## Department Vision and Mission

Vision: To achieve academic excellence in Electronics and Communication Engineering, thus enabling students to have enhanced opportunities in the evolving global industrial scenario.

Mission: To institutionalize academic , engineering and ethical culture, that strives towards continuous improvement of quality and content that emphasizes hands on exposure and interaction with R&D and industrial organizations. To mould the students into good leaders with high degree of credibility and integrity.

## Program Outcomes

1. Graduates will apply the knowledge of mathematics, Physics, chemistry and allied engineering subjects to solve problems in Electronics and Communication Engineering

2. Graduates will Identify, formulate and solve Electronics and Communication Engineering problems.

3. Graduates will design Electronics and Communication Engineering systems meeting the given specifications for different problems taking safety and precautions into consideration.

4. Graduates will solve complex problems applying research methods, design and conduction of experiments, analysis and interpretation.

Graduates will design, conduct experiments, analyse and interpret data

5. Graduates will use modern software tools to model and analyse problems, keeping in view their limitations.

6. Graduates will understand the impact of local and global issues / happenings on Electronics and Communication Engineering

7. Graduates will provide sustainable solutions for problems related to Electronics and Communication Engineering and also will understand their impact on environment.

8. Graduates will have knowledge of professional ethics and code of conduct as applied to Electronics and Communication engineers.

9. Graduates will work effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.

10. Graduates will communicate effectively in both verbal and written form.

11. Graduates will have the ability for self- education and life long learning.

12.Graduates will plan, monitor and complete projects

**Program Educational Objectives**

PEO 1 : Graduates will exhibit leadership qualities and develop solutions for the service of the society

PEO 2: Graduates will excel in industry and become successful Entrepreneur

PEO 3: Graduates will excel in Higher Education and Research through Life Long Learning

# SYLLABUS FOR III SEMESTER

# ENGINEERING MATHEMATICS – III

## PREREQUISITES

Students are expected to have the basic knowledge of differentiation and integration

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course ENGINEERING MATHEMATICS – III*** | ***Course Code*: *MAT31*** |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*:** 45hrs | ***Duration of SEE*:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*:** 50 |

## COURSE OUTCOMES

- Students should be able to solve problems involving simple to complex functions.
- Students should be able to implement these in Matlab programs.
- Students should be able to understand the logic which helps them develop programs and algorithms.

## TEACHING METHODOLOGY:

- Black Board

## UNIT-I

**Fourier series:** Euler's Formulae, Dirichlet's Conditions for Fourier Series Expansion, Change of Interval, Even and Odd function, half range series, Practical Harmonic Analysis.

**Text1: Ch 10** **9 Hrs**

## UNIT-II

**Fourier Transforms:** Definition, Complex Fourier transforms, Cosine and Sine transforms, Properties, Inverse Fourier transform, Application to boundary value problems.

**Text1: Ch 22.22.1, 22.5, Ch. 22.22.11** **9 Hrs**

## UNIT– III

$Pp: Qq: R$

**Partial Differential equations:** Formation of PDE, Solution by direct integration, Lagrange's linear PDE of the form, Charpit's method, Method of separation of variables, Derivation of one dimensional heat and wave equation, Solution by variable separable method, Solution of two dimensional Laplace equations by variable separable method

**Text1: Ch 17, 17.1 to 17.5, 17.7, Ch 18.18.2 to 18.6** **9 Hrs**

## UNIT – IV

**Finite differences and interpolation:** Finite differences, Forward & Backward differences, Interpolation, Newton's forward and backward formulae, Newton's divided difference formulae and Lagrange's formula for unequal intervals and inverse interpolation by Lagrange's formula.

**Z- Transforms:** Transform of standard functions, Linearity property, Damping rule, Initial and final value theorems, Convolution theorem, Inverse z transforms, Application of z- transform to difference equations.

**Text1: Ch 25. 25.1, 25.5, 25.12, 25.13, Ch 26.26.9 to 26.21**

**9Hrs**

## UNIT-V

**Linear Algebra:** Elementary row transformation, Echelon form, Rank of a matrix, Consistency of linear system of equation, Gauss elimination, Gauss Siedel methods, Eigen values and Eigen vectors, Largest Eigen value by Power method.

$\frac{3}{8}$

**Numerical Analysis:** Solution of algebraic and transcendental equations by regula-falsi method and Newton-Raphson methods. Evaluation of derivatives using Newton's forward and backward difference interpolation formulae, Numerical Integration by Trapezoidal, Simpson's and rule, Weddle's rule.

**Text1: Ch 24.24.2, Ch 25. 25.14, 25.16**

**9 Hrs**

**Text Books:**


1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publication, 36th Edition, 2002

**Reference Books**:

1. Erwin E Kreyszig, "Advanced Engineering Mathematics", Wiley, 8th Edition, 1999
2. Iyengar and Jain, "Numerical Methods ", New age International, 2002
3. Denis G Zill, Michael R Cullen, "Advanced Engineering Mathematics", Narola Publication, 3rd Edition , 2006

# ANALOG ELECTRONIC CIRCUITS

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title***Analog electronic circuits | ***Course Code*****:** 10EC32 |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES :**

- Structure and operation of bipolar junction transistors, junction field-effect transistors, metal-oxide-semiconductor diodes and transistors. Analysis of dc and ac characteristics..
- Crystal structure and quantum theory of solids; electronic band structure; review of carrier statistics, drift and diffusion, p-n junctions; Fundamental circuit theory concepts, Kirchhoff's voltage and current laws.

**COURSE OUTCOMES**

Students will be able to:

- solve problems relating to clipper and clamper circuit and verify it experimentally
- solve problems related to various transistor biasing techniques and verify it experimentally
- solve problems related to transistor at low frequencies and verify it experimentally
- design different types of amplifiers for given specifications and verify it experimentally
- design different types of oscillator for a given frequency and verify it experimentally

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | P | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | O | | | | | | | | | | |
| | CO1 | S | | | W | | M | | | | M |
| | CO2 | S | S | S | W | | | | | | M |
| | CO3 | S | S | S | W | M | M | | | | M |

**UNIT 1**

**Diode Circuits:** Diode Resistance, Diode equivalent circuits, Transition and diffusion capacitance, Reverse recovery time, Load line analysis, Rectifiers, Clippers and clampers.

**Transistor Biasing**: Operating point, Fixed bias circuits, Emitter stabilized biased circuits, Voltage divider biased, DC bias with voltage feedback, Design operations, Transistor switching networks, and stability factor derivation for fixed bias configuration only

**Text 1**: **Ch 1:1.8 to 1.11, 2.1,2,2, 2.6,2.7, 2.8,2.9, Ch4: 4.1 to 4.6, 4.8, 4.9 4.11, 4.12 9Hrs**

**UNIT II**

**Transistor at Low Frequencies:** Amplification in AC domain, BJT transistor modeling, re model( CB,CE configuration), Hybrid equivalent model, Hybrid Π model, CE Fixed bias configuration, Voltage divider bias, Emitter follower, CB configuration, Collector feedback configuration.(Derivation of Zi,Z0,Av,Ai for the configurations)

**Transistor Frequency Response**: General frequency considerations, low frequency response-BJT amplifier, Miller effect capacitance, High frequency response of BJT amplifier

**Text 1**: **Ch5: 5.1 to 5.4, 5.5 to 5.14 , Ch9: 9.4, 9.6, 9.8, 9.9**

**9Hrs**

## UNIT III

**General Amplifiers**: Cascade connections, Cascade connections, Darlington connections.

**Feedback Amplifier:** Feedback concept, Feedback connections type, Practical feedback circuits.

**Text 1: Ch 5.19 ,5.20, Ch 14.1 to 14.3**

**9Hrs**

## UNIT IV

**Power Amplifiers**: Definitions and amplifier types, series fed class A amplifier, Transformer coupled Class A amplifiers, Class B amplifier operations, Class B amplifier circuits, Amplifier distortions.

**Oscillators:** Oscillator operation, Phase shift Oscillator, Wien bridge Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (Derivation of Frequency excluded)

**Text 1: Ch 12.1 to12.9, Ch 14.5 to 14.9** ***(BJT version only)***

**9Hrs**

## UNIT V

**FET Amplifiers:** FET small signal model, Biasing of FET, Common drain common gate configurations, MOSFETs.

**Text 1: Ch 8**

**9Hrs**

**Text Book:**

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI/Pearson Education, 9th Edition.

**Reference Books:**

1. Jacob Millman & Christos C. Halkias, "Integrated Electronics", Tata -McGraw Hill, 1991
2. David A. Bell, "Electronic Devices and Circuits", PHI, 4th Edition, 2004

# DIGITAL ELECTRONICS

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Digital Electronics | ***Course Code*****:** 10EC33 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PRE-REQUISITES:**

- **A Fundamental course on Physics at the plus 2 level**

**COURSE OUTCOMES**

- Students will be able to understand the fundamental principles behind the practical design methodologies of digital circuits
- Get to know the different design techniques available for the simplification of different Boolean expressions

- Students will learn about combinational logic circuits, sequential logic circuits and various types of memories.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

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**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | c | d | e | f | g | h | i | j | k |
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| | CO1 | M | S | M | | M | | | | | | |
| | CO2 | M | S | M | | M | | | | | | |
| | CO3 | S | S | | | M | | | | | | |

## UNIT - I

**Number Systems, Arithmetic and Codes:** Positional Number Systems, Counting in a positional Number system, Basic Arithmetic operations, Polynomial method of number conversion, Iterative method of number conversion, Special conversion procedures, signed number and components, addition and subtraction with r's and (r-1)'s complement methods.

**Boolean algebra and Combinational Networks:**

Definition of Boolean algebra, Boolean algebra theorem, A two-valued Boolean algebra, Boolean formulas and functions, canonical forms, Manipulation of Boolean formulae, Gates and combinational networks, Incomplete Boolean functions and Don't care conditions, Additional Boolean operations and gates.

**Text1: Ch 2. 2.1 to 2.9, Ch 3. 3.1 to 3.9 9 Hrs**

## UNIT - II

**Simplification of Boolean expressions**: Formulation of the simplification problem, Prime implicants and irredundant disjoint expressions, Prime implicants and irredundant conjugate expressions, Karnaugh Maps, Using K-Maps to obtain minimal expressions for complete Boolean functions, Minimal expressions of incomplete Boolean functions, Five-Variable and Six-variable K-Maps.Quine Mc-clusky method of generating prime implicants.MEV Techniques.

**Text1: Ch 4.1, 4.8, 4.14 9 Hrs**

## UNIT - III

**Logic Design with MSI components and programmable logic devices:** Binary adders and subtractors, Decimal adders, comparators, Decoders, Encoders, Multiplexers, PLDs, PROMs, PLAs, PAL devices.

**Text1: Ch 5. 5.1 to 5.10 9hrs**

## UNIT - IV

**Flip-Flops and simple flip-flop applications:** The basic bistable element, Latches, timing considerations, Master-Slave Flip-flops, Edge triggered Flip-Flops, Characteristic Equations, Registers, counters, Design of Synchronous counters.

**Text1: Ch 6. 6.1 to 6.9**

**9 Hrs**

## UNIT - V

**Synchronous Sequential Networks:** Structure and operation of clocked clocked synchronous sequential networks, Analysis of clocked synchronous sequential networks, Modeling clocked synchronous sequential network's behavior, State table reduction, State assignment, completing the design of clocked synchronous sequential networks.

**Text1: Ch 7** **9 Hrs**

**Text Books:**


1. Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill, 2002.


**References:**


1. John M. Yarbrough, "Digital Logic Applications and Design", Thomson Books, 2007
2. Thomas L. Floyd, "Digital Fundamentals", Universal Book Stall, 3rd Edition, 2002.
3. Ronald J. Tocci and Neal S. Widmer, "Digital Systems Principles and Applications", Pearson Education, 2002.

# NETWORK ANALYSIS

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Network Analysis | ***Course Code*****:** 10EC34 |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

Students should know to solve simple algebraic equation and strong knowledge on mathematics is required which includes integration, differentiation, matrix multiplication and addition also**.**

**COURSE OUTCOMES**

- After studying the network analysis students will be able to solve problems related to networks.
- Students will be in a position to simplify the complex circuits
- Students will be able to analyze simple DC circuits and plot the steady state and transient responses.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.

- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | S | S | W | M | | | | | | | |
| | CO2 | S | M | S | | | M | | | | | |
| | CO3 | M | S | W | M | | | | | | | |

## UNIT I

**Basic circuit analysis concepts**: Circuit components, Sources of electrical energy, Standard input signal, Kirchoff's Laws, Source transformation, Mesh analysis, Node analysis, Network equations for RLC circuits.

**Text1: Ch 1, Ch 2** **9 Hrs**

## UNIT II

**Graph Theory and Network equations**: Graph of a network, Trees, Co-trees and Loops, Incidence Matrix, Cut-set Matrix, Tie-se Matrix and loop currents, Number of possible trees of a graph, Analysis of networks, Duality.

**Text1: Ch 3** **9 Hrs**

## UNIT III

**Laplace transform and it's applications**: Laplace transformation, Basic theorems, gate function, impulse function, Laplace transform of periodic functions, Solution of linear differential equation, Heaviside's partial fraction expansion, Solution of network problems.

**Text1: Ch 5, Ch 6**

**9 Hrs**

## UNIT IV

**Network Theorems**: Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Millman's theorem, Maximum power transfer theorem, substitution theorem, compensation theorem.

**Text1: Ch 7**

**9Hrs**

## UNIT V

**Two port Network**: Characterization of linear time invariant two port network, open circuit impedance parameter, short circuit admittance parameter, transmission parameter, inverse transmission parameter, hybrid parameter, inverse hybrid parameter, relationship between parameters, Two-port symmetry, input impedance in terms of two-port parameters, output impedance, Transistor as two-port active network.

**Text1: Ch 8, Ch 10**

**9 Hrs**

**Text books:**

1. D. Roy Choudhury, “Networks and Systems”, New Age International (P) Ltd, 1988

**Reference books:**

1. Van Valkenburg M. E. “Nework Analysis”, Prentice Hall of India Pvt Ltd. 3rd Edition, 2002
2. Joseph Edminister, Mahamood Nahvi, “Electric Circuits”, Schaum’s outlines, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2000.
3. Franklin F. Kuo, “Network Analysis and Synthesis”,. John Wiley and Sons 2nd Edition, 2002

## SIGNALS AND SYSTEMS

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Signals and systems | ***Course Code*****:** 10EC35 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

- A fundamental course on mathematics at least at plus two level is necessary.

**COURSE OUTCOMES:**

- Students should be able to understand the role of signals and systems in Electronic and Communication circuits
- Students will be able to understand signal characteristics and signal representation techniques
- Students will be able to understand the differences between continuous and discrete time signals and differential and difference equations
- Students will be able to understand the Fourier, Laplace and Z-transforms and the use of these in signals and systems analysis

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | M | S | S | S | | M | | | M | | |
| | CO | M | M | S | M | | | | | S | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2** | | | | | | | | | | |
| | **CO 3** | M | W | M | W | | | | | M | |
| | **CO 4** | M | S | M | S | | | | | | |

**UNIT - I**

**Introduction to signals and systems:** Definitions of signals and systems and examples.

**Mathematical description of signals:** Continuous time and discrete time functions, Continuous time and discrete time signals, Functions and combinations of functions, Continuous time scaling and Shifting transformations, Differentiation and Integration, Continuous time even and odd functions, Continuous time Periodic functions, Discrete time signal functions, Discrete time scaling and shifting, Differencing and Accumulation, Discrete time even and odd functions, Discrete time periodic functions, Signal energy and power. **Text1: Ch 1, Ch 2** **9 Hrs**

**UNIT - II**

**Description and analysis of systems:** System characteristics, Eigen functions of LTI systems and Analysis, Convolution sum, Convolution integral, Block diagram representation of difference and differential equations.

**Text1: Ch 3** **9 Hrs**

**UNIT - III**

**Fourier representation of signals: Fourier series:** Continuous time Fourier series(CTFS) , Calculation of CTFS, Properties of continuous time Fourier series(CTFS), Discrete time Fourier series (DTFS), Properties of DTFS .

**Fourier transform:** Continuous time Fourier transform (CTFT), Convergence and generalized Fourier Transform , Comparison CTFS and CTFT, Properties of CTFT, Discrete time Fourier Transform (DTFT), Convergence of DTFT, 7.Properties of DTFT, Relation among Fourier methods.

**Text1: Ch 4. 4.1 to 4.4, 4.8, 4.9 Ch 5 9 Hrs**

**UNIT - IV**

**Sampling:** Sampling methods, representing a continuous-Time signal by samples, sampling discrete-time signals, band limited periodic signals.

**Correlation, Energy spectral Density and power spectral density:**

Correlation and the correlogram, The correlation function, Autocorrelation, Cross correlation, Correlation and the Fourier series, Energy spectral density[ESD], power spectral density[PSD].

**Text1: Ch 7. 7.1 to 7.5, Ch 8. 8.1 to 8.8 9Hrs**

**UNITV**

**Z-Transform:**Development of the z-Transform, Properties of z-Transform, The inverse z-Transform, Solution of Difference equations with initial conditions, Relationship between z and Laplace Transform, the bilateral z-Transform

**Analysis of signals and systems:** Transfer functions, system stability, parallel, cascade and feedback connections, system responses to standard signals, pole zero diagrams and graphical calculation of frequency.

**Text1: Ch 11, Ch 12.12.1 to 12.6 9Hrs**

**Text Books:**

1. Michael J. Roberts, “Signals and Systems - Analysis using transform methods and MATLAB”, Tata McGraw-Hill , 1st Edition, 2003.

**Reference Books :**

1. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, “Signals and Systems”, Pearson Education Asia / PHI, 2nd edition, 2002.
2. H. P Hsu, R. Ranjan, “Scham’s outlines of Signals and Systems”, TMH, 2006.
3. B. P. Lathi, “Linear Systems and Signals”, Oxford University Press, 2005.
4. Simon Haykin and Barry Van Veen, “Signals and Systems”, John Wiley & Sons, 2002

# MICROPROCESSOR

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Microprocessor | ***Course Code*****:** 10EC36 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

Students are expected to have the following topical knowledge upon entering this course:

- Sufficient knowledge of various digital blocks like registers, flip flops, etc…
- Ability to write algorithms for a particular task.

**Course Outcomes:**

- Students will be able to learn working of various processors and their applications.
- Students will be able to write programs and execute them
- Students will learn to interface processors with pheripherals

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Average of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | | | | | | | | | | S | |
| | CO2 | M | S | S | M | | | | | M | | |
| | CO3 | | M | S | S | S | | | | | | |

UNIT –I

Introduction, microprocessor based computer system, Architecture of 8086 Microprocessor, pin functions, Clock generator, Minimum/Maximum mode of operation.

**8 hrs**

UNIT –II

Read/Write Timing diagrams, 8086 instruction set, Instruction template for data transfer instruction, addressing modes. Assembler Directives, Programming examples.

**8 hrs**

UNIT –III

Linking and Relocation, Stacks, Procedures, Interrupt and Interrupt routines, Macros.DOS interrupt 21H function to read a character from keyboard, write character to console, creation of a new file, read/write from/to file. Serial/parallel communication.

**7hrs**

UNIT –IV

Interfacing devices, memory devices and interfacing.. 8255PPI device and interfacing, Keyboard, Display, ADC,DAC, stepper motor using 8255

**7 hrs**

UNIT –V

8259 programmable interrupt controller and interfacing.8253 and interfacing, 8279 Programmable keyboard display controller and interfacing.

**5 hrs**

**TEXT BOOKS**:

1 **Advanced Microprocessor and Peripherals**-A.K Ray and K.M.Bhurchandi, Tata McGraw Hill.

2 **Microcomputer systems 8086/8088 family, Architecture, Programming and design-**Yu-Cheng Liu & Glenn A Gibson,2nd Edition- July 2003, Prentice Hall of India.

**REFERENCE BOOKS:**

1. **Microprocessor and Interfacing, programming & Hardware**-Douglas V Hall,2nd Edition, Tata McGraw Hill
2. **Microprocessor Architecture, Programming and Applications with the 8085-** Ramesh S Gaonkar,4th edition,Penram International.

# ANALOG ELECTRONICS AND PSPICE LAB

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Analog electronics circuits lab | ***Course Code*****:** 10ECL37 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 03hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES :**

- Structure and operation of bipolar junction transistors, junction field-effect transistors, metal-oxide-semiconductor diodes and transistors. Analysis of dc and ac characteristics..

**COURSE OUTCOMES**

- Student will learn about Analog Electronics related circuits.
- Students will be able to design analog circuits using KVL and KCL theorem.
- Students will get placement opportunities in core Electronic companies within the country and also abroad.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | C | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | S | M | M | W | | M | | | | | M |
| | CO2 | S | S | S | W | | | | | | | M |
| | CO3 | S | S | S | W | M | M | | | | | M |

## LIST OF EXPIREMENTS

1. Half wave, Full wave and Bridge Rectifier circuits with and without Capacitor filter. Determination of ripple factor, regulation and efficiency.
2. RC coupled Single stage BJT amplifier. Determination of the gain- frequency response, input and output impedances.
3. BJT-RC Phase shift Oscillator and BJT – Hartley / Colpitts Oscillators
4. Clipping circuits using diodes
5. Clamping circuits: positive clamping /negative clamping.
6. Operational amplifier applications:
    a. Inverting and Non inverting amplifier
    b. Adder and Subtractor
    c. Voltage follower
    d. Comparator
    e. Differentiator and integrator
7. Experiment 1-6 using Pspice

# DIGITAL ELECTRONICS +MICROPROCESSOR LAB

**Semester:** III **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** DE+MP lab | ***Course Code*****:** 10ECL38 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 03hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

## PRE-REQUISITES:

- **A Fundamental course on Physics at the plus 2 level**

## COURSE OUTCOMES

- students will be able to design and conduct experiments on digital circuits
- Students will get to know the different design techniques available for the simplification of different Boolean expressions.
- Apply systematic design approach for application specific integrated circuits.

**LIST OF THE EXPIREMENTS**

## PART --I

1. Realization of Half/Full adder and Half/Full Subtractors using logic gates.
2. Realization of parallel adder/Subtractors using 7483 chip.
3. BCD to Excess-3/ Binary to Gray code conversion and vice versa.
4. MUX/DEMUX – use of 74153, 74139 for arithmetic circuits and code converter.
5. Realization of 3 bit counters as a sequential circuit and MOD – N counter design (7476, 7490)
6. Wiring and testing Ring counter/Johnson counter.
7. Wiring and testing of Sequence generator.

**PART –II**

**Programs involving**

1)Programs involving data transfer instructions like:

i)Byte and word transfer in different addressing modes.

ii)Block move (with and without overlapping)

iii)Block interchange.

2)Programs involving arithmetic and Logical operations like:

i)Addition and Subtraction Multiplication and division of signed and unsigned hexadecimal nos

ii)program to find square, cube ,lcm, factorial.

3)Programs involving Bit manipulation instructions like checking

i)If given data is positive and negative

ii)If data is odd or even.

4) Programs involving branch or loop instructions like

i) Programs on arrays addition /subtraction of N no's ,finding largest/smallest

no, ascending/descending order etc.

5) Programs on string manipulations like string transfer, string reversing, searching character in a

String, palindrome etc.

6) Programs on DOS Interrupt INT 21H Function call for:

Reading a character from keyboard, buffered keyboard input, display character /string on
Console, creation of new file, read/write from file.

7) Experiment on interfacing 8086 with logic controller Interface.

# SYLLABUS FOR IVth SEMESTER

## ENGINEERING MATHEMATICS – IV

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course ENGINEERING MATHEMATICS – IV*** | ***Course Code*: *MAT41*** |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*:** 45hrs | ***Duration of SEE*:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*:** 50 |

### COURSE OUTCOMES

- The students understands the concept of random process, stochastic process, sampling and analysis of given data.
- Students will be able to analyze Random Sampling, Testing Hypothesis, and Level of significance. Confidence limits: Sampling

- Students will get to know about the different type of distributions namely Binomial distribution, Poisson distribution.
- Students can analyze series solution of differential equations and special functions.
-

**PREREQUISITES**

Students are expected to have the basic knowledge of differentiation and integration

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class.

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Average of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Course Project

  Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

$z + \frac{a}{z}$

**Complex analysis:** Functions of complex variables, Definitions of limit, Continuity and differentiability, Analytic function, C-R equations in polar and Cartesian forms, Construction of analytic functions, Conformal mapping, mapping of the form , , , Bilinear transformation, Complex integration, Cauchy's theorem, Consequences, Cauchy's integral formula, Taylor's and Laurent's series, Singularities, Poles residue, Residue theorem.

**Text1: Ch 20. 20.4 to 20.6, 20.8, 20.10, 20.12 to 20.14, 20.16 to 20.20 9 Hrs**

## UNIT-II

**Series solution of differential equations and special functions:** Frobineous method, Bessel's equation, Bessel's function, Orthogonality property, Legendre's equation, Rodrigue's formula, Legendre polynomials, Orthogonality.

**Text1: Ch 16. 16.2, 16.6 to 16.11, 16.13 to 16.16.17**

**9Hrs**

## UNIT- III

$y = ae^{bx}$

**Statistics:** Curve fitting by least square method y =ax+b,, .Correlation, Regression, Lines of regression.

**Probability:** Axiomatic definition, Addition rule, Independent events, Multiplication rule, Conditional probability, Baye's theorem. Random Variables, Discrete and Continuous random variables, Probability distribution. Joint Probability distribution for continuous random variables.

**Text1: Ch 23. 23.9 to 23.11, Ch 1.12 to 1.14**

**9Hrs**

## UNIT-IV

**Theoretical distributions:** Binomial distribution, Poisson distribution, Exponential distribution and Normal distribution.

**Text2: Ch 3.3.1 to 3.3, Ch 4.4.1 to 4.5, Ch 5. 5.1 to 5.11 9Hrs**

**Random Sampling, Testing Hypothesis, Level of significance. Confidence limits:** Sampling distribution of means and test of significance for mean of two samples. T-distribution, significance test for sample mean chi-square test for goodness of fit.

**Text 2: Ch 6. 6.1 to 6.4, Ch 7. 7.1 to 7.6**

**9hrs**

## UNIT-V

**Markov process:** Introduction, probability vector and stochastic matrices, Transition matrix of a Markov process, State distribution, Regular Markov process and stationary state distributions.

Simulation and Monte Carlo method of generating random numbers.

**Text 2: Appendix B**

**9Hrs**

**Text Books:**


1. B S Grewal, **"**Higher Engineering Mathematics", Khanna Publication, 36th edition-2002
2. Seymour Lipschutz, "Schaum outline of Probability", Publisher McGraw Hill, 2nd Edition, 2002.


**Reference Books:**


1. Erwin E Kreyszig **"**Advanced Engineering. Mathematics", Wiley. 8th Edition,1999
2. Jay L Devore, "Probability and Statistics for Engineering and Science", Thomson Dunbury Publication, 5th Edition , 2002
3. Allen Jaffrey, "Advanced Engineering Mathematics", Academic press 2003

# LINEAR INTEGRATED CIRCUITS

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Linear Integrated Circuits | ***Course Code*****:** 10EC42 |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- Students should have basic knowledge of Network Analysis and must be able to analyze simple circuits.
- Knowledge of Feedback Concepts, Differential Amplifier
- Students should be able to solve Linear, Differential Equations and Laplace Transform.

**Course Outcomes:**

Upon completion of the subject, students will be able to:

- Design Linear integrated circuits.
- Select OPAMPs for particular applications and know how to calculate the values of components that must be connected externally.
- Apply systematic design approach for application specific Linear integrated circuits

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class.

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Average of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Course Project
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Introduction to operational amplifiers:** Operational amplifier description, basic operational amplifier circuit, OPAMP 741 IC, Voltage follower circuit, non inverting amplifier, inverting amplifier.

**Operational Amplifier parameters:** Input and Output voltage, common mode and supply rejection, Offset voltages and currents, input and output impedances, slew rate and frequency limitations. OPAMP as DC.

**Amplifiers:** Basing OPAMP, Direct coupled voltage follower, Direct coupled non inverting amplifier, Direct coupled inverting amplifier, Summing amplifier, difference amplifier.

**Text1: Ch 1, Ch 2, Ch 3**

**9 Hrs**

## UNIT-II

**OPAMP as AC Amplifier:** Capacitor coupled voltage follower, high Zin, capacitor coupled voltage follower, capacitor coupled non inverting amplifier, high Zin, capacitor coupled non inverting amplifier, capacitor coupled inverting amplifier, setting the upper cut off frequency, capacitor coupled difference amplifier, use of single polarity supply.

**OPAMP's frequency response and compensation:** OPAMP circuit stability, frequency and phase response, frequency compensating methods, OPAMP circuit bandwidth, slew rate effects, stray capacitance effects, load capacitance effects, Zin mod compensation.

**Text1: Ch 4, Ch 5.5.1-5.9.**

**9 Hrs**

## UNIT- III

**Miscellaneous OPAMP linear applications:** Voltage sources, current sources and current sinks, current amplifiers, instrumentation amplifier.

**Signal processing circuits:** Precision half wave rectifiers, precision full wave rectifiers limiting circuits, clamping circuits, peak detectors, sample and hold circuit .

**Text1: Ch 6. 6.1- 6.4, 6.8, Ch 7, Ch** *8.*

**9 Hrs**

**UNIT-IV**

**OPAMP Applications:** Basic OPAMP applications, V to I and I to V converter, OPAMP circuits using diodes, Log and antilog amplifier, Multiplier and divider, differentiator, Integrator.

**OPAMP nonlinear circuits:** OPAMP in switching circuits, crossing detectors inverting Schmitt trigger circuit, non inverting Schmitt circuits, astable multivibrator, mono stable multivibrator.

**Signal generators:** Triangular/rectangular wave generator, wave form generator design, phase shift oscillator, Wein bridge oscillator,

**Text1: Ch 9, Ch 10. 10.1 to 10.3, 10.5,**

**Text2: Ch 4. 4.1, 4.2, 4.5, 4.6, 4.8-4.11.**

**9 Hrs**

**UNIT-V**

**Voltage regulators**: Series OPAMP regulators, IC voltage regulators

**Active filters:** First order active low pass active filter, second order low pass filter, first order high pass filter, second order high pass filter, Band pass filter, Band stop filter.

**555 Timer:** Monostable and Astable operations, Schmitt Trigger.

**PLL:** Basic principles, Phase Detector/Comparator, VCO, Low Pass Filter, PLL Applications.

**D to A and A to D converters:** Basic DAC techniques, AD converters, Weighted resistor DAC, R-2R ladder DAC Problems, AD converter, parallel comparator A/D converter, Successive approximation ADC.

**Text2: Ch. 6. 6.2, 6.3, Ch 7.7.1, 7.3, Ch 8 (Excluding Applications), Ch 9, Ch 10**

**9 Hrs**

**Text Books:**


1. David A. Bell," Operational Amplifiers and Linear IC's", PHI, 2nd edition, 2004.
2. D. Roy Choudhury and Shail B. Jain "Linear Integrated Circuits", New Age International, 2nd edition, 2006.


**Reference Books:**

1. Ramakant A. Gayakwad, "Op - Amps and Linear Integrated Circuits", PHI, 4th edition, 1999.
2. Robert. F. Coughlin and Fred. F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI, Pearson, 2006.
3. James M. Fiore, "Op-Amps and Linear Integrated Circuits", Thomson Learning, 2001.
4. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", TMH, 3rd Edition, 2005.
5. Kannan Kano, "Semiconductor devices", Pearson Education, 2004.

## DIGITAL SIGNAL PROCESSING

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Digital Signal Processing | ***Course Code*****:** 10EC43 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- Students should have knowledge of signals and Systems.
- Knowledge of differentiation and Integration and other mathematical concepts.

**Course Outcomes:**

- Student will be able to analyze and solve real world problem by applying appropriate algorithm.
- Students will be able to understand the DSP concepts and its applications.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Assignment/course project based test. 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Discrete Fourier Transforms (DFT)**: Frequency domain sampling and reconstruction of discrete time signals. The Discrete Fourier Transform (DFT). DFT as a linear transformation. Properties of DFT. Multiplication of two DFTs- the circular convolution, additional DFT properties, use of DFT in linear filtering, overlap-save and overlap-add method.

*Text1: Ch 5. 5.1.1, 5.1.2, 5.1.3, 5.2 to 5.3* **9Hrs**

## UNIT-II

**Fast-Fourier-Transform (FFT) algorithms**: Direct computation of DFT, need for efficient computation of the DFT (FFT algorithms).Radix- 2 FFT algorithms, for the

computation of DFT and IDFT. Decimation in time and Decimation in frequency FFT algorithms. Applications of FFT Algorithms. Goertzel algorithm and Chirp Z algorithm.

*Text1: Ch 6. 6.1.1, 6.1.3, 6.2, 6.3.1, 6.3.2* **9Hrs**

**UNIT– III**

**FIR filter design**: Introduction to FIR filters. Properties of FIR digital filters. Design of Linear FIR filters using - Rectangular, Hanning, Hamming, Blackmann, Bartlett and Kaiser Windows, Linear phase FIR filter design using frequency sampling and Equiripple filter design. Design of FIR Differentiators. Design of Hilbert Transformers.

*Text1: Ch 8. 8.2.1 to 8.2.6* **9 Hrs**

**UNIT – IV**

**IIR filter design:** Characteristics of commonly used IIR filters (Butterworth and Chebyshev). Design of IIR filters from analog filters (Butterworth and Chebyshev) - impulse invariance method. Mapping of transfer functions. Approximation of derivative and bilinear transformation method, Matched z transforms, Verification for stability and linearity during mapping.

*Text1: Ch 8.8.3.1 to 8.3.6* **9Hrs**

**UNIT-V**

**Implementation of discrete-time systems**: Basic IIR Filter Structures: Direct Form I and II, Cascade and Parallel Structure. Signal flow graph and Transposed structure. Basic FIR Filter Structure: Direct Form, Cascade structure. Lattice and Frequency Sampling Structure.

*Text1: Ch.7.2, 7.3. 7.3.1 to 7.3.4* **9Hrs**

**Text Books:**

1. Proakis & Monalakis, "Digital signal processing – Principles Algorithms & Applications", Pearson education, 3rd Edition, 2003

**Reference Books**:

1) Oppenheim & Schaffer, "Discrete Time Signal Processing", PHI, 2003

S. K. Mitra, "Digital Signal Processing", Tata Mc-Graw Hill, 2nd Edition, 2

# FIELDS AND WAVES

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Field and Waves | ***Course Code*****:** 10EC44 |
| ***L-T-P:*** 3-2-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

Complex vectors, Maxwell's equations, Uniform plane waves, Wave reflection and transmission at interfaces, Waveguides and resonators, Transmission line principles. Topics in waves

**COURSE OUTCOMES**:

- Students will able to apply Maxwell's equations to stationary and time-harmonic fields.
- Students will be able to characterize uniform plane waves in free space and different types of media.
- Students will be able to solve problems of wave reflection and transmission at interfaces. The concepts of propagation of guided waves, power flow by poynting's theorem and applications.
- Students will be competent enough to learn subjects like antennas, microwave engineering, radar systems and wireless communication. Research activities can be pursued with knowledge.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Vector Analysis:** Scalars & vectors, Vector Algebra, the Cartesian coordinate system, vector components & unit vectors, vector field, Dot product & cross product, circular coordinate system, cylindrical coordinate system, spherical coordinate system.

**Coulomb's Law and Electric Field Intensity:** The Experimental law of Coulomb, Electric Field Intensity, and Field due to continuous Volume charge distribution, Field of a line charge, field of a sheet charge.

**Electric Flux density, Gauss's Law & Divergence:** Electric Flux density, Gauss Law, Applications of Gauss' Law: Differential Volume Element, Divergence, Maxwell's First Equation (Electrostatics),The vector operator DEL and Divergence Theorem.

**Text 1: Ch 1.1, 1.2,1.3,1.4,1.5,1.6,1.71.8,1.9, Ch 2.2.1 to 2.5, Ch 3.3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7**

**9 hrs**

## UNIT II

**Energy and Potential:** Energy & potential in a moving point charge in an Electric Field, The Line Integral, |Definition of potential difference & potential, The potential field of a point charge, The potential field of a system of charges: conservative property, Potential Gradient, The Dipole, Energy density in the Electric Field.

**Conductors, Dielectrics and Potential:** Current & current density, continuity of current, metallic conductors, conductor properties & boundary conditions. The method of images, Semiconductors, Nature of Dielectric materials, Boundary conditions for perfect

dielectric materials, Capacitance, several capacitance examples, capacitance of a two wire line.

**Poisson's and Laplace Equations:** Poisson's & Laplace Equations, Uniqueness theorem, Examples of the solutions of Laplace's equation & Poisson's equation.

**Text 1: Ch 4. 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, Ch 5. 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, Ch 7- 7.1, 7.2, 7.3, 7.4**

**9Hrs**

**UNIT III**

**The Steady Magnetic Field:** Biot-Savart Law, Ampere's Circuital Law,Curl,Stokes' Theorem, Magnetic Flux & Magnetic Flux density, The Scalar & Vector magnetic potentials, Derivation of steady magnetic field Laws.

**Magnetic Forces:** Force on a moving charge, Force on a Differential current element, Force between differential Current elements, Force & Torque on a closed circuit.

**Text 1: Ch 8. 8.1 , 8.2, 8.3, 8.4, 8.5, 8.6, Ch 9. 9.1, 9.2, 9.3, 9.4**

**9hrs**

**UNIT IV**

**Time- varying fields & Maxwell's Equations:** Faraday's Law, Displacement current, Maxwell's equations in point form, Maxwell's equations in Integral form, The Retarded potentials.

**Text-1: Ch 10. 10.1, 10.2, 10.3, 10.4, 10.5**

**9hrs**

**UNIT V**

**The Uniform Plane wave:** Wave propagation in Free space, Wave propagation in Dielectrics, The Poynting vector & power considerations, Propagation in good conductors: Skin Effect, Wave polarization.

**Plane waves at Boundaries:** Reflection of uniform plane waves at normal Incidence, Standing wave ratio, Wave reflection from multiple interfaces, Plane wave propagation in general Directions. **Text-1: Ch 12. 12.1, 12.2, 12.3, 12.4, 12.5, Ch 13. 13.1, 13.2, 13.3,**

**13.4**

**9hrs**

**Text Books:**

1. William H Hayt Jr. and John A Buck,"Engineering Electromagnetics", Tata McGraw-Hill, 6th Edition 2001.

**Reference Books:**

1. John Kraus, "Electromagnetics with Applications", Tata Mc-Graw Hill, 5th Edition 1999.
2. Edward C. Jordan, "Electromagnetic waves & Radiating systems", Prentice –Hall of India / Pearson education, 2nd edition, 1968.

Mathew N.O. Sadiku, "Elements of Electromagnetics", 3rd edition, Oxford University press,
2000.

## DIGITAL SYSTEM DESIGN USING VERILOG

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Digital System Design using Verilog | ***Course Code*****:** 10EC45 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

A knowledge of digital design is useful to take the full benefit of this course, however no hardware description language knowledge is necessary

**COURSE OUTCOMES**

1. Student will learn about fundamentals of HDL Programming.
2. They would study the theoretical aspects of hardware programming. With this knowledge they will be able to understand the FPGA programming concepts.
3. This knowledge will give the students to get placement opportunities in core VLSI companies within the country and also abroad.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

## UNIT-I

**Introduction:** What is verilog HDL? Major capabilities, A module.

**Language Elements:** Identifiers, comments, format, system task and function, compiler directives, value set, data types, parameters, operands, operators, kinds of expression.

**Text 1:Ch 1,2,3,4** **9 Hrs**

## UNIT-II

**Gate level modeling and user defined primitives:** The built in primitive gates, multiple input gates, multiple output gates, tristate gates, pull gates, MOS switches, bidirectional switches, gate delays, an array of instances, implicit nets, A simple example, two to four decoder, master slave flip-flop, parity circuit, Defining a UDP, combinational UDP, sequential UDP, example.

**Text 1: Ch 5, Ch 6** **9Hrs**

## UNIT - III

**Data Flow and behavioral modeling:** Continuous assignment and example, net declaration assignment, delays, net delays, examples: Master slave flip flop, magnitude comparator, Procedural constructs, timing control, block statement, procedural assignment, conditional statement, case statement, loop statement, procedural continuous assignment, Handshake example.

**Text 1: Ch 7, Ch 8**

**9Hrs**

## UNIT -IV

**Structural Modeling and other topics:** Module, ports, model instantiation, external ports, example, tasks, functions

**Text 1: Ch 9, Ch10**

**9Hrs**

## UNIT V

**Modeling Examples:** Modeling simple elements, different styling of modeling, modeling delays, modeling conditional operations, modeling synchronous logic, generic shift register, state machine modeling, interacting state machines, modeling a Moore FSM, modeling a Mealy FSM.

**Text 1: Ch 12.**

**9 Hrs**

**Text Books:**

1. J. Bhasker," A verilog HDL Primer" BS Publications ,2nd Edition.

**Reference Books**:

1. Stephen Brown, Zvonko Vransic," Fundamentals of digital logic with verilog Design", TMH 2nd Edition.
2. Nazeih M.Botros, "HDL Programming (VHDL & Verilog)", John Weily - India & Thomson Learning, 2006

# MICROCONTROLLER

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Microcontroller | ***Course Code*****:** 10EC46 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

Programming experience with C and assembly is strongly recommended

**COURSE OUTCOME**

1. Upon completion of this course, students will understand the architecture of the 8051 microcontroller.

2. Students will be able to write programs, and embed the code in flash memory for stand-alone system for embedded system designs.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Microprocessor and Microcontroller:** Introduction, Microprocessor and Microcontrollers, RISC & CISC CPU Architectures, Harvard and Von – Neumann CPU architecture.

**The 8051 Architecture:** Introduction, 8051 Microcontroller hardware, input / output pins, Ports and circuits, External Memory.

**Addressing Modes and Operations:** Introduction, Addressing modes, External data moves, Code Memory, Read only data moves/ Indexed addressing mode, PUSH and POP Opcodes, Data Exchanges, Example Programs.

*Text 3: Ch1. 1.0 to 1.1, Text 3: Ch3. 3.0 to 3.3, Text 3. Ch 5*

**9Hrs**

## UNIT-II

**Logical and Arithmetic:** Byte level logical operations, Bit level logical operations, Rotate and swap operations, Example Programs. Arithmetic operations: Flags, Incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic, Example Programs.

**Jump and Call Instructions:** The jump and call Program range, jumps, calls and subroutines. Example Problems.

*Text3: Ch 6, Ch7, Ch* 8

**9 Hrs**

## UNIT -III

**8051 Programming in C:** Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space, data serialization.

**Timer / Counter Programming in 8051:** Programming 8051 Timers, Counter Programming timers 0 and 1 in 8051 C

*Text 2: Ch 7, Ch 9* **9 Hrs**

**UNIT IV**

**8051 Serial Communication:** Basics of serial Communication, 8051 connections to RS 232, 8051 serial communication Programming, Programming the second serial port, Serial programming in C.

**Interrupts Programming:** 8051 Interrupts, Programming timer interrupts, programming external hardware interrupts, Programming the serial communication interrupts, Interrupts priority in the 8051/52, Interrupt programming in C

*Text 2: Ch 10, Ch 11*

**9Hrs**

**UNIT V**

**8051 Interfacing and Applications:** Interfacing 8051 to LCD, keyboard parallel and serial ADC, DAC, stepper motor interfacing, DC motor interfacing and PWM

*Text 2: Ch 12, Ch 13, Ch 17*

**9 Hrs**

**Text Books:**


1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, "The 8051 Microcontroller and embedded systems – using assembly and C", Prentice Hall India, Pearson, 2006
2. Kenneth Ayala, "The 8051 Microcontroller", Thomson Delmar Learning, 3rd Edition


**Reference Books**:


1. Predko,"Programming and customizing the 8051 micro controller", Tata McGraw Hill
2. Frank Vahid & Tony Givargis, "Embedded System design", John Wiley, 2002.
3. Michael J. Pont, "Embedded C", Pearson Education, 2002.

# DSD USING VERILOG LAB

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** DSD using verilog lab | ***Course Code*****:** 10ECL47 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 03hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

A knowledge of digital design is useful to take the full benefit of this course, however no hardware description language knowledge is necessary

**COURSE OUTCOMES**

- Student will learn about fundamentals of HDL Programming.
- They would study the theoretical aspects of hardware programming. With this knowledge they will be able to understand the FPGA programming concepts.
- This knowledge will give the students to get placement opportunities in core VLSI companies within the country and also abroad.

–

## PROGRAMMING (using VERILOG)

1. Realizing the logic gates using HDL.
2. Realizing the combinational designs using HDL
    a. 2 to 4 decoder

b. 8 to 3 (encoder without priority & with priority)

c. 8 to 1 multiplexer

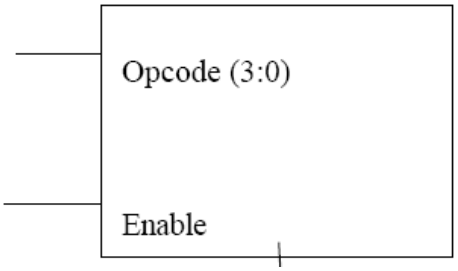
d. 4 bit binary to gray converter

e. Multiplexer, de-multiplexer, comparator.

3. HDL code to describe the functions of a Full Adder Using three Modeling styles.

4. Model for 32 bit ALU using the schematic diagram shown below

A (31:0) B (31:0)




□□ALU should use combinational logic to calculate an output based on the four bit op-code input.

□□ALU should pass the result to the out bus when enable line in high, and tri-state the out bus when the enable line is low.

□□ALU should decode the 4 bit op-code according to the given in example below.

| OPCODE | ALU OPERATION |
|---|---|
| 1. | A + B |
| 2. | A – B |
| 3. | A Complement |
| 4. | A * B |
| 5. | A AND B |
| 6. | A OR B |
| 7. | A NAND B |
| 8. | A XOR B |

5. Develop the following flip-flops, (SR, D, JK, T) using HDL

6. Design of 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset) and "any sequence" counters  download the programs on a FPGA/CPLD boards such as Apex/Acex/Max/Spartan/Sinfi/TK Base or equivalent and performance testing may be

done using 32 channel pattern generator and logic analyzer apart from verification by simulation with tools such as Altera/Modelsim or equivalent.

**Note:** Programming can be done using any compiler. Download the programs on a FPGA/CPLD boards such as Apex/Acex/Max/Spartan/Sinfi/TK Base or equivalent and performance testing may be done using 32 channel pattern generator and logic analyzer apart from verification by simulation with tools such as Altera/Modelsim or equivalent.

## MICRO CONTROLLER LAB

**Semester:** IV **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Microprocessor | ***Course Code*****:** 10ECL48 |
| | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 03hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

Programming experience with C and assembly is strongly recommended

**COURSE OUTCOME**

1. Upon completion of this course, students will understand the architecture of the 8051 microcontroller.
2. Students will be able to write programs, and embed the code in flash memory for stand-alone system for embedded system designs.

**PROGRAMMING**

1. Programming in Assembly level code.
   a. Block Transfer with and with out overlapping.
   b. Exchange of data
   c. Arrange data in Ascending and Descending order
   d. To find the largest number in an array.
   e. To add two 16 bit and 8 bit numbers
   f. To subtract two 16 bit and 8 bit numbers
   g. To multiply two 16 bit and 8 bit numbers
   h. To find the square of two 8 bit numbers
   j. To find the cube of an 8 bit number
   k. To implement mod 16, mod 10 up and down counter.
   l. To logically AND, OR, XOR two 8 bit numbers.

2 .Write a program in ALP for Code conversion

   a. BCD – ASCII
   b. ASCII – Decimal
   c. Decimal – ASCII
   d. Hex – Decimal
   e. Decimal – Hex

**8.** Write a program in ALP for generating delay using Timer.

**9.** Write a program in ALP for transmitting data using serial communication.

**10.** Write a program in ALP using call instruction.

**11.** Write a program in ALP using conditional and unconditional jump instructions.

**INTERFACING**

Programming in C language.

1. Implement simple calculator using 6 digit seven segment display and Hex Key board interface to 8051.
2. Alpha Numeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and temperature control interface to 8051.
4. Generate different waveforms sine, square, triangular, ramp using DAC interface to 8051
5. Stepper and DC motor control interface to 8051.
6. Elevator interface to 8051.
7. Write code to generate different waveforms (Sine, Square, Triangle, Ramp, stair case etc.,) using DAC change the frequency and amplitude.

# SYLLABUS FOR VTH SEMESTER

## CONTROL SYSTEMS

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Control systems | ***Course Code*****:** 10EC51 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

Students should know to solve simple algebraic equation and strong knowledge on mathematics is required which includes integration, differentiation,matrix multiplication and addition and Laplace transformation

**Course Outcomes**

- Students will be able to represent the mathematical model of a system
- Students will be in a position to determine the response of different order systems for various step inputs
- Students will be able to analyze the stability of the system.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT - I

**Modeling of systems:** The control system, Mathematical models of physical systems-Introduction, Differential equations of physical systems – Mechanical systems, Frictions, Translational systems, Rotational Systems, Electrical systems, Analogous systems.

**Block diagrams and signal flow graphs:** Transfer function, Block diagram algebra, Signal Flow graphs.*Text1: Ch 1.1.1, Ch. 2. 2.1, 2.2, 2.4, 2.5, 2.6*

**9 Hrs**

## UNIT – II

**Time Response of feed back control systems:** Standard test signals, Unit step response of first and second order systems, Time response specifications of second order systems, steady state error and error constants.

**Stability analysis:** Concept of stability, necessary conditions for Stability, Routh-stability criterion, Relative stability criterion.

*Text1: Ch 5. 5.1, 5.2, 5.3, 5.4, 5.5, Ch. 6.6.1, 6.2, 6.4, 6.5, 6.6*

**9 Hrs**

**UNIT – III**

**Root-Locus Techniques:** Root locus concepts, Construction of root loci, Stability of System.

*Text1: Ch 7. 7.1, 7.2, 7.3* **9 Hrs**

**UNIT - IV**

**Stability in the frequency domain:** Mathematical preliminaries, Nyquist stability criterion concept. *Text1: Ch 9. 9.1, 9.2, 9.3*

**9 Hrs**

**UNIT V**

**Frequency domain analysis:** Bode Plots, All pass and minimum phase systems, Experimental determination of transfer function, Assessment of relative stability using Bode Plots.

*Text1: Ch 1. 1.1, Ch 2. 2.1, 2.2, 2.4, 2.5, 2.6, Ch 8.8.1, 8.4, 8.5, 8.6*

**9 Hrs**

**Text Books:**

1. J.Nagarath and MGopa1,"Control Systems Engineering", New Age International(p) Limited Publishers, 4th Edition, 2005

**Reference Books:**

1. K.Ogata,"Modem Control Engineering" Pearson .Education Asia *I* PHI, 4th Edition, 2002.
2. M. Gopal,"Control Systems-Principles and Design", TMH, 1999.
3. U.ABakshi and A. V .Bakshi, "Control Systems", Technical Publications Pune, 3rd Edition.
4. K.Channa Venkatesh and D. Ganesh Rao, "Control Systems", Sanguine Technical Publishers.

5. Chi-Tsong Chen, "Analog and Digital Control System Design Transfer-Function, State-Space, and Algebraic Methods", OUP, 2006,

# ANALOG COMMUNICATION

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Analog communication | ***Course Code*****:** 10EC52 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

Understanding of basics of signals and systems, random variables, mean, variance, co-variance, correlation, auto co-relation, Gaussian process.

**COURSE OUTCOME**

- Students will get the foundational education in analog communication system analysis and design.
- Students are provided learning experiences that enable them to analyze and design basic communications systems, particularly with application to noise-free analog.
- Apply concepts and techniques from Fourier analysis and circuit analysis to communication systems.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)

- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT- I

**Introduction to Electronic Communication Systems:** Introduction, power measurements, electronic communication systems modulation and multiplexing, EM spectrum, Bandwidth and information capacity, Noise analysis.

**Random process:** Random variables: Several random variables. Statistical averages: Function of Random variables, moments, , Mean, Correlation and Covariance function: Principles of autocorrelation function, cross –correlation functions. Central limit theorem, Properties of Gaussian process. *Text 1: Ch 4.1-4.6,Ch 8: 8.1,8.2,8.3,8.4,8.5,8.6,8.7,8.8,8.9,8.10,8.11,8.12* **9Hrs**

## UNIT-II

**Amplitude Modulation:** Introduction to AM: Time-Domain description, Frequency – Domain description. Generation of AM wave: square law modulator, switching modulator. Detection of AM waves: square law detector, envelop detector. Double side band suppressed carrier modulation (DSBSC): Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Costas loop. Quadrature carrier multiplexing, Hilbert transform, properties of Hilbert transform, Pre-envelope, Canonical representation of band pass signals.

*Text 1: Ch 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 , Text 2: Ch 7: 7.1,7.2*

**9Hrs**

**UNIT-III**

**Single Side-Band Modulation (SSB):** Single side-band modulation, Frequency-Domain description of SSB wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves.

*Text 2: Ch 7: 7.3, 7.4*

**9Hrs**

**Vestigial Side-Band Modulation ( VSB):** Frequency – Domain description,Generation of VSB modulated wave, Time - Domain description, Envelop detection of VSB wave plus carrier, Comparison of amplitude modulation techniques, Frequency translation, Frequency division multiplexing. Application: Radio broadcasting, AM radio.

*Text 1: Ch 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6*

**9Hrs**

*Text 2: Ch 7: 7.5, 7.6, 7.7, 7.8, 7.9*

**UNIT-IV**

**Angle Modulation (FM):** Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM.

**Demodulation of FM waves:** Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop, Nonlinear effects in FM systems

**9Hrs**

*Text 2: Ch 7: 7.10,7.11,7.12,7.13,7.14.*

**UNIT-V**

**Noise:** Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks.

**Noise in Continuous wave modulation systems:** Introduction, Receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, FM threshold effect, Preemphasis and De-emphasis in FM

*Text 2: Ch 9: 9.1, 9.2 ,*

**9Hrs**

*Text 1: Ch 5: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7*

**TEXT BOOKS:**

1. Simon Haykins, Communication Systems, 3rd Edition, John Willey, 1996.

2. Simon Haykins, An Introduction to Analog and Digital Communication, John Wiley, 2003

**REFERENCE BOOKS:**

1. B.P.Lathi, Modern digital and analog Communication systems 3rd 2005 Oxford university press.

2. Harold P.E, Stern Samy and A Mahmond, Communication Systems, Pearson Edition, 2004

3. Singh and Sapre**:** Communication systems: Analog and digital TMH 2nd , Ed 2007

## MICROWAVE & RADAR

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Microwave and radar | ***Course Code*****:** 10EC53 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |

| | |
|---|---|
| ***Total Contact Hours*:** 45hrs | ***Duration of SEE*:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*:** 50 |

**PREREQUISITES**

Understanding of basics of propagation theory and basics of analog/digital communication system.

**COURSE OUTCOMES**:

- The students will learnt about the working of subsystems using a microwave communication link
- Students will have studied about different devices used for generating signals in microwave frequencies.
- Students will be able to do the link calculation, power budget, noise budgeting and signal noise ratio of a link
- The students will be conversant with the radar cross section calculation, radar range, transmitted/received power and different types of radars

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Microwave transmission lines:** Introduction, transmission lines equations and solutions, reflection and transmission coefficients, standing waves and SWR, line impedance and line admittance. Smith chart, impedance matching using single stubs, Microwave coaxial connectors.

Text 1**:** *Ch 3.3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7*

**9 Hrs**

## UNIT–II

**Microwave waveguides and components:** Introduction, rectangular waveguides, co-axial lines, microwave cavities, microwave hybrid circuits, directional couplers, circulators and isolators.

*Text 1: Ch 4* **.***4.1, 4.2, 4.3, 4.4, 4.5.*

**9 Hrs**

## UNIT–III

**Microwave network theory and passive devices**:. Symmetrical Z and Y parameters, for reciprocal Networks, S matrix representation of multi port networks, Microwave passive devices, coaxial connectors and adapters, Phase shifters, Attenuators, Waveguide Tees, Magic tees.

*Text 3:Ch 3. 3.1, 3.2, 3.3, 3.4* **9**

**Hrs**

## UNIT–IV

**Strip lines:** Introduction, Micro strip lines, Parallel strip lines, Coplanar strip lines, Shielded strip Lines.

**Microwave diodes**: Transfer electron devices: Introduction, GUNN effect diodes – GaAs diode, RWH theory, Modes of operation, Avalanche transit time devices: READ diode, IMPATT diode, BARITT diode, Parametric amplifiers

*Text1: Ch 7.7.1, 7.2, 7.3, Ch 8.8.1, 8.2, 8.3, 8.4, 8.5.3, Ch 11.-11.1, 11.2, 11.3, 11.4.*

**9 Hrs**

**UNIT–V**

**An Introduction to Radar:** Basic Radar, The simple form of the Radar equation, Radar block diagram, Radar frequencies, application of Radar, the origins of Radar MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, delay line Cancellers, digital MTI processing, Moving target detector, pulse Doppler Radar.

*Text2: Ch1, Ch 2, 2.1, 2.2, 2.3, 2.5, 2.7, 2.9, 2.10 & 2.12, Ch 3, 3.1, 3.2, 3.5, 3.6 & 3.9, Ch 4, 4.1, 4.2, 4.3 & 4.6.*

**9 Hrs**

**Text Books**:


1. Liao, "Microwave Devices and circuits", Pearson Education
2. Merrill I Skolnik, "Introduction to Radar systems", TMH, 3rd Ed, 2001.
3. Annapurna Das, Sisir K Das, "Microwave Engineering", TMH Publication, 2001


**Reference Book:**


1. David M Pozar, "Microwave Engineering", John Wiley, 2nd Edition,, 2004


# FUNDAMENTALS OF VLSI DESIGN

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Fundamentals of VLSI Design | ***Course Code*****:** 10EC54 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES BY TOPIC:**

Students are expected to have the following topical knowledge upon entering this course:

- Satisfactory completion of understanding of basics of semiconductor theory in physics.
- Satisfactory knowledge of Analog Electronic Circuits.
- Satisfactory knowledge of Digital Electronics.

**COURSE OUTCOME**

- Student will learn about fundamentals of MOSFETs. They would study the theoretical aspects of CMOS structure and fabrication.
- With this knowledge they will be able to understand the front end and back end in VLSI Design flow. They will also be able to sketch stick diagrams and layouts of logic gates implemented as CMOS transistors

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT-I**

**Basic MOS technology:** Integrated circuits era. Enhancement and depletion mode MOS transistors. NMOS fabrication. CMOS Fabrication. Thermal aspects of processing, Bi-CMOS technology. Production of E-beam masks.

*Text1: Ch 1*

**9Hrs**

**UNIT-II**

**MOS Transistor Theory**: Introduction, threshold voltage equation, body effect, MOS Device Design Equations, sub threshold region, channel length modulation, mobility variation, tunneling, punch through, hot electron effect.

**The Complementary CMOS Inverter**: DC Characteristics, Static Load MOS Inverters, the Differential Inverter, the Transmission Gate, Tristate Inverter.

*Text2: Ch 2*

**9Hrs**

## UNIT– III

**Circuit design processes:** MOS layers. Stick diagrams. Design rules and layout – lambda-based design and other rules. Examples. Layout diagrams, Symbolic diagrams.

**Basic CMOS Technology:** p well/ n well/ twin well process, Current CMOS enhancement (oxide isolation, LDD, refractory gate, multilayer Interconnect), Circuit elements, resistor, Capacitor, interconnects, Tutorial exercises. Basic Physical Design of Simple logic gates

*Text2: Ch 2, Ch 3*

**9Hrs**

## UNIT – IV

**Basic circuit concepts:** Sheet resistance. Area capacitances. Capacitance calculations. The delay unit. Inverter delays. Driving capacitive loads. Propagation delays. Wiring capacitances. Tutorial exercises

**Scaling of MOS circuits:** Scaling models and factors. Limits on scaling. Limits due to current density and noise.

*Text1:Ch4,Ch5.1,5.8*

**9Hrs**

## UNIT-V

**CMOS Logic Structures:** CMOS Complementary Logic, BICMOS Logic, Pseudo NMOS LOGIC, Dynamic CMOS Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS Domino Logic, Cascaded Voltage Switch Logic.

*Text 1: Ch 5, 5.4* **9Hrs**

**Text Books:**

1. Douglas A. Pucknell & Kamran Eshraghian, "Basic VLSI Design" PHI 3rd Edition (original Edition – 1994), 2005.

2. Neil H. E. Weste and K. Eshragian," Principles of CMOS VLSI Design", A Systems Perspective," Pearson Education (Asia) Pvt. Ltd, 2nd edition, 2000

**Reference Books:**

1. M. K. Achuthan and K. N. Bhat, "Fundamentals of Semiconductor Devices", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2007.

2. Sung-Mo Kang & Yusuf Leblebici, "CMOS Digital Integrated Circuits: Analysis and Design", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.

## DATA STRUCTURES & ALGORITHM USING C

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Data Structures & algorithm using C | ***Course Code*****:** 10EC55 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

For taking this course students are expected to have knowledge of:

- Basics of programming using C and use of IDE and compilation, Fundamentals of digital logic
- Basic computer architecture such as CPU – registers and addressing, memory – data, code, stack and extra segments, IO Devices – console / keyboard, display
- Basics of data representation – structures, little-endian and big-endian

**COURSE OUTCOME**

- After completion of this subject students are able to study object oriented and principles like, classes, inheritance, overloading, exceptions, C File I/O, Virtual Functions

and Polymorphism ,Function Overloading, Copy Constructors, and Default Arguments, Templates.

- Students will get the basic ability to analyze algorithms and to determine algorithm correctness and time efficiency.
- Master a variety of advanced abstract data type (ADT) and data structures and their implementations.
- Master different algorithm design techniques.
- Ability to apply and implement learned algorithm design techniques and data structures.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted

## UNIT I

**Introduction, Arrays and Structures:**

Overview, Pointers and Dynamic Memory Allocation, Arrays, Dynamically Allocated arrays, Structures and Unions, Representation of Multidimensional Arrays, Strings, Singly Linked Lists and chains, Representing Chains in C.

Chapter 1, 2, 4: 1.1, 1.2, 2.1, 2.2, 2.3, 2.6, 2.7, 4.1, 4.2

**9hrs**

**UNIT II**

**Linked List**

Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Chapter 4: 4.3, 4.5, 4.8

**9hrs**

**UNIT III**

**Stacks and Queue Using Array, Dynamic Array, Linked List**

Stacks, Stacks Using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions.

Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.6

**9hrs**

**UNIT IV**

**Binary Tree & Heaps**

Introduction, Binary Trees, Binary Tree traversals, Heaps, Binary Search Trees.

Chapter 5: 5.1, 5.2, 5.3, 5.6, 5.7

**9hrs**

**UNIT V**

**Sorting and Hashing**

Motivation, Insertion Sort, Quick Sort, How fast can we sort, Merge Sort, Heap Sort, Introduction to hashing, Static hashing, Dynamic hashing.

Chapter 7 and 8: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 8.1, 8.2, 8.3

**9hrs**

**Text Book**

1. Horowite, Sahni and Anderson Freed, Fundamentals of Data Structures in C, Universities Press, Second Edition.

**Reference**

1. Padma Reddy, Data Structures using C

## ELECTIVE A

## DIGITAL IMAGE PROCESSING

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Core elective* |
| ***Course Title*** Digital Image Processing | ***Course Code*****:** 10ECE564 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**pre-requisites:**

- Students should have knowledge of signals and Systems and Digital Signal Processing.
- Knowledge of differentiation and Integration and other mathematical concepts.
- Knowledge of Fourier Transforms

**Course Outcomes:**

- Student will be able to analyze and solve real world problem by applying appropriate algorithm.
- Students will be able to understand the fundamentals of DIP concepts and its applications.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Assignment/course project based test. 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT - I

**Digital Image Fundamentals**: Introduction to Image Processing, Overview, Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Elements of Visual Perception. Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels Linear and Nonlinear Operations.

*Text1: Ch1, Ch2*

**7Hrs**

## UNIT - II

**Image Transforms:** Introduction about 1-D and 2-D transforms, review of Fourier transforms. Properties of unitary transforms, two dimensional discrete Fourier transform, discrete cosine transform, sine transform, Hadamard transform, Haar transform, Hadamard transform, Haar transform.

*Text2: Ch5*

**7Hrs**

## UNIT – III

**Image Enhancement:** Introduction, Image Enhancement in Spatial domain, Some Basic Gray Level Transformations Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Introduction, Image Enhancement in the Frequency Domain, Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

*Text1:Ch3, Ch4*

**7Hrs**

## UNIT - IV

**Image Restoration**: Introduction, A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function , Inverse Filtering, Minimum

Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Geometric Transformations

*Text1: Ch5*

**7Hrs**

**UNITV**

**Color Image Processing:** Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.

*Text1: Ch6*

**8Hrs**

**Text Books:**

1. Rafael C. Gonzalez and Richard E.Woods, " Digital Image Processing", Pearson Education, 2nd Edition, 2001.

2. Anil K. Jain, "Fundamentals of Digital Image Processing" , Pearson Education, PHI, 2001.

**Reference Books:**

1. B. Chanda and D. Dutta Majumdar "Digital Image Processing and Analysis", PHI, 2003

2. Tamal Bose, "Digital Signal and Image Processing", John Wiley and Sons, Inc -2003

# MICROELECTROMECHANICAL SYSTEMS

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *Electronics and Communication Engineering* | *Elective Course* |
| ***Course Title***: Introduction to MEMS | ***Course Code*****:** 9EC561 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35 hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

Students are expected to have the following topical knowledge upon entering this course:

- Satisfactory completion of understanding of basics of semiconductor theory in physics.
- Satisfactory knowledge of Analog Electronic Circuits.

- Satisfactory knowledge of Physics.
- Satisfactory knowledge of Chemistry.
- Fundamentals of Mechanical engineering.

**Course Outcomes:**

The specific course outcomes supporting the program outcomes are:

- Students will get a basic knowledge of VLSI design flow.
- They will know how to optimize the layout.
- They get hands on experience on VLSI CAD tool.
- They learn different analysis to Analog circuits
- The students also learn the different mathematical modeling of MEMS Devices.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- A mini project is given to all students who are asked to give a report on the same and presentation is also given by students based on which the students are evaluated for 10 marks.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Introduction:** Why Miniaturization? Microsystems versus MEMS, Why microfabrication? Smart Materials, Structures and systems, Integrated Microsystems, Applications of smart Materials and Micro Systems

**Micro Sensors, Actuators:** Silicon capacitive Accelerometer, Piezoresistive Pressure Sensor, Conductometric Gas Sensor, Electrostatic Com Drive, Magnetic Microrelay.

*Text book: Ch.1: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6* *6hrs*

*Ch. 2:2.1, 2.2, 2.3, 2.4, 2.5*

## UNIT II

**Micro Actuators, Systems and Smart Materials:** Portable Blood analyzer, Piezoelectric Inkjet Print Head, Micromirror Array for Video Projection, Smart materials and systems

**Scaling Effects in Microsystems:** Scaling in the mechanical Domain, Scaling in the electrostatic Domain, Scaling in Magnetic Domain, Scaling in the thermal Domain, Scaling in Diffusion, Scaling in Fluids, scaling Effects in the Optical Domain, Scaling in Biochemical Phenomena.

*Text book: Ch. 2: 2.6, 2.7, 2.8, 2.9*

*Ch. 9: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8*

*7hrs*

## UNIT III

**Micromachining Technologies:** Silicon as a material for Micromachining, Thin Film Deposition, lithography, Etching, Silicon Micromachining, Specialized Materials for Microsystems, Advanced Process for Microfabrication.

*Text Book: Ch 3: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7*

*6hrs*

## UNIT IV

**Modeling of solids in Microsystems:** The simplest deformable element: A Bar, Transversely deformable element: A beam, Energy methods for Elastic Bodies, Examples and problems, Heterogeneous Layered Beams, Bimorph Effect, Residual Stresses and stress Gradient, Poisson Effect and Anticlastic Curvature of Beams, Torsion of Beams and Shear Stresses, Dealing with Large Displacements, In- Plane Stresses.

*Text Book: Ch 4: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11*

*8hrs*

## UNIT V

**Modeling of Coupled Electromechanical Systems:** Coupled Electromechanics: statics, Coupled Electromechanics: stability and pull –in Phenomenon

**Integration of Micro and Smart Systems:** Integration of Microsystems and Microelectronics. Microsystems Packaging, Case studies of Integrated Microsystems, Case study of a smart Structure in Vibration Control

*Text Book: Ch 6: 6.2, 6.3* *8hrs*

*Ch 8: 8.1, 8.2, 8.3, 8.4*

**Text Books:**

G.K. Ananthasuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat, V.K. Aatre, " Micro and Smart Systems", Wiley India, 2010

**Reference Books:**


1. Nadim Maluf, Kirt Williams, "An Introduction to microelectromechanical systems engineering", Artech House, Inc, 2nd Edition, 2004
2. **Mohamed Gad-el-Hak; "MEMS: Introduction And Fundamentals"; CRC Press, 2006.**
3. **Mark J. Madou; "Fundamentals of Microfabrication: The Science of Miniaturization", CRC Press, Second Editio, 2002.**
4. **Stephen D. Senturia; "Microsystem Design"; Springer, 2004.**
5. **Gregory T. Kovacs; "Micromachined Transducers Sourcebook"; McGraw-Hill, 1998.**
6. **Elwenspoek M. and Wiegerink R.; "Mechanical Microsensors"; Springer, 2001.**
7. **Gabriel M. Rebeiz; "RF MEMS: Theory, Design, and Technology"; Wiley-Interscience, 1st edition, 2002.**
8. **Steve P. Beeby, Stephen Beeby, Graham Ensel, Michael Kraft and Neil M. White; "MEMS Mechanical Sensors"; Artech House, 2004.**
9. **Ajay Malshe; "Fabrication, Packaging and Integration of MEMS and Related Microsystems"; Springer, 1 edition, 2008.**
10. **Vijay Varadan, K. J. Vinoy, K. A. Jose, Vijay K. Varadan and Udo Zoelzer "RF MEMS and Their Applications"; Wiley; 1st edition, 2002.**

## ANALOG COMMUNICATION AND LIC LAB

**Semester:** V **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Microprocessor | ***Course Code*****:** 10ECL57 |
| | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 03/hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

Understanding of basics of signals and systems, random variables, mean, variance, co-variance, correlation, auto co-relation, Gaussian process.

**COURSE OUTCOME**

- Students will get the foundational education in analog communication system analysis and design.
- Students are provided learning experiences that enable them to analyze and design basic communications systems, particularly with application to noise-free analog.
- Apply concepts and techniques from Fourier analysis and circuit analysis to communication systems.
- Develop the ability to compare and contrast the strengths and weaknesses of various communication

**EXPERIMENTS**

1. Second order active LPF and HPF
2. Second order active BPF and BE
3. Schmitt Trigger Design and test a Schmitt trigger circuit for the given values of UTP and LTP
4. Frequency synthesis using PLL.
5. Design and test R-2R DAC using op-amp
6. Design and test the following circuits using IC 555

a. Astable multivibrator for given frequency and duty cycle

b. Monostable multivibrator for given pulse width W

7. Class C Single tuned amplifier
8. Amplitude modulation using transistor/FET (Generation and detection)
9. Pulse amplitude modulation and detection
10. Pulse Width Modulation and Pulse Position Modulation
11. Frequency modulation using IC 8038/2206
12. Precision rectifiers – both Full Wave and Half Wave.

## DIGITAL SIGNAL PROCESSING LAB

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Lab* |
| ***Course Title*** DSP lab | ***Course Code*****:** 10ECL58 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 3hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- Students should have knowledge of signals and Systems.
- Knowledge of differentiation and Integration and other mathematical concepts..

**Course Outcomes:**

On completing this course, students will be sufficiently familiar with the theory, practice on DSP

Students should be able to Design the filter

- Student will be able to analyze and solve real world problem by applying appropriate algorithm.
- Students will be able to understand the DSP concepts and its applications.

**PART- A: LIST OF EXPERIMENTS USING MATLAB**

**(4 Lab Sessions of 3Hrs Each)**

1. Solving a given difference equation and Impulse response of a given system
2. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum.
3. Linear convolution and Circular convolution of two sequences using DFT and IDFT.
4. Design and implementation of FIR and IIR filter to meet given specifications.
6. To obtain FFT and IFFT for a given sequence where number of points are $2^n$.
7. Experiments based on Simulink and DSP Block set

**PART- B: LIST OF EXPERIMENTS USING DSP PROCESSOR (8 Lab Sessions of 3Hrs Each)**

**(Using TMS320C6713 Processor with DSK and Code Composer Studio - Assembly level coding and C coding).**

1. Implementation of simple mathematical operations.
2. Linear convolution and Circular convolution of two given sequences.
3. Computation of N- Point DFT of a given sequence

4 (a). Impulse response of first order and second order system

(b). Solution of differential and difference equations with zero initial conditions for a causal system.

5 (a). Realization of an FIR filter ( any type ) to meet given specifications .The input can be a signal from function generator / speech signal.

(b) Design of IIR filters of order less than or equal to three.

6. Audio applications such as to plot a time and frequency display of Microphone plus a cosine using DSP. Read a wav file and match with their respective spectrograms

7. Noise removal: Add noise above 3kHz and then remove ; Interference suppression using 400 Hz tone.

# SYLLABUS FOR VI SEMESTER

# COMPUTER COMMUNICATION NETWORK

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** CCN | ***Course Code*****:** 10EC36 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

## Pre-requisites:

- **Satisfactory completion of understanding of basics of physics course on electronics**
- **Understanding of analog and digital communication**
- **Understanding of the programming**
- **Understanding of simple jobs in pseudo codes**

## Course Outcomes:

**T**he specific course outcomes supporting the course outcomes are: –

- Student will be able to apply knowledge of mathematics, probability and statistics to model and analyze some networking protocols.
- Students will be able to design, implement and analyze simple computer networks.

## Teaching Methodology:

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

## Assessment Methods

- Two Surprise Tests, 10 Marks each. Average of two.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Introduction:** Layered tasks, OSI Model, Layers in OSI model, TCP/IP Suite, Addressing, Telephone and cable networks for data transmission, Telephone networks, Dial up modem,DSL, Cable TV for data transmission.

*Text1: Ch 2* **9 Hrs**

## UNIT-II

**Data link control:** Framing, Flow and error control, Protocols, Noiseless channels and noisy channels, HDLC.

**Multiple access:** Random access, Controlled access, Channelisation

*Text 1: Ch.11. 11.1 to 11.6,Ch 12*

**9Hrs**

## UNIT - III

**Wired LAN:** Wired LAN, Ethernet, IEEE standards, Standard Ethernet. Changes in the standards, Fast Ethernet, Gigabit Ethernet, Wireless LAN IEEE 802.11

**Connecting LANs:** Connecting LANs, Backbone and Virtual LANs, Connecting devices, Back bone Networks, Virtual LANs

*Text 1: Ch 13, Ch 14. 14.1,Ch 15*

**9Hrs**

## UNIT -IV

**Network Layer:** Network Layer, Logical addressing, Ipv4addresses, Ipv6 addresses, Ipv4 and Ipv6Transition from Ipv4 to Ipv6.*Text 1: Ch 19 and 20*

**9 Hrs**

## UNIT V

**Delivery:** Delivery, Forwarding, Unicast Routing Protocols, Multicast Routing protocols.

**Transport Layer:** Transport layer Process to process Delivery, UDP, TCP, Domain name system, Resolution

*Text 1: Ch 22. 22.1 to 22.4, Ch 25. 25.1 to 25.5*

**9**Hrs

**Books:**

1. B Forouzan, " Data communication and networking", TMH ,4th Edition, 2006.

**Reference Books**:

1. James F. Kurose, Keith W. Ross, "Computer networks", Pearson education, 2nd Edition, 2003.
2. L L Petreson and B S Davie, "Computer Networks a systems approach", Morgan Kauffman/ Elsevier ,4th Edition, 2007.

## DIGITAL COMMUNICATION

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Digital communication | ***Course Code*****:** 10EC62 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- **Understanding of mathematical tools like Fourier series, Fourier transforms.**
- **Understanding of probability theory, random variables, and linear time invariant systems.**

**Course Outcomes:**

The specific course outcomes supporting the course outcomes are: –

- **Students should be able to understand the need for sampling, quantization and encoding.**
- **They should be able to use source coding techqunies to convert analog signal to digital signal.**
- **They should be able to use digital modulation techniques for long distance communication.**

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT-I**

**Basic signal processing operations in digital communication:** Sampling Principles, Sampling Theorem, Quadrature sampling of Band pass signal, Practical aspects of sampling and signal recovery. PAM, TDM.

*Text1: Ch 1. 1.2, Ch 4. 4.1, 4.2, 4.5, 4.6, 4.7* **9 Hrs**

**UNIT-II**

**Waveform Coding Techniques:** PCM, Quantization noise and SNR, robust quantization.DPCM, DM, applications. Base-Band Shaping for Data Transmission, Discrete PAM signals, power spectra of discrete PAM signals.

*Text 1: Ch 5.5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, Ch 6. 6.1, 6.2*

**9 Hrs**

**UNIT-III**

**Base-Band Shaping for Data Transmission** ISI, Nyquist's criterion for distortion less base-band binary transmission, correlative coding, eye pattern, base-band M-ary PAM systems, adaptive equalization for data transmission. Digital Modulation Techniques: Digital Modulation formats, Coherent binary modulation techniques.

*Text 1: Ch 6. 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, Ch 7. 7.1, 7.2, 7.3* **9 Hrs**

**UNIT-IV**

**Coherent Quadrature modulation Techniques**. Noncoherent binary modulation techniques, Detection and estimation, Model of DCS, Gram-Schmidt Orthogonalization procedure, geometric interpretation of signals, response of bank of correlators to noisy input.

*Text 1: Ch 7. 7.3, 7.4, Ch 3. 3.1, 3.2, 3.3, 3.4*

**9 Hrs**

**UNIT-V**

**Detection & Estimation:** Detection of known signals in noise, correlation receiver, matched filter receiver, detection of signals with unknown phase in noise, Spread Spectrum Modulation: Pseudo noise sequences, notion of spread spectrum, direct sequence spread spectrum, coherent binary PSK, , frequency hop spread spectrum, applications.

*Text 1: Ch 3. 3.5, 3.7, 3.8, 3.9, Ch 9. 9.1, 9.2, 9.3, 9.6*

**9 Hrs**

**Text Books:**

1. Simon Haykin, "Digital communications", JohnWiley, 2003.

**Reference Books:**

1. K.Sam Shanmugam, "Digital and analog communication systems",John Wiley, 1996.

2. Simon Hay kin," An introduction to Analog and Digital Communication", John Wiley, 2003

3. Bernard Sklar, "Digital communications" Pearson education, 2007

# ANTENNA AND WAVE PROPAGATION

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Antenna and wave propagation | ***Course Code*****:** 10EC63 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- A Fundamental course on Fields & Waves and the Maxwell's equations for time varying fields are necessary to understand this subject.

**COURSE OUTCOMES**:

- Students learn about different propagation mechanisms and in particular interpretation of radiation patterns of an antenna.
- Students will be able to plot the radiation pattern and find out VSWR, gain, directivity, front to back ratio, main lobe to side lobe ratio and express the different parameter mentioned above in decibel scale. They will be in a position to calculate antenna efficiency, received power at the distant end.
- Students will study the different types of antenna and antenna arrays. The antennas like dipole, loop antenna, linear antenna, aperture antenna, horn antenna, parabolic reflector antenna and microstrip antenna. They will also learn to choose appropriate antenna for different applications.
- The knowledge acquired by the students will help them to take up research projects from leading organizations such as: DRDO, ISRO etc.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50

**UNIT 1**

**Antenna Basics** : Introduction, basic antenna –parameters, patterns, beam area, radiation intensity, beam efficiency, directivity, directivity and gain, antenna aperture, effective aperture, scattering aperture, loss aperture, collecting aperture, effective height, maximum effective aperture of a short dipole, maximum effective aperture of a linear $\lambda/2$ antenna, effective aperture and directivity and Friis transmission formula.

*Text 1: Ch 2.2.1 to 2.7, 2.8, 2.9, 2.10, 2.12 to 2.16, 2.19, 2.20, 2.21, 2.22, 2.25*

*Text 3: Ch 2.11, 2.14, 2.18.*

**9Hrs**

**UNIT II**

**Point Sources and Arrays**: Introduction to point source, power patterns, power theorem, radiation intensity, field patterns, phase patterns. Array of two isotropic point sources, two isotropic point sources of same amplitude phase, Two isotropic point sources of same amplitude but opposite phases, two isotropic point sources of same amplitude quadrature phase, non isotropic but similar point sources and the principle of pattern multiplication,

examples of pattern synthesis by pattern multiplication, non isotropic & non isotropic point sources. Linear broadside arrays with non uniform amplitude distribution. General considerations. Linear arrays with non uniform amplitude distributions. The Dolph-Tchebychef optimum distribution

*Text 1: Ch 3. 3.1 to 3.4, 3.16, 3.17, 4.2a, 4.2b, 4.2c, 4.3, 4.4, 4.5, 4.10, 4.11*

**9 Hrs**

## UNIT III

**Electric dipoles and thin linear antennas**: Introduction, short electric dipole, field of a short dipole, radiation resistance of short dipole radiation resistances of lambda/2 Antenna, thin linear antenna, Array of two driven lambda/2 elements end fire case. Micro strip arrays, long wire antenna, folded dipole antenna, patch antennas, rectangular horn antennas.

*Text 1: Ch 5. 5.1to 5.6, and Ch 11. 11.3, Ch 16. 16.12, Ch 13. 13.8*

**9hrs**

## UNIT IV

**Antenna Types**: Helical Antenna, Yagi – Uda array, corner reflectors, parabolic reflectors, log periodic antenna, lens antenna, antenna for special applications-sleeve antenna, turnstile antenna, omni directional antennas, antennas for satellite antennas for ground penetrating radars, embedded antennas, ultra wide band antennas, plasma antenna.

*Text 1: Ch 7, Ch 8 , Ch 9,Ch 14 and Ch 17*

**9Hrs**

## UNIT V

Radio Wave Propagation: Introduction, Ground wave propagation, free space propagation, ground reflection, surface wave, diffraction.

Troposphere Wave Propagation: troposcophic scatter, lonosphere propagation, electrical properties of the ionosphere, effects of earth’s magnetic field.

*Text 2: Ch 8.1, 8.2*

**9Hrs**

**Text book:**


1. John D.Krauss, "Antennas", McGraw- Hill International edition, II edition, 1988.
2. Harish and Sachidananda, "Antennas and Wave Propagation", Oxford Press, 2007
3. C.A Balanis, "Antenna Theory Analysis and Design", John Wiley, 2nd Edition, 2007


**Reference Books:**


1. Sineon R Saunders, "Antennas and Propagation for wireless Communication systems", John Wiley, 2003


## OPERATION RESEARCH

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department: Electronics and Communication Engineering*** | *Regular Course* |
| ***Course Title***: *Operation Research* | ***Course Code*****:** 10ECH64 |
| ***L-T-P:*** 4-0-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45 hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- Students should have knowledge of Matrix multiplication and must be able to solve the problems.
- Students should know basics of mathematical concepts.

**Course Outcomes:**

- Students will be able to develop efficient design, analysis, operation and control of complex systems.
- Students will be able to use tools for optimization, probability, statistics, simulation, and engineering economic analysis, including fundamental applications of those tools in industry and the public sector in contexts involving uncertainty and scarce or expensive resources.
- Students will be able to use mathematical and computational modeling of real decision-making problems, including the use of modeling tools and computational tools, as well as analytic skills to evaluate the problems.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Three Surprise Tests, 10 Marks each. Average of best of two tests will be taken.
- Three Assignment Tests, 10 Marks each. best of three tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT I**

**Introduction:** Linear programming, Definition, scope of operations research (O.R) approach and limitations of OR models, characteristics and phases of OR mathematical formulation of L.P. Problems. Graphical solution methods.
**Linear Programming Problems:** Introduction, Definitions, simplex method - computational procedure.

**09 Hrs**

**UNIT II**

**Artificial Variable Technique:** Two phase method. Big-M-method (Charne's penalty method). Degeneracy-Methods to resolve degeneracy. Special cases- Alternative, unbounded & non-existing solution, Concept of duality, primal &dual correspondence, Dual simplex method.

**09 Hrs**

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**UNIT III**

**Game Theory:** Formulations of games, two person-zero sum game, games with and without saddle point, graphical solution (2 x n, m x 2 game), dominance property.
**Transportation Problem:** Mathematical Formulation; Matrix form, Definitions, Initial basic feasible solution using different methods. Optimality methods. Minimization problem, unbalanced transportation problem, degeneracy in transportation problems.

**9 Hrs**

**UNIT IV**

**Assignment Problem:** Mathematical Formulation, Hungarian method, Minimal, Maximal & unbalanced assignment problem, traveling salesman (Routing) problem.
**Sequencing:** Terminology & notations, Johnson's algorithm, processing of: n-jobs to 2 machines, n jobs 3 machines, n jobs m machines without passing sequence. 2 jobs n machines with passing. Graphical solution.

**9Hrs**

**UNIT V**

**PERT-CPM Techniques:** Definitions, difference between CPM & PERT. Applications. Network construction, labeling using Fulkerson's '1-J' Rule. Time Estimates and Critical path - Forward & Backward pass computation. Determination of Floats, Slack times & critical path. PERT-critical path, scheduling by project duration, variance under probabilistic models, prediction of date of completion, crashing of simple networks-Optimum duration & Minimum duration cost.
**Queuing Theory:** Queuing system and their characteristics. The M/M/1 queuing system, steady state performance and analysis of M/M/1 & MIMIC queuing model.

**9Hrs**

**TEXT BOOKS**

1. Operation Research, S. D. Sharma - Kedarnath Ramnath and Co ,2002.
2. Problems in Operations Research - P.K.Gupta, Manmohan, Sultan Chand Publications,2005

**REFERENCE BOOKS**

**1.** Operations Research - An Introduction, Taha H.A. -Low price Edition, ih Edn,2006
**2.** Introduction to Operation Research, Hiller and Liberman,Mc Graw Hill. 5th edition 2001.
**3.** Operations Research: principles and practice: Ravindran, philiphs and Solberg, Wiley india its 2nd edition 2007.
**4.** Operation Research, Prem kumar Gupta, 0 SHira,S chand pub,New delhi, 2007.
**5.** Operation Research, Prem kumar Gupta, 0 SHira,S chand pub,New delhi, 2007.

**ELECTIVE B**

## ANALOG AND MIXED MODE VLSI DESIGN

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Core elective* |
| ***Course Title*** Analog and mixed mode VLSI | ***Course Code*****:** 10ECE651 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

Satisfactory completion of understanding of basics of semiconductor theory in physics.

Satisfactory knowledge of Analog Electronic Circuits. Satisfactory knowledge of Digital Electronics

## COURSE OUTCOME

- Student will learn about the design of CMOS-VLSI Circuits.
- They would study the applications of CMOS circuits.
- This knowledge will give the students to get placement opportunities in core VLSI companies within the country and also abroad.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**Course Outcome to Programme Outcome Mapping**

| | PO | a | b | c | d | e | f | g | h | i | j | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CO1 | | W | S | S | M | S | | | M | M | S |
| | CO2 | | S | S | S | S | S | | W | M | M | S |
| | CO3 | | S | S | S | S | S | | M | S | M | S |

## UNIT I

**Introduction to CMOS analog circuits**: Second order effects, MOS Device models.

**Single Stage Amplifier:** Common source stage with resistive load, diode load, triode load, current source load, Source Degeneration, Source follower, Common gate Stage, Cascode amplifier, Folded Cascode,

*Text 1: Ch 2: 2.3, 2.4, Ch 3. 3.1, 3.2, 3.3, 3.4, 3.5* **9 Hrs**

## UNIT II

**Differential amplifier**, Single ended and differential operation, Basic Differential pair, Common mode response, Differential pairs with MOS load, Gilbert cell.

**Passive current mirrors:** Basic current mirrors, cascade current mirrors.

*Text 1: Ch 4, Ch 5* **9 Hrs**

## UNIT III

**Active Current mirrors**

**Frequency Response of Amplifiers:** Miller Effect, Association of poles and nodes, Source Follower, Differential pair.

*Text 1: Ch 5; Ch 6. 6.1, 6.3 and 6.6, Ch 9*

**9Hrs**

## UNIT IV

**Operational Amplifier:** Performance parameters, One stage and two stage op amp, gain boosting, common mode feedback, input range limitations, slew rate, power supply rejection, multi pole systems, phase margin, frequency compensation.

*Text 1:, Ch 9, Ch 10. 10.1 to 10.4* **9 Hrs**

**UNIT V**

**Data Converter fundamentals:** Analog Verses discrete time signals, Converting analog signals to digital signals, sample and hold Characteristics, DAC specifications, ADC specifications, Mixed signal Layout issues.

**Data Converter Architecture:** DAC Architectures, ADC Architectures.

*Text 2:Ch.28, Ch 29*

**9Hrs**

**Text Books:**


1. Razavi B., "Design of Analog CMOS Integrated Circuits", McGraw Hill, 2001
2. R.Jacob Baker, Harry W.Li & David E.Boyce,"CMOS Circuit Design Layout and Simulation", PHI, 2002


**References:**


1. Razavi B., "RF Microelectronics", Prentice Hall, 1998.
2. E. Allen, Douglas R. Holberg, "CMOS Analog circuit Design"


## DSP ARCHITECTURE AND ALGORITHM

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Core elective* |
| ***Course Title*** DSP architecture and algorithm | ***Course Code*****:** 10ECE654 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge on Signals and Systems and DSP is required

**COURSE OUTCOME**

- Students will learn about various DSP architectures
- Students will learn about DSP programming

- Students will be in a position to implement basic DSP algorithms and FFT algorithms
- Students will learn about the interfacing between DSP with pheripherals and applications of programmable DSP devices

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT - I**

**Introduction to DSP** :Introduction, A Digital Signal Processing systems, the sampling process, Discrete Time Sequences, DFT, and FFT, Linear Time Invariant Systems, Digital Filters, Decimation and Interpolation Analysis and Design Tool for DSP Systems. *Text 1: Ch 2.2.1 to 2.9* **9Hrs**

**UNIT II**

**Architectures for Programmable Digital Signal-Processing Devices:** Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for external Interfacing

**Programmable Digital Signal Processors :**Introduction, Commercial Digital signal processing devises, data addressing modes of TMS 320C54xx digital signal processors,

Memory space of TMS 320C54xx processors, Program control, TMS 320C54xx Instructions and Programming, On chip peripherals, Interrupts of TMS 320C54xx processors, Pipeline operation of TMS 320C54xx processors

*Text 1: Ch 4.4.1 to 4.9,Ch 5.5.1 to 5.0*

**9Hrs**

**UNIT III**

**Implementations of Basic DSP Algorithms :**Introduction, The Q-notation, FIR filters, IIR filters, Interpolation filters, Decimation filters, PID controller, Adaptive filters, 2-D signal processing

**Implementation of FFT Algorithms :** Introduction, An FFT algorithm for DFT computation, A Butterfly computation, overflow and scaling, bit reversed index generation, FFT implementation on the TMS 320C54xx, computation of the signal spectrum

T*ext 1: Ch 7, 7.1 to 7.9 Ch 8.8.1 to 8.7*

**9Hrs**

**UNIT IV**

**Interfacing Memory and Parallel I/O Peripherals to Programmable DSP Device:** Introduction, memory space organization, external bus interfacing signals, memory interface, parallel I/O interface, programmed I/O, interrupts and I/O, direct Memory Access (DMA)

**Interfacing Serial Converters to a Programmable DSP Device:** Introduction, synchronous serial interface, a multi channel buffered serial port,(McBSP), McBSP Programming, A CODEC interface circuit, CODEC Programming, A CODEC-DSP interface example

*Text 1: Ch 9, 9.1 to 9.8*, *Ch 10.10.1 to 10.7*

**9Hrs**

**UNIT V**

**Applications of Programmable DSP Devices:**Introduction, A DSP system, DSP-Based Bio-telemetry receiver, a speech processing system, an image processing systems [8 Hrs]

*Text 1 :Ch 11.11.1 to 11.5*

**9hrs**

**Text Book:**

1 1. Avatar Singh and S Srinivasan," Digital Signal Processing" 2004

**Reference Books:**


1. Ifeachor, "Digital Signal Processing", Jervis B.W, Pearson Education, 2nd Edition, 2002
2. B Venkataramani and M Bhaskar,"Digital Signal Processors", TMH, 2002.


**OPEN ELECTIVE –C**

# EMBEDDED SYSTEM

**Semester:** VI **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** Embedded System | ***Course Code*****:** 10ECO663 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Satisfactory completion of understanding of basics of computer organization.
- Satisfactory knowledge of basic C programming.
- Satisfactory knowledge of Digital Electronics.

**COURSE OUTCOME**

- Students will get know the concept of Embedded systems and its challenges.
- They will have a practical knowledge about assembly and C programming.
- They will be able to perform real time programming.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT-I**

**Introduction:** Overview: Optimizing the metrics, Processor Technology, Design Technology. **Custom single purpose processors:** Optimizing program, FSMD, Data path & FSM

*Text 1: Ch 1, 2 to 2.6* **7 Hrs**

**UNIT-II**

**General Purpose Processors & ASIP's:** Software & operation of general purpose processors, programmers view, Development Environment, ASIPs, Microcontrollers, DSP chips. **Standard Peripherals:** Timers & Applications, PWM's Application, UART, Keypad controllers, Stepper motor controls, A/D converters

*Text 1: Ch 3, 4*

**7 Hrs**

**UNIT – III**

**Memory:** Different types of ROMs & RAMs, Cache system designs.

**Interfacing:** Introduction to Interfacing, Interrupts & DMA, Communication serial protocols, parallel protocol, Wireless protocols

*Text 1: Ch 5, Ch 6, 6.7 to 6.12.*

**7 Hrs**

**UNIT -IV**

**Interrupts:** Basics, shared data problem, Interrupt latency.

**Survey of software Architecture:** Round robin, Round robin with interrupts Function queues, scheduling, and RTOS architecture.

*Text 2: Ch 4, 2, 4.4, Ch 5.* **7 Hrs**

**UNIT V**

**Introduction to RTOS:** Tasks, States, Data, Semophores & shared data, operating system services, Message queues, mail boxes, timers, events, memory management, Interrupts. **Basic design using RTOS:** Principles, An Example: Encapsulating semaphores and queues, hard real time scheduling considerations, Saving memory space & power.

*Text 2: Ch 6 & 7, 8.*

**8Hrs**

**Text Books:**

1. Frank Vahid & Tony Givargis, "Embedded System design", John Wiley, 2002.

2. David E Simon, "An Embedded software primer", Pearson Education,1999.

**Reference Books:**

1. Rajkamal, "Embedded systems: Architecture programming & Design", TMH, 2003.

2. Philip A Laplante, "Real time systems design & Analysis-an Engineers Handbook", PHI Publications, 2nd Edition.

# VLSI LAB

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Lab* |
| ***Course Title*** VLSI lab | ***Course Code*****:** 10ECL67 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 3hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Satisfactory completion of understanding of basics of semiconductor theory in physics.
- Satisfactory knowledge of Analog Electronic Circuits.

- Satisfactory knowledge of Digital Electronics

## COURSE OUTCOME

- Student will learn about fundamentals of Mixed mode VLSI Circuits.
- They would study the theoretical aspects of CMOS circuits. With this knowledge they will be able to design CMOS Analog circuits.
- This knowledge will give the students to get placement opportunities in core VLSI companies within the country and also abroad

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**LIST OF EXPERIMENTS**

Conduct the DC, AC and Transient Analysis for a given circuit

1. Inverter
2. Common Source Amplifier
3. Common Drain Amplifier
4. Current Mirror
    a. Single Stage
    b. Two Stage
5. Differential Amplifier
6. Operational Amplifier
    a. Single Stage,Two Stage

    Also draw the layout of the above mentioned experiments

## ADVANCED COMMUNICATION LAB

**Subject code : 10ECL68** **examhours : 03**

**No .of hrs/week : 3** **CIE marks : 50**

**SEE marks : 50**

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Lab* |
| ***Course Title*** DSP lab | ***Course Code*****:** 10ECL68 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 3hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITE BY TOPIC:**

Fundamentals of analog communication and some exposure to microwave, antenna and wave propagation.

**OUTCOME OF THE COURSE**

The specific course outcomes supporting the program outcome are-

- Students will get a basic knowledge digital modulation techniques ask, fsk, dpsk and qpsk.
- They get hands on experience on micro strips.
- Students get hands on experience to use microwave test branch.
- They get experience to use fiber optic kit

## Course Contents

1. TDM of two band limited signals.
2. ASK generation & detection
3. FSK generation & detection.
4. PSK generation & detection.
5. DBSK generation & detection.
6. QPSK generation & detection.
7. PCM generation & detection using codec chip.
8. Measurement of losses in a given optical fiber (propagation loss, bending loss) and numerical aperture.
9. Measurement of power & VSWR in a microwave test bench.
10. Measurement of guide wavelength and frequency in microwave test bench.
11. Measurement of gain & directivity of standard dipole antenna (printed dipole antenna).
12. Measurement of gain & directivity of micro strip patch antenna.
13. Measurement of gain & directivity of printed YAG antenna.
14. Determination of coupling and isolation characteristics of strip line or micro strip line directional coupler.
15. Measurement of resonance characteristics of micro strip ring resonator and determination of dielectric constant of the substrate.
16. Measurement of power division & isolation characteristics of a micro strip 3 db power divider.

# SYLLABUS FOR VII SEMESTER

## COMPUTER COMMUNICATION NETWORK

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** CCN | ***Course Code*****:** 09EC71 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITE**

- Satisfactory completion of understanding of basics of physics course on electronics.
- Ability to understand analog and digital communication.
- Ability to describe and transform the programming.
- Ability to perform simple jobs in pseudo codes.

Ability to use a computer to prepare written reports and to perform basic data reduction, graphing, and engineering data presentation

**COURSE OUTCOME**

- This subject made the student to have the ability to apply knowledge of mathematics, probability, and statistics to model in the field of computer networking.
- They also acquire the knowledge of layered architecture TCP/IP and ISO/OSI model used for computer communication.
- In addition to this students learnt the details of flow control, error control, routing, segmentation, domain name server resolution, application layer details.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT-I

**Introduction:** Layered tasks, OSI Model, Layers in OSI model, TCP/IP Suite, Addressing, Telephone and cable networks for data transmission, Telephone networks, Dial up modem,DSL, Cable TV for data transmission.

*Text1: Ch 2* **9 Hrs**

## UNIT-II

**Data link control:** Framing, Flow and error control, Protocols, Noiseless channels and noisy channels, HDLC.

**Multiple access:** Random access, Controlled access, Channelisation

*Text 1: Ch.11. 11.1 to 11.6,Ch 12*

**9Hrs**

**UNIT - III**

**Wired LAN:** Wired LAN, Ethernet, IEEE standards, Standard Ethernet. Changes in the standards, Fast Ethernet, Gigabit Ethernet, Wireless LAN IEEE 802.11

**Connecting LANs:** Connecting LANs, Backbone and Virtual LANs, Connecting devices, Back bone Networks, Virtual LANs

*Text 1: Ch 13, Ch 14. 14.1,Ch 15*

**9Hrs**

**UNIT -IV**

**Network Layer:** Network Layer, Logical addressing, Ipv4addresses, Ipv6 addresses, Ipv4 and Ipv6Transition from Ipv4 to Ipv6.*Text 1: Ch 19 and 20*

**9 Hrs**

**UNIT V**

**Delivery:** Delivery, Forwarding, Unicast Routing Protocols, Multicast Routing protocols.

**Transport Layer:** Transport layer Process to process Delivery, UDP, TCP, Domain name system, Resolution

*Text 1: Ch 22. 22.1 to 22.4, Ch 25. 25.1 to 25.5*

**9**Hrs

**Books:**

1. B Forouzan, " Data communication and networking", TMH ,4th Edition, 2006.

**Reference Books**:

1. James F. Kurose, Keith W. Ross, "Computer networks", Pearson education, 2nd Edition, 2003.

2. L L Petreson and B S Davie, "Computer Networks a systems approach", Morgan Kauffman/ Elsevier ,4th Edition, 2007.

## INFORMATION THEORY AND CODING

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** ITC | ***Course Code*****:** 09EC72 |

| | |
|---|---|
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES:**

- Students should have the knowledge of mathematics, matrix, digital communication, and digital electronics

**COURSE OUTCOME**

- Upon completion of this course, students will understand to define and apply the basic concepts of information theory, entropy etc
- Students will be able to calculate the capacity of communication channels, sketch Shannon's proof regarding the limits of error-free communication.
- Students will be able to analyze the entropy and mutual information.
- Students will get to know channel capacity and coding for noisy channels, capacity for different channel models (with emphasis on discrete memory less channels and Gaussian channels), finite field theory, design and analysis of error correcting codes with a focus on linear block codes.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Information Theory:** Introduction, Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Mark-off statistical model for information source, Entropy and information rate of mark-off source.

**Source Coding**: Encoding of the source output, Shannon's encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels.

*Text 1: Ch 4. 4.1, 4.2, 4.3, 4.4, 4.5, 4.6.*

9**Hrs**

## UNIT-II

**Fundamental Limits on Performance:** Source coding theorem, Huffman coding, discrete memory less Channels, Mutual information, Channel Capacity, Channel coding theorem.

*Text 2: Ch 2. 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8.* **9Hrs**

## UNIT-III

**Differential entropy and mutual information for continuous ensembles:** Channel capacity Theorem. Introduction to Error Control Coding: Introduction, Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding.

*Text 1: Ch 9. 9.1,9.2Text 2: Ch 2. 2.8, 2.10*

**9Hrs**

## UNIT-IV

**Binary Cycle Codes**, Algebraic structures of cyclic codes, Encoding using an (n-k) bit shift register, Syndrome calculation. BCH codes. RS codes, Golay codes, shortened cyclic codes, Burst error correcting codes.

*Text 1: Ch 9. 9.3, 9.4, 9.5.*

**9Hrs**

## UNIT-V

**Burst and Random Error correcting codes**. Convolution Codes, Time domain approach. Transform domain approach.

*Text 1: Ch 9. 9.5, 9.6, 9.7 9.8.*

**9Hrs**

**Text Books:**

1. K. Sam Shanmugam, "Digital and analog communication systems", John Wiley, 1996.

2. Simon Haykin, "Digital communication", John Wiley, 2003.

**Reference Books:**

1. Ranjan Bose, "ITC and Cryptography", TMH, II Edition, 2007

2. Glover and Grant**; "**Digital Communications" Pearson Edition, 2nd Edition, 2008

## POWER ELECTRONICS

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** power electronics | ***Course Code*****:** 09EC733 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge of mathematics, basic electrical, basic electronics, analog electronics, microelectronics, digital electronics, microcontroller/DSP/FPGA and signals and systems

**COURSE OUTCOME**

On successful completion of Power Electronics course the student will be able to:

- Understand the basic operation of various power semiconductor devices and passive components.
- Learn the principles of operation of power electronic converters.
- Describe the role of Power Electronics in various applications such as energy conservation, renewable energy, transportation etc.

- Understand the basic principle of switching circuits.
- Specify appropriate power electronic converter circuits for common applications.
- Use SCR, DIAC, TRIAC, BJT, MOSFET and IGBT for power control applications.
- Design the controllers for power electronic converters to control AC and DC motors including pulse width modulation.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT 1**

**Introduction:** Power semiconductor devices, applications of power electronics, power semiconductor devices, control characteristics, types of power electronic circuits, peripheral effects.

**Power BJTs:** Switching characteristics, switching limits, base-drive control, introduction to IGBTs, isolation of gate and base drives,

*.Text1: Ch1, 1.1, 1.3, 1.4, 1.5, 1.7, Ch 8, 8.2, 8.5, 8.8* **9 Hrs**

## UNIT II

**Thyristors:** Commutation Techniques: Introduction, natural commutation, forced commutation: self-commutation, impulse commutation, resonant pulse commutation and complementary commutation, External Pulse commutation, load side commutation, Line side commutation. *Text 1*: *Ch 7, 7.1 to 7.3*

**9 Hrs**

## UNIT III

**AC Voltage Controllers**: Introduction, principle of ON-OFF and phase control, single-phase bidirectional controllers with resistive loads.

**Controlled rectifiers**: Introduction, principle of phase controlled converter operation, single-phases,Semionverters,fullconvertersanddualconverters.

*Text1: Ch 6, 6.1 to 6.4, Ch 5, 5.1 to 5.5* **9**

**Hrs**

## UNIT IV

**DC Choppers:** Introduction, principle of step-down and step-up choppers, step-down chopper with RL loads, performance parameters. Chopper classification, analysis of impulse commutated thyristor chopper (only qualitative analysis).

*Text1: Ch9, 9.1 to 9.6 & 9.8* **9**

**Hrs**

## UNIT V

**Inverters**: Introduction, principle of operation, performance parameters, single phase bridge inverters, three phase inverters, voltage control of single phase inverters, current source inverter, variable DC link inverter.

*Text 1: Ch10, 10.1 to 10.7 and 10.11* **9**

**Hrs**

**Textbook:**

1. M. H. Rashid, “Power Electronics”, Prentice Hall of India Pvt. Ltd., /Pearson (Singapore -Asia) New Delhi, 2nd Edition, 2002

**Reference Books:**

1. G. K. Dubey, S. R. Doradla, A. Joshi& R.M.K. Sinha, " Thyristorized Power Controllers", New Age International (P) Ltd. Publishers, 9th Reprint, 1999.
2. M. D. Sing and Khanchandani K. B, "Power Electronics", TMH Publishing Company Limited, 2001.
3. Cyril W.Lander, "Power Electronics", McGraw Hill, 3rd Edition,

## HUMAN RESOURCE MANAGEMENT

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** ITC | ***Course Code*****:** **09ECH74** |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 36hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge of willingness to understand the human psychology
- Students should be in a position to differentiate human resource from other resources available in the organization
- Students should have some idea about the responsibility of the job

**COURSE OUTCOME**

- Students will be in position to develop inter-personnel and intra-personal skills
- They will be in a position to understand feelings and emotions of the people
- Students can understand the importance and worth of the human resource and also enhance communication skills and body language

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

UNIT-I

Nature & scope of HRD: Definition, Importance, Problems & suggestions & measures, Role & functions of HRM, Need for HR planning & limitation.
Job analysis & role analysis: uses & methods.
New economic policy, How can India emerge a winner: Labor issues in India, HRM & Poverty, Implication for HRM,
Managing change through continuous improvement: Introduction, challenges, investment in employees for organizational success, new environmental issues, effect of competition on HRM, continuous improvement using tools.
Techniques for HRM: Definition of Bench marking, B.M process & steps for effective bench marking, Bench Marking HR policies & practices, types of bench marking, Strategic HRM & Business performance, Business process re-engineering, Tools for improvement in organization in addition to bench marking & business process reengineering a) Urgency motivation b) HR Accounting/ HR audit.
Quality management: Definition of TQM, Features, Tenets, elements, effective implementation of TQM, Need & advantages of TQM, Pitfalls in TQM, "CRISIS" in TQM implementation, objective of quality control, Quality Audit & its need, Quality Audit for Quality control,
*Text1: Ch 1 &Ch 2*

7Hrs

UNIT II

Performance appraisal: Formats, Roll of assessors & Reviewers, $360^0$ appraisal, Potential appraisal: Objective & importance, Identification of training needs, methodologies, Importance of evaluation of training results.

Planning: Successor planning, Career planning: Career development cycle, model for self development, Man power planning: Definition, uses, benefits, steps.

*Text1: Ch 10, 11, 12*

7Hrs

UNIT III

Recent Techniques in HR management: Employees for lease, Moon lighting-blue or full moon, dual career group, consequences of HRM techniques, Flexi time, Flexi work, training, management participation in employee organization, functions, consumer participation in collective gaining. Collaboration management: a Multidimensional approach, employee's proxy, human resource accounting, organizational politics, exit policy & practice, attrition control, How to implement VRS.

*Text1: Ch 13, 14, 15* 7 Hrs

UNIT IV

Future of HRM: Elements of future good HRD, good HRD & its benefits, need for realignment approach to evaluate HR function, HRD scorecard & Job evaluation techniques, what is HRD audit, methods followed in audit & limitations of HRD audit, components of audit, Impact of good HRD practices.

*Text1: Ch 4, 5, 9, 10, 16*

7Hrs

UNIT V

HR in IT industries & Case studies: HR & organizational molding, HR & organizational effectiveness, HRM techniques

*Text1: Ch 15*

8Hrs

Text Book:


1. Prof. P.A. Noronha, "HR Management & Practices", Symbiosis centre for distance Learning, Aug 2004

Reference Books:

1. P. Subba Rao, "Personal & HRM", Himalaya Publication, 2002
2. T.V. Rao, Raja Rao, Maya, "360$^{o}$ feedback & performance management system"
3. T.V. Rao,"HRD Audit"
4. Dr. R.S. Arora & N.A Vazrani, "Developing & management & H R Development"
5. Ashok Chandra & Shilpa, "Human Resource strategy"
6. K. Ashwathappa, "HRM text & Cases", TMH, 4$^{th}$ edition
7. Prof K. Sridhar, "Total quality management", Himalaya Publication,1$^{st}$ edition, 2004


## ELECTIVE C

## SATELLITE COMMUNICATION

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Core elective* |
| ***Course Title*** Satellite communication | ***Course Code*****:** 09EC751 |

| | |
|---|---|
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREUISITES**

- Students should have the knowledge of mathematics, communication

**COURSE OUTCOME**

- Gives confidence to work in the area related to satellite communication.
- Conversant with link calculation and in a position to solve problems related with the received power in a station
- Analyze the data and interpret the results received at monitoring stations
- To explore the possibilities using the satellites for other applications such as earth resource finding out, prediction of natural calamities and weather forecasting.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Introduction:** History, Overview

**Orbital Mechanics and Launchers:** Orbital mechanics, Look angle Determination, Orbital perturbations, Orbit determination, Launches and Launch Vehicles, Orbital effects in communications Systems performance

*Text: Ch.1:1.1 to 1.4, Ch.2:2.1 to 2.6*

**7Hrs**

## UNIT II

**Satellite:** Satellite subsystems, Attitude and orbit control systems(AOCS), Telemetry, Tracking, Tracking, Command and Monitoring, Power Systems, Communications subsystems, Satellite antennas, Equipment Reliability and space qualification tests.

**VSAT System:** Introduction, Overview of VSAT systems, Network Architecture VSAT systems, Network Architecture VSAT Earth Station Engineering

*Text: Ch.3:3.1 to 3.7, Ch.9:9.1 to 9.3, 9.6*

**7Hrs**

## UNIT III

**Satellite Link Design**: Introduction, Basic Transmission Theory, System Noise Temperature and G/T Radio, Design of Downlinks, satellite Systems using Small Earth Stations, Uplink Design, Design for Specified C/N:Combining C/N and C/I valudes in Satellite Links, System Design Examples

*Text: Ch.4:4.1 to 4.8*

**7Hrs**

## UNIT IV

**Multiple Access:** Introduction, Frequency Division Multiple Access, Intermodulation, Intermodulation Example, Calculation of C/N with Intermodulation, Time Division multiple access, Demand Access Multiple Access (DAMA), Code Division Multiple Access(CDMA)

**Error Control for Digital Satellite Links:** Implementation of Error Detection on Satellite Links

*Text Ch6:6.1, 6.2, 6.3, 6.5, and 6.8 Ch.7:7.6*

**7Hrs**

**UNIT V**

**Low Earth Orbit and Non-Geo-stationary satellite Systems:**

Introduction, Orbit Considerations, Coverage and Frequency Considerations, Delay and Throughput Considerations, Operational NGSO Constellation Design-Iridium, Teledesic *Ch.10:10.1 to 10.4, 10.6*

**Satellite Navigation and the Global Positioning System**

Radio and Satellite Navigation, GPS position Location Principles, GPS receivers and Codes

Text: *Ch.10:10.1 to 10.4, 10.6, Ch* 12:12.1, 12.2, 12.3

**8Hrs**

**Text Book:**

**1.**Charles Bostian, Jeremy Allnutt , Timothy Pratt, "Satellite Communications", John Wiley & Sons-II Edition.

**Reference Book:**

1. Dennis Roody "Satellite Communications", Mc Graw Hill.

## CYPTOGRAPHY & NETWORK SECURITY

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** Cryptography and network security | ***Course Code*****:** 09ECO762 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge of mathematics, algorithms and networking

**COURSE OUTCOME**

- Student will be able to account for the cryptographic theories, principles and techniques that are used to establish security properties.
- Analyze and use methods for cryptography, the techniques for access control and intrusion detection.
- Student will have an understanding of the themes and challenges of network security, the role of cryptography, reflect about limits and applicability of methods.
- The student will have developed a critical approach to the analysis of network security, and will be able to bring this approach to bear on future decisions regarding network security

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.

- Three internals, 30 Marks each will be conducted and the Average of best of two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

- **UNIT I**

- Overview: Services, Mechanisms and attacks, OSI security architecture, Model for network security. Classical Encryption Techniques: Symmetric cipher model, Substitution techniques, Transposition techniques, Rotor machine, Steganography.

- **Block Ciphers and DES (Data Encryption Standards):** Simplified DES, Block cipher principles,DES, Strength of DES, Block cipher design principles, Block cipher modes of operation. 8 hrs

- **UNIT II**

- **Public Key Cryptography and RSA:** Principles of public key cryptosystems, RSA algorithm.

- **Other Public Key Crypto Systems and Key Management:** Key management, Diffie-Hellman key exchange, Elliptic curve arithmetic, Elliptic curve cryptography.
- 8 hrs

- **UNIT III**

- **Message Authentication and Hash Functions:** Authentication requirements, Authentication functions, Message authentication codes, Hash functions, Security of hash functions and MAC's.

- **Digital Signature and Authentication Protocol:** Digital signature, Authentication protocols, Digital signature standard.
- **Authentication Applications:** Kerberos, X.509 authentication service, Kerberos encryption technique.
- 8 hrs

- **UNIT IV**

- **Electronic Mail Security:** Pretty good privacy, S/MIME, Data compression using ZIP, Radix-64 conversion, PGP random number generator.
- **IP Security:** Overview, IP security architecture, Authentication header, ESP (encapsulating security pay load), Security associations, Key management.

- 8 hrs
- **UNIT V**
- **Intruders:** Intruders,Intrusion detection,Password management
- **Firewalls:** Firewall design principles; Trusted systems.
- 4 hrs
- **Text Book:** William Stallings, "**Cryptography and Network Security"**, 3rd edition, Pearson Education (Asia) Pvt. Ltd./ Prentice Hall of India, 2003.
- **Reference Books**
- C. Kaufman, R. Perlman, and M. Speciner, "**Network Security: Private Communication in a Public World**", 2nd edition, Pearson Education (Asia) Pvt. Ltd., 2002.
- 
- Atul Kahate, "**Cryptography and Network Security**", Tata McGraw-Hill, 2003.
- Eric Maiwald, "**Fundamentals of Network Security**", McGraw-Hill, 2003.
- 

## DIGITAL IMAGE PROCESSING

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** digital Image Processing | ***Course Code*****:** 09ECO763 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

- Students should have knowledge of signals and Systems and Digital Signal Processing.
- Knowledge of differentiation and Integration and other mathematical concepts..
- Knowledge of Fourier Transforms

**Course Outcomes:**

- Student will be able to analyze and solve real world problem by applying appropriate algorithm.
- Students will be able to understand the fundamentals of DIP concepts and its applications.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Assignment/course project based test. 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT - I

**Digital Image Fundamentals**: Introduction to Image Processing, Overview, Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Elements of Visual Perception. Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels Linear and Nonlinear Operations.

*Text1: Ch1, Ch2*

**7Hrs**

## UNIT - II

**Image Transforms:** Introduction about 1-D and 2-D transforms, review of Fourier transforms. Properties of unitary transforms, two dimensional discrete Fourier transform, discrete cosine transform, sine transform, Hadamard transform, Haar transform, Hadamard transform, Haar transform.

*Text2: Ch5*

**7Hrs**

## UNIT – III

**Image Enhancement:** Introduction, Image Enhancement in Spatial domain, Some Basic Gray Level Transformations Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Introduction, Image Enhancement in the Frequency Domain,

Smoothing Frequency-Domain Filters, Sharpening Frequency Domain Filters, Homomorphic Filtering.

*Text1:Ch3, Ch4*

**7Hrs**

**UNIT - IV**

**Image Restoration**: Introduction, A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only-Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function , Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Geometric Transformations

*Text1: Ch5*

**7Hrs**

**UNITV**

**Color Image Processing:** Color Fundamentals, Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening.

*Text1: Ch6*

**8Hrs**

**Text Books:**

1. Rafael C. Gonzalez and Richard E.Woods, " Digital Image Processing", Pearson Education, 2nd Edition, 2001.

2. Anil K. Jain, "Fundamentals of Digital Image Processing" , Pearson Education, PHI, 2001.

**Reference Books:**

1. B. Chanda and D. Dutta Majumdar "Digital Image Processing and Analysis", PHI, 2003

2. Tamal Bose, "Digital Signal and Image Processing", John Wiley and Sons, Inc -2003

# POWER ELECTRONICS LAB

**Semester:** VII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** PE lab | ***Course Code*****:** 09ECL77 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 3hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

## PREREQUISITES

Knowledge of mathematics, basic electrical, basic electronics, analog electronics, microelectronics, digital electronics, microcontroller/DSP/FPGA and signals and systems

## COURSE OUTCOME

On successful completion of Power Electronics course the student will be able to:

- Understand the basic operation of various power semiconductor devices and passive components.
- Learn the principles of operation of power electronic converters.
- Describe the role of Power Electronics in various applications such as energy conservation, renewable energy, transportation etc.
- Understand the basic principle of switching circuits.
- Specify appropriate power electronic converter circuits for common applications.
- Use SCR, DIAC, TRIAC, BJT, MOSFET and IGBT for power control applications.
- Design the controllers for power electronic converters to control AC and DC motors including pulse width modulation.

## Teaching Methodology:

- Blackboard teaching
- PowerPoint presentations (if needed)

- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

Experiments to find the

1) Static characteristics of SCR and TRIAC
2) Static characteristics of MOSFET and IGBT
3) Controlled HWR and FWR using RC triggering circuit
4) SCR turn off using i) LC control ii) Auxiliary commutation
5) UJT firing circuit for HWR and FWR circuits.
6) Generation of firing signals for thyristors/trials using digital circuits /microprocessor
7) AC voltage controller using tric –diac combination.
8) Single phase fuzzy controlled Bridge converter with R and RL load
9) Voltage (impulse) Commutated chopper both constant frequency and variable frequency

Operation.

10) Speed control of separately exited DC motor
11) Speed control of universal motor
12) Speed control of Stepper motor
13) Parallel /series inverter.

# VLSI LAB

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Lab* |
| ***Course Title*** VLSI lab | ***Course Code*****:** 10ECL67 |
| | ***Credits:*** 1.5 |
| ***Total Contact Hours*****:** 3hrs/week | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

Satisfactory completion of understanding of basics of semiconductor theory in physics.

Satisfactory knowledge of Analog Electronic Circuits.

Satisfactory knowledge of Digital Electronics

**COURSE OUTCOME**

- Student will learn about fundamentals of Mixed mode VLSI Circuits.
- They would study the theoretical aspects of CMOS circuits. With this knowledge they will be able to design CMOS Analog circuits.

  This knowledge will give the students to get placement opportunities in core VLSI companies within the country and also abroad

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

Conduct the DC, AC and Transient Analysis for a given circuit

1) Inverter
2) Common Source Amplifier
3) Common Drain Amplifier
4) Current Mirror
5) Single Stage
6) Two Stage
7) Differential Amplifier
8) Operational Amplifier
9) Single Stage,Two Stage
10) Also draw the layout of the above mentioned experiments

# SYLLABUS FOR VIII SEMESTER

## WIRELESS COMMUNICATION

**Semester:** VIII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Regular Course* |
| ***Course Title*** Wireless communication | ***Course Code*****:** 09EC81 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge of mathematics, analog and digital communication

**COURSE OUTCOME**

- Ability to apply knowledge of mathematics, probability theory, and statistics to model analyze wireless communication. Student will be in a position to calculate path lossess suffered by the signals in urban as well as in rural environment
- After completing this course students will have the basic understanding of wireless communication systems at the root level. The student will be in a position to take up responsible assignements in manufacturing and marketing areas
- They will be in a position to acquire familiarity with the state of the art technologies like GSM, CDMA and personal communication systems, in addition to an ability to

understand the advanced wireless technologies like wirelesss LAN , wireless MAN, PAN, Bluetooth etc.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Introduction to Wireless Communication Systems:** Evolution of Mobile radio Communications, Mobile Radiotelephony, Mobile Radio Systems around the World, Examples of Wireless Communication Systems, Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems, Comparison of Common Wireless Communication Systems, Trends in Cellular Radio and Personal Communication Systems.

**The Cellular Concept- System Design Fundamental:** Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System capacity, Trunking and Grade of Service, Improving Coverage& capacity in Cellular Systems.

*Text1: Ch 1, Ch 3* **9Hrs**

## UNIT II

**Mobile Radio Propagation: Large Scale Path Loss:**Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering, Practical Link Budget Design Using Path Loss Models, Outdoor propagation Models, Indoor Propagation Models, Signals Penetration into Buildings, Ray Tracing and Site Specific Modeling.

*Text: Ch 4* **9Hrs**

**UNIT III**

**Mobile Radio Propagation: Small –Scale Fading and Multipath:** Small-Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-scale Fading.

**Speech Coding** :Characteristics of Speech Signals, Quantization Techniques, Adaptive Differential Pulse Code Modulation, Frequency Domain Coding of Speech, Vocoders, Linear Predictive Coders, Choosing Speech Coders for Mobile Communications, The GSM Codec, The USDC Codec, Performance Evaluation of Speech Coders

*Text: Ch 5. 5.1 to 5.5, Ch. 8*

**9Hrs**

**UNIT IV**

**Modulation Techniques for Mobile Radio:** Digital Modulation-an overview, Line Coding, Pulse Shaping Techniques, Geometric Representation of Modulation Techniques, Linear Modulation technique, Constant Envelope Modulation Techniques.

*Text: Ch 6.6.1 to 6.9*

**9Hrs**

**UNIT V**

**Multiple-Access (MA) Schemes:** Introduction to FDMA,TDMA,SDMA, Packet radio, capacity of cellular system, Introduction to wireless Networks, Difference between Wireless and Fixed Telephone Networks, Public Switched telephone Networks, Limitations in Wireless networking, Merging Wireless networks and PSTN

*Text: Ch 9, Ch 10, 10.1, 10.2*

**9Hrs**

**Text Books:**

1. Theodore S.Rappaport, "Wireless Communications-Principles and practice", Pearson Education, 2Edition, 2002

**Reference Books:**

1. Dr.Kamilo Fehel , "Wireless digital Communications", PHI.
2. William C.Y.Lee, "Mobile Communications Engineering, - Theory and applications", McGraw-Hill, 2nd Edition,1995.
3. John W.Mark , "Wireless Communications and Networking ".

## Elective D

## FIBER OPTIC COMMUNICATION

**Semester:** VIII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Core elective* |
| ***Course Title*** Fiber optic communication | ***Course Code*****:** 09ECE822 |
| ***L-T-P:*** 3-1-0 | ***Credits:*** 04 |
| ***Total Contact Hours*****:** 45hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**PREREQUISITES**

- Knowledge of physics, mathematics, optoelectronics, analog and digital communication

**COURSE OUTCOME**

- Student will be able to work efficiently in activities like establishing a fiber optical link which is perhaps the most extensively used mode of communication.
- Students will be able to understand working of state of the art equipments used in medical electronics where optical fiber finds application.
- Students will learn the different technologies available for optical amplifiers, the structure and uses of directional couplers, uses of erbium-doped fiber amplifiers. Also the main difference between lasers and LEDs used as light sources for optical-fiber communications systems.
- They will be able to draw up a power budget for an optical-fiber communication link and use it to estimate the maximum link distance.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

## UNIT I

**Overview of optical fiber communication:** Advantages of optical fiber communication, Basic principles, Fiber modes and configuration, step index and graded index structures, Fiber materials, Fiber fabrication, Mechanical properties of fibers, Fiber optic cables.

**Signal Degradation in optical fibers**: Attenuation, Signal distortion in optical Waveguides, Pulse broadening in graded index in graded index waveguides, Mode Coupling and Design optimization of single mode fibers.

*Text 1: Ch 2.2 to 2.10 and 3.1 to 3.5* **7 Hrs**

**UNIT II**

**Optical sources:** Basic characteristics of light sources for communication, LED sources and LASER diodes sources, Hetero junction structure.

**Optical Detectors:** Physical principles of photo diode, PIN photo diodes and AVALANCHE photo diodes and their responses.

*Text 1:Ch 4.1 to 4.3 and 6.1 to 6.3* **7 Hrs**

**UNIT III**

**Power launching and coupling**: Source of fiber power launching, Lensing schemes for Coupling improvement, fiber to fiber joints, LED coupling to single mode fibers, Fiber Splicing, optical fiber connectors.

**Optical receiver operation:** Fundaments receiver operations, digital receiver Performance calculation, Pre amplifier types, Analog receiver.

*Text 1: Ch 5.1 to 5.6 and 7.1 to 7.5* **7 Hrs**

**UNIT IV**

**Analog systems:** Overview of analog links, Carrier to noise ratio, Multi channel Transmission techniques.

**Digital Transmission systems:** Point to point links, System considerations, Link power Budget, Rise time budget, Line coding for optical fiber links multiplexing, Error Correction.

*Text 1:Ch 8.1 to 8.3 and 9.1 to 9.3* **7 Hrs**

**UNIT V**

**Advanced systems and techniques:** Operational principles of Wavelength division multiplexing, passive components, Optical amplifiers, Local area networks, SONET/SDH networks, Photonic switching, and non linear optical effects.

*Text 1: Ch 10.1 to 10.2 and 12.1 to 12.5 & Ch 11* **8 Hrs**

**Text Book**:

1. Gerd Keiser, "Optical fiber communication", MC Graw Hill, 3Edition, 2000.

**Reference Books:**

1. John Gowar, "Optical communication systems", PHI, 2001
2. D.C Agarwal, Wheeler "Fiber optic communication".

## OPEN ELECTIVE II

## ADHOC WIRELESS NETWORKS

**Semester:** VIII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** Adhoc Wireless Network | ***Course Code*:** |

| | |
|---|---|
| | 09ECO832 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

Students are expected to have the following topical knowledge upon entering this course:

- Satisfactory completion of understanding of basics of data communication.
- Ability to describe and transform the simple protocols via programming.
- Ability to understand computer communication network and transport protocols.

**Course Outcomes:**

The specific course outcomes supporting the program outcomes are:

1. Ability to apply knowledge of mathematics, probability, and statistics to model and analyze some adhoc networking protocols.
2. Ability to design, implements, and analyze simple adhoc and wireless sensor networks.
3. Ability to use techniques, skills, and modern networking tools necessary for engineering practice.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT I**

**AD HOC NETWORKS And MAC Protocols:** Introduction, Issues in Ad hoc wireless networks,Ad hoc wireless internet. Issues in designing a MAC protocol for Ad hoc wirelessNetworks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols

**8Hrs**

**UNIT II**

Contention - based MAC protocols with scheduling mechanism, MAC protocols that use directional antennas, Other MAC protocols.

**ROUTING PROTOCOLS FOR AD HOC WIRELESS NETWORKS:**

Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols,

**8Hrs**

**UNIT III**

**TRANSPORT LAYER PROTOCOLS FOR AD HOC WIRELESS NETWORKS:** Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks.

**7 Hrs**

**UNIT IV**

**SECURITY:** Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning.

**7 Hrs**

**UNIT V**

**QUALITY OF SERVICE IN AD HOC WIRELESS NETWORKS:**Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions.

**5 hrs**

**TEXT BOOK:**

1. **"Ad hoc wireless Networks"**, C. Siva Ram Murthy & B. S. Manoj, Pearson Education, 2nd Edition, reprint 2005.

**REFERENCE BOOKS:**

1. **"Ad hoc wireless Networks"**, Ozan K. Tonguz and Gianguigi Ferrari, Wiley
2. **"Ad hoc wireless Networking"**, Xiuzhen Cheng, Xiao Hung, Ding- Zhu Du, Kluwer Academic publishers.

## ASIC DESIGN

**Semester:** VIII **Year:** 2013-14

| | |
|---|---|
| ***Department:*** *ELECTRONICS AND COMMUNICATION* | *Open elective* |
| ***Course Title*** ASIC design | ***Course Code*****:** 09ECO833 |
| ***L-T-P:*** 3-0-0 | ***Credits:*** 03 |
| ***Total Contact Hours*****:** 35hrs | ***Duration of SEE*****:** 3 hrs |
| ***SEE Marks***: 50 | ***CIE Marks*****:** 50 |

**Pre-requisites:**

Students are expected to have the following topical knowledge upon entering this course:

- Satisfactory completion of understanding of basics of semiconductor theory in physics.
- Satisfactory knowledge of Analog Electronic Circuits.
- Satisfactory knowledge of Digital Electronics.

**Course Outcomes:**

The specific course outcomes supporting the program outcomes are:

- Students will get a basic knowledge of VLSI design flow.
- They will know how to optimize the layout and learn the concepts of floor planning.
- They will get know the basic concept of routing.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.

- Assignment based test, two tests, 10 Marks each. Best of two will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT I**

Introduction: Full custom with ASIC, Semi customs ASIC'S, Standard cell based ASIC, gate Array based ASIC, channeled gate array, channelless gate array, structured gate array, Programmable logic devices, FPGA Design Flow,ASIC cell libraries.

DataLogic Cells: Data path elements, Adders, Multipliers, arithmetic operator, I/O cell, cell compliers

**8hrs**

**UNIT II**

ASIC library design: Logical effort:Practising delay,logical area and logical efficiency, logical path, multistage cells, optimum delay, optimum number of stages, library cell design.

**6hrs**

**UNIT III**

Low level design entry: Schematic entry:hierarchical design, the cell library , names, schematics, icons & symbols, nets ,schematic entry for ASIC's, coonections, vectored instances & buses, edit in place attributes, netlist, screener, back annotation.

**7hrs**

UNIT IV

Programmable ASIC:Programmable ASIC logic cell, ASIC I/O cell, A brief introduction to low level design language: An introduction to EDIF, PLA tool, An introduction to CFI

design representation. Half gate ASIC, Introduction to Synthesis & Simulation

**7hrs**

**UNIT V**

ASIC construction Floor planning& placement & routing: Physical design, CAD tools, System portioning, Estimating ASIC size, Partioning methods, floor planning tools, I/O & power planning, clock planning, placement algorithms, iterative placement improvement, time driven placement methods. Physical, design flow: Global routing, local routing, Detailed routing, Special routing, Circuit extraction & DRC

**8hrs**

**Text books:**

M.J.S Smith-" Application-Specific Integrated Circuits"-Pearson Education 2003

**Reference books:**


1) Jose E France, Yannis Tsividis," Design Of analog-Digital VLSI circuits for Telecommunication & signal processing", Prentice Hall 1994
2) Malcolm R Haskard, Lan C May,"Analog VLSI Design-NMOS & PMOS", Prentice Hall 1998


**ARM PROCESSOR**

*Semester:* VIII Year: 2011-12

| | |
|---|---|
| *Course Title*: ARM PROCESSOR | *Course Code*: 08ECO834 |
| *Total Contact Hours*: 35 Hrs. | *Duration of SEE*: 3 hrs |
| *SEE Marks*: 50 | *CIE Marks*: 50 |
| *Credits:03* | *Open elective* |

**PREREQUISITES:**

Knowledge of microprocessors, microcontrollers.

**COURSE OUTCOMES:**

Upon completion of this course

1. Students will understand the complete architecture and instruction sets of ARM processor.
2. Students will be able to write programs to reduce computational and processing time and to save memory space.

**Teaching Methodology:**

- Blackboard teaching
- PowerPoint presentations (if needed)
- Regular review of students by asking questions based on topics covered in the class

**Assessment Methods**

- Two Surprise Tests, 10 Marks each. Best of two tests will be taken.
- Assignment based test, two tests, 10 Marks each. Best of two will be taken.
- Three internals, 30 Marks each will be conducted and the Average of best two will be taken.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

**UNIT I**

**ARM Embedded Systems & ARM Processor Fundamentals:** Introduction, RISC and ARM design philosophy, embedded system hardware and software. Registers, current program status registers, pipeline, exceptions, interrupts and the vector table, core extensions, architecture revisions and ARM processor families.
*Text 1: Ch. 1: 1.1 to 1.4, Ch. 2: 2.1 to 2.7*

5**Hrs**

**UNIT-II**

**Introduction to the ARM Instruction set:** Data-processing instructions, branch instructions, Load-Store instructions, Software Interrupt Instruction, Program status register instructions, Loading constants, ARMv5E Extensions, Conditional Execution.
*Text 1: Ch 3. 3.1 to 3.8*

**8Hrs**

**UNIT-III**

**Thumb Instruction Set:** Thumb register usage, ARM-Thumb Interworking, Other Branch Instructions, Data Processing Instructions, Single-Register Load-Store

Instructions, Multiple-Register Load-Store Instructions, Stack Instructions, Software Interrupt Instruction
*Text 1: Ch. 4.1 to 4.8*

**8Hrs**

**UNIT-IV**

**Writing and Optimizing ARM Assembly Code:** Writing Assembly Code, Profiling and Cycle counting, Instruction scheduling, Register allocation, Conditional execution, Looping constructs, Bit manipulation, Efficient switches, Handling unaligned data.

*Text 1: Ch. 6.1 to 6.9*

**7Hrs**

**UNIT-V**

**Memory Management Units:** Moving from an MPU to an MMU, How virtual memory works, Details of the ARM MMU, Page Tables, The Translation Lookaside Buffer, Domains and Memory access permission, The caches and Write Buffer.
*Text 1: Ch 14.1 to 14.7*

**7Hrs**

**Text Book:**

1. Andrew N. Sloss, Dominic Symes and Chris Wright, "ARM System Developer's Guide- Designing and Optimizing System Software", Morgan Kaufmann Publishers- Elsevier, 2004.

**Reference Book:**

1. Jason R Andrews, "Co-Verification of Hardware and Software for ARM SoC Design", Newnes- Elsevier, 2005.