B.TECH – ELECTRONICS & COMMUNICATION ENGINEERING

Course Structure R-20

SEMESTER V

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM1	Business Economics and Financial Analysis	3	0	0	3
2	PC	C45PC1	Control Systems	3	0	0	3
3	PC	C45PC2	Digital Communications	3	0	0	3
4	PC	C45PC3	Microprocessor and Microcontrollers	3	0	0	3
5	OE	C45OE4	**Open Elective-I**	3	0	0	3
6	PE	C45PE5	Professional Elective -I 1. Digital Design through Verilog HDL 2. Image Processing & Pattern Recognition 3. Introduction to Embedded Systems 4. Optical Fiber Communications	3	0	0	3
7	PC	C45PC6	Digital Communications Lab	0	0	3	1.5
8	PC	C45PC7	Microprocessor and Microcontrollers Lab	0	0	3	1.5
9	MC	MC005	MOOCs/Online Course	0	0	0	Satisfactory
Total Credits				**18**	**0**	**6**	**21**

Mandatory Course: MOOCs/Online Course
The student should register for any one of the MOOCs course offered by NPTEL, COURSERA, UDEMY, student should submit the completion certificate to clear this course.

B.TECH – ELECTRONICS & COMMUNICATION ENGINEERING

Course Structure R-20

SEMESTER VI

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM2	Fundamentals of Management	3	0	0	3
2	PC	C46PC1	Antennas and Wave Propagation	3	0	0	3
3	PC	C46PC2	Digital Signal Processing	3	0	0	3
4	PE	C46PE3	Professional Elective -II Digital IC Design Colour Image Processing Advanced Micro controllers Telecommunication Switching Systems and Networks	3	0	0	3
5	PC	C46PC4	VLSI Design	3	0	0	3
6	OE	C46OE5	OE-II	3	0	0	3
7	PC	C46PC6	Digital Signal Processing Lab	0	0	3	1.5
8	PC	C46PC7	VLSI Design Lab	0	0	3	1.5
9	MC	MC006	1. Personality Development/Skill Development 2. Technical Events 3. Internships	0	0	0	Satisfactory
Total Credits				**18**	**0**	**6**	**21**

Mandatory Course: The satisfactory report should be submitted either for 1 or 2 or 3 given below.

1. Personality Development/ Skill Development: Student should participate in personality development/communication skills program student should submit the completion certificate for clearing this course.

2. Technical Events: The student should participate in any technical event organized by any College/Organization/Industry and submit the participation certificate for clearing this course.

3. Internships: The Student should submit the completion certificate from the respective organization. Where he/she performs their internship.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
CONTROL SYSTEMS

B.Tech. V Semester **L/T/P/C**

3/ 0 /0/ 3

Pre-Requisite: Ordinary Differential Equations & Laplace Transform, Mathematics I

COURSE OBJECTIVES:

1. To understand the different ways of system representations such as Transfer function representation to assess the system dynamic response.
2. To assess the system performance using Time domain analysis and Methods for improving it.
3. To assess the system performance using Frequency domain analysis and techniques for improving the performance.
4. To design various Controllers and Compensators to improve system performance
5. To understand the different ways of System behavior using State space representation for continuous systems.

COURSE OUTCOMES: After completion of this course the student is able to

1. Understand the System performance by selecting a suitable Controller and/or a Compensator for a specific application
2. Apply various Time Domain techniques to assess the system performance
3. Apply various Frequency Domain techniques to assess the system performance
4. Apply various control strategies to different applications
5. Test system Controllability and Observability using State space representation and applications of state space representation to various systems.

UNIT – I:

Introduction: Introduction to Control System- Basic Elements of Control System- Classification of control systems-Open Loop and Closed Loop control systems and their differences- Different examples of control systems- Feedback Characteristics-Effects of feedback, Differential equations representation of physical systems - Impulse Response and transfer functions – Mathematical Modeling of Electrical and Mechanical Systems (Translational and Rotational)- Analogous System.

Transfer Function Representation: Block diagram representation of systems considering electrical systems as examples - Block diagram algebra – Representation by Signal flow graph – Reduction using mason's gain formula. Signal flow graphs to the Electrical Networks. Construction of Signal flow graph from Block diagram.

UNIT-II:

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems Time domain specifications – Steady state response - Steady state errors and error constants. Effects of Adding poles and zeros to the Second order system. Classification of controllers, Effects of proportional derivative, proportional integral systems.

UNIT – III:

Stability Analysis: The concept of stability –Effects of Location of poles on stability, Relative Stability, Routh-Hurwitz criterion, Limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-Root contours, effects of adding poles and zeros to G(s) H(s) on the root loci.

Frequency Response Analysis: Introduction, Correlation between time and frequency response, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – IV:

Stability Analysis In Frequency Domain: Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability - Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams. All pass and minimum phase systems.

Classical Control Design Techniques: Compensation techniques – Lag, Lead, and Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT – V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Signal flow graphs and Electrical networks, Diagonalization-Solution of the Time Invariant State Equation, State Transition Matrix and its Properties. Concepts of Controllability and Observability.

TEXT BOOKS

1. "I. J. Nagrath and M. Gopal", "Control Systems Engineering", New Age International (P) Limited,
Publishers, 5th edition, 2009
2. "B. C. Kuo", "Automatic Control Systems", John wiley and sons, 8th edition, 2003.

REFERENCE BOOKS

1. "Syed Hasan Saeed", Automatic Control Systems, S.K.KATARIA & SONS, New Delhi, 5th Revised Edition, 2007.
2. "N. K. Sinha", "Control Systems", New Age International (P) Limited Publishers, 3rd Edition, 1998.
3. "Katsuhiko Ogata", "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 3rd Edition, 1998.
4. "S Palani", "Control Systems Engineering", McGraw Hill Education private limited, 2 nd Edition, 2010.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
DIGITAL COMMUNICATIONS

B.Tech. V Semester **L/T/P/C**
3/ 0 /0/ 3

Pre-Requisite: Analog Communications

COURSE OBJECTIVES:

1. To understand the functional block diagram of Digital Communication system.
2. To understand the various digital modulation techniques.
3. To understand a mathematical model of Digital Communication system for bit error rate analysis of different Digital Communication systems.
4. To study various source and channel coding techniques.
5. To study the performance of spread spectrum modulation.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to:

1. Analyze the basic digital modulation techniques such as PCM, DM etc., and understand the concepts of sampling.
2. Explain the concepts of different Shift Keying techniques.
3. Classify the basics of information theory and analyze the error performance, design optimum receivers for digital modulation techniques.
4. Interpret about different error detection and correcting codes like block codes, cyclic codes and convolution codes.
5. Analyze the performance of Spread Spectrum and Noise.

UNIT –I:

ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS: Model of digital communication systems, Digital representation of Analog signal, certain issues in Digital transmission, Advantages of digital communication systems, Sampling Theorem, Types of sampling- impulse sampling, natural sampling, flat-top sampling, Introduction to Base band sampling.

WAVEFORM CODING TECHNIQUES: PCM generation and reconstruction, Quantization noise, Non uniform quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT –II:

DIGITAL MODULATION TECHNIQUES: Introduction, ASK, ASK modulator, Coherent ASK detector, Non-coherent ASK detector, FSK, Bandwidth and Frequency spectrum of FSK, Non coherent FSK detector, Coherent FSK detector, FSK detection using PLL, BPSK, Coherent PSK Detection, QPSK, 8-PSK,16-PSK,Differential PSK,QAM.

UNIT –III:

INFORMATION THEORY: Information and Entropy, Conditional Entropy and Redundancy, Shannon-Fano coding, mutual information, Information loss due to noise, source coding-Huffman code, Variable length coding, Lempel-Ziv coding, source coding to increase average information per bit, Lossy source coding, Bandwidth-S/N tradeoff, Hartley Shannon Law.

BASEBAND PULSE TRANSMISSION: Introduction, Matched filter, Error rate due to noise, Inter symbol interference, Nyquist's criterion for distortion less baseband binary transmission, eye patterns.

DIGITAL PASSBAND TRANSMISSION: Pass band transmission model, probability of error, correlation receiver.

UNIT- IV:

ERROR CONTROL CODES: LINEAR BLOCK CODES: Matrix description of linear block codes, Error detection and correction capabilities of linear block codes.

CYCLIC CODES: Algebraic structure, Encoding, syndrome calculation, Decoding.

CONVOLUTION CODES: Encoding, Decoding using state, Tree, Trellis diagrams, Decoding using Viterbi algorithm.

UNIT –V:

SPREAD SPECTRUM MODULATION: Use of spread spectrum, direct sequence spread spectrum (DSSS), Code division Multiple Access, Ranging using DSSS, Frequency hopping spread spectrum, PN-sequences: Generation and characteristics, Synchronization in spread spectrum systems.

TEXT BOOKS

1. Digital communication—Simon Haykin, John Wiley, 4 the Edition, 2009.
2. Digital and analog communication systems-Sam Shanmugam, John Wiley, 2005.
3. Digital communications- Bernard Sklar and Pabitra Kumar Ray-Pearson, 2nd edition, 2009.

REFERENCES

1. Principles of Communication Systems-Herbert Taub, Donald L schilling, GouthamSaha, 3rd Edition, McGraw Hill, 2008.
2. Electronic Communication systems, Wayne Tomasi, 5^{th}Edition, Pearson.
3. Communication Systems-Analog and Digital, R.P. Singh, S. Sapre, Mc Graw Hill Education, 2012.
4. Digital Communications-John G.Proakis, Masoud Salehi-5^{th}edition, McGraw-hill, 2008.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

MICROPROCESSORS AND MICROCONTROLLERS

B.Tech. V Semester **L/T/P/C**
3/ 0 /0/ 3

Pre-Requisite: Digital logic Design

Course Objectives:

1. To familiarize the architecture of microprocessors and micro controllers
2. To provide the knowledge about interfacing techniques of bus & memory.
3. To understand the concepts of ARM architecture
4. To study the basic concepts of Advanced ARM processors

Course Outcomes: Upon completion of this course the student will be able to:

1. Acquire the knowledge of internal architecture, organization of 8086 processor and can develop assembly language programming.
2. Analyze internal architecture, memory organization of 8051 controller and can develop programming.
3. Construct interfacing techniques to 8086 and 8051 and define various serial communication standards.
4. Interpret the internal architecture and organization of ARM processor, and can develop programming.
5. Build the knowledge of the internal architecture and organization of advanced ARM Processors.

UNIT–I

8086Architecture:8086 Architecture-Functional diagram, Register Organization, 8086 Flag register, Memory Segmentation, Physical Memory organization, Pin diagram of 8086,Signal description of 8086- Common function signals, Minimum and Maximum mode signals, addressing modes, Instruction set, Assembler directives, Programming.

UNIT– II

Introduction to Microcontrollers: Overview of 8051 microcontroller, Architecture, I/O ports, Memory Organization, Addressing modes, Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the serial communication Interrupts, Programming 8051 Timers and Counters.

UNIT– III

I/O And Memory Interface: 8255 PPI, stepper motor interfacing to 8086,LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication standards, Serial data transfer schemes, Onboard Communication Interfaces- I2C Bus, SPI Bus, UART; External Communication Interfaces- RS-232, USB.

UNIT– IV

ARM Architecture: ARM Processor Fundamentals, Processor modes, ARM Architecture-Register, CPSR, Pipeline, exception and interrupts, Interrupt vector table, ARM instruction set-Data processing, Branch Instructions, load store instructions, Software interrupt instructions, Program Status register instructions, loading constants, Conditional execution, Simple programs, Introduction to Thumb Instructions.

UNIT-V

Advanced ARM Processors: Introduction to CORTEX Processor, features, applications and its architecture, Registers, Pipeline, interrupts, OMAP Processor and its Architecture.

TEXT BOOKS:

1. Advanced microprocessors and peripherals, A.K. Ray and K Bhurchandani, MHE. 2ND edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning., 3rd Ed.
3. ARM system Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012.

REFERENCE BOOKS

1. Microprocessor and Interfacing , D.V.Hall, MGH, 2nd Edition 2006.
2. Introduction to Embedded Systems, ShibuK.V. MHE,2009.
3. The 8051 Microcontrollers, Architecture and Programming and Applications – K. Uma Rao, Anhe Pallavi, Pearson, 2009.
4. Digital Signal Processing and Applications with the OMAP- L138 Experimenter, Donald Reay, WILEY 2012.

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B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.Tech. V Semester **L/T/P/C**
3/0/0/3

Pre-Requisites: None

COURSE OBJECTIVES

1. To learn the basic business type of the organization.
2. To acquire the knowledge and impact of the economy on business firms.
3. To analyze the business from the financial perspective.
4. To know the financial position of the company.

COURSE OUTCOMES

1. Analyze the total structure of the business and able to identify and classify the Different types of business entities.
2. Asses the demand and supply analyses with the help of various measures and types of Elasticity of demand.
3. Infer the knowledge about production and cost analysis for product and services.
4. Interpret the fundamental concepts related to financial accounting.
5. Predict the financial position by analyzing the financial statement of the company through various ratios.

UNIT – I

Introduction to Business and Economics:
Business: Define Business, characteristics of business, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company..
Economics: Significance of Economics, Micro and Macro Economic Concepts, and Importance of National Income, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist,

UNIT – II

Demand Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Steps in Demand Forecasting, Methods of Demand Forecasting.

UNIT- III

Production, Cost, Market Structures & Pricing:

Production Analysis: production function, Law of returns to scale, Internal and External Economies of Scale.

Cost analysis: Cost concepts, Types of Costs. Break-even Analysis (BEA)

Pricing: Types of Pricing, product life cycle, **GST** (**Goods & service Tax**)

Market Structures- Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly.

UNIT - IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

TEXT BOOKS:

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.
4. Rakesh garg,sandeepgarg,Hand book of GST in India
5. A.R. Aryasri (2011), Managerial Economics and Financial Analysis, TMH, India.

REFERENCES:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S. N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

DIGITAL DESIGN THROUGH VERILOG HDL

B.Tech. V Semester **L/T/P/C**
3/0 /0 /3

Pre-Requisite: Switching Theory and Logic Design

COURSE OBJECTIVES:

1. To build Verilog design modules using the constructs and conventions of the Verilog HDL programming language and various modeling styles supported by the language.
2. To distinguish between the various modeling styles like structural, register-transfer (data flow), and algorithmic (behavioral) and make use of various levels of abstraction for modeling digital hardware systems.
3. To develop advanced complex systems for real time environment and to develop required skill set in this programming language to foster the needs of the industry.

COURSE OUTCOMES: On completion of this course, the students will be able to:

1. Describe, design, simulate, and synthesize computer hardware using the Verilog hardware description language.
2. Describe the role of hardware description language (HDL) in design flows for FPGA and ASIC with a historical development of the Verilog HDL.
3. Develop program codes for structural, behavioral and data flow modeling of combinational and sequential logic using Verilog HDL in any problem identification formulation and solution.
4. Complete tasks and assignments effectively as instructed with the use of modern technology through research and case studies.
5. Interpret and Implement designs using the advanced features of Verilog HDL and be able to write code effectively.

UNIT – I:

Introduction To VLSI Design: Introduction, conventional approach to digital design, VLSI/ASIC design flow, Role of HDL.

Introduction To Verilog: Verilog as HDL, Emergence of HDLs, Capabilities of Verilog HDL, Levels of Design Description, Hierarchical Modeling Concepts.

Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars, Vectors and Arrays, Memories, System Tasks, Modules and Ports, Modeling Styles

UNIT – II:

Gate Level Modeling: Introduction, Gate Types - AND/OR Gates, BUF/NOT Gates, Tri-state Gates, Array of Instances of Gate Primitives, Net Delays and Gate Delays, Rise, Fall and Turn-off Delays, Min/Typ/Max Values, Delay Examples, Strengths and Contention Resolution, Verilog Design Examples Using Gate Level Modeling.

UNIT – III:

Data Flow Modeling: Introduction, Continuous Assignments, Delays, Expressions, Operands and Operators, Operator Types, Verilog Design Examples Using Data Flow Modeling.

Switch Level Modeling: Introduction, Switch-Modeling Elements - MOS Switches, CMOS Switches, Bidirectional Switches, Resistive Switches, Delay Specification on switches, Verilog Design Examples Using Switch Level Modeling.

UNIT-IV:

Behavioral Modeling: Introduction, Structures Procedures - Initial and Always Statements, Procedural Assignments, Timing Controls, Conditional Statements, Multi-way Branching, Loops, Sequential and Parallel Blocks, Generate Blocks, Procedural Continuous Assignments, Test Benches, Verilog Design Examples Using Behavioral Modeling.

UNIT – V:

Tasks, Functions and User Defined Primitives: Parameters, Path delays, Compiler Directives, Functions, and Tasks, Differences between Tasks and Functions, UDP Basics, Combinational UDPs, Sequential UDPS.

TEXT BOOKS

1. T. R. Padmanabhan, B. Bala Tripura Sundari (2004), Design through Verilog HDL, Wiley & Sons Education, IEEE Press, USA.
2. Samir Palnitkar (2013), Verilog HDL - A Guide to Digital Design and Synthesis, 2nd Edition, Pearson Education, New Delhi, India.

REFERENCE BOOKS

1. Michael D. Ciletti (2005), Advanced Digital Design with Verilog HDL, Prentice Hall of India, New Delhi.
2. Stephen. Brown, Zvonko Vranesic (2005), Fundamentals of Logic Design with Verilog, Tata McGraw Hill, India.
3. J. Bhaskar (2003), A Verilog Primier, 2 nd edition, BS Publications, India.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
IMAGE PROCESSING & PATTERN RECOGNITION

B.Tech. V Semester **L/T/P/C**
3/ 0 /0/ 3

Pre-Requisite: Signals and Systems, Digital Signal Processing, Knowledge of mathematics and matrices

COURSE OBJECTIVES:

The objectives of this course are to make the student

1. Adequate background knowledge about image processing and pattern recognition
2. Practical knowledge and skills about image processing and pattern recognition tools
3. Necessary knowledge to design and implement a prototype of an image processing and pattern recognition application.

COURSE OUTCOMES:

Upon completion of this course, the students should be able to

1. Understand Basics of image formation and transformation using sampling and quantization. Analyzes image enhancement techniques in both spatial and frequency domains.
2. Estimate how to restore the degraded image and finds tradeoffs between various filters to image restoration techniques. Apart from that evaluates the need for image compression also to evaluate the basic compression algorithms.
3. Ability to analyze image using different morphological techniques also understands the concepts of various Image segmentation.
4. Recognizes various representation and description techniques used in image processing.
5. Understands the fundamentals of Pattern recognition and classification methods to choose an appropriate features

UNIT – I:

Image fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and quantization. Relationship between pixels.

Image Enhancement in Spatial & Frequency Domain: Intensity functions transformations, histogram processing, smoothing & sharpening – spatial filters.

Basics of filtering in frequency domain, image smoothing & sharpening – frequency domain filters, homomorphic filtering

UNIT – II:

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration

Image compression: Types and requirements, statistical compression, spatial compression, contour coding, quantizing compression, image data compression-predictive techniques, pixel coding, transform coding theory.

UNIT-III:

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion, Opening and closing, Hit-or-Miss Transformation, Morphological algorithms.

UNIT – IV:

Representation and Description: Chain codes, Polygonal approximation, Signature Boundary Segments, Skeltons, Boundary Descriptors, Regional Descriptors, Relational Descriptors, Principal components for Description, Relational Descriptors.

UNIT – V:

Pattern Recognition Fundamentals: Basic Concepts of pattern recognition, Fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

Pattern classification: Pattern classification by distance function: Measures of similarity, Clustering criteria, K-means algorithm,

TEXT BOOKS

1. Digital Image Processing Third edition, Pearson Education, Rafael C. Gonzalez, Richard E. Woods.

2. Pattern recognition Principles: Julus T. Tou, and Rafel C. Gonzalez, Addision-Wesly Publishing Company.

3. Digital Image Processing, M.Anji Reddy, Y.Hari Shankar, BS Publications.

REFERENCE BOOKS

1. Image Processing, Analysis and Machine Vision, Second Edition, Milan Sonka, Vaclav Hlavac and Roger Boyle. Thomson learning

2. Digital Image Processing – William k. Pratl –John Wiley edition.

3. Fundamentals of digital image processing – by A.K. Jain, PHI.

4. Pattern classification, Richard Duda, Hart and David strok John Wiley publishers.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
INTRODUCTION TO EMBEDDED SYSTEMS

B.Tech. V Semester **L/T/P/C**
3/ 0 /0/ 3

Pre-Requisite: Fundamentals of Integrated Circuits and Microprocessors

COURSE OBJECTIVES:
The objective of this course is to enable the students to understand embedded system basics and apply that knowledge to design and develop embedded solutions.

COURSE OUTCOMES: On completion of the course, student will able to
1. Identify the constraints and challenges of an Embedded System design
2. Understand the custom single purpose processors
3. Understand the general purpose processors
4. Get familiarized with state machines and models
5. Develop simple examples of embedded system

UNIT I
INTRODUCTION: Embedded Systems Overview, Design Challenges, Processor Technology, IC Technology, Design Technology, and Trade-offs.

UNIT II
CUSTOM SINGLE PURPOSE PROCESSORS: Combinational logic, Sequential logic, custom single purpose processor design, RT-level custom single purpose processor design, optimizing custom single purpose processors.

UNIT III
GENERAL PURPOSE PROCESSORS: Basic architecture, Operation, Programmer's view, Development environment, Application Specific Instruction-Set Processors (ASIPs), selecting a microprocessor, General purpose processor design.

UNIT IV
STATE MACHINE AND CONCURRENT MODELS: Introduction, Models vs. Languages, Text Vs. Graphics, An introductory example, Finite State Machines with data path model (FSMD), Using State Machines, HCFSM and State chart language, Program State Machine Model (PSM), The role of appropriate model and language, Concurrent process model.

UNIT V

EXAMPLES OF EMBEDDED SYSTEMS: Mobile Phone, Automotive Electronics, Radio Frequency Identification, Wireless Sensor Networks, Robotics, Biomedical Application, Brain Machine Interface.

TEXT BOOKS:

1. Frank Vahid, Tony Givargis, "Embedded System Design - A Unified Hardware/Software Introduction", Wiley India Edition, 3rd Edition, 2008.
2. Lyla B. Das, "Embedded Systems", Pearson Education, 2013.

REFERENCE BOOKS:

1. Shibu K.V, "Introduction to Embedded Systems", McGraw Hill.
2. Raj Kamal, "Embedded Systems - Architecture, Programming and Design", 2nd Edition, McGraw Hill, 2008.
3. Wayne Wolf, "Computers and Components: Principles of Embedded Computing System Design", Elsevier.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

OPTICAL FIBER COMMUNICATIONS

B.Tech. V semester **L/T/P/C**
3/0/0/3

Pre-Requisites: Principles of Communications

COURSE OBJECTIVES:

1. Introductions and the basic elements, of optical fiber transmission link, fiber modes configurations and structures.
2. To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
3. To learn the various optical source, detectors and optical fiber connectors.
4. To learn the concept of WDM, optical fiber communication system design.

COURSE OUTCOMES: Upon completion of course the Student should be able to

1. Summarize the importance, introductions and the basic elements, of optical fiber transmission link, fiber modes configurations and structures.
2. Interpret the different kind of losses, signal distortion in optical wave guides and other signal degradation factors.
3. Demonstrate the ability to design a system, with the knowledge of optical components as per needs and specifications.
4. Co-relate various Optical detectors and its performance.
5. Design Optical System and measure its characteristics.

UNIT – I:

Overview of Optical Fiber Communication: Historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Number, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Fiber materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers.

UNIT – II:

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. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT – III:

Optical Sources: LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Reliability of LED & ILD. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT – IV:

Optical Detectors: Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT – V:

Optical System Design: Considerations, Component choice, multiplexing. Point-to- point links, System considerations, Link power budget with examples. Over all fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples. Transmission distance, Line coding in Optical links, WDM, Necessity, Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS

1. Optical Fiber Communications - GerdKeiser, Mc Graw-Hill International edition, 4^{th}Edition, 2000.
2. Optical Fiber Communications - John M. Senior, PHI, 3^{rd}Edition, 2009.

REFERENCE BOOKS

1. Optical Communication systems-John Gowar, 2^{nd}edition, PHI,2001
2. Fiber Optic Communications - D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
3. Text Book on Optical Fiber Communication and its Applications- S.C.Gupta, PHI, 2005.
4. FiberOpticCommunicationSystems-GovindP.Agarwal, JohnWiley, 3rdEdition, 2004.
5. FiberOpticCommunications-JosephC.Palais, 4thEdition, PearsonEducation, 2004.
6. Introduction to fiber optics by Donald J.Sterling, cengage learning, 2004.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

DIGITAL COMMUNICATION LAB

B.Tech. V Semester **L/T/P/C**
0/0/3/1.5

Pre-Requisite: Analog Communications Lab

COURSE OBJECTIVE:

1. This course gives students deep knowledge in digital communication systems at the practical level.
2. This lab focuses the fundamental concepts on TDM, Pulse modulation Techniques.
3. To analyze various digital modulation techniques like ASK, FSK, PSK, DPSK and QPSK.
4. To understand the concept of ISI & OFDM.

COURSE OUTCOMES:

On completion of this lab course the students will be able to

1. Understand basic theories of Digital communication system in practical.
2. Design and implement different Pulse modulation and demodulation techniques.
3. Analyze digital modulation techniques.
4. Identify and describe different techniques in modern digital communications, in particular source coding techniques.
5. Perform different multiplexing techniques

Note: Perform any twelve experiments**.**
All these experiments are to be simulated using MATLAB or any other simulation package and then to be realized in hardware.

List of Experiments:

1. PCM Generation and Detection
2. Differential Pulse Code Modulation
3. Delta Modulation
4. Adaptive Delta modulation
5. Time Division Multiplexing of 2 Band Limited Signals
6. Frequency Shift Keying: Generation and Detection
7. Phase Shift Keying: Generation and Detection
8. Amplitude Shift Keying: Generation and Detection
9. Study of the spectral characteristics of PAM

10. Study of the spectral characteristics of PWM
11. Study of the spectral characteristics of QAM.
12. DPSK :Generation and Detection
13. QPSK : Generation and Detection
14. OFDM: Generation and Detection

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
MICROPROCESSORS AND MICROCONTROLLERS LAB

B.Tech. V Semester **L/T/P/C**
0/0/0/1.5

Pre-Requisite: Digital logic Design Lab

Course Objectives:

- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Course Outcomes:

1. Apply the fundamentals of assembly level programming for microprocessors/microcontrollers.
2. Develop programs on a microprocessor using instruction set of 8086.
3. Develop the assembly level programming using 8051 instruction set.
4. Able to understand how different I/O devices can be interfaced to microprocessor and microcontroller.
5. Develop programs using instruction set of ARM.

Note: - Minimum of 12 experiments to be conducted.

List of Experiments:

1. Programs for 16 bit arithmetic operations 8086(using various addressing modes)
2. Programs for sorting an array for 8086.
3. Programs for searching for a number of characters in a string for 8086.
4. Programs for string manipulation for 8086.
5. Parallel communication between two microprocessor kits using 8255.
6. Serial communication between two microprocessor kits using 8251.
7. Interfacing to 8086 and programming to control stepper motor.
8. Programming using arithmetic, logical and bit manipulation instructions of 8051.
9. Program and verify Timer/Counter in 8051.
10. Program and verify interrupt handling in 8051.
11. UART operation in8051.
12. Communication between 8051 kit and PC.
13. Interfacing LCD to 8051
14. Interfacing Matrix/Keyboard to 8051
15. Data transfer from peripheral to memory through DMA controller 8237/8257.
16. Programs for arithmetic operations using ARM7.
17. Program for Digital output (blink LEDs) using ARM7.
18. Program to display message on LCD using ARM7.
19. Interfacing seven segment display to ARM7.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
ANTENNAS AND WAVE PROPAGATION

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisite: EMTL

Course Objectives: This can be termed a middle level course in the electronic communication engineering domain. The course deals with antenna basics, different types of antennas, some design features, antenna measurements and wave propagation, and has the following main objectives:

1. To understand the concept of radiation, antenna definitions and significance of antenna parameters, to derive and analyze the radiation characteristics of thin wire dipole antennas and solve numerical problems.
2. To distinguish between UHF, VHF and Microwave Antennas, their requirements, specifications, characteristics and design relations.
3. To analyze the characteristics of Yagi-Uda antennas, helical antennas, pyramidal horns, micro strip patch antennas and parabolic reflectors and identify the requirements to facilitate their design.
4. To identify the antenna array requirements and understand the set-up requirements for microwave measurements.
5. To define and distinguish between different phenomenon of wave propagation.

Course Outcomes: Having gone through this course on Antenna Theory and Wave Propagation, the students would be able to:

1. Explain the mechanism of radiation, distinguish between different antenna characteristic parameters, establish their mathematical relations, and estimate them for different practical cases.
2. Establish the radiation patterns of folded dipole, Yagi-Uda Antenna, Helical Antennas, Horn Antennas, and to acquire the knowledge of their analysis, design and development.
3. Analyze a micro strip rectangular patch antenna and a parabolic reflector antenna.
4. Carry out the Linear Array Analysis, Binomial Arrays and Planar arrays and specify the requirements for microwave measurements.
5. Classify the different wave propagation mechanisms.

UNIT – I

Antenna Basics: Introduction, Basic Antenna Parameters – Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height, Friis transmission equation, Illustrative Problems.

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem

Thin Linear Wire Antennas – Radiation from Small Electric Dipole, Quarter Wave Monopole and Half Wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far Fields and Patterns of Thin Linear Centre-fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small Loops (Qualitative Treatment).

UNIT - II

VHF, UHF and Microwave Antennas - I : Arrays with Parasitic Elements, Yagi-Uda Array, Folded Dipoles and their Characteristics, Helical Antennas – Helical Geometry, Helix Modes, Practical Design Considerations for Mono filar Helical Antenna in Axial and Normal Modes, Horn Antennas – Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Illustrative Problems.

UNIT - III

VHF, UHF and Microwave Antennas - II: Microstrip Antennas – Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas – Geometry and Parameters, Characteristics of Microstrip Antennas. Reflector Antennas – Introduction, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors – Geometry, Pattern Characteristics, Feed Methods, Reflector Types – Related Features, Illustrative Problems.

UNIT – IV

Antenna Arrays: Point Sources – Definition, Patterns**,** arrays of 2 Isotropic Sources **-** Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, End fire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays, Planar arrays (Qualitative treatment), Illustrative Problems.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT - V

Wave Propagation – I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Qualitative Treatment) – Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections. Space Wave Propagation – Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super Refraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Wave Propagation – II: Sky Wave Propagation – Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance, Multi-hop Propagation.

TEXT BOOKS:

1. Antennas and Wave Propagation – J.D. Kraus, R.J. Marhefka and Ahmad S. Khan, MC GRAW HILL EDUCATION, New Delhi, 4th ed., (Special Indian Edition), 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

REFERENCE BOOKS:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd Ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
DIGITAL SIGNAL PROCESSING

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

PREREQUISITES: To have Knowledge of Signals and Systems.

COURSE OBJECTIVES:

1. Describe the necessity and efficiency of digital signal processing.
2. Design and implementation of FIR and IIR digital filters.
3. Describe the basics of Multirate digital signal processing and its application.
4. Describe the DSP processor architecture for the efficient implementation of digital filters.

COURSE OUTCOMES: Upon Completion of Course the student will be able to

1. Necessity and use of digital signal processing and its application.
2. Analyze Discrete Fourier transform
3. Analyze FIR and IIR digital filters.
4. Applications of Multirate digital signal processing.
5. Acquaintance of DSP processor and its architecture.

UNIT – I:
Introduction: Discrete time signals & sequences, discrete time systems, Block diagram of DSP, Time and Frequency response analysis of Discrete time systems.
Z-Transforms: Introduction, Relation between DTFT and Z-transforms, Relation between Laplace transform and Z-transforms Properties, Poles and Zeros in Z-plane, Region of convergence, System function, stability criterion, Inverse z-transform, Solution of difference equations, Applications.

UNIT – II:
Discrete And Fast Fourier Transform: Discrete Fourier Transform (DFT), Computation of DFT, Properties of DFT, Linear and Circular Convolution, Filtering of long duration sequences, FFT algorithms: Radix- 2 Decimation in Time and Decimation in Frequency algorithms, Inverse FFT.

UNIT – III:

Digital Filter (IIR) Design: Butterworth and Chebyshev approximation- IIR digital filter design techniques- Backward difference algorithm, Step and Impulse Invariant technique- Bilinear transformation technique, Spectral transformations, Realization of IIR digital filters.

UNIT – IV:

Digital Filter (FIR) Design: Amplitude and phase responses for FIR filters- Linear phase filters, Design of FIR digital filters-Fourier series method, Window techniques, Frequency sampling technique, Realizations, Comparison between FIR and IIR filters.

UNIT – V:

Multirate Digital Signal Processing: Introduction, Down sampling, Up sampling, Decimation, Interpolation, Sampling Rate conversion by a Rational factor I/D, Multistage implementation of Sampling Rate conversion, Applications of Multirate Signal Processing.

Introduction To Digital Signal Processors: Introduction, Evolution of Digital signal processors, TMS 320C 54XX processors, Architecture, Addressing modes, Instruction set.

TEXT BOOKS:

1. Alan V. Oppenheim and Ronald W. Schafer, "Digital Signal Processing", 2/e, PHI, 2010.
2. John G. Proakis and Dimtris G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Application", 4/e, PHI, 2007.
3. Avathar Singh and S. Srinivasan, "Digital Signal Processing using DSP Micrprocessor", 2/e, Thomson Books, 2004.
4. John G Proakis and Vinay K Ingle, " Digital Signal Processing using MATLAB" 3/e, Cengage Learning, 1997.
5. Richard G Lyons, "Understanding Digital Signal Processing", 3/e, Prentice Hall.

REFERENCE BOOKS:

1. Analog and Digital signal processing by Ashok Ambardar-2nd Edition,Brooks/cole publishing company,2006.
2. Digital signal processing by S.Shalivahanan,A.vallavaraj and C.Gnanapriya,TMH,2009.
3. Fundamentals of Digital signal processing by Loney Ludeman,John Wiley,2009.
4. Digital signal processing by Tarun kumar Rawat, Oxford Higher education.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
DIGITAL IC DESIGN

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisites: Digital Logic Design

Course objectives:

1. To understand issues in digital integrated circuits.
2. To understand in detail static and dynamic behavior of CMOS inverter.
3. To understand designing of various logics using CMOS static and dynamic logic and their power issues.
4. To understand designing of static and dynamic latches and registers.
5. To understand how to design arithmetic building blocks and various memories using CMOS

Course outcomes: After the completion of this course, the students should be able to

a. Understand the various issues in digital integrated circuits.
b. Acquire knowledge of static and dynamic CMOS inverter.
c. Design of CMOS static and dynamic logics.
d. Acquire knowledge of static and dynamic latches and registers behavior.
e. Design arithmetic building blocks and various memories using CMOS.

UNIT – I:

Introduction: Historical perspective, issues in digital integrated circuit design, quality metrics of a digital design:- cost of an integrated circuit, functionality and robustness, performance, power and energy consumption, packing integrated circuits:-packing materials, interconnect levels, thermal considerations in packing, interconnect parameters:-capacitance, resistance and inductance, electrical wire models.

UNIT – II:

The CMOS Inverter: Introduction, the static CMOS inverter — an intuitive perspective, evaluating the robustness of the CMOS inverter:- the static behavior, switching threshold, noise margins, robustness revisited, performance of CMOS inverter:- the dynamic behavior, computing the capacitances, propagation delay: first-order analysis, propagation delay:- from a design perspective, power, energy, and energy-delay:- dynamic power consumption, static consumption, perspective: technology scaling and its impact on the inverter metrics.

UNIT – III:

Designing Combinational Logic Gates in CMOS: static CMOS design: complementary CMOS, ratioed logic, pass-transistor logic, dynamic CMOS design: dynamic logic basic principles, speed and power dissipation of dynamic logic, signal integrity issues in dynamic design, cascading dynamic gates.

UNIT – IV:

Designing Sequential Logic Circuits: Introduction, timing metrics for sequential circuits, classification of memory elements, static latches and registers:-the bi stability principle, multiplexer-based latches master-slave edge-triggered register, low-voltage static latches, static SR flip-flops—writing data by pure force, dynamic latches and registers.

UNIT – V:

Designing Arithmetic Building Blocks and Memories: Introduction, data paths in digital processor architectures, Adders: The binary Adder, full adder, binary adder logical considerations, Multipliers, shifters.

Memories: Nonvolatile read only memory, read write memories, contents addressable or associative memory.

Text Books

1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits – A design perspective, 2/e, Prentice Hall of India, 2010.

References

1. S. M. Kang & Y. Leblebici, CMOS Digital Integrated Circuits, 3/e, Tata McGraw Hill, 2010. 2. Jackson & Hodges, Analysis and Design of Digital Integrated circuits, 3/e, Tata McGraw Hill, 2012
2. Ken Martin, Digital Integrated Circuit Design, 2/e, Oxford Publi

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

Color Image Processing

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisites: Signals and Systems, Digital image Processing, Digital Signal Processing, Knowledge of mathematics and matrices.

Course objectives

The objectives of this course are to make the student

1. To study the Color image fundamentals
2. To understand the mathematical transforms necessary for Color Image processing.
3. To study the Color Image enhancement techniques
4. To study Image Segmentation procedures as related to Color Images.
5. To study the Color Image compression procedures.

Course outcomes

Upon completion of this course, the students should be able to

1. Analyze the fundamentals of Color and its applications.
2. Understands different types of color image processing and transformations techniques involved in color images
3. Acquires the knowledge about color image enhancement techniques.
4. Ability to understand the concepts of various color image and edge-base segmentation
5. Understands color image compression procedures.

UNIT-I

Introduction: Introduction to color Image Processing, color image fundamentals, Primary and secondary colors, Color models.

UNIT-II

Color Image Processing: Pseudo-color Image Processing: Intensity slicing, Gray Level to color Transformations, Full Color Image Processing.

Color Transformations: Formulation, Color Complements, Color slicing, Tone and color corrections, Histogram Processing

UNIT-III:

Color Image Enhancement: False Colors and Pseudo-colors, Enhancement of Real Color Images, Contrast Enhancement in Color Images: Color Image Smoothing, Color Image Sharpening.

UNIT-IV:

Color Image Segmentation: Pixel-Based Segmentation, Area-Based Segmentation, Edge-Based Segmentation, Comparison of Segmentation Processes, Color Edge Detection.

UNIT-V

Color Image Compression: Information and data, Redundancy, coding, compression, File Formats for Lossy & Lossless Compression

TEXT BOOKS:

1. Digital Image processing – R.C. Gonzalez & R.E. Woods, Addison Wesley/ Pearson Education,
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, Image Processing, Analysis, and Machine Vision, Second Edition, Thomson Learning

REFERENCE BOOKS:

1. Digital Image processing using MAT LAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Edition, PEA, 2004.
2. "Fundamentals Of Digital Image Processing" Anil K Jain
3. Digital Image Processing – William K. Pratt, John Wilely, 3rd Edition, 2004.
4. Adrian Low, Computer Vision and Image Processing, Second Edition, B.S.P

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING

ADVANCED MICROCONTROLLERS

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisite: Fundamentals of Microprocessors and Microcontrollers

Course Objectives: The objective of this course is to enable the students to understand various controllers' architectures to design embedded applications

Course Outcomes: Upon completion of the course, student will able to understand

1. The Intel microcontroller architecture and its components
2. The basics of Motorola and PIC controllers
3. The basics of ARM processors
4. The detailed instruction sets of ARM and Thumb.
5. Microcontroller application development tools

UNIT I

INTEL8051: 8051 Microcontroller Architecture, Memory Organization, Instruction set, Addressing modes, Timers, Interrupts.

INTEL80196: 80196 Microcontroller Architecture, Memory Organization, Instruction set, Addressing modes, Timers, Interrupts.

UNIT II

Motorola MC68hC11: Architecture, Instruction set, Addressing modes, Memories, Interrupts.

PIC Microcontrollers – PIC16C61/71: Overview and Features, Architecture, Memory Organization, and Instruction set, Addressing modes, Timers, Interrupts.

UNIT III

ARM Processors: Introduction, Registers, Current program status register, Pipeline, Exceptions, Interrupts and Interrupt vector table, Core extensions, Architecture revisions-ARM9&ARM11 Processors.

UNIT IV

ARM Instruction Set: Data processing instructions, Branch instructions, Load-store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution.

Thumb Instruction Set: Thumb register usage, Branch instructions, Data processing instructions, Single register Load-store instructions, Multiple register Load-store instructions, Stack instructions, Software interrupt instructions.

UNIT V

Microcontroller Application Development Tools: Development phases of a Microcontroller - Based System, Software development cycle and applications, Software development tools, Exemplary IDE – microvision tools from Keil, Emulator and In-circuit Emulator (ICE), Target board, Device Programmer.

Exemplary 8051 Assembly Codes - Delaysand Timer controlled delays**,** Serial communication.

TEXT BOOKS:

1. Raj Kamal, "Microcontrollers - Architecture, Programming, Interfacing and System Design", Pearson Education, 2009.
2. Ajay V. Deshmukh, "Microcontrollers - Theory and Applications", Tata McGraw Hill, 2010.
3. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide - Designing and Optimizing System Software",Elsevier, 2013.

REFERENCE BOOKS:

1. Trevor Martin, 'The Insider's Guide to The Philips ARM7-Based Microcontrollers, An Engineer's Introduction To The LPC2100 Series", Hitex (UK) Ltd.
2. "ARM Architecture Reference Manual".
3. Muhammad Ali Mazidi, Janice Mazidi, RolinMcKinlay"8051 Microcontroller and Embedded Systems", Pearson Education, 2nd Edition, 2005.
4. PIC Microcontroller and Embedded Systems – Muhammad Ali Mazidi, RolinD.Mckinaly, Danny Causy – PE.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisites: Digital communications

Course objectives

The following are the course objectives

1. To expose through the evolution of switching systems from manual and electromechanical systems to stored-program-controlled digital systems
2. To provide knowledge to the students regarding design and performance analysis of various switching systems.
3. To train the students about basic telephone networks structures and traffic engineering concepts
4. To inculcate students on various internet concepts like OSI reference model, LAN, MAN, WAN, repeaters, bridges, routers and gateways
5. To provide a comprehensive coverage of data communication networks and ISDN

Course outcomes On completion of this course, it is expected that the student will be able to:

1. Analyze different switching methodologies.
2. Differentiate between signaling methods used in Telecommunication Networks
3. Exhibit a good knowledge on data communication networks and ISDN and be able to differentiate LAN, MAN, WAN.
4. Demonstrate an ability to work on various Telecommunication Network concepts.
5. Demonstrate knowledge on modern telecommunication concepts like DSL & SONET

UNIT - I

Telecommunication Switching Systems: Introduction, Elements of switching systems, switching network configuration, Rotary switches, Uniselector, Two motion selector, Trunking principle ,principles of cross bar switching, Crossbar Switch Configuration, Cross point Technology, Crossbar Exchange Organization.

UNIT - II

Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced services, Two- Stage Networks, Three-Stage Networks, n-Stage Networks.

Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three Stage Combination Switching, n - Stage Combinational Switching.

UNIT - III

Telecommunications Traffic: Introduction; The Unit of Traffic, Congestion; Traffic Measurement, A Mathematical Model, Lost-Call Systems-Theory, Traffic Performance, Loss Systems in Tandem, Use of Traffic Tables, Queuing Systems-The Second Erlang Distribution, Probability of Delay, Finite Queue Capacity, Some Other Useful Results, Systems with a Single Server, Queues in Tandem, Delay Tables, Applications of Delay Formulae.

UNIT - IV

Telephone Networks: Subscriber loop systems, switching hierarchy and routing, transmission plan, transmission systems, numbering plan, charging plan, Signaling techniques: In channel signaling, common channel signaling, Cellular mobile telephony.

Data Networks: Data transmission in PSTNs, Switching techniques for data transmission, data communication architecture, link to link layers, end to end layers, satellite based data networks, LAN, MAN, Internetworking.

UNIT - V

Integrated Services Digital Network (ISDN): Introduction, motivation, new services, Network and protocol architecture, Transmission channels, User-Network interfaces, functional grouping, reference points, signaling, numbering, addressing, BISDN.

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

SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries, and Higher rate of service.

TEXT BOOKS

1. J. E Flood, "Telecommunications Switching and Traffic Networks," Pearson Education, 2006.
2. Tyagarajan Viswanathan, "Telecommunications Switching Systems and Networks," Prentice Hall of India Pvt. Ltd., 2006.

REFERENCE BOOKS

1. John C Bellamy, "Digital Telephony, N John Wiley International Student Edition, 3rd Edition, 2000.
2. Behrouz A. Forouzan, "Data Communications and Networking," TMH, 2nd Edition, 2002.
3. Tomasi," Introduction to Data Communication and Networking," Pearson Education, 1st Edition, 2007.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
VLSI DESIGN

B.Tech. VI Semester **L/T/P/C**
3/0/0/3

Pre-Requisites: Analog Electronics, Digital logic Design

Course Objectives:

1. Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS, CMOS and Bi CMOS transistors and knowledge about basic electrical properties of MOS.
2. Preparing the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.
3. Designing of different types of logic gates using CMOS logic and analyze their transfer characteristics.
4. Provide design concepts required to design data path building blocks and memories.
5. Design logic circuits using PLA, PAL, FPGA and CPLD. Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

Course Outcomes:

Upon successfully completing the course, students will be able to:

1. Acquire qualitative knowledge about the fabrication of MOS transistors.
2. Design layout of any logic circuit with proper design rules.
3. Implement transistor level circuits for equivalent logic circuits.
4. Design sub systems like data, control and memory modules.
5. Implement any logic circuit using various Programmable Logic Devices.

UNIT - I

Introduction to IC Technology: Introduction, MOS, PMOS, NMOS, CMOS & BiCMOS technologies, New trends in VLSI.

Basic Electrical Properties: Basic Electrical Properties of MOS: Ids-Vds relationships, MOS transistor threshold Voltage V_t, transconductance g_m, output conductance g_{ds}, figure of merit ωo; Various pull ups, NMOS Inverter, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT - II

VLSI Circuit Design Processes: VLSI Design Flow, Stick Diagrams, MOS Layers, Design Rules and Layout, 2μm CMOS Design rules for wires, Contacts and Transistors, Layout for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, introduction to CAD tools.

UNIT - III

Gate Level Design: Designing static CMOS circuits for Logic Gates, Switch logic, Alternate gate circuits, power, time delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT - IV

Data Path Subsystems: Subsystem Design, Adders, Multipliers, Parity generators, Zero/One Detectors, Comparators, Shifters, Counters, ALUs.

Array Subsystems: ROM, Serial access memories, SRAM, DRAM.

UNIT - V

Programmable Logic Devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), FPGAs, CPLDs, Standard Cells.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

TEXT BOOKS:

1. Essentials of VLSI circuits and systems - Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
2. CMOS VLSI Design -a circuits and systems perspective, Neil H.E. Weste, David Harris, Ayan Banerjee, Peason, 2009.
3. VLSI Design-M.Michael Val, 2001, CRC Press.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and systems Perspective-Ming-BO Lin, CRC Press, 2011.
2. CMOS logic circuit Design - John.P.Uyemura, Springer, 2007.
3. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
4. 4.N.H.E.Weste&D. Harris, “CMOS VLSI Design: A Circuits and Systems Perspective”, 4th Edition, Pearson, 2011.
5. 5.J.Rabey& B. Nikolic, “Digital Integrated circuits”, 2ndEdition,Pearson, 2003.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
FUNDAMENTALS OF MANAGEMENT

B.Tech. VI Semester **L/T/P/C**
3/ 0 /0/ 3

Pre-Requisite:

COURSE OBJECTIVES

1. To make the students to understand the management concepts
2. To analyze the managerial skills.
3. To know the applications of management concepts in practical aspects of business.
4. To interpret, understand and develop the management principles in organizations.
5. To learn the basic concepts of organization its principles and functions.

OUT COMES

Upon the Completion of course the student will be able to

1. infer the basic knowledge of management functions , levels and evolution of
2. Management.
3. Ensure the students in decision making problem solving for the issues in corporate in the organization.
4. Acquire the knowledge of entire organization design and structure.
5. Perceive the strategically decision in selection, requirement training and development.

Enact and impose the qualities of a leader, mentor and coach.

UNIT - I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach.

UNIT – II

Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans. Decision making and Problem solving - Programmed and Non Programmed Decisions, Steps in Problem Solving and Decision Making.

UNIT - III

Organization and HRM: Principles of Organization: Organizational Design &Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization;

Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT – IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis.

Motivation - Types of Motivation; Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT - V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCES:

1. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Harold Koontz and Heinz Weihrich, 2010, Essentials of Managemen

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
DIGITAL SIGNAL PROCESSING LAB

B.Tech. VI Semester **L/T/P/C**
3/0/0/1.5

PREREQUISITES: Linear systems and signals, Embedded C programming language

COURSE OBJECTIVES:

1. Implement the basic algorithms of DFT, IDFT, FFT and IFFT.
2. Design FIR Filter with specific magnitude and phase requirements.
3. Design IIR Filter with specific magnitude and phase requirements.
4. Describe the basics of Multi rate signal processing.
5. Design and implement digital filters on DSP processors.

COURSE OUTCOMES: On completion of course the student will be able to

1. Illustrate various signal processing algorithms.
2. Analyze FIR Filter with specific magnitude and phase requirements.
3. Analyze IIR Filter with specific magnitude and phase requirements.
4. Illustrate the basics of Multi rate signal processing.
5. Analyze digital filters on DSP processors

NOTE:

1. At least twelve experiments to be conducted in the semester.
2. Minimum of 6 from Part A and 6 from Part B is Compulsory.
3. For Section 'A' MATLAB with different toolboxes like signal processing, signal processing block set and SIMULINK / MATHEMATICA / any popular software can be used.

PART-A

Signal Processing Experiments

1. Generation of sinusoidal waveform/signal based on recursive difference equations.
2. To find DFT/IDFT of a given DT signal.
3. To find frequency response of a given system.
4. Implementation of FFT of a given sequence.
5. IIR filters design: Butterworth and Chebyshev.
6. FIR filters design using different window functions.
7. Interpolation and Decimation.
8. Sampling rate conversion by a rational factor L/M.

PART-B

DSP Processor Experiments

1. Introduction to DSP processor kits and Software used with details of some basics.
2. Linear Convolution.
3. Impulse Response.
4. Frequency response of given system.
5. Fast Fourier Transform Algorithms.
6. Power spectrum of a given signal.
7. Design of FIR (LP/HP) using windows
8. Design of IIR (HP/LP) filters.

REFERENCES:

1. Jaydeep Chakravorthy, ‘’Introduction to MATLAB Programming: Toolbox and Simulink”,1/e, University Press,2014.

B.TECH. ELECTRONICS & COMMUNICATION ENGINEERING
VLSI Design Lab

B.Tech. VI Semester **L/T/P/C**
3/0/0/1.5

PREREQUISITES: Digital Electronics

COURSE OBJECTIVES:

1. To learn the HDL programming language.
2. To learn the simulation of basic gates using the HDL.
3. To learn the simulation of combinational and sequential circuits using HDL.
4. To learn the synthesis and layouts of analog and digital CMOS circuits.
5. To develop an ability to simulate and synthesize various digital circuits

COURSE OUTCOMES:

At the end of the course, students will be able to:

1. Simulate various digital circuits.
2. Simulate and synthesize various CMOS circuits.
3. Understand the layout design rules for both static CMOS and dynamic clocked CMOS Circuits.
4. Develop an ability of designing of analog and digital CMOS circuits.
5. Design of Digital VLSI Circuits, stick diagram of circuits.
6. Design Entry & simulation of combinational circuits with test bench & functional verification.
7. Generation of configuration/fuse files for combinational circuits & implementation of the hardware using FPGA.
8. Design a schematic and simple layout for CMOS circuits, parasitic extraction.
9. Be able to complete a significant VLSI design project having a set of objective criteria and design constraints

LIST OF EXPERIMENTS:

Design and implementation of the following CMOS digital/analog circuits using **Cadence / Mentor Graphics / Synopsys /Equivalent** CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification, Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners), Circuit optimization with respect to area, performance and/or power, Layout, Extraction of parasitic and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS)

PART- A (E-CAD programs)

Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools

1. HDL code to realize all the logic gates
2. Design of Full adder using 3 modeling styles
3. Design of 3-to-8 decoder using 2-to-4 decoder.
4. Design of 8-to-3 encoder (without and with priority)
5. Design of 8-to-1 multiplexer and 1-to-8 de-multiplexer
6. Design of 4 bit binary to gray code converter
7. Design of 4 bit comparator
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
10. Finite State Machine Design

PART- B (VLSI CIRCUIT DESIGN)

Introduction to layout design rules, Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis of the following:

1. CMOS inverter
2. CMOS NOR/ NAND gates
3. CMOS OR/ AND gates
4. CMOS XOR/XNOR
5. Design of Half Adder
6. AOI or OAI gates.
7. Design of a 2x1 multiplexer using transmission gates
8. Latch & Pass transistor
9. A 6 –T SRAM bit cell
10. Analog Circuit simulation (AC analysis) – CS & CD amplifier