV/ I**

Regulation year : **2015-16**

Theory : **3+2hrs**

Credits : **4**

Course Objectives:

The course intends to provide an overview of the principles, operation and application of the analog building block MOSFET for performing various functions. Introduce the technology, design concepts, electrical properties and modeling of Very Large Scale Integrated circuits. To understand the basics of MOS Circuit Design and modeling and the basics of Semiconductor Integrated Circuit Design

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Know fabrication process of IC technologies and Basic Electrical Properties of MOS & BICMOS Circuits.

CO 2. Draw stick and layout models of CMOS circuits using design rules.

CO 3. Design CMOS & other complex logic gates and can estimate basic circuit parameters.

CO 4. Design subsystems and programmable logic devices and get an idea of large scale integrated circuits.

UNIT-I REVIEW OF MICROELECTRONICS AND INTRODUCTION TO MOS TECHNOLOGY

Basic MOS transistors, enhancement and depletion modes of transistor action, MOS and related VLSI technology, NMOS, CMOS, BICMOS, GaAs Technologies, IC production process, Comparison between CMOS and Bipolar technologies.

UNIT-II BASIC ELECTRICAL PROPERTIES OF MOS AND BICMOS CIRCUITS

I_{DS} versus V_{DS} Relationship, aspects of MOS transistor threshold voltage, MOS trans conductance and output conductance , MOS transistor figure of merit, pass transistor, MOS inverter ,determination of pull–up to pull- down ratio for nMOS inverter driven by another nMOS inverter and for an nMOS inverter driven through one or more pass transistors, alternative forms of pull –up, the CMOS inverter, MOS transistor circuit model, Bi-CMOS inverter ,latch –up in CMOS circuits and Bi-CMOS latch up susceptibility.

UNIT-III MOS AND CMOS CIRCUIT DESIGN PROCESS

MOS layers, stick diagrams, design rules, Lambda based design rules, 2µ.meter, 1. 2µ.meter design rules, double metal double poly CMOS rules, Layout diagrams, VLSI design flow.

UNIT-IV BASIC CIRCUIT CONCEPTS

Sheet Resistance, Sheet Resistance concepts applied to MOS transistors and inverters, Area capacitance of layers, standard unit of capacitance some area capacitance calculations, delay unit, inverter delays ,driving large capacitive loads, wiring capacitances, choice of layers.

UNIT-V SCALING OF MOS CIRCUITS

Scaling models, Scaling function for device parameters, Limitation of Scaling, Introduction to switch logic and gate logic, other forms of CMOS logic.

UNIT-VI SEMICONDUCTOR INTEGRATED CIRCUITS DESIGN

Introduction to Programmable Logic Devices (PLDs), implementation approaches in VLSI design full custom design, semi custom design gate arrays, standard cells, Complex Programmable Logic Devices (CPLDs), Field Programmable Gate Arrays (FPGAs), simulation and synthesis.

Text Books

T1. Essential of VLSI Circuits and systems –Kamran Eshraghian, Douglas A.Pucknell, Sholeh Eshraghian, Prentice-Hall of India private limited, 2005 edition.

T2. Principles of CMOS VLSI Design, Neil H.Weste Jhon Wiely, 2006 Edition.

References

R1. Introduction to VLSI Circuits and systems, Jhon P. Uyemura Jhon Wiely, 2005 Edition.

R2. Modern VLSI Design, Wayne Wolf, PHI, Fourth Edition.

Name of the Subject: **Telecom and Computer Networks**

Subject Code : **UGEC7T02**
Year / Semester : **IV/ I**
Regulation year : **2015-16**
Theory : **3hrs**
Credits : **3**

Course objectives:

To cover the networking concepts and components and introduces various models. The course is a highly efficient way of gaining networking awareness, understanding of the protocols and communication techniques used by networks and vocabulary. To learn about Network hardware, connecting hosts, Peer to Peer Networks, Client/Server Model.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the basic concepts of Data communication with different models.
CO 2. Enumerate the OSI/ISO layers.
CO 3. Understand about Telecom Networks and Signaling concepts.
CO 4. Know about ISDN and digital networks.

UNIT-I INTRODUCTION

Uses of computer networks, OSI, TCP/IP and other reference models, Arpanet, Internet, Network Topologies, WAN, LAN, MAN, Protocols and Standards.

UNIT-II PHYSICAL LAYER and DATA LINK LAYER

Physical Layer: Classification of Transmission media, Guided media: Twisted pair cable, Coaxial Cable, Fiber Optic cable, Unguided Media: wireless communications, Switching, Digital Transmission

Data Link Layer: Design issues, Checksum, CRC, framing, Stop and Wait protocol, Stop- and-Wait ARQ, Go-Back-N, Selective Repeat ARQ ,piggybacking, Data link layer in HDLC. Medium Access sub layer: Random Access: ALOHA, Carrier sense multiple access. Controlled Access: Reservation, Polling, Token Passing, Wired LANS.

UNIT-III NETWORK LAYER-DESIGN AND ROUTING

Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. Network Layer-Congestion control, Rotary for mobility, Congestion Control Algorithms, General Principals of Congestion Control, Congestion Prevention Policies the Network layer in the Internet and in the ATM Network.

UNIT-IV TRANSPORT LAYER

Transport Services, Connection Management, TCP and UDP protocols. Application Layer - Network Security, Domain Name System, Electronic Mail; The Worldwide Web, Basics of Multi Media.

UNIT V TELEPHONE NETWORKS AND SIGNALING TECHNIQUES

Subscriber loop system, switching hierarchy and routing, transmission plan, numbering plan, charging plan In-Channel signaling, common channel signaling, network traffic load parameters, grade of service and blocking probability.

UNIT-VI INTEGRATED SERVICES DIGITAL NETWORKS

Introduction, ISDN architecture, ISDN interfaces, Functional Grouping, Reference Points, protocol architecture, signaling, numbering, addressing, BISDN.

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, CM & CMTS and DOCSIS.

Text Books

T1. Computer Networks---- Andrew S TANENBAUM, 4th Edition. Pearson Education/PHI.

T2. Telecommunication switching system and netwoks – Thyagarajan Viswanath, PHI, 2000

References

R1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.

R2. Understanding Communications and Networks, 3rd Edition,,W.A. Shay,Thomson

R3. Data Communications and Networking----- Behrouz A. Forouzan. Third Edition TMH.

Name of the Subject: **Microcontrollers & Applications**

Subject Code : **UGEC7T03**
Year / Semester : **IV/ I**
Regulation year : **2015-16**
Theory : **3+2hrs**
Credits : **4**

Course objectives:

The objective of this course is to develop background knowledge as well as core expertise in microcontroller which includes study the concepts and basic architecture and programming of 8051, PIC microcontroller and ARM processors

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand and apply knowledge of the microcontroller's architecture (8051, PIC & ARM) and programs to solve basic binary mathematical operations.

CO 2. Understand the operation of various peripheral components and their program development for 8051, PIC & ARM.

CO 3. Understand and interface various I/O devices such as LED, ADC, motors etc.

CO 4. Design and develop simple systems using microcontrollers.

UNIT I INTRODUCTION TO MICROCONTROLLERS

Microcontrollers & Microprocessors, 8 bit & 16 bit Microcontrollers, CISC & RISC Processors, Harvard & Von-Neumann architectures, 8051 architecture and register set, pin description, parallel I/O ports, Memory organization.

UNIT II PROGRAMMING OF 8051

Addressing modes, Instruction set, sample programs, interrupts, timers & counters, serial communication, introduction to embedded C, simple programs, development tools.

UNIT III INTERFACING

LEDs & switches interfacing, keypad interfacing, Seven Segment Display interfacing, ADC & DAC interfacing, 2X16 LCD interfacing, stepper motor interfacing, serial port interfacing, high power devices, simple calculator development.

UNIT IV PIC MICROCONTROLLERS

Overview and features, architecture of PIC 16C6X/7X, PIC memory organization, PIC 16C6X/7X instructions, addressing modes, I/O ports, Interrupts in PIC 16C61/71, PIC 16C61/71 timers.

UNIT V PIC 16F8XX FLASH MICROCONTROLLERS

Pin diagram of 16F8XX, status register, OPTION_REG register, PIC 16F8XX program memory and data memory, DATA EEPROM and Flash Program EEPROM, Interrupts in 16F877, I/O Ports, Timers.

UNIT VI: ARM 32-BIT MICROCONTROLLER

Introduction to 16/32 bit processors, ARM architecture and organization, ARM/ Thumb programming model, addressing modes, ARM / Thumb instruction set, Development tools.

Text Books

T1. Kenneth J. Ayala, "The 8051 Microcontroller: Architecture, Programming, and Applications" West Publishing

T2. Muhammad Ali Mazdi, "8051 Microcontrollers & Embedded Systems", Pearson Education.

References

R1. Krishna kant, "Microprocessors and Microcontrollers". PHI publications, 2010.

R2. Raj Kamal, "Microcontrollers – Architecture, Programming, Interfacing & System Design" Pearson Eduaction.

R3. AJAY V Deshmukh," Microcontroller" TATA McGraw Hill publications 2012.

Name of the Subject: **Digital Image Processing**

Subject Code : **UGEC7T04**

Year / Semester : **IV/ I**

Regulation year : **2015-16**

Theory : **3+2hrs**

Credits : **4**

Course Objectives:

To get knowledge of different types of image processing techniques

To apply image processing for different real time applications

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the fundamental steps in image processing.

CO 2. Apply image processing techniques for enhancement, restoration and compression of an image.

CO 3. Perform segmentation and morphological processing on an image.

CO 4. Analyze various color image processing techniques.

Unit I INTRODUCTION

Introduction to Digital Image Processing, Fundamental steps in image processing systems, Image acquisition, Sampling and quantization, Basic relationship between pixels, Mathematical tools used in image processing, Camera model of Image, Need for image transform and spatial frequencies in image processing, 2-D DFT, DCT, DST transforms

UNIT II IMAGE ENHANCEMENT

Some basic intensity transformation functions, Histogram processing, Fundamentals of spatial filtering –smoothing spatial filters and sharpening spatial filters, Combining spatial enhancement methods, Transformation and spatial filtering, Image smoothing using frequency domain filters Selective filtering and implementation

UNIT-III IMAGE RESTORATION & RE-CONSTRUCTION

Image degradation/restoration model, Noise models, Restoration in the presence of noise, linear Position invariant degradation, Estimation of degradation function and inverse filtering, Wiener filtering, Constrain least square filtering.

UNIT IV COLOR IMAGE PROCESSING

Color fundamentals, Color models, Pseudo color Image Processing, Basics of full color image processing, Color transformations, Smoothing and sharpening.

UNIT V IMAGE COMPRESSION AND WATER MARKING

Lossless Compression: Variable length coding, Dictionary-based coding, LZW compression, Lossy Compression, Image Compression standards, JPEG, JPEG 2000, Digital Water Marking, Frequency Domain Water Marking, Security Attacks.

UNIT VI SEGMENTATION & MORPHOLOGICAL PROCESSING

Erosion and Dilation, Opening and closing, Hit or miss transformation, some basic Morphological algorithms, Gray-Scale Morphology, Point , line and edge detection, Thresholding, Region oriented segmentation, Segmentation using morphological watersheds, Use of motion in segmentation.

Text Books

T1. Rafael C. Gonzalez and Richard E. Woods," Digital Image Processing" Pearson Education, 2011.

T2. Anil K jain, "fundementals of Digital Image Processing". Prentice Hall of India, 2012(print).

References

R1. S.Jayaraman,S,Esakkirajan,T.Veerakumar" Digital Image Processing" McGraw Hill Publisher,2009

R2. B.Canda and D Dutta Mjumder" Digital Image Processing and analysis"Prentice Hall of india,2011/12(print)

Name of the Subject: **Optical Fiber Communication** | Subject Code : **UGEC7T05**

Year / Semester : **IV/ I**

Regulation year : **2015-16** | Theory : **3+1hrs**

Credits : **4**

Course Objectives:

This course provides a full understanding of the components and the design and operation of optical fibre communication systems. The principles of wavelength division multiplexed (WDM) systems. The characteristics and limitations of system components like laser diodes, external modulators, optical fibre, optical amplifiers, optical receivers and the factors affecting the performance of both analog and digital transmission systems are studied.

Course Outcomes:

Upon completion of the course, students will be able to

- **CO 1.** Understand fiber-optic communication system, optical properties and principles of optical fibers.
- **CO 2.** Know about Fiber losses and dispersion in fibers.
- **CO 3.** Know the operation of optical sources and detectors and the fabrication process of Optical Fibers.
- **CO 4.** Design Optical receiver and analyze power budget.
- **CO 5.** Understand WDM, analog and digital receivers.

UNIT-I OVER VIEW OF OPTIC FIBER

Advantages of Optical Fiber Communications, Nature of Light, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, V Number, Optical Fiber Modes and Configurations, Mode Theory for Circular Waveguides, Single-Mode Fibers, Step Index and Graded-Index Fiber Structure. Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index.

UNIT – II FIBER MATERIALS

Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses. Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber.

UNIT – III OPTICAL SOURCES AND PHOTO DETECTORS

Optical Sources: Light-Emitting Diodes, Light-Emitting – Diodes Operating Characteristics, Quantum Efficiency and Power bandwidth. Laser Principles, Laser Diodes, Laser-Diode Operating Characteristics, Distributed – Feedback Laser Diode, Fiber Laser, Vertical-Cavity Surface-Emitting Laser Diodes. Laser diode rate equations, Resonant frequencies.

Photo Detectors: Physical Principles of PIN and Photodiodes, Photo detector Noise, Detector Response me Avalanche Multiplication Noise, Structures for InGaAs APDs, Temperature Effect on Avalanche Gain, Comparison of Photo detectors.

UNIT IV: FIBER FABRICATION

Outside Vapor Phase Oxidation, Vapor Phase Axial Deposition, Modified Chemical Vapor Deposition, Double-Crucible Method

Unit-V: OPTICAL COUPLERS AND WDM CONCEPTS

Source Coupling, Fiber-to-fiber joints, fiber end Preparation, Splicing, Connectors, Principles of Wavelength-Division Multiplexing, Types of WDM, Directional Couplers, Star Couplers, Isolator and Circulator, Fiber Bragg Gratings, Tunable optical filters and Tunable optical Sources.

Unit-VI: SYSTEM DESIGN AND FIBER OPTICAL APPLICATIONS

Optical system design — Considerations, Component choice, Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples. Analog System and Digital System Design, Applications of Fiber Optics.

Text Books

T1. Gerd Keiser “Optical fiber Communication,” Mc Graw Hill. 3rd Edition , 2003

T2. P. Chakravarthy “Fiber Optic Communications,” Mc Graw Hill.

References

R1. Fiber Optic Systems, John Powers, Irwin Publications, 1997

R2. Optical Fiber Communication, Howes M.J., Morgen, D.V John Wiely

Name of the Subject: **Satellite Communication** Subject Code **: UGEC7T06**

(ELECTIVE-III) Year / Semester : **IV/ I**

Regulation year : **2015-16** Theory : **3+1hrs**

Credits : **4**

Course Objectives:

This course provides learn the fundamentals and the techniques for the design and analysis of satellite communication systems. Satellite Orbits, Space Stations and Ground Terminals, Frequency Allocation, Link Calculation and Signal Propagation, Digital Modulation, Multiple Access, Receiver Synchronization, Baseband Processing and the basics of various Satellite types.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the orbital mechanics, basic concepts of satellite communication, its applications.

CO 2. Understand the Concepts of satellite subsystems and Link Design.

CO 3. Know about Satellite Earth stations.

CO 4. Understand satellite navigational aids.

UNIT I INTRODUCTION

Origin of Satellite Communication, Historical Back ground, Introduction to Polar, geo-synchronous and geo-stationary satellites, Kepler's laws, Locating the satellite with respect to the earth, sub-satellite point, look angles, mechanics of launching a synchronous satellite, Orbital perturbations, Orbit determination, Orbital effects in communication systems performance. Indian scenario in communication satellites.

UNIT II SATELLITE SUBSYSTEMS

Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT III SATELLITE TRANSPONDER

Transponder model, Satellite signal processing, RF-RF translation, IF demodulation.

UNIT IV SATELLITE LINK DESIGN

Basic transmission theory, system noise temperature and G/T ratio, Design of downlinks, uplink design, Design of satellite links for specified C/N, System design example.

UNIT V EARTH STATION SUB SYSTEMS

Introduction, Transmitters and Receivers, Different types of earth stations, Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Space craft antennas, Multiple Access Techniques, comparison of FDMA, TDMA, CDMA and SDMA.

UNIT VI INTRODUCTION TO VARIOUS SATELLITE SYSTEMS

VSAT, direct broadcast satellite television and radio, satellite navigation and the global positioning systems.

Text Books

T1. Timothy Pratt, Charles Bastian and Jeremy Allnutt. (2008), "Satellite Communications", WSE, Wiley Publications, 2nd Edition.

T2. Satellite Communication System Design Principles - M. Richharia

References

R1. Satellite Communication - R.M. Gagliardi

Name of the Subject: **MECHATRONICS**
(ELECTIVE-III)
Regulation year : **2015-16**

Subject Code **: UGEC7T07**
Year / Semester : **IV/ I**
Theory : **3+1hrs**
Credits : **4**

Course Objectives:
To give an insight of different components of a Mechatronic system.

Course Outcomes:
Upon completion of the course, students will be able to

CO 1. Understand a Mechatronic system component and perform physical system modelling.
CO 2. Know different sensors and actuators and analyze the role of controls in mechatronics.
CO 3. Perform fault analysis in mechatronic systems.
CO 4. Understand the design of computer based instrumentation system.

UNIT-I – OVERVIEW OF MECHATRONICS

Mechatronics Definition, Mechatronic Design Approach System Interfacing, instrumentation and control systems microprocessor-based controllers and microelectronics, An Introduction to Micro- and Nanotechnology Mechatronics: New Directions in Nano-, Micro-, and Mini-Scale Electromechanical Systems.

UNIT-II PHYSICAL SYSTEM MODELING

Modeling Electromechanical Systems, Structures and Materials, Modeling of Mechanical Systems for Mechatronics Applications, Fluid Power Systems, Electrical Engineering, Engineering Thermodynamics, Modeling and Simulation for MEMS, Rotational and Translational Microelectromechanical Systems: MEMS Synthesis, Microfabrication, Analysis, and Optimization, The Physical Basis of Analogies in Physical System Models.

UNIT III – SENSORS AND ACTUATORS

Introduction to Sensors and Actuators, Fundamentals of Time and Frequency, Sensor and Actuator Characteristics, Sensors, Linear and Rotational Sensors, Acceleration Sensors, Force Measurement, Torque and Power Measurement, Flow Measurement, Temperature Measurements, Distance Measuring and Proximity Sensors, Light Detection Image and Vision Systems, Integrated Micro-sensors, Actuators, Electro-mechanical Actuators, Electrical Machines, Piezoelectric Actuators, Hydraulic and Pneumatic Actuation Systems,

UNIT IV– SYSTEMS AND CONTROLS

The Role of Controls in Mechatronics, The Role of Modeling in Mechatronics Design, Kalman Filters as Dynamic System State Observers, Digital Signal Processing for Mechatronic Applications, adaptive and nonlinear control design advanced control of an electrohydraulic axis, Design Optimization of Mechatronic Systems.

UNIT V – COMPUTERS AND LOGIC SYSTEMS

Fault Analysis in Mechatronic Systems, Logic System Design, Synchronous and Asynchronous Sequential Systems, Architecture, Control with Embedded Computers and Programmable Logic Controllers.

UNIT VI – SOFTWARE AND DATA ACQUISITION

Introduction to Data Acquisition, Measurement Techniques: Sensors and Transducers, A/D and D/A Conversion, Signal Conditioning, Computer-Based Instrumentation Systems, Software Design and Development, Data Recording and Logging.

Text Books

T1. Robert H. Bishop "Mechatronic Systems, Sensors and Actuators", CRC press, Taylor and Francis Group

T2. John G. Webster "*Measurement, Instrumentation, and Sensors Handbook*" CRC Press, 999, 0-8493-2145-X

References

R1. Ilene J. Bush Vishniac, "Electromechanical Sensors and Actuators", Springer

Name of the Subject: **Digital Signal Processors and Architecture (ELECTIVE-III)**	Subject Code : **UGEC7T08**
	Year / Semester : **IV/ I**
Regulation year : **2015-16**	Theory : **3+1hrs**
	Credits : **4**

Course Objectives:

1. To know the architectures of different types of DSP Processors.
2. To implement basic DSP algorithms on different DSP processor.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the fundamentals of programmable DSPs
CO 2. Familiarize with the architectures of different DSP processors
CO 3. Apply basic DSP algorithms on different DSP processors
CO 4. Use DSP processors for signal processing applications

UNIT-I FUNDAMENTALS OF PROGRAMMABLE DSPs

Multiplier and Multiplier accumulator, Modified Bus Structures and Memory access in P-DSPs, Multiple access memory , Multi-ported memory , VLIW architecture, Pipelining , Special Addressing modes in PDSPs , On chip Peripherals, Computational accuracy in DSP processor

UNIT-II ADSP PROCESSORS

Architecture of ADSP-21XX and ADSP-210XX series of DSP processors

UNIT-III TMS320C5X PROCESSOR

Architecture, Assembly language syntax, Addressing modes, Assembly language Instructions - Pipeline structure, Operation Block Diagram of DSP starter kit Application Programs for processing real time signals.

UNIT-IV PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, On-Chip peripherals, Interrupts ofTMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors

UNIT-V ADVANCED PROCESSORS

8 Code Composer studio -Architecture of TMS320C6X - architecture of Motorola DSP563XX – Comparison of the features of DSP family processors

UNIT-VI IMPLEMENTATION OF BASIC DSP ALGORITHMS

An FFT Algorithm for DFT Computation, Computation of signal spectrum, FIR Filters, IIR Filters, interpolation Filters, Decimation filters, Adaptive Filters

Text Books

T1. B.Venkata Ramani and M. Bhaskar, Digital Signal Processors, Architecture, Programming and TMH, 2004

T2. Avtar Singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -THAMSON 2004

References

R1. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. S. Chand & Co, 2000

R2. Digital signal processing-Jonathen Stein John Wiley 2005

Name of the Subject: **VLSI Lab**

Subject Code **: UGEC7P09**

Year / Semester **: IV/ I**

Regulation year : **2015-16**

Practical **: 3hrs**

Credits **: 1**

Course objectives:

To educate students with the knowledge of design entry, simulation, synthesis for various digital designs and verification, floor planning placement routing by using cad tools, Design a schematic and simple layout for various designs.

Course outcomes:

Upon completion of the course, students will be able to

CO 1. Obtain the simulations for various digital designs.

CO 2. Generate synthesis report for different designs using HDL and verify on the FPGA.

CO 3. Obtain the floor planning, placement and routing by using CAD tools.

CO 4. Obtain the layout for various designs and also perform DRC.

LIST OF EXPRIMENTS (Any 10 Experiments)

1. NMOS and PMOS characteristics.
2. Inverter characteristics.
3. Stick diagrams of different gates.
4. Layout of different gates (inverters, NAND, NOR).
5. Design of adders.
6. Design of VLSI multipliers.
7. Digital Filters.
8. 4-bit sign magnitude comparator.
9. Synthesis of different logic gates.
10. FPGA implementation and verification.
11. Place and routing of different gates.
12. Static timing analysis of different gates.

EXPRIMENTS BEYOND SYLLABUS

1. Sequential logic circuit design.
2. State Machines.
3. Design of microprocessor parts.

TOOLS REQUIRED

1. Cadence Design Suite(Student Version)
2. Synopsis TCAD Suite

Name of the Subject: **Microcontrollers Lab**	Subject Code **: UGEC7P10**
	Year / Semester **: IV/ I**
Regulation year : **2015-16**	Practical **: 3hrs**
	Credits **: 1**

Course objectives:

To develop assembly language and 'C' language program skills and providing the basic knowledge of interfacing various peripherals to 8051 microprocessor.

Course Outcomes:

Upon completion of the course, students will be able to

- **CO 1.** Understand the Programming concepts of microcontrollers.
- **CO 2.** Use the IDE such as Kiel to develop, compile, debugging and simulate the microcontroller codes.
- **CO 3.** Know the specifications of various I/Os and their interfacing to 8051 Microcontroller
- **CO 4.** Write Embedded C Programs.

LIST OF EXPERIMENTS (ANY 10 EXPERIMENTS)

PART-I: PROGRAMMING

1. Data Transfer - Block move, Exchange, Sorting, Finding largest element in an array
2. Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube – (16 bits Arithmetic operations – bit addressable).
3. Counters.
4. Boolean & Logical Instructions (Bit manipulations).
5. Conditional CALL & RETURN.
6. Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII; HEX -Decimal &Decimal – HEX.
7. Programs to generate delay, Programs using serial port and on-Chip timer /counter.

PART-II: INTERFACING TO 8051

Write C programs to interface 8051 chip to interface modules to develop single chip solutions.

1. LEDs and switches interface to 8051.
2. 7 segment display interface to 8051.
3. 2x16 LCD and 4x4 key board interface to 8051.
4. Serial communication.
5. DAC interface to 8051 and wave forms generation.
6. Stepper motor control / stair case control.

Name of the Subject: **Technical Writing**

Subject Code **: UGBS7A01**

Year / Semester **: IV/ I**

Regulation year : **2015-16**

Theory **: 3hrs**

Credits **: 0**

Course Objectives:

- To be able to write or speak cohesively and coherently and flawlessly avoiding grammatical errors, using a wide range expressions, organizing the ideas logically on a topic.
- To make the students understand various formal ways of writing and
- To acquaint students with professional communication in writing.

Course Outcomes:

CO 1. Enables students to use English effectively in formal and informal contexts.

CO 2. Introduces learners to different forms of written and oral communication in their career.

CO 3. Exposes students to latest developments in various communication modes.

UNIT I ROUTINE WRITTEN COMMUNICATION

- Notes/messages
- Memorandum
- Circular / Notice
- Resume
- Minutes of meeting
- Email
- Letters
- Journal articles

UNIT II REPORT WRITING

- Proposal
- Progress
- Documentation
- Project Report

UNIT III WRITING FOR SOCIAL /DIGITAL MEDIA

- Blogging
- Twitter post
- Facebook post
- Customer review

UNIT IV REDESIGNING A USER MANUAL /INSTRUCTION MANUAL/INSTALLATION MANUAL

UNIT V PRESENTATION

- Oral
- Written
- Poster
- Product launch
- Research paper/Conference paper

UNIT VI MECHANICS OF WRITING

- Grammar
- Punctuation
- Vocabulary
- Use of computer technology

Suggested Reading

1. Rosenberg, J.Barry.Spring into Technical Writing for Engineers and scientists Addition Wesley 2005.
2. Barass,Robert. Scientist Must write: A Guide to Better writing for Scientists, Engineers and Students ,second edition Rutledge London 2002ools Hand book IEEE press 2010
3. Mamishev, Alexander and Sean Williams. Technical Writing for Teams: The STREAM Tools Hand book IEEE Press 2010
4. Budnski, Kenneth G. Engineers's Guide to Technical Writing ASM International 2001
5. Woolever, Kristin R.Writing for the Technical Profession 4 edition Pearson Education 2008
6. Shelton, James H.Handbook for Technical Writing 1996 NTC Business Books 1996

IV Year II-Semester Syllabus Department of Electronics and Communication Engineering (R14(R) Regulation)

Name of the Subject: **Digital Television Engineering** Subject Code **: UGEC8T01**
(FREE ELECTIVE-I) Year / Semester : **IV/ II**
Regulation year : **2015-16** Theory : **3hrs**
Credits : **3**

Course Objectives:

To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver ,Picture tubes and Television Camera Tubes. To study the various Color Television systems with a greater emphasis on television standards . To study the advanced topics in digital television and High definition television .

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the fundamentals of television engineering and Television Standards.
CO 2. Understand the working of tubes to process the television signals.
CO 3. Know the various circuits and their working of Monochrome and Color Television.
CO 4. Know the concepts of Digital TV and New era Projection TVs.

UNIT I INTRODUCTION TO TELEVISION

Picture Transmission, Geometric Form, Aspect Ratio, Flicker, Image Continuity, no of scanning lines, progressive and interlaced scanning, Television systems and Standards, Composite Video Signal : Video signal levels, Need for Synchronization, Details of Horizontal and Vertical Sync Pulses, Equalizing Pulses, VSB Transmission, Complete Channel Bandwidth, Reception of Vestigial Sideband Transmission, Block Schematic study of a typical TV Transmitter.

UNIT II CAMERA AND PICTURE TUBES

Camera Tube Types, Principle of working and constructional details of Videocon, Silicon diode array Vidicon and Solid-state Image Scanners, Color Camera, Color Picture Tube-Delta; Picture Tube Specifications.

UNIT III MONOCHROME RECEIVERS

Block Schematic and Functional Requirements of a Monochrome Receiver, RF tuner, IF Subsystem, Video Detector, Sound Channel Separation, Sync Separation Circuits, Vertical and Horizontal Deflection Circuits, E.H.T. Generation, Study of Video IF Amplifier.

UNIT IV COLOR TELEVISION

Principles of Additive and Subtractive Color Mixing, Chromaticity Diagram, Compatibility and Reverse Compatibility, Color Signal Transmission, Bandwidth for Color Signal Transmission, Sub-carrier Modulation of Chroma Signals, Block diagram of Color TV Receiver, NTSC Encoding (Y, I, Q signals), NTSC Decoder.

UNIT V DIGITAL TELEVISION

Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct to Home, Digital TV Receiver, Merits of Digital TV Receivers, LCD AND PLASMA SCREENS: LCD Technology,

LCD Matrix types and operation, LCD Screens for Television, Plasma and conduction of charge, Plasma TV Screens, LCD color receiver, Plasma Color Receiver, Working Principles of LED TV.

UNIT VI NEW ERA PROJECTION TV

Direct View and Rear projection Systems. Front Projection Systems, Reflective Projection Systems, digital light Processing (DLP) Projection system, Projection TV for Home Theaters.

Text Book

T1. RR Gulati: Modern Television Practice, Principles Technology and Servicing Third Edition New Age International Publishers.

References

R1. Television Engineering, A. M. Dhake, Tata - McGraw Hill.

Name of the Subject: **Analog IC Design**
(FREE ELECTIVE-I)
Regulation year : **2015-16**

Subject Code **: UGEC8T02**
Year / Semester : **IV/ II**
Theory : **3hrs**
Credits : **3**

Course Objectives:

The objectives of this course is to introduce the basics of MOSFET, its characteristics, second order effects, small signal model of MOSFET and analyze the small signal analysis and large signal analysis for single stage amplifiers, differential amplifiers, current sources, current mirrors and frequency response of amplifiers.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand and design MOSFET based analog integrated circuits.
CO 2. Design and Analyze single stage amplifiers and differential amplifiers.
CO 3. Analyze current sources and sinks.
CO 4. Analyze high frequency response of amplifiers.
CO 5. Understand stability compensation for amplifiers.

UNIT I BASIC MOS DEVICE PHYSICS

General Considerations, MOSFET as a Switch, MOSFET Structure, MOS Symbols, MOS I/V Characteristics, Threshold Voltage, Derivation of I/V Characteristics, Second-Order Effects, MOS Device Models, MOS Device Layout, MOS Device Capacitances, MOS Small-Signal Model, NMOS versus PMOS Devices, Long-Channel versus Short-Channel Devices.

UNIT II SINGLE-STAGE AMPLIFIERS I

Basic Concepts, Common-Source Stage, Common-Source Stage with Resistive Load ,CS Stage with Diode-Connected Load, CS Stage with Current-Source Load, CS Stage with Source Degeneration.

UNIT III SINGLE-STAGE AMPLIFIERS II

Source Follower, Common-Gate Stage, Cascode Stage, Folded Cascode Amplifiers.

UNIT IV DIFFERENTIAL AMPLIFIERS

Single-Ended and Differential Operation. Basic Differential Pair, Qualitative Analysis, Quantitative Analysis, Common-Mode Response, Differential Pair with MOS Loads.

UNIT V PASSIVE AND ACTIVE CURRENT MIRRORS

Basic Current Mirrors, Cascode Current Mirrors, Active Current Mirrors, Large-Signal Analysis, Small-Signal Analysis, Common-Mode Properties.

UNIT VI FREQUENCY RESPONSE OF AMPLIFIERS

General Considerations, Miller Effect, Association of Poles with Nodes, Common-Source Stage, Source Followers, Common-Gate Stage, Cascode Stage, Differential Pair Feedback General Considerations, Properties of Feedback Circuits, Effect of Loading, Effect of Feedback on Noise.

Text Books

T1. Ken Martin, Analog Integrated Circuit Design, Wiley Publications, 2002.

T2. B. Razavi, Design of Analog CMOS Integrated Circuits, McGraw Hill, 2001.

References

R1. Sedra and Smith, Microelectronic Circuits 5/e, Oxford Publications, 2001

R2. P. R. Gray & R. G. Meyer, Analysis and Design of Analog Integrated Circuits, Fifth Edition, John Wiley, 2010.

Name of the Subject: **Optimization Techniques**		Subject Code	**: UGEC8T03**
(FREE ELECTIVE-I)		Year / Semester	: **IV/ II**
Regulation year	: **2015-16**	Theory	: **3hrs**
		Credits	: **3**

Course Objectives:

In this course it is aimed to introduce to the students the fundamentals of optimizaiton, traditional and nontraditional optimization techniques to solve complex problems. It is also aimed to optimize engineering problems with and without constraints. To apply soft computing techniques like genetic algorithm and particle swarm optimization algorithm to hard real life optimization problems which cannot be solved with classic techniques.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the concepts of optimization techniques.

CO 2. Apply linear and non linear programming techniques to solve engineering problems.

CO 3. Optimize engineering problems with and without constraints.

CO 4. Apply geometric and dynamic programming to optimize the complex problems

CO 5. Apply genetic algorithm and particle swarm optimization technique to optimization problems

UNIT I INTRODUCTION TO OPTIMIZATION

Development- Engineering application-statement of an optimization problem - classification of problems-optimization techniques, Classical optimization technique – Introduction, single variable and multivariable with no constraints and equality constraints – Lagrange model-optimization with inequality constraints.

UNIT II LINEAR PROGRAMMING TECHNIQUE

Simplex method-Dual simplex, Revised simplex, sensitivity analysis - Interial approach of Dikin Quadratic programming and linear complementary problem. Special cases in linear programming

UNIT III NON-LINEAR PROGRAMMING PROBLEMS

General non-linear programming problems; convex, quasi-convex, concave and uni-modal functions, Theory of unconstrained optimization-Necessary and sufficient conditions for extreme, Theory of constrained optimization-Lagrange multipliers and Lagrangian optimization, Inequality constraints, Kuhn-Tucker conditions.

UNIT IV UNCONSTRAINED AND CONSTRAINED OPTIMIZATION

Fibonacci search method, Cauchy's (Steepest descent) method, Penalty function methods, Frank-Wolfe method, Gradient project method.

UNIT V STOCHASTIC PROGRAMMING

Linear, Non-linear and Geometric programming, Stochastic dynamic programming-Dynamic programming-Introduction, multi-decision problems, concept of sub optimization, principle of optimality, computational procedure, Calculus method of solution, tabular method of solution, Linear programming as a case of dynamic of programming – continuous dynamic programming

UNIT VI NON-TRADITIONAL ALGORITHMS

Genetic Algorithms (GA) :GA Fundamentals-Basic concepts, Creation of Offsprings, Working Principle, Encoding, Fitness Function, Reproduction, Genetic Modeling–Inheritance Operators, Cross Over, Inversion and Deletion, Mutation Operator, Bit - wise Operators, Bit- wise Operators used in GA, Generational Cycle, Convergence of GA, Differences and Similarities between GA and other traditional methods, simulated annealing,

Particle Swarm Optimization (PSO): Basic concepts, Swarm intelligence, population, velocity updation, particle - best (pbest), global - best (gbest), velocity initialization, solution, Applications

Text Books

T1. S.S. Rao, "Engineering Optimization: Theory and Practice", New Age International (P) Ltd., New Delhi, 2000.

T2. K. Deb, "Optimization for Engineering Design – Algorithms and Examples", Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.

References

R1. Genetic Algorithms in search, Optimization and Machine Learning (English) 1st Edition, David E Goldberg, Pearson Education India

R2. Particle Swarm Optimization Maurie Clerc, Wiley

Name of the Subject: **Radar Engineering and Navigational Aids (FREE ELECTIVE-II)**	Subject Code : **UGEC8T04**
	Year / Semester : **IV/ II**
Regulation year : **2015-16**	Theory : **3hrs**
	Credits : **3**

Course Objectives:

The student will be introduced to the knowledge of different parameters of Transmitter and Receiver of RADAR, the concept of Doppler Effect to measure parameters of RADAR, different types of RADARS and applications based on the type of Transmitters, Receivers, and their functions and navigational systems

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the basic Concepts of radar system.
CO 2. Know the different types of radars and their applications.
CO 3. Familiarize with different methods used for tracking targets.
CO 4. Apply basic detection theory to radar systems.
CO 5. Understand various technologies used in the design of radar systems & Navigational Aids.

UNIT I RADAR EQUATION

Radar Equation, Radar Block Diagram and Operation, Prediction of Range Performance, Minimum Detectable Signal, Probability Density Functions, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross-section of Targets(simple targets-sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses and Propagation Effects, Related problems.

UNIT II CW AND FREQUENCY MODULATED RADAR

Doppler Effect, CW Radar-Block Diagram, Isolation between Transmitter and Receiver, Non-Zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW Radar, FMCW Radar, Range and Doppler Measurement, Block Diagram and characteristics, FM-CW Altimeter, Multiple Frequency CW Radar.

UNIT III MTI AND PULSE DOPPLER RADAR

Introduction, Delay line Cancellers, Moving target Detector, Limitation to MTI performance, MTI from moving platform, Pulse Doppler Radar.

UNIT IV TRACKING RADAR

Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar, Low angle tracking, Pulse compression, Block Diagrams of Synthetic Aperture Radar (SAR), Phased array Radars.

UNIT V RADAR RECEIVERS

The Radar Receiver, Noise Figure and Noise Temperature, Mixers, Low Noise front-ends, Radar Displays, Duplexer and Receiver Protectors.

UNIT VI RADIO AND NAVIGATIONAL AIDS

Aircraft Homing System and Instrument Landing System: introduction, Switching Cardiod Homing System, Four Course Radio Range, Omni directional Ranges, Tactical air navigation (TACAN), instrument Landing System, Microwave Landing System Introduction to Hyperbolic Navigation: LORAN-A, LOREAN-C

Text Books

T1. Introduction to Radar Systems,Merrill I skolnik, the McGraw Hill, 2nd Edition

T2. Radar Engineering and Fundamentals of Navigational Aids, G S N Raju, IK international Publishers, 2008

References

R1. Roger J Suullivan, “Radar Foundations for Imaging and Advanced Topics”.

R2. N S Nagaraja, “Elements of Electronic Navigation”,TMH

Name of the Subject: **Audio and Speech Processing**	Subject Code : **UGEC8T05**
(FREE ELECTIVE-II)	Year / Semester : **IV/ II**
Regulation year : **2015-16**	Theory : **3hrs**
	Credits : **3**

Course objectives:

To provide an introduction to basic concepts and methodologies for the analysis, modeling, synthesis and coding of audio and speech. To provide a foundation for developing applications and for further study in the field. To introduce algorithms for the analysis and manipulation of audio and speech processing.

Course outcomes:

Upon completion of the course, students will be able to

CO 1. Understand the fundamentals of digital audio signal processing and speech processing.

CO 2. Use algorithms for extracting parameters and Noise removal from the speech signal.

CO 3. Apply algorithms for speech coding and enhancement.

CO 4. Understand the concepts of Speech recognition and Speech synthesis.

UNIT I DIGITAL AUDIO SIGNAL PROCESSING

Introduction, Acoustics fundamentals: Sound, waves, waveguides, resonance, energy transfer. Digital Audio Recording and Playback, Microphone Array Processing,

UNIT II NOISE REDUCTION

Acoustic Echo Cancellation, Acoustic Feedback Control, Reverb/De-reverberation, Active Noise Control - 3D Audio, Editing

UNIT III INTRODUCTION TO SPEECH PROCESSING

Speech production, Speech perception, source-filter model, formants and linear predictive coding (LPC), Speech analysis (Segmental, sub-segmental, Supreasegmental), feature vector extraction: estimation of LPC parameters, the Levinson-Durbin algorithm, short-term Fourier transfors, Mel-spectra, cepstra, pitch period estimation.

UNIT IV SPEECH CODING AND SPEECH ENHANCEMENT

LPC-based coders: CELP, MELP, RELP, RPE, perceptial coders including MP3 Speech enhancement techniques: spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter.

UNIT V SPEECH RECOGNITION

Bayesian formulation, definition of Hidden Markov Models (HMM), HMM topology,
Parameter estimation in HMMs, The VIterbi algorithm, Language modeling, Deep learning for speech recognition

UNIT VI SPEECH SYNTHESIS

Introduction, Grapheme-to-phoneme conversion, Different synthesis techniques: Source-filter synthesis (Klatt synthesis), concatenative synthesis, the PSOLA-algorithm, synthesis with HMMs

Text Books

T1. Digital processing of speech signals - L.R Rabiner and S.W. Schafer. Pearson Education.

T2. Applied Speech And Audio Processing: With Matlab Examples Paperback – 2009 by McloughlinIan

References

R1. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd ed., IEEE Press.

R2. Fundamentals of Speech Recognition. L.R Rabinar and B.H. Juang.

Name of the Subject: **Assistive Technology**
(FREE ELECTIVE-II)
Regulation year : **2015-16**

Subject Code **: UGEC8T06**
Year / Semester : **IV/ II**
Theory : **3hrs**
Credits : **3**

Course Objectives:

To provide an overview of assistive technologies for disabled people

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Know the accessible technologies and models of disability.
CO 2. Understand the assistive technology for children with disability.
CO 3. Identify the challenges to effective evaluation of assistive technology.
CO 4. Provide innovative engineering solutions of AT devices for commercialization.

UNIT - I ACCESSIBLE TECHNOLOGIES AND MODELS OF DISABILITY

What is Assistive Technology, models of disability, accessible technology, concepts from human computer interaction, and new directions in accessible technology.

UNIT - II ASSISTIVE TECHNOLOGY FOR CHILDREN WITH DISABILITIES

Robot Applications for children, Robots and cognitive development, Robot use by very young typically developing children, integrating communication and robotic manipulation

UNIT - III NEED OF TASK BASED DESIGN AND EVALUATION

Assistive technology abandonment, HAAT model, case stories: applying the HAAT model

UNIT - IV CHALLENGES TO EFFECTIVE EVALUATION OF ASSISTIVE TECHNOLOGY

Evaluating technologies in the lab, evaluating technologies in the clinic, evaluating technologies in the world

UNIT-V PROVIDING INNOVATIVE ENGINEERING SOLUTIONS

The Niche between academic and commercial approaches, project criteria, example projects, logistics

UNIT-VI DEVELOPMENT AND COMMERCIALIZATION

Examples of ICT, the need for regulations and standards, small market obstacles, small market opportunities, new opportunities in small market innovation

Text Books

T1. Meeko Mitsuko K. Oishi, Ian M. Mitchell, H. F. Machiel Van der Loos, "Design and Use of Assistive Technology-Social, Technical, Ethical, and Economic Challenges", Springer , 2010

T2. Lancioni, Giulio E., Singh, Nirbhay N. (Eds.), Assistive Technologies for People with Diverse Abilities", Springer 2014

References

R1. Rory A Cooper, Hisaichi Ohnabe, Douglas A. Hobson, An Introduction to Rehabilitation Engineering, CRC press, Taylor and Francis group, 2006

R2. Paul H. King, Richard C. Fries, Arthur T. Johnson Design of Biomedical Devices and Systems, Third Edition, CRC Press Taylor and Francis group 2014

Name of the Subject: **Wireless Sensor Networks**	Subject Code **: UGEC8T08**
(FREE ELECTIVE-III)	Year / Semester : **IV/ II**
Regulation year : **2015-16**	Theory : **3hrs**
	Credits : **3**

Course Objectives:

To cover the Sensor networking concepts and components. The course is a highly efficient way of gaining networking awareness, understanding of the protocols and communication techniques used by networks and vocabulary. To learn about physical, wireless Mac layer and Transport Control Protocols &its various Security issues in Wireless Sensor Networks &Applications.

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Understand wireless sensor networks and Infrastructure.
CO 2. Understand various physical and wireless MAC layers.
CO 3. Analyze different Ad hoc routing protocols.
CO 4. Know about transport layer protocols and challenges for providing QOS.
CO 5. Understand the security issues in wireless sensor networks and WSN applications.

UNIT I OVER VIEW OF WIRELESS SENSOR NETWORKS

Introduction, Back ground of sensor networks, Key definitions of sensor networks, Advantages of sensor networks, Unique constraints, Challenges and Applications of Wireless sensor networks, Collaborative Processing.

UNIT II ARCHITECTURES AND NETWORKING TECHNOLOGIES

Single Node architecture-Hard ware components, Energy Consumption of Sensor nodes, Operating systems for Wireless sensor networks, Network Architecture-Sensor networks Scenarios, Optimization Goals and figures of merit, WPANS, MANETS

UNIT III PHYSICAL LAYER AND MAC PROTOCOLS FOR WIRELESS SENSOR NETWORKS

Wireless channel and Communication Fundamentals, Physical layer and Transceiver Design Considerations, Issues in Designing a MAC protocol for Ad hoc Wireless Networks, Classification of MAC protocols, Contention based protocols-MACAW,DBMA. Contention based protocols with reservation mechanism -D-PRMA,FPRP,RTMAC. Contention based protocols with scheduling mechanisms-Distributed priority scheduling, Multihop coordination, DWOP, MAC protocols that use directional antennas, other MAC protocols-Interleaved carrier sense multiple Access protocol.

UNIT IV ROUTING PROTOCOLS FOR WIRELESS SENSOR NETWORKS

Introduction, Issues in designing a Routing protocol for Ad Hoc wireless network, Classification of Routing protocols, Table – driven Routing protocols-DSDV, STAR. On demand Routing protocols-DSR, AODV. Hybrid Routing protocols-CEDAR, ZRP. Routing protocols with efficient flooding mechanisms, hierarchical Routing protocols-Fisheys state routing protocol, Power- Aware Routing protocols, Proactive Routing.

UNIT V TRANSPORT CONTROL PROTOCOLS

Introduction, Issues in Designing a Transport layer protocol for AdHoc Wireless Networks, Design goals of a transport layer protocol for AdHoc Wireless Networks, Classification of transport layer solutions, TCP Over AdHoc Wireless Networks, Other transport layer protocol for AdHoc Wireless Networks.

UNIT VI SECURITY IN WIRELESS SENSORNETWORKS &APPLICATIONS OF WSN

Security in AdHoc Wireless Networks, Network security requirements, Issues and challenges in security provisioning, Network security attacks, Key managements, Secure routing in AdHoc Wireless Networks. Ultra wide band radio communication, Wireless fidelity systems, Future directions, Home automations, Smart metering applications.

Text Books

T1. AdHoc Wireless Networks: Architectures and protocols – C.SivaRam Murthy and B.S.Manoj,2004,PHI

T2. Wireless AdHoc and sensor networks: Protocols, Performance and Control – Jaganathan Sarangapani,CRC Press

References

R1. Kazem Sohraby, Daniel Minoli, &Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.

R2. Ad-Hoc Mobile Wireless Networks: protocols & systems, C.KToh,led.Pearson Education.

R3. Holger Karl and Andreas Willig, ” Protocols and Architectures for wireless sensor networks”, John Wiley,2005

Name of the Subject: **Embedded and Real Time Operating Systems (FREE ELECTIVE-III)**
Regulation year : **2015-16**

Subject Code : **UGEC8T09**
Year / Semester : **IV/ II**
Theory : **3hrs**
Credits : **3**

Course Objectives:

To introduce the concepts of "Embedded Systems" and their constraints and understand design of embedded systems, this course also introduce various Communication interface, and concepts of real time operating systems

Course Outcomes:

Upon completion of the course, students will be able to

- **CO 1.** Familiarize with "Embedded systems" and various constraints associated with Embedded Systems.
- **CO 2.** Understand the technologies used for the design of embedded systems.
- **CO 3.** Understand the need for communication interface along with their Specifications.
- **CO 4.** Distinguish between "Operating system" and "Real Time Operating Systems (RTOS)" and discuss various kernel objects with real time analysis.
- **CO 5.** Familiar with several RTOSs in the commercial market.

UNIT I INTRODUCTION

Embedded systems over view, design challenges, processor technology, Design technology, Trade-offs. Single purpose processors RT-level combinational logic, sequential logic (RT-level), custom purpose processor design (RT -level), optimizing custom single purpose processors.

UNIT II GENERAL PURPOSE PROCESSORS

Basic architecture, operations, programmer's view, development environment, Application specific Instruction –Set processors (ASIPs)-Micro controllers and Digital signal Processors.

UNIT III STATE MACHINE AND CONCURRENT PROCESS MODELS

Introduction, models Vs Languages, finite state machines with data path model(FSMD),using state machines, program state machine model(PSM, concurrent process model, concurrent processes, communication among processes, synchronization among processes, Implementation, data flow model, real-time systems.

UNIT IV COMMUNICATION PROCESSES

Need for communication interfaces, RS232/UART, RS422/RS485,USB, Infrared, IEEE1394 Firewire, Ethernet, IEEE 802.11, Blue tooth.

UNIT V EMBEDDED/RTOS CONCEPTS-I

Architecture of the Kernel, Tasks and task scheduler, interrupt service routines, Semaphores, Mutex, Mailboxes, Message Queues, Event Registers, Pipes-Signals.

UNIT VI EMBEDDED/RTOS CONCEPTS-II

Timers-Memory Management-Priority inversion problem-embedded operating systems-Embedded Linux-Real-time operating systems-RT Linux-Handheld operating systems-Windows CE

Text Books

- **T1.** Embedded System Design-A Unified Hardware/Software Introduction- Frank Vahid, Tony D.Givargis, John Wiley & Sons, Inc.2002.
- **T2.** Embedded/Real Time Systems- KVKK prasad, Dreamtech press-2005.

References

- **R1.** Embedded Microcomputer Systems-Jonathan W.Valvano, Books/Cole, Thomson Leaarning.
- **R2.** An Embedded Software Primer- David E.Simon, pearson Ed.2005

Name of the Subject: **Advanced Digital Signal Processing**
(FREE ELECTIVE-III)
Regulation year : **2015-16**

Subject Code **: UGEC8T10**
Year / Semester : **IV/ II**
Theory : **3hrs**
Credits : **3**

Course Objectives:

1. To know about various advanced signal processing techniques
2. To apply advanced signal processing methods for applications like speech processing

Course Outcomes:

Upon completion of the course, students will be able to

CO 1. Use parametric methods for power spectrum estimation.
CO 2. Apply adaptive signal processing methods for speech processing.
CO 3. Analyze wavelet transforms.
CO 4. Analyze Kalman Filters and blind source separation methods.

UNIT - I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION

Relationship between the auto correlation and the model parameters, The Yule – Walker method for the AR Model Parameters, The Burg Method for the AR Model parameters unconstrained least-squares method for the AR Model parameters – sequential estimation methods for the AR Model parameters, selection of AR Model order

UNIT - II ADAPTIVE SIGNAL PROCESSING

FIR adaptive filters, steepest descent adaptive filter, LMS algorithm, convergence of LMS algorithms, Application: noise cancellaption, channel equalization, adaptive recursive filters recursive least squares.

UNIT - III SPEECH SIGNAL PROCESSING

Digital models for speech signal : Mechanism of speech production, model for vocal tract, radiation and excitation, complete model, time domain processing of speech signal:, Pitch period estimation using autocorrelation function, Linear predictive Coding: Basic Principles autocorrelation method, Durbin recursive solution.

UNIT - IV WAVELET TRANSFORMS

Fourier Transform : Its power and Limitations, Short Time Fourier Transform, The Gabor Transform , Discrete Time Fourier Transform and filter banks, Continuous Wavelet Transform , Wavelet Transform Ideal Case – Perfect Reconstruction Filter Banks and wavelets, Recursive multi-resolution decomposition, Haar Wavelet, Daubechies Wavelet.

UNIT-V KALMAN FILTERING

State-space model and the optimal state estimation problem, discrete Kalman filter, continuous-time Kalman filter, extended Kalman filter

UNIT-VI BLIND SOURCE SEPARATION

Principal Component Analysis, Independent Component Analysis, Application of Blind Source Separation to Biomedical signals

Text books

T1. John G.Proakis, Dimitris G.Manobakis, Digital Signal Processing, Principles, Algorithms and Applications, Third edition, (2000) PHI Monson H.Hayes – Statistical

T2. Digital Signal Processing and Modeling, Wiley, 2002

References

R1. L.R.Rabiner and R.W.Schaber, Digital Processing of Speech Signals, Pearson Education

R2. K. P. Soman, K. I. Ramachandran, "Insight into Wavelets- From Theory to Practice", second Edition, Prentice Hall of India, 2008