

COURSE OBJECTIVES

- To introduce electric circuits and its analysis
- To impart knowledge in solving circuits using network theorems.
- To introduce the phenomenon of resonance in coupled circuits.
- To analyze the transient response of circuits.
- To know the concepts of duality.

UNIT I BASIC CIRCUITS ANALYSIS 9

Ohm's Law – Kirchhoff's laws – DC and AC Circuits – Resistors in series and parallel circuits – Mesh current and node voltage method of analysis for D.C and A.C. circuits – Phasor Diagram – Power, Power Factor and Energy.

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 9

Network reduction: voltage and current division, source transformation – star delta conversion - Thevenin and Norton Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 9

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits – Double tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 9

Transient response of RL, RC, RLC circuits using Laplace transform for DC input and A.C. with sinusoidal input – Characterization of two port networks in terms of Z, Y, h and ABCD parameters.

UNIT V CONCEPTS OF DUALITY 9

Concept of duality, Dual network, Graphs of a network, Trees, twig, link and branches, Incidence matrix, Tieset matrix and cutset matrix of a graph, Inverse networks and equalizers - Applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- analyze electrical circuits
- apply circuit theorems
- analyze AC and DC Circuits
- design resonance circuits
- understand the concepts of Duality

TEXT BOOKS

1. William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", Tata McGraw Hill publishers, 6th edition, New Delhi, 2003.
2. Joseph A. Edminister, Mahmood Nahri, "Electric circuits", Schaum's series, Tata McGraw-Hill, New Delhi, 2001.
3. Sudhakar A and Shyam Mohan SP, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2007.

REFERENCES

1. M Russell, Mersereau and Joel R. Jackson, "Circuit Analysis- A System Approach", Pearson Education, 2007.
2. Chakrabati A, "Circuits Theory (Analysis and synthesis)", Dhanpath Rai & Sons, New Delhi, 1999.
3. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw Hill, 2003.
4. Robert L. Boylestad, "Experiments in Circuit Analysis to Accompany Introductory Circuit Analysis", Prentice Hall, 2000.

WEB LINKS

1. <http://www.electronics-tutorials.ws/>
2. www.electrical4u.com
3. <http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/esc102/index.html>
4. http://www.tina.com/1200_problems_and_examples
5. www.circuits-magic.com
6. www.zen22142.zen.co.uk

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes(POs)														
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO2	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO4	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO5	3	3	3	-	-	-	-	-	-	-	3	-	3	3



COURSE OBJECTIVES

- To learn the basics of diode and rectifiers
- To study the basics and characteristics of BJT
- To understand the basics and characteristics of FET
- To know the basics of special semiconductor devices, power devices and display devices
- To be familiar with the theory, construction, and operation of Basic electronic devices.

UNIT I	SEMICONDUCTOR DIODE	9
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PN junction diode, Current equations, Diffusion and drift current densities, forward and reverse bias characteristics, Switching Characteristics. Clipping & Clamping Circuits – Voltage multipliers using diodes- Half wave and full wave rectifier.

UNIT II BIPOLAR JUNCTION 9

NPN -PNP -Junctions-Early effect-Current equations – Input and Output characteristics of CE, CB CC-Hybrid - π model - h-parameter model, Ebers Moll Model- Multi Emitter Transistor.

UNIT III FIELD EFFECT TRANSISTORS 9

JFETs – Drain and Transfer characteristics, Current equations-Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET- Current equation - Equivalent circuit model and its parameters, FINFET, DUAL GATE MOSFET.

UNIT IV SPECIAL SEMICONDUCTOR DEVICES 9

Metal-Semiconductor Junction- MESFET, Schottky barrier diode-Zener diode- PIN Diode- Varactor diode –Tunnel diode- Gallium Arsenide device. LASER diode. LDR.

UNIT V	POWER DEVICES AND DISPLAY DEVICES	9
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UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS - LED, LCD, Photo transistor, Opto Coupler, Solar cell, CCD.

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- gain knowledge in the theory, construction, and operation of semiconductor diode
- understand the basics and characteristics of BJT
- know the basics and characteristics of FET
- be familiar with the concepts of special semiconductor devices, power devices and display devices.
- use the basic electronic devices

TEXT BOOKS

1. J Millman, C. Halkias & Satyabrata JIT "Electronic Devices and Circuits", Tata McGraw-Hill, 2007.
2. Donald A Neaman, "Semiconductor Physics and Devices", Third Edition, Tata McGrawHill Inc. 2007.
3. Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory" Pearson Education 2006.

REFERENCES

1. Christo Papadopoulos, "Solid State Electronic Devices", Springer-Verlag, New York, 2014
2. Thomas L. Floyd, "Electronic Devices", Merrill, 1992
3. Yang, "Fundamentals of Semiconductor devices", McGraw Hill International Edition, 1978.
4. David A. Bell, "Electronic Devices and Circuits", Prentice Hall, 1986

WEB LINKS

1. www.electronics-tutorials.ws/
2. <http://www.radio-electronics.com>
3. www.allaboutcircuits.com
4. <http://textofvideo.nptel.iitm.ac.in/122106025/>
5. www.electronicsforu.com
6. www.chegg.com

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Programme Outcomes(POs)														
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CO2	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO3	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO4	3	3	3	-	-	-	-	-	-	-	3	-	3	3
CO5	3	3	3	-	-	-	-	-	-	-	3	-	3	3



COURSE OBJECTIVES

To enable the students to

- gain the knowledge about circuit theorem
- learn about characteristics of electronic devices
- understand the characteristics of photo devices

LIST OF EXPERIMENTS

1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems
3. Verification of superposition Theorem
4. Verification of Maximum power transfer and reciprocity theorems
5. Frequency response of series and parallel resonance circuits
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET
11. Characteristics of Diac and Triac
12. Characteristics of Photodiode and Phototransistor

TOTAL: 30 PERIODS

COURSE OUTCOMES

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

- impart knowledge by analyzing and verifying the circuit theorems.
- analyze the characteristics of electronic devices
- acquire the knowledge of Photo devices

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CO2	3	3	3	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	3	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable the students to

- understand the basic concepts of biasing
- study the concept of small signal Amplifiers
- study the Multistage Amplifiers
- learn various types of Large Signal Amplifiers
- know about rectifiers, filters and power supplies

UNIT I TRANSISTOR BIASING 9

Transistor Biasing, Methods of Transistor Biasing - DC load line, AC load line, Quiescent point, variation due to uncertainty in β , Effect of temperature on the Q-point, Stability factor analysis, Bias compensation techniques, FET Biasing.

UNIT II MID-BAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS 9

Two-Port Networks, Analysis of a Transistor Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, and CB Configuration using Approximate Model, BJT Amplifiers, Small Signal Analysis of Single Stage BJT Amplifiers, Miller's Theorem and its Dual, Design of Single Stage RC Coupled Amplifier using BJT, Differential Amplifiers & Methods of improving CMRR.

UNIT III MULTISTAGE AMPLIFIERS 9

Different Coupling Schemes used in Amplifiers, General Analysis of Cascade Amplifiers, Choice of Transistor Configuration in Cascade Amplifier, Direct Coupled Amplifiers, Two Stage RC Coupled Amplifier, Transformer Coupled Amplifier, Methods of increasing input impedance, Cascode Amplifiers.

UNIT IV HIGH FREQUENCY AND LARGE SIGNAL AMPLIFIERS 9

General Shape of Frequency Response of Amplifiers, High Frequency π model for a Transistor- Large Signal Amplifiers - Introduction, Classification Based on Biasing Condition - Class A, Class B, Class C Power Amplifiers, Thermal Stability and Heat Sink.

UNIT V POWER SUPPLIES, RECTIFIERS AND FILTERS 9

Linear Mode Power Supply - Rectifiers - Half wave rectifier - Full wave rectifier – Bridge rectifier & Comparison - Filters and its types - Voltage Regulators – Switched Mode Power Supply

TOTAL PERIODS 45

COURSE OUTCOMES

At the end this course, students will be able to

- explain the concept of biasing
- elaborate about the small signal amplifiers

- analyze various multistage amplifiers
- demonstrate the concept of large signal amplifiers
- explain about the power supplies, rectifiers and filter design

TEXT BOOKS

1. L.Schilling Donald, Charles below, —Electronic CircuitsI, 3rd edition, McGraw Hill, 1989.
2. Salivahanan.S, Sureshkumar.N, —Electronic Devices and CircuitsI, 3rd edition, McGraw Hill, 2014

REFERENCES

1. Jacob Millman, Christos C.Halkias, — Electronic Devices and CircuitsI, Tata McGraw Hill,1991
2. Donald.A.Neamen, —Electronic Circuit Analysis and DesignI, 2nd edition, Tata McGraw Hill, 2007
3. Adel.S.Sedra, Kenneth C.Smith, —Micro Electronic CircuitsI, 5th edition, Oxford University Press, 2004.

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CO1	3	3	3	3	3	3	-	-	-	-	-	3	3	3
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CO3	3	3	3	3	3	3	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	3	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	3	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- understand the fundamentals and simplification of digital logic
- design the various combinational circuits
- study and design synchronous sequential circuits
- design and implement asynchronous sequential circuits
- acquire basic knowledge about memory devices and HDL programming

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean functions Minimization of Boolean functions– Karnaugh map Minimization – Tabulation Method - Don't care Conditions. Logic Gates- Implementations of Logic Functions using gates - NAND – NOR implementations - TTL - CMOS - NAND, NOR, NOT – Tristate gates

UNIT II COMBINATIONAL CIRCUITS 9

Design procedure of Combinational circuits: Adders- Subtractors – Parallel and serial adder/ Subtractor - Carry look ahead adder- BCD adder - 2 bit Magnitude Comparator- Multiplexer, Demultiplexer - Encoder, Decoder – Parity generator and checker – Code converter.

UNIT III SEQUENTIAL CIRCUITS 9

Flip flops – Triggering – Realization of flip flop using other flip flops – Asynchronous and Synchronous counters – Classification of sequential circuits – Moore and Mealy - Design of Synchronous counters – Modulo-n counter - Ring counters- Shift registers.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table – state assignment – Excitation table – cycles – Race Free State assignment – ASM Chart - Hazards: Static –Dynamic – Essential – Hazards elimination.

UNIT V MEMORY DEVICES AND INTRODUCTION TO HDL 9

Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM EAPROM, RAM – RAM organization – Write operation – Read operation– Memory decoding – memory expansion – Static RAM Cell - Bipolar RAM cell – Dynamic RAM cell. Programmable Logic Devices – PLA – PAL - FPGA - Introduction to HDL – Simple programs Using Verilog HDL

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the realization of boolean functions using various techniques

- design and implement combinational circuits
- design and implement synchronous sequential circuits
- design and study the effect of hazards in asynchronous sequential circuits
- elaborate the concepts of memories and HDL.

TEXT BOOKS

1. M. Morris Mano, —Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 .
2. H. Charles Roth Jr, —Digital System Design using VHDL, Thomson/ Brookscole, 2005.(Unit V)

REFERENCES

1. S. Salivahanan and S. Arivazhagan, —Digital Circuits and Design, 3rd Edition, Vikas Publishing House Pvt.Ltd, New Delhi, 2007.
2. John .M Yarbrough, —Digital Logic Applications and Design, Thomson Publications, New Delhi,2007.
3. Charles H.Roth, —Fundamentals of Logic Design, Thomson Publication Company, 2003.
4. Donald P.Leach and Albert Paul Malvino, —Digital Principles and Applications, 5th edition, Tata Mc-Graw Hill Publishing Company Limited, New Delhi, 2003.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

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CO3	3	3	3	3	3	2	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	2	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	2	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- learn the basic concepts of continuous time and discrete time signals and systems
- analyze signals and systems using different transforms
- know about the analysis and realization of LTI Continuous Time systems
- acquire the basic knowledge in Sampling and Z transform
- understand about the analysis and realization of LTI Discrete Time systems

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS**15**

Continuous time signals (CT signals) - Discrete time signals (DT signals) – Step, Ramp, Pulse, Impulse, Exponential, basic operation on signals, classification of CT and DT signals –periodic and aperiodic signals, Energy & Power signals - CT systems and DT systems -Properties - LTI system Properties. .

UNIT II ANALYSIS OF CONTINUOUS TIME SIGNALS**15**

Fourier series - definition, properties and analysis - Fourier transform - definition, properties and analysis - Laplace Transform – definition, ROC, properties and signal Analysis – Unilateral Laplace Transform.

UNIT III LINEAR TIME INVARIANT – CONTINUOUS TIME SYSTEMS**15**

Differential Equation - impulse response, Step response and output response - Fourier and Laplace transforms in analysis of continuous time (CT)systems - Block diagram representation - Direct Form I Direct Form II - Cascade and Parallel Realization

UNIT IV ANALYSIS OF DISCRETE TIME SIGNALS**15**

Sampling Theorem – Reconstruction – Aliasing - DTFT and properties - z-transform - Region of Convergence - Properties of ROC - Properties of z-transform - Inverse z-transform using Partial fraction expansion.

UNIT V LINEAR TIME INVARIANT – DISCRETE TIME SYSTEMS**15**

Difference Equations using Z transform - Impulse response - Analysis of Discrete time systems using DTFT and Z Transform - Block diagram representation -Direct Form I - Direct Form II - Cascade and Parallel Realization.

TOTAL PERIODS**75****COURSE OUTCOMES**

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

- explain the basic concepts of solving problems in continuous time and discrete time signals and systems
- analyze signals and systems using different transforms
- analyze problems and solutions relating to LTI – continuous time systems
- demonstrate the analysis of Sampling and Z transform .
- elaborate about LTI – discrete time systems

TEXT BOOKS

1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, —Signals and Systems, Pearson, Indian Reprint, 2007

REFERENCES

1. S.K.Poornachandra, —Signals and Systems, Third edition, Tata McGraw-Hill.
2. B P Lathi, —Linear Systems and Signals, Oxford University Press Inc, Chennai, 2004
3. H P Hsu, Rakesh Ranjan, —Signals and Systems, Schaum's Outlines, Tata McGraw Hill, Indian Reprint 2007.
4. John Alan Stuller, —An Introduction to Signals and Systems, Thomson, 2007

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CO3	3	3	3	3	3	2	-	-	-	-	-	3	3	3
CO4	3	3	3	3	3	2	-	-	-	-	-	3	3	3
CO5	3	3	3	3	3	2	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- learn the theories of DC machines
- understand concepts and construction of transformers
- study the concepts and construction in electrical generators, motors
- learn the concepts of Electronic measurement systems
- gain knowledge of the importance of digital instruments in measurements

UNIT I DC MACHINES 9

Construction of DC machines – Theory of operation of DC generators – types— emf equation-Characteristics of DC generators - Operating principle of DC motors –torque equation- Types of DC motors and their characteristics – Speed control of DC motors – Applications.

UNIT II TRANSFORMERS 9

Single phase transformer- construction and principle of operation – EMF equation of transformer- Transformer on no load– Transformer on load –Equivalent circuit of transformer- Transformer losses and efficiency-All day efficiency –open circuit test- short circuit test-auto transformer.

UNIT III AC MACHINES 9

Construction of single-phase induction motors, Types of single phase induction motors—Equivalent circuit-Torque equation- Principles of alternator – Construction- Equation of induced EMF- synchronous motors- V curves applications

UNIT IV MEASUREMENT SYSTEMS 9

Measurement systems –Static and dynamic characteristics –error - moving coil, moving iron meters Multimeter - Bridge measurements: Wheat stone, Maxwell, Hay, Schering, Anderson and Wien bridge

UNIT V DIGITAL INSTRUMENTS AND DATA ACQUISITION SYSTEMS 9

Digital Voltmeter-Digital Multimeter-Digital RLC meters-Digital Storage Oscilloscope Digital frequency meterUniversal counter timer-Digital Data Acquisition System-Overview of PC Based instrumentation.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the concept of DC machines
- elaborate the concepts of transformers
- comprehend the concepts of AC machines



COURSE OBJECTIVES

To enable the students to

- learn the systematic way of solving problems
- understand the different methods of organizing large amounts of data To understand Object oriented concepts in generic programming
- introduce linear, non-linear data structures and their applications
- introduce linear, non-linear data structures and their applications
- efficiently implement the different data structures

UNIT I PRINCIPLES OF OOP 9

Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program – Tokens - Data types Dynamic initialization - Reference variables- Scope resolution operator - Member dereferencing operators Memory management operators - Type casting- Function Prototyping- call by value, call by reference- Inline function- Default arguments – Function overloading.

UNIT II CLASSES AND OBJECTS 9

Class specification- Access qualifiers - Static data members and member functions - Array of objects- Objects as function arguments - Friend functions - Returning objects - Local classes - Constructors and Parameterized Constructors - Overloaded Constructors - Constructors with default arguments - Copy constructors – Dynamic constructors - Dynamic initialization using constructors- Destructors - Operator Overloading: Operator function – Overloading unary and binary operator - Type Conversion- this pointer

UNIT III INHERITANCE AND POLYMORPHISM 9

Basic Principle – Use of Inheritance-Defining Derived classes- Single Inheritance-Protected Data with private Inheritance - Multiple Inheritance - Multi level inheritance - Hierarchical Inheritance - Hybrid Inheritance Multipath inheritance - virtual functions - Array of pointer to base class objects - Abstract classes – Virtual destructors – Dynamic Binding - Virtual Base Class – Templates – function templates and class templates Exception handling.

UNIT IV LINEAR DATA STRUCTURES 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists –Polynomial Manipulation - Stack ADT – Queue ADT -Evaluating arithmetic expressions

UNIT V NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Binary tree representation and traversals – AVL trees – Graph and its representations Graph Traversals - Representation of Graphs - Breadth first search- Depth first search- Connected components

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design problem solutions using object oriented techniques

- apply the concepts of data abstraction, encapsulation and inheritance for problem solutions
- use the control structures of c++ appropriately
- critically analyze the various algorithms.
- apply the different data structures to problem solutions

TEXT BOOKS

1. E.Balagurusamy, —Object Oriented Programming with C++I, Tata McGraw Hill, Sixth Edition, 2013
2. Mark Allen Weiss, —Data Structures and Algorithm Analysis in C++I, Third Edition, AddisonWesley, 200

REFERENCES

1. Bhushan Trivedi, 'Programming with ANSI C++, A Step-By-Step approachI', Oxford University Press, 2010.
2. BjarneStroustrup, —The C++ Programming LanguageI, 3rd Edition, Pearson Education, 2007.
3. Ellis Horowitz, SartajSahni and Dinesh Mehta, —Fundamentals of Data Structures in C++I, Galgotia Publications, 2007.
4. Goodrich, Michael T., Roberto Tamassia, David Mount, —Data Structures and Algorithms in C++I, 7th Edition, Wiley. 2004.

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CO5	3	3	3	3	3	2	-	-	3	-	-	3	3	3



COURSE OBJECTIVES

To enable students to

- gain knowledge about frequency response of different types of amplifiers
- learn about transfer characteristics of Differential and power amplifiers
- know about the response of amplifiers
- understand about different types of rectifiers

LIST OF EXPERIMENTS

1. Design of biasing methods using BJT
2. Determination of the Frequency response of any one configuration (CE/CB/CC) of BJT amplifier
3. Determination of the Frequency response of any one configuration (CS/CG/CD) of FET amplifier
4. Design Class A power amplifiers and determination its efficiency
5. Design Class B power amplifiers and determination its efficiency
6. Measurement of CMRR of differential amplifier
7. Determination of the bandwidth of Cascade/Cascode amplifier
8. Determination of the efficiency and ripple factor of half wave/full wave rectifier

SIMULATION USING PSPICE /MULTISIM/EQUIVALENT SOFTWARE PACKAGE

9. Simulation of BJT amplifier Configurations (CE/CB/CC)
10. Simulation of differential amplifiers

TOTAL PERIODS 60

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- explain the working condition and frequency response of different types of Amplifiers
- comprehend the Differential and power amplifiers
- analyse the bandwidth of multi-stage, Cascade and Cascode amplifiers elaborate about measurement of CMRR
- determine the efficiency and ripple factor of half and full wave rectifier

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CO3	3	3	3	3	3	3	-	-	3	-	-	-	3	3
CO4	3	3	3	3	3	3	-	-	3	-	-	-	3	3



COURSE OBJECTIVES

To enable students to

- design and implement Adders and Subtractors
- design and implement code converters
- get the knowledge about design and implementation of combinational and sequential logic circuits
- acquire the knowledge about simulation of digital circuits with Verilog HDL

List of Experiments

1. Design and implementation of Full and Half Adders and Full and Half Subtractors using logic gates.
2. Design and implementation of code converters using logic gates
 - i. BCD to excess-3 code convertors and vice versa.
 - ii. Binary to gray code convertors and vice-versa.
3. Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483.
4. Design and implementation of 2 Bit Magnitude Comparator using logic gates
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using basic logic gates and study of IC 74160 and IC 74164.
7. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147.
8. Construction and verification of 4 bit ripple counter and Mod-n Ripple counters.
9. Design and implementation of 3-bit synchronous up (or) down counter.
- 10 Implementation of 3- bit shift registers using Flip flops
- 11 Design and Simulation of Full and Half Adders, Full and Half Subtractors, Multiplexer and De-multiplexer.
- 12 Encoder and Decoder, 4 bit Ripple Counter using Verilog HDL.

TOTAL PERIODS**60****COURSE OUTCOMES**

Upon the completion of the course, students will be able to

- design Adders and Subtractors using basic logic gates and karnaugh map
- create code converters using basic logic gates
- analyze the combinational and sequential logic circuits
- Simulate digital circuits with Verilog HDL

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COs	Programme Outcomes(POs)
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	-	-	3	-	-	-	3	3
CO2	3	3	3	3	3	3	-	-	3	-	-	-	3	3
CO3	3	3	3	3	3	3	-	-	3	-	-	-	3	3
CO4	3	3	3	3	3	3	-	-	3	-	-	-	3	3



COURSE OBJECTIVES

To enable students to

- be familiarized with good programming design methods, particularly Top- Down design.
- getting exposure in implementing the different data structures using C++
- efficiently implement the different data structures
- analyze solutions for specific problems

LIST OF EXPERIMENTS

1. Write C++ Programs using Classes and Objects.
2. Write C++ classes with static members, methods with default arguments, friend functions.
3. Develop C++ Programs using Operator Overloading.
4. Develop C++ Programs using constructor, destructor, and copy constructor.
5. Develop C++ Programs using Inheritance, Polymorphism and its types.
6. Develop C++ Programs using Templates and Exceptions.
7. Design C++ Program for Array implementation of List Abstract Data Type (ADT).
8. Design C++ Program for Linked list implementation of List ADT.
9. Design C++ Program for Stack ADT - Array and linked list implementations.
10. Design C++ Program for Queue ADT – Array and linked list implementations.
11. Design C++ Program for Search Tree ADT - Binary Search Tree.

TOTAL PERIODS 60**COURSE OUTCOMES**

Upon the completion of the course, students will be able to

- identify and apply object oriented concepts like abstraction, encapsulation, modularity, hierarchy.
- estimate various metrics specific to object oriented development
- design and implement C++ programs for manipulating stacks, queues, linked lists, trees, and graphs.
- apply the different data structures for implementing solutions to practical problems.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

Software: Turbo C++.

Hardware: Flavor of any WINDOWS or LINUX and Standalone desktops 30 Nos.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	3
CO2		3	3										3	3
CO3				3	3	3		3					3	3
CO4				3	3		3		3			3	3	3



COURSE OBJECTIVES

To enable the students to

- acquire knowledge of the random variables and manipulate.
- understand the concepts of standard distributions methods
- analyze the relationship between the two random variables
- provide necessary basic concepts in probability and random processes related to communication engineering domain.
- correlate the function and properties of linear time invariant system

UNIT I RANDOM VARIABLES 15

Axioms of probability – Conditional probability – Total probability – Bayes' theorem - Random variable – Probability mass function – Probability density function – Properties - Moments – Moment generating functions and their properties

UNIT II STANDARD DISTRIBUTION 15

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions and their properties

Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression Transformation of random variables.

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 15

Classification – Stationary process – Poisson process – Markov Chain – Transition probabilities – Limiting Distributions

UNIT V CORRELATION AND SPECTRAL DENSITIES 15

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density – Properties. Linear time invariant system – System transfer function – Linear systems with random inputs – Autocorrelation and Cross correlation functions of input and output

TOTAL PERIODS 60

COURSE OUTCOMES

- understand the basic probability concepts
- acquire skills in handling situations involving more than one random variable and functions of random variables
- evolve with respect to time in a probabilistic manner
- analyze the response of random inputs to linear time invariant systems
- evaluate correlation and spectral densities of random variables.

TEXT BOOKS

1. T. Veerarajan. —Probability, Statistics and Random Processes, 2nd ed., Tata McGraw- Hill, New Delhi, 2008
2. Ibe.O.C., —Fundamentals of Applied Probability and Random Processes, Elsevier, 2nd Indian Reprint, 2010

REFERENCES

1. Cooper. G.R., McGillem. C.D., —Probabilistic Methods of Signal and System Analysis, 3rd Indian Edition, Oxford University Press, New Delhi, 2012.
2. Hsu and Hwei, —Schaum's Outline of Theory and Problems of Probability, Random variables and Random Processes, Tata McGraw – Hill, New Delhi, 2008.
3. Leon-Garcia, Albert, —Probability and Random Processes for Electrical Engineering, 2nd ed., Pearson Education, 2008.
4. Venkatachalam G., Probability and Random Process, Hitech Publishing Company Pvt.Ltd., Chennai, 3rd Edition, 2012.

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COs	Programme Outcomes(POs)													
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CO1	3	3	3	3	-	3	-	-	-	-	-	-	3	3
CO2	3	3	3	3	-	3	-	-	-	-	-	-	3	3
CO3	3	3	3	3	-	3	-	-	-	-	-	-	3	3
CO4	3	3	3	3	-	3	-	-	-	-	-	-	3	3
CO5	3	3	3	3	-	3	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable the students to

- To acquire knowledge about the feedback amplifiers
- To learn about tuned amplifiers
- To study the concepts of oscillator
- To study the wave shaping and multivibrator circuits
- To acquire the basics of blocking oscillators

UNIT I FEEDBACK AMPLIFIERS**9**

Classification of Basic Amplifiers, Basic Concept of Feedback, General Characteristics of Negative feedback Amplifiers, Transfer Gain with Feedback, Effect of Negative Feedback on Input Resistance and Output Resistance, Method of Identifying Feedback Topology, Voltage Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback, Stability of Feedback Amplifiers.

UNIT II OSCILLATORS**9**

Classification of Oscillators, Conditions for Oscillation, General form of an LC Oscillator Hartley Oscillator, Colpitts Oscillator, Clapp Oscillator, RC Oscillators, RC Phase Shift Oscillators, Wien-Bridge Oscillator, TwinT Oscillator, Crystal Oscillators.

UNIT III TUNED AMPLIFIERS**9**

Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned & Double tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Comparison of Tuned Amplifiers, Large Signal Class – C Tuned Amplifiers – Stability of Tuned Amplifiers, Hazeltine Neutralization.

UNIT IV WAVE SHAPING AND MULTIVIBRATOR CIRCUITS**9**

Waveform Shaping Circuits - Diode clippers – Clampers – Multivibrators - Triggering Methods for Bistable Multivibrators- Schmitt Trigger

UNIT V BLOCKING OSCILLATORS AND TIME BASE GENERATORS**9**

UJT Sawtooth Generator - Pulse Transformers - Blocking Oscillator and its types –Voltage and Current Time Base Circuits

TOTAL PERIODS 45**COURSE OUTCOMES**

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

- explain the concept of feedback amplifiers
- elaborate the concept of oscillators
- comprehend the concept of tuned amplifiers
- analyse various types of multivibrators
- explain the basic concepts of blocking oscillators

TEXT BOOKS

1. Donald L.Schilling, Charles Belove, —Electronic CircuitsI, 3rd edition, McGraw Hill, 1989.
2. Salivahanan.S, Sureshkumar.N, —Electronic Devices and CircuitsI, 3rd edition, McGraw Hill, 2014

REFERENCES

1. JacobMillman, Christos C.Halkias, —Electronic Devices and CircuitsI, Tata McGraw Hill, 1991.
2. F.Bogart Jr., —Electronic Devices and CircuitsI, 6th edition, Pearson Education, 2007.
3. Donald.A.Neamen, —Electronic Circuit Analysis and DesignI, 2nd edition, Tata McGraw Hill, 2007.
4. Adel.S.Sedra, Kenneth C.Smith, —Micro Electronic CircuitsI, 5th edition, Oxford University Press, 2004.

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable students to

- know the basics of communication
- understand various Amplitude modulation and demodulation systems
- acquire knowledge about various Angle modulation and demodulation systems
- know the working of transmitters and receivers.
- understand the effect of noise on communication systems.

UNIT I AMPLITUDE MODULATION **9**

Elements of an Electrical communication system-Communication channel and their characteristics
Need for modulation- Amplitude Modulation – Definition- single tone modulation-Phasor representations- power relations in AM waves- Generation of AM waves- Detection of AM Waves
DSB MODULATION : Double side band suppressed carrier modulators- time domain and frequency domain description-Generation of SSB AM Modulated Wave - Demodulation of SSB Waves-principles of Vestigial Side Band modulation, comparison of AM system.

UNIT II ANGLE MODULATION **9**

Basic concepts- Frequency Modulation & Phase Modulation: Single tone frequency modulation
Spectrum Analysis of Sinusoidal FM Wave- Narrow band FM- Phasor representation - Wide band FM
Constant Average Power- Transmission bandwidth of FM Wave - Generation of FM Waves: Direct and Indirect FM- Detection of FM Waves: Balanced Slope detector- Foster Seeley discriminator- Ratio detector- Phase locked loop method of FM detection- Comparison of FM and AM.

UNIT III RADIO TRANSMITTERS AND RECEIVERS **9**

Radio Transmitter - Classification of Transmitter: AM Transmitter- FM Transmitter – Variable reactance type and phase modulated FM Transmitter- frequency stability in FM Transmitter-Radio Receiver - Receiver Types - Tuned radio frequency receiver- Super heterodyne receiver- RF section and Characteristics - Frequency changing and tracking- Intermediate frequency- AGC- FM Receiver Amplitude limiting- Comparison with AM Receiver.

UNIT IV NOISE **9**

Noise sources and types -Noise figure- Calculation of noise figure- noise bandwidth- Equivalent noise resistance - Noise figure of cascaded stages-noise figure measurement- Noise temperature- Available Noise Power Noise in Analog communication System- Noise in DSB, SSB, AM and FM Systems
Threshold effect in FM System- Pre-emphasis & De-Emphasis in FM.

UNIT V INFORMATION THEORY **9**

Entropy - Discrete Memory less channels - Channel Capacity - Hartley - Shannon law - Source coding theorem - Huffman & Shannon - Fano codes.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- explain the basics of AM communication systems
- design Angle modulated communication systems

- elaborate the transmission and reception concept of communication system
- analyze the noise performance of AM and FM systems
- explain the concepts of Discrete Memoryless channels

TEXT BOOKS

1. Wayne Tomasi, "Electronic Communication Systems Fundamentals through Advanced", 5th Edition, Pearson Education Inc, 2004.

REFERENCES

1. H Taub & D. Schilling, Gautam Sahe, "Principles of Communication Systems", Tata McGraw Hill, 3rd Edition, 2007.
2. Simon Haykin, "Communication Systems", John Wiley, 5th Edition, 2009.
3. B.P. Lathi, "Communication Systems", BS Publication, 2006.

WEB LINKS

1. <http://nptel.ac.in/video.php?subjectId=117102059>
2. <https://www.youtube.com/watch?v=GqBSyLRHDeE>
3. <https://www.youtube.com/watch?v=Z-Hw3CpPVj0>

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	3	-	3	3
CO2	3	3	-	-	-	-	-	-	-	-	3	-	3	3
CO3	3	3	-	-	-	-	-	-	-	-	3	-	3	3
CO4	3	3	-	-	-	-	-	-	-	-	3	-	3	3
CO5	3	3	-	-	-	-	-	-	-	-	3	-	3	3



COURSE OBJECTIVES

To enable students to

- know the basics of operational amplifier
- learn linear and nonlinear applications of operational amplifier
- study the applications of analog multiplier and PLL
- understand the theory of analog and digital conversion
- know basic knowledge of special function IC's

UNIT I INTEGRATED CIRCUIT FABRICATION AND BASICS OF OPERATIONAL AMPLIFIER 9

Integrated Circuit classification, Fundamentals of Monolithic IC Technology, Basic Fabrication process Fabrication of a typical circuit – Active and passive components of ICs - Operational amplifier – Basic information of Op-Amps – Ideal Op Amp –operational amplifier Internal circuit– Examples of IC Op-Amps - DC, AC Characteristics of Op-Amp –virtual ground, frequency compensation techniques - slew rate.

UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS 9

Basic Op-Amp applications (sign changer, scale changer, voltage follower, adder and subtractor) – Instrumentation amplifier – Voltage-to-Current and Current-to-Voltage converter – Logarithmic amplifier - Anti-logarithmic amplifiers Differentiator - Integrator - Comparator – Schmitt trigger – Active filters – Design of Low pass, high pass and band pass filters – Precision rectifiers.

UNIT III ANALOG MULTIPLIER AND PLL 9

Analog multiplier IC – applications - Analysis of four quadrant and variable Trans-conductance multipliers –PLL: Basic principles-Phase Detector/Comparator- Voltage controlled Oscillator – Monolithic PLL - PLL applications – Frequency multiplier - AM, FM and FSK demodulators - Frequency synthesizers – Frequency translation.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Introduction - basic DAC techniques: Binary weighted resistor type – R-2R ladder type – sample and hold circuits – Analog to-Digital converters: Flash type ADC – Counter type ADC –Successive approximation register type ADC- Dual slope ADC – DAC / ADC Specifications.

UNIT V SPECIAL FUNCTION ICS 9

Waveform generators – Basic principles of sine wave oscillators – Astable and monostable multivibrators using Op-Amp ICL8038 Function Generator – 555 timer: description of functional diagram – Astable, monostable operation – IC 723 general purpose voltage regulator – switching regulator – Switched capacitor filter – LM380 audio amplifier – Opto couplers and fiber optic ICs.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- explain the basic concepts of operational amplifier
- elaborate the working and applications of operational amplifier

- explain about PLL applications in modulator circuits
- elaborate the working of analog and digital communication circuits
- demonstrate the working of special function IC's

TEXT BOOKS

1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., Fourth edition 2010.
2. Sergio Franco, "Design with operational amplifiers and analog integrated circuits", McGraw Hill, 3rd edition 2007.

REFERENCES

1. William D.Stanely, "Operational Amplifiers with Linear Integrated Circuits", Pearson Education, 2004.
2. David L.Terrell, "Op Amps-Design, Application, and Troubleshooting", Elsevier publications 2005.
3. Ramakant A. Gayakwad, "OP - AMP and Linear IC's", Prentice Hall, 1994.
4. Botkar K.R., "Integrated Circuits", Khanna Publishers, 1996.

WEB LINKS

1. http://www.ee.iisc.ernet.in/new/people/faculty/prasantg/downloads/opamp_circuits.pdf
2. http://cc.ee.ntu.edu.tw/~lhlu/eecourses/Electronics1/Electronics_Ch2.pdf
3. <http://www.electronics.dit.ie/staff/ypanarin/Lecture%20Notes/DT0214/7AnalogMultipliers%284p%29.pdf>
4. <http://astro.temple.edu/~silage/Chapter8MS.pdf>

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COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable the students to

- gain knowledge on control system modelling
- understand the concept of time domain analysis of control systems
- Acquire knowledge about the frequency response analysis using various plots
- study methods to analyze the stability of control systems
- know the concept of state variable analysis in control systems

UNIT I CONTROL SYSTEM MODELING 9

Basic Elements of Control System – Open loop and Closed loop systems - Differential equation – Transfer function concept- Modelling of Electric systems, Translational and rotational mechanical systems – Block diagram reduction Techniques – Signal flow graph – Mason's gain formula

UNIT II TIME RESPONSE ANALYSIS 9

Standard Test Signals - Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation

UNIT III FREQUENCY RESPONSE ANALYSIS 9

Frequency Response - Bode Plot, Polar Plot, Nyquist Plot - Frequency Domain specifications from the plots - Constant M and N Circles - Nichol's Chart - Nichol's Chart in Control System Analysis Series, Parallel, seriesparallel Compensators

UNIT IV STABILITY ANALYSIS 9

Stability-Location of roots in S plane for stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Nyquist Stability Criterion.

UNIT V STATE VARIABLE ANALYSIS 9

State space representation of Continuous Time systems – State equations- Transfer function from state Variable representation – Solutions of the state equations- Concepts of Controllability and Observability

TOTAL PERIODS 45

COURSE OUTCOMES

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

- determine the models of control systems and their representation
- Learn time domain techniques to design a control system
- understand the basic frequency response plots
- identify the major causes that affect the stability of a control system



EC16405 ELECTROMAGNETIC FIELDS AND WAVES
COURSE OBJECTIVES

3 0 0 3

To enable the students to

- study the fields and potentials due to static charges
- know about static magnetic fields
- understand how materials affect electric and magnetic fields
- learn the relation between the fields under time varying situations
- gain the knowledge of the propagation of uniform plane waves

UNIT I ELECTRICSTATIC FIELDS 9

Co-ordinate systems, Vector differential operators, Coulombs law, Divergence theorem, Stokes theorem, Electric field intensity – charge distribution, electric flux density –Applications of Gauss’s law, Electric potential, Electric dipole, Energy and Energy density.

UNIT II ELECRIC FIELDS IN MATERIAL SPACE 9

Conductors – Polarization in dielectrics, Dielectric constant and strength, Uniqueness theorem - continuity equation, Boundary conditions, Poisson’s and Laplace’s equation – General procedure for solving Poisson’s and Laplace’s equation– Resistance and Capacitance, Method of images.

UNIT III MAGNETOSTATIC FIELDS 9

Biot – Savart’s law, Ampere’s circuit law - Magnetic flux Density and Field intensity – applications of Ampere’s Law –Magnetic scalar and vector potentials -Force due to magnetic fields -Magnetic Torque and moment, Magnetization in materials, magnetic boundary conditions, Inductors and Inductances magnetic Energy – magnetic circuits.

UNIT IV TIME VARYING FIELDS AND MAXWELL’S EQUATIONS 9

Faradays law, Transformer and motional electromotive forces, The equation of continuity for time varying fields – Inconsistency of Ampere’s Law - Maxwell’s equation, Displacement current, time varying potentials – time harmonic fields – Electromagnetic spectrum.

UNIT V ELECTROMAGNETIC WAVE PROPAGATION 9

Wave propagation in lossy dielectric – plane waves in lossless dielectrics-plane waves in free space-plane waves in good conductors-power and the Poynting vector-Reflection of plane waves at normal incidence\ Reflection of plane wave at oblique incidence- Transmission line analogy-Application Note- microwaves.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- analyze field potentials due to static changes
- analyze the effect of field on materials

- analyze field intensity due to static magnetic fields
- analyze the relation between the fields under time varying situations □
- explain the principles of propagation of uniform plane waves

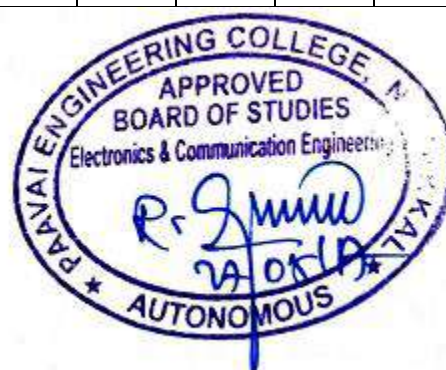
TEXT BOOKS

1. Mathew.N.O.Sadiku, —Principles of ElectromagneticsI, Oxford UniversityPress,2011
2. E.C. Jordan and K.G. Balmain, —Electromagnetic Waves and Radiating SystemsI, Printice-hall of India/PHI , 2nd edition, 2007.

REFERENCES

1. Kraus, Fleisch, —Electromagnetics with ApplicationsI, McGraw-Hill, 2005
2. David .K.Cheng, —Field and wave ElectromagneticsI, 2nd edition, Pearson education, 2004.
3. Karl E.Longman and Sava V.Savov, —Fundamentals of Electro-MagneticsI, Prentice Hall of India, 2006
4. W.H.Hayt and A.Buck, —Engineering ElectroMagneticsI, 7th Edition, McGraw Hill, 2006

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
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CO3	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO4	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable students to

- gain hands on experience in designing feedback amplifiers
- acquire the knowledge about the design of oscillators
- learn the simulation software used for circuit design
- understand the concepts of Multivibrators

LIST OF EXPERIMENTS

1. Design of Feedback amplifier circuits
2. Frequency response of class C tuned amplifier
3. Design of integrator and differentiator
4. Design of RC oscillators (RC Phase shift / Wien bridge/Twin-T)
5. Design of LC oscillators (Hartley /Colpitts /Clapp)
6. Design of multivibrators (Astable / monostable / bistable)
7. Design of clippers and clampers

SIMULATION USING PSPICE /MULTISIM/EQUIVALENT SOFTWARE PACKAGE

1. Simulation of clippers and clampers
2. Simulation of Multivibrators
3. Simulation of integrator and differentiator

TOTAL PERIODS**60****COURSE OUTCOMES**

Upon the completion of the course, students will be able to

- Analyze feedback amplifiers
- Learn about differential and power amplifiers
- Design of oscillators and Multivibrators for the given specifications
- Analyze electronic circuits through simulation

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
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CO3	-	3	3	-	3	3	-	-	-	-	-	-	3	3
CO4	-	3	3	-	3	3	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable students to

- study the application of operational amplifier
- know the design of multivibrators using operational amplifier and 555 timer
- design oscillators and active filters in various applications.
- simulate the Op-Amp application circuits using PSPICE software

LIST OF EXPERIMENTS**Design and testing of**

1. Inverting, Non inverting amplifier and differential amplifier
2. Instrumentation amplifier
3. Integrator and Differentiator
4. Active low pass, High pass and band pass filters.
5. Astable, Monostable Multivibrators and Schmitt trigger (using IC 741)
6. Phase shift Oscillator and Wien bridge oscillators (using IC 741)
7. Astable and monostable Multivibrators using NE555 Timer
8. Frequency multiplier using PLL IC
9. Voltage regulation using LM317 and LM723

Simulation Experiments

10. Simulation of (i) Instrumentation amplifier, (ii) Integrator and Differentiator, (iii) Active low pass, High pass and band pass filters, (iv) Astable, Monostable Multivibrators and Schmitt trigger (using IC 741), (v) Phase shift Oscillator and Wien bridge oscillators (using IC 741)

TOTAL PERIODS**60****COURSE OUTCOMES**

Upon the completion of the course, students will be able to

- design and test the Op-amp applications
- design oscillators and multivibrators for various applications
- analyze the working of power supply
- simulate circuits using Op-amp

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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CO2	3	3	-	3	3	-	-	-	-	-	-	3	3	3
CO3	3	3	-	3	3	-	-	-	-	-	-	3	3	3
CO4	3	3	-	3	3	-	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- study the basics of different digital communication techniques.
- understand the concept of eye pattern to analyze ISI.
- study detection and estimation techniques used in receivers.
- acquire knowledge about the performance of various digital modulation techniques.
- understand the error control coding techniques for data transmission

UNIT I PULSE MODULATION**9**

Sampling process – Quantization – PCM – Noise Consideration in PCM Systems – TDM – Differential Pulse Code Modulation – Adaptive Differential Pulse Code Modulation – Delta Modulation – Adaptive Delta Modulation.

UNIT II BASEBAND TRANSMISSION**9**

Properties of Line Codes – Power Spectral Density of Unipolar / Polar RZ & NRZ – Bipolar NRZ ISI – Nyquist criterion for distortion less transmission – Pulse shaping – Correlative coding – Eye Pattern – Equalization.

UNIT III DETECTION AND ESTIMATION**9**

Gram-Schmidt Orthogonalization Procedure, Correlation Receiver, Matched Filter Receiver. Estimation: MAP Criteria, Maximum Likelihood Estimation.

UNIT IV DIGITAL MODULATION TECHNIQUES**9**

Signaling scheme, Generation, Detection, Probability of error and Power Spectral Density of Coherent Modulation Techniques: BPSK, BFSK, QPSK, QAM – Non Coherent Binary Modulation Technique: FSK – Differential Phase Shift Keying.

UNIT V ERROR CONTROL CODING**9**

Channel coding theorem – Linear block codes – Cyclic codes – Convolution codes – Viterbi Algorithm, Trellis Coded Modulation.

TOTAL PERIODS**45****COURSE OUTCOMES**

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

- apply the concept of sampling and pulse code modulation for analog signals.
- apply the concept of Eye pattern to analyze in ISI.
- comprehend the detection and estimation techniques used in receivers.
- compare about digital modulation techniques.

- apply channel coding techniques for data transmission.

TEXT BOOKS

1. Simon Haykin, “Digital Communication”, John Willey, student reprint, 2006.
2. John G.Proakis, “Digital Communication” McGraw Hill Fourth Edition, 2008.

REFERENCES

1. Bernard Sklar, “Digital Communication, Fundamentals and Applications” Pearson Education Asia, Second Edition, reprint, 2002.
2. B.P.Lathi, “Modern Digital and Analog Communication Systems”, Third Edition, Oxford Press, 2007.
3. Leon W.Couch, “Digital and Analog Communication Systems, 6th Edition, Pearson Education, 2001.
4. A.F Molisch, ”Wireless Communication” John Wiley & Sons Ltd., 2005

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
Cos	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	1	2	1	-	-	2	-	-	2	3	3
CO2	3	2	1	1	2	-	-	-	2	-	-	2	3	3
CO3	3	-	-	1	2	1	-	-	-	-	-	2	3	3
CO4	3	-	-	1	2	-	-	-	-	-	-	2	3	3
CO5	3	2	1	1	2	1	-	-	2	-	-	2	3	3



COURSE OBJECTIVES

To enable the students to

- study the architecture of 8086 microprocessor.
- learn the design aspects of I/O and Memory Interfacing circuits.
- import knowledge about the architecture of 8051 microcontroller.
- acquire knowledge about programming of 8086 microprocessor.
- understand the concepts of interfacing microcontroller

UNIT I 8086 MICROPROCESSOR 9

Evolution of Microprocessors – 8086 Microprocessor architecture – Pipelining – Cache memory – Addressing modes - Instruction set and assembler directives– Modular Programming – Connecting Microprocessor and I/O devices –Stacks– Macros – Interrupts and interrupt service routines – Byte and String Manipulation– Assembly language programming

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing –System design using 8086 – I/O programming – Multiprogramming –Multiprocessor configurations –Closely coupled and loosely Coupled configurations – Coprocessor– Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, Keyboard display interface and Alarm Controller.

UNIT IV 8051 MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers (SFRs) – Ports of 8051 - Instruction set- Addressing modes - Assembly language programming – Introduction of PIC 16877

UNIT V INTERFACING MICROCONTROLLER 9

8051 Timer modes and Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC,DAC Interfacing - External Memory Interface –Case studies: Traffic light controller, Stepper Motor .

TOTAL PERIODS 45

COURSE OUTCOMES

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

- design and implement programs on 8086 microprocessor.
- analyze and design multiprocessor system
- explain the concept of I/O devices.

- elaborate the memory interfacing circuits.
- design and implement 8051 microcontroller based systems.

TEXT BOOKS

1. Krishna Kant, “Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096”. PHI 2007.
2. Kenneth J.Ayala, “The 8051 Microcontroller Architecture, Programming and applications”, Second edition, Penram International.

REFERENCES

1. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson education, 2011
2. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”, TMH, 2012
3. Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family Architecture, Programming and Design”, Second Edition, Prentice Hall of India, 2007.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	3	-	-	-	-	-	-	-	-	3
CO4	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	-	3	3



- ## TEXT BOOKS

- ## REFERENCES

- Andreas Antoniou, “Digital Signal Processing”, Tata Mc Graw Hill, 2006.

COURSE OBJECTIVES

To enable the students to

- be familiar with propagation of signals through lines
- understand signal propagation at radio frequencies
- understand radio propagation in guided systems
- study the concepts of resonators
- impart knowledge about the error control coding techniques for data transmission

UNIT I TRANSMISSION LINE THEORY AND PARAMETERS 15

Introduction to different types of transmission lines , Transmission line Equation –Solution –Infinite line concept -Distortion less line –loading –input impedance, Losses in Transmission lines–Reflection loss, Insertion loss, return loss, Transmission line parameters at radio frequencies.

UNIT II IMPEDENCE MATCHING AND TRANSFORMATION 15

Reflection Phenomena –Standing waves – $\lambda/8$, $\lambda/4$ & $\lambda/2$ lines- $\lambda/4$ Impedance transformers, Stub Matching – Single and Double Stub –Smith Chart and Applications – Solution of Problems using smith chart.

UNIT III FILTER DESIGN 15

Characteristic impedance of symmetrical networks - Filter fundamentals, Design of filters: Constant K –LPF, HPF and BPF Filter design, m-derived filters - Composite filters, Fundamentals of Attenuators and Equalizers

UNIT IV RECTANGULAR WAVE GUIDES 15

Waves between Parallel Planes –characteristic of TE , TM and TEM waves , Velocities of propagation, Solution of wave Equation in Rectangular guides ,TE and TM modes , Dominant Mode, Attenuation, Mode Excitation, rectangular cavity resonator.

UNIT V CYLINDRICAL WAVE GUIDES 15

Solution of wave equation in circular guides, TE and TM wave in circular wave guides, Wave impedance, attenuation, Phase velocity and Group velocity , mode excitation, formation of cylindrical cavity, cavity resonator and Q for dominant mode.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- explain the propagation of signals through transmission lines.
- analyze the signal propagation at radio frequencies.
- apply the radio propagation concepts in guided systems.

- elaborate the concept of filter design.
- utilize waveguides and cavity resonators in several applications.

TEXT BOOKS

1. John D Ryder "Networks lines and fields" Prentice Hall of India, 2005.

REFERENCES

1. G.S.N Raju "Electro Magnetic Field Theory and Transmission Lines" Pearson Education, First edition 2005.
2. Bhag Guru & Hizioglu, "Electromagnetic Field Theory Fundamentals" Second edition Cambridge University press, 2005
3. Annapurna Das Sisir K Das, "Microwave Engineering" Tata McGraw Hill, 2004

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COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO2	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO3	3	3	-	-	3	-	-	-	-	-	-	-		3
CO4	3	3	-	-	3	-	-	-	-	-	-	-	3	3
CO5	3	3	-	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable the students to

- understand the division of network functionalities into layers.
- be familiar with the different types of error in a networks
- know about the routing protocols
- learn the flow control and congestion control algorithms
- study the concept of encryption

UNIT I DATA COMMUNICATION AND PHYSICAL LAYER 9

Introduction, Data Communication - Components, Data flow; Networks- Criteria, Physical Structure, Topology, Types; Protocol layering, OSI Model, Internet Model, Physical Layer Services-Transmission Impairment, Transmission media, Guided media-Twisted pair cable, Coaxial cable, Fiber optic cable. Switching - Circuit switching networks, Packet switching networks.

UNIT II DATA LINK LAYER 9

Services, Link-Layer Addressing, Types of Errors, Error Detection, Cyclic Redundancy Check, Checksum, Forward Error Correction, CSMA/CD, CSMA/CA, IEEE 802.3, IEEE802.11, Bluetooth

UNIT III NETWORK LAYER 9

Services, Performance, IPV4 addresses, Classful Addressing, Classless Addressing, DHCP, ICMP, IGMP, IPV6, Routing algorithm- Distance-Vector Routing, Link-State Routing, and Path-Vector Routing, Unicasting - RIP, OSPF. Multicast routing DVMRP, PIM.

UNIT IV TRANSPORT LAYER 9

Services, Connectionless and Connection-Oriented Protocols, Port Numbers, UDP, TCP, TCP connection establishment, TCP flow Control, Error Control, TCP Congestion control. QoS.

UNIT V APPLICATION AND NETWORK SECURITY 9

WWW, Domain Name Space (DNS), HTTP, SMTP, E-Mail; Network Security- Security Goals, Services and Techniques, Symmetric-Key Ciphers, Asymmetric-Key Ciphers and Digital Signature.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- analyze the different types of layers in a networks
- apply the error detection techniques to send data in a network
- construct the routing algorithm
- explain the congestion control techniques
- apply the security authentication in a various network

TEXT BOOKS

1. Behrouz A. Foruzan, Data communications and Networking, The McGraw-Hill Companies, Inc. 2013, 5th edition.

REFERENCES

1. William Stallings, Data and Computer Communication, PHI 2010.
2. Larry L.Peterson & S.Peter Davie, Computer Networks, Harcourt, 2008.
3. James F.Kurose & Keith W.Ross, Computer Networking A Top-down Approach Featuring the Internet, PHI, 2007.
4. Andrew S.Tannenbaum, Computer Networks, PHI, 2010.

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CO1	3	3	3	2	-	-	-	-	2	-	-	3	3	3
CO2	3	3	3	2	-	-	-	-	2	-	-	1	3	3
CO3	3	3	3	1	-	-	-	-	-	-	-	1	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	2	-	-	-	-	2	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- To introduce speech production and related parameters of speech
- To understand the time domain methods for speech processing
- To study the frequency domain techniques for estimating speech parameters
- To learn about the predictive technique for speech compression.
- To understand speech recognition, synthesis and speaker identification

UNIT I NATURE OF SPEECH SIGNAL 9

Speech production mechanism, Classification of speech, Sounds, Nature of speech signal, Models for speech production. Speech signal processing: purpose of speech processing, Digital models for speech signal, Digital processing of speech signals, Significance, Short time analysis.

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters for speech, methods for extracting the parameters, Zero crossings, Auto correlation function, pitch estimation.

UNIT III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short time Fourier analysis, filter bank analysis, spectrographic analysis, Formant extraction, pitch Extraction, Analysis- Synthesis systems.

UNIT IV LINEAR PREDICTIVE CODING OF SPEECH 9

Formulation of linear prediction problem in time domain, solution of LPC equations, Interpretation of Linear Prediction in auto correlation and spectral domains.

UNIT V SPEECH SYNTHESIS AND ANALYSIS 9

Central analysis of speech, formant and pitch estimation, Applications of speech processing, Speech Recognition, Speech synthesis and speaker verification.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- analyze the basics of speech production and related speech parameters.
- comprehend the time domain methods of speech processing
- develop frequency domain techniques for speech parameters estimation
- design predictive techniques for speech compression
- use different speech synthesis techniques

TEXT BOOKS

L.R.Rabiner and R.E.Schafer, “Digital processing of speech signals, Dorling Kindersley (India) Private Limited , 2011

REFERENCES

1. L.Rabiner and Biling Hwang Juang, “Fundamentals of Speech recognition”, Pearson Education, 2003.
2. J.L.Flanagan, “Speech Analysis Synthesis and Perception”, 2nd Edition- Springer Verlag, 1972.
3. I.H.Witten, “Principles of Computer Speech”, Academic press, 1983
4. Thomas F.Quateri, “Discrete-Time Speech Processing – Principles and Practice” , Pearson Education, 2004

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
Cos	Programme Outcomes(POs)													
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CO1	-	-	3	-	3	-	-	-	-	-	-	-	3	3
CO2	-	-	3	-	3	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	3	--	-	-	-	-	-	-	3	3
CO4	-	-	3	-	3	-	-	-	-	-	-	-	3	3
CO5	-	-	3	-	3	-	-	-	-	-	-	-	3	3



COURSE OBJECTIVES

To enable the students to

- To study the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To learn about processes, threads and scheduling algorithms.
- To understand the principles of concurrency and deadlocks.
- To learn various memory management schemes.

UNIT I INTRODUCTION 9

Introduction: Computer system organization - Introduction to operating systems – operating system structures – Services - System calls – System programs. Processes: Process concept – Process scheduling – Operations on Processes – Cooperating processes – Inter process communication – Communication in client-server systems. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library

UNIT II PROCESS MANAGEMENT AND DEADLOCK 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple - processor scheduling – Real time scheduling – Algorithm Evaluation. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Monitors. Deadlock: System model – Deadlock Characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock. Case Study: Process scheduling in Linux.

UNIT III MEMORY MANAGEMENT 9

Main Memory: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in windows and Solaris

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – Directory structure – File system mounting – File sharing - Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – Network file systems. Case studies: File system in Windows XP.

UNIT V I/O SYSTEMS AND MASS STORAGE MANAGEMENT 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – streams performance. Mass-Storage Structure: Disk attachment - Disk scheduling – Disk management – Swap-space management – RAID – stable storage. Case study: I/O in Linux.

COURSE OUTCOMES

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

- design various scheduling algorithms.
- apply the principles of concurrency.
- design deadlock, prevention and avoidance algorithms.
- compare and contrast various memory management schemes.
- schedule and manage the disk effectively .

TEXT BOOKS

Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Ninth Edition, Wiley India Pvt Ltd, 2013.

REFERENCES

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Fourth Edition, Pearson Education, 2014.
2. William Stallings, “Operating Systems – internals and design principles”, Prentice Hall, 7th Edition, 2011.
3. Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education, 2007.
4. Andrew S. Tannenbaum & Albert S. Woodhull, “Operating System Design and Implementation”, Prentice Hall, 3rd Edition, 2006.
5. Gary J. Nutt, “Operating Systems”, Pearson/Addison Wesley, 3rd Edition, 2004.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	-	-	-	-	2	-	-	3	3	3
CO2	3	3	3	2	-	-	-	-	2	-	-	1	3	3
CO3	3	3	3	1	-	-	-	-	-	-	-	1	3	3
CO4	3	3	3	2	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	2	-	-	-	-	2	-	-	3	3	3



COURSE OBJECTIVES

To enable the students to

- analyze different methods to find solution for a large system of linear equations
- find the intermediate values for a series of given data
- develop efficient algorithms for solving problems in science, engineering and technology
- solve the non linear differential equations that cannot be solved by regular conventional method.
- apply finite element method to increase the accuracy of second order differential equations

UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9

Solution of equation –Iteration method : Newton Raphson method – Solution of linear system by Gaussian elimination and Gauss - Jordan method – Iterative method – Gauss-Seidel method – Inverse of a matrix by Gauss Jordan method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION AND APPROXIMATION 9

Lagrangian Polynomials – Divided differences – Newton's Divided Difference, Hermite Interpolation Polynomial and Interpolating with a cubic spline – Newton's forward and backward difference formulas

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Differentiation using interpolation formulae – Numerical integration by trapezoidal and Simpson's 1/3– Romberg's method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpson's rule.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor series method – Modified Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- comprehend the basics of linear equations.

- apply the interpolation methods for constructing approximate polynomials
- demonstrate the knowledge of numerical differential equations in computational and simulation process
- utilize the concept of initial value problems in the field of science and engineering
- describe the computational procedure of the amount of heat emitted or transferred from an object

TEXT BOOKS

1. Erwin Kreyszig., “Advanced Engineering Mathematics” 10th edition, Wiley Publications, 2010.
2. T. Veerarajan. and T .Ramachandran, “Numerical Methods with programming in C”, 2nd ed., Tata McGraw-Hill, 2006.
3. Sankar Rao K “ Numerical Methods For Scientists And Engineers –3rd Edition Princtice Hall of India Private, New Delhi, 2007.

REFERENCES

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, “Numerical Methods”, S.Chand Co. Ltd., New Delhi, 2003
2. Gerald C.F. and Wheatley, P.O., “Applied Numerical Analysis” 6th Edition, Pearson Education Asia, New Delhi, 2002
3. M.K.Jain , S.R.K. Iyengar , R.K.Jain , “Numerical Methods For Scientific & Engineering Computation” New Age International (P) Ltd , New Delhi , 2005.
4. M.B.K. Moorthy and P.Geetha, “Numerical Methods” , Tata McGraw Hill Publications company, New Delhi, 2011.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	3
CO2		3	3										3	3
CO3				3	3	3		3					3	3
CO4				3	3		3		3			3	3	3
CO5		3	3	3	3				3	3	3	3	3	3



COURSE OBJECTIVES

To enable students

- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/O s with Microprocessors
- Be familiar with MASM

8086 Programs using kits and MASM

- 1 Basic arithmetic and Logical operations
- 2 Move a data block without overlap
- 3 Code conversion, decimal arithmetic and Matrix operations.
- 4 String manipulations, Sorting and Searching
- 5 Counters and Time Delay

Peripherals and Interfacing Experiments

- 6 Traffic light control
- 7 Stepper motor control
- 8 Key board and Display Control
- 9 Serial interface and Parallel interface
- 10 10. A/D, D/A interface and Waveform Generation

8051 Experiments using kits and MASM

TOTAL PERIODS 60

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- Write ALP Programs for fixed, Floating Point and Arithmetic
- Interface different I/O s with processor
- Execute Programs in 8051
- Explain the difference between simulator and Emulator

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	-		3	3
CO2	-	-	3	-	3	-	-	-	-	-	-		3	3
CO3	-	-	3	-	3	-	-	-	-	-	-		3	3
CO4	-	-	3	-	3	-	-	-	-	-	-		3	3



COURSE OBJECTIVES

To enable students

- To implement Linear and Circular Convolution
- To implement FIR and IIR filters
- To study the architecture of DSP processor
- To know the generation of the signals and arithmetic operations using TMS320C5X DSP processor.

- 1 Generation of Signals
- 2 Linear Convolution
- 3 Circular Convolution
- 4 Spectrum Analysis using DFT
- 5 FIR filter design
- 6 IIR filter design
- 7 Study of architecture of Digital Signal Processor
- 8 Generation of waveform using Processor
- 9 Linear convolution using processor.
- 10 Circular convolution using processor

TOTAL PERIODS 60

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- Carry out simulation of DSP systems
- Demonstrate their abilities towards DSP processor based implementation of DSP systems
- Design of digital filter and Generation of various signals
- Computation of circular and linear convolution

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-		-	-		3	3
CO2	-	-	3	-	3	-	-	-		-	-		3	3
CO3	-	-	3	-	3	-	-	-		-	-		3	3
CO4	-	-	3	-	3	-	-	-		-	-		3	3



COURSE OBJECTIVES

To enable students

- To visualize the effects of sampling and DM and FM scheme
- To implement error control coding schemes and BPSK, QPSK and QAM schemes
- To study and implement the ARQ protocols
- To analyze the different routing Protocol
- To implement the Encryption and Decryption techniques

A. Communication Experiments

- 1 Implementation of signal sampling and reconstruction
- 2 Implementation of Delta modulation and Demodulation
- 3 Implementation of FM modulator and Demodulator
- 4 Simulation of Error control coding schemes-Linear block codes
- 5 Simulation of signal constellations of BPSK, QPSK and QAM

B. Networks Experiments

- 1 Implementation of Stop and wait protocol to provide reliable data transfer
- 2 Implementation of Go-back-N protocol to provide reliable data transfer
- 3 Implementation of Selective repeat protocol to provide reliable data transfer
- 4 Simulation and analysis of Distance vector routing protocol
- 5 Simulation and analysis of Link state routing protocol
- 6 Simulation and analysis of Encryption and Decryption techniques

TOTAL PERIODS 60

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- Demonstrate their knowledge in modulation and demodulation scheme through implementation of DM, FM, BPSK, QPSK and QAM
- Apply various channel coding schemes and demonstrate their capabilities towards the improvement of the noise performance of communication system
- Analyze the Flow control and Error control mechanism
- Implement the various routing algorithm
- Acquire the knowledge about the network security

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
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CO1	-	-	3	-	3	-	-	-	-	-	-		3	3
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CO3	-	-	3	-	3	-	-	-	-	-	-		3	3
CO4	-	-	3	-	3	-	-	-	-	-	-		3	3
CO4	-	-	3	-	3	-	-	-	-	-	-		3	3



COURSE OBJECTIVES

- To understand their capabilities & enhance their grooming and showcasing his/ her capabilities to a prospective employer
- To provide opportunity for the students to become acquainted with corporate opportunities relevant to their academic learning
- To articulate their thoughts on a given topic – in english and also to make decent write ups in english on any given topic
- To practice & score well in Aptitude tests conducted by corporates / prospective employers
- To prepare for any group discussion evaluation or presenting their credentials during a face- to-face interview leading to selection and employment

UNIT I PERSONALITY DEVELOPMENT 1**6**

Introduction – self explorations – **character building** – self esteem- self confidence- positive thinking – leadership qualities- time management.

UNIT II PERSONALITY DEVELOPMENT 2**6**

Grooming- role play – **good etiquettes** - extempore - **writing skills:** email, paragraph – team building- body language - non verbal communication

UNIT III QUANTITATIVE APTITUDE (QA) 1**6**

Time , speed & distance -- simple interest & compound interest – **percentage – height & distance – time & work – number systems – L.C.M & H.C.F – ratio proportion- area – directions.**

UNIT IV LOGICAL REASONING (LR) 1**6**

Analogies - letter & symbol series – number series – cause & effect – essential part – verbal reasoning.

UNIT V VERBAL REASONING (VR) 1**6**

Blood relation – venn diagrams – **analogy – character puzzles** – logical sequence – classification – verification of truth – seating arrangement

TOTAL PERIODS 30**COURSE OUTCOMES**

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

- demonstrate aptitude & reasoning skills
- enhance verbal & written ability.
- improve his/her grooming and presentation skills.
- interact effectively on any recent event/happenings/ current affairs.
- be a knowledgeable person on the various evaluation processes leading to employment and face the same with Confidence.

REFERENCES

1. Agarwal, R.S.” A Modern Approach to Verbal & Non Verbal reasoning”, S.Chand & co ltd, New Delhi.
2. Abhijit guha, “Quantitative Aptitude “, Tata-Mcgraw hill.
3. word power made easy by norman lewis ,W.R.Goyal publications.
4. Johnson, D.W. reaching out – interpersonal effectiveness and self actualization.Boston: Allyn and Bacon.
5. Agarwal, R.S.“ objective general English”,S.Chand & co
6. Infosys campus connect program – students’ guide for soft skills.

CO-PO MAPPING:														
Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
CO's	Programme Outcomes PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	3	3	1	-	-	-	-	-	-	3	2
CO2	-	2	3	-	2	-	2	-	-	-	-	-	3	2
CO3	3	2	2	2	-	-	1	-	-	-	-	-	2	3
CO4	3	2	2	-	-	1	-	-	-	-	2	-	2	3
CO5	2	3	3	2	1	3	3	1	-	1	2	-	2	3



COURSE OBJECTIVES

To enable the students to

- study the overview of embedded system architecture.
- learn various embedded communication protocols.
- exposed to the basic concepts of real time operating system
- learn the architecture and programming of ARM processor.
- learn the applications of embedded systems.

UNIT I ARCHITECTURE OF EMBEDDED SYSTEMS 9

Categories of Embedded Systems-Specifications of Embedded systems Recent trends in Embedded Systems-Hardware Architecture-Software Architecture-Communication software-Process of generation of executable image development/testing tools.

UNIT II EMBEDDED COMMUNICATION PROTOCOLS 9

Serial/Parallel Communication - Serial communication protocols - UART - RS232 standard - Serial Peripheral Interface - Inter Integrated Circuits - Ethernet - Universal serial Bus - Controller Area Network - Parallel communication protocols - ISA / PCI Bus protocols.

UNIT III REAL-TIME OPERATING SYSTEM CONCEPTS 9

Architecture of the Kernel-task and task scheduler-Interrupt Service Routines Semaphores-Mutex-Mailboxes-Message Queues-Event Registers-Pipes-Signals Timers-Memory Management - Priority Inversion Problem

UNIT IV ARM ARCHITECTURE 9

Advanced RISC Machine - Architecture Inheritance - ARM Programming Model - ARM Development Tools - 3 and 5 stages Pipeline ARM Organization - ARM Instruction Execution and Implementation - ARM Co-Processor Interface - Thumb bit in the CPSR - Thumb programmer's model.

UNIT V APPLICATION OF EMBEDDED SYSTEM 9

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine Engine control unit - Video accelerator.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- describe hardware and software architectures of embedded systems.
- analyze the devices and buses used for embedded networking.
- interpret the concepts of a real time operating System.
- analyze the special features of ARM architecture.

- model real-time applications using embedded-system concepts.

TEXT BOOKS

K.V.K.K.Prasad “Embedded /Real-Time Systems: Concepts, Design and Programming
“Dreamtech, Wiley 2003.

REFERENCES

1. Raj Kamal, “Embedded Systems Architecture Programming and Design”, Second Edition, MH, 2010
2. Andrew N.Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide Designing and Optimizing System Software”, Morgan Kaufmann Publishers, Elsevier, 2004.
3. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
4. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)												PSO1		PSO2
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	-	3	-	3	3	-	3	-	-	-	3	3	-	-	3
CO2	-	3	-	3	3	-	3	-	-	-	3	3	-	-	3
CO3	-	3	-	3	3	-	3	-	-	-	3	3	-	-	3
CO4	-	3	-	3	3	-	3	-	-	-	3	3	-	-	3
CO5	-	3	-	3	3	-	3	-	-	-	3	3	-	-	3



1. John D Kraus," Antennas for all Applications", 3rd Edition, Mc Graw Hill, 2005.
2. K.D. Prasad, "Antennas and Wave Propagation", Sathya prakasan Tech India Publications- New Delhi 2015.

REFERENCES

1. Edward C.Jordan and Keith G.Balmain" Electromagnetic Waves and Radiating Systems" Prentice Hall of India, 2006.
2. Rajeswari Chatterjee, "Antenna Theory and Practice" Revised Second Edition New Age International Publishers, 2006.
3. Peyton Z. Peebles:, "Radar Principles", John wiley, 2004.
4. J.C Toomay, " Principles of Radar", 2nd Edition –Prentice Hall India, 2004.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	3	-	-	-	3	3	3	3
CO2	3	3	-	-	-	-	3	-	-	-	3	3	3	3
CO3	3	3	-	-	-	-	3	-	-	-	3	3	3	3
CO4	3	3	-	-	-	-	3	-	-	-	3	3	3	3
CO5	3	3	-	-	-	-	3	-	-	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- understand the MOS circuit realization of the various building architectural choices.
- study the transistor circuit level design and realization for digital operation
- impart knowledge about various circuit characteristics and performance estimation
- gain the knowledge about testing of CMOS
- study the basics of VHDL in different types of modeling.

UNIT I MOS TRANSISTOR THEORY AND PROCESS TECHNOLOGY 9

NMOS and PMOS transistors –Threshold voltage –Body effect –Design equations–Second order effects –MOS models and small signal AC characteristics –Basic CMOS Technology

UNIT II INVERTERS AND LOGIC GATES 9

NMOS and CMOS inverters –Stick diagram –Inverter ratio –DC and transient characteristics –CMOS logic structures –Transmission gates –Static CMOS design –Dynamic CMOS design

UNIT III CIRCUIT CHARACTERISATION AND PERFORMANCE ESTIMATION 9

Resistance estimation –Capacitance estimation –Inductance –Switching characteristics Transistor sizing –Power dissipation and design margining –Charge sharing –Scaling

UNIT IV CMOS TESTING 9

Need for testing-Fault models-observability, controllability, fault coverage-Design for testability-Ad-Hoc testing-scan based test techniques-self test techniques-Boundary scan.

UNIT V VERILOG HARDWARE DESCRIPTION LANGUAGE 9

Overview of digital design with Verilog HDL –Hierarchical modeling concepts–Modules and port definitions –Gate level modeling–Data flow modeling –Behavioral modeling–HDL programs for simple combinational and sequential circuits.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- analyse the basic concepts of MOS transistor logic.
- design inverters and logic gates.
- comprehend CMOS characteristics
- analyse the basic CMOS circuits and the CMOS process technology
- model the digital system using hardware description language.

TEXT BOOKS

Neil H. E. Weste and Kamran Eshraghian, “Principles of CMOS VLSI Design”, 2nd edition, Pearson Education Asia, 2000.

REFERENCES

1. John P. Uyemura, "Introduction to VLSI Circuits and Systems", John Wiley and Sons, Inc., 2002.
2. Samir Palnitkar, "Verilog HDL", 2nd Edition, Pearson Education, 2004.
3. Pucknell, "Basic VLSI Design", Prentice Hall of India Publication, 1995
4. Wayne Wolf, "Modern VLSI Design System on chip", Pearson Education, 2002
5. Bhasker J., "A Verilog HDL Primer", 2nd Edition, B. S. Publications, 2001.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-		3	3	3	3
CO2	3	3	-	-	3	-	-	-	-		3	3	3	3
CO3	3	3	-	-	3	-	-	-	-		3	3	3	3
CO4	3	3	-	-	3	-	-	-	-		3	3	3	3
CO5	3	3	-	-	3	-	-	-	-		3	3	3	3



COURSE OBJECTIVES

To enable the students to

- gain knowledge about the various physiological parameters both electrical and non-electrical and the methods of recording.
- get clear idea about the method of transmitting those parameters.
- study about the various assist devices used in the hospitals.
- gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic technique
- learn about the recent trends in Medical Instrumentation.

UNIT I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING 9

The origin of Bio-potentials: Bio potential electrodes, Biological amplifier – Difference amplifier and chopper amplifier, ECG, EEG, EMG, PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT II NON ELECTRICAL PARAMETER MEASUREMENT 9

Auto analyzer, Blood flow meter, Cardiac output, Respiratory measurement, Blood Pressure, Blood cell Counters

UNIT III ASSIST DEVICES 9

Cardiac Pacemakers, Classification of Pacemakers, DC Defibrillator, Dialyzer, Heart lung machine.

UNIT IV LASER, DIATHERMIES AND ULTRASONIC APPLICATIONs 9

Principle of Laser action, Different types and clinical applications of laser, Ultrasonic frequency for medical application , Diathermies-Shortwave, Ultrasonic and Microwave type and their applications, Surgical Diathermy, Radio-pill.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Principle and application of Thermography, Principle and application of Nanotechnology, Endoscopy and Ophthalmic equipment's, Principles of Lithotripsy.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- compare the concepts about electro-physiology, ECG, EEG, EMG and PCG.
- apprehend the different types of measurements in Non-electrical parameter.
- analyse the functions of various machines to save human life
- examine the concept of laser, ultrasonic which is involved in medical field.
- apply the recent trends in field of diagnostic and therapeutic equipment's

TEXT BOOKS

Leslie Cromwell , Fred J.Weibell and Erich A.Pfeiffer - Biomedical Instrumentation
Prentice Hall New Delhi 2000.

REFERENCES

1. Albert M Cook and Webster J G – Therapeutic medical devices Prentice Hall New York 1982
2. Khandpur R.S Hand Book of Biomedical Instrumentation – Tata McGraw Hill publication , New Delhi 2nd edition 2003
3. Leslie Cromwell , Fred J.Weibell and Erich A.Pfeiffer - Biomedical Instrumentation Prentice Hall New Delhi 2000
4. Jacobson B and Webster J G Medical and Clinical Engineering – Prentice Hall of India New Delhi 1999
5. Wolbarsht . M. L, Laser Application in Medicine and Biology plenum press NewYork 1989.
6. Heinz Kresse – Handbook of Electro medicine. John Wiley & Sons – Chichester– 1985.

Mapping of Course Outcomes with Programme Outcomes:														
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO2	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO4	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO5	3	3	3	-	3	-	-	-	-	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- gain knowledge about the different types of signaling in digital telephony
- learn the various transmission schemes for telephony and broadband
- study the methods of modeling and analysis techniques for data transmission
- understand the different Switching Techniques
- know the telegraphic engineering in digital networks

UNIT I INTRODUCTION 9

Overview of existing Voice, Data and Multimedia Networks and Services; Review of Basic Communication principles; Synchronous and Asynchronous transmission, Line Codes

UNIT II TRUNK TRANSMISSION 9

Multiplexing and Framing- types and standards; Trunk signaling; Optical Transmission-line codes and Muxing: SONET/SDH; ATM; Microwave and Satellite Systems.

UNIT III LOCAL LOOP TRANSMISSION 9

The Analog Local Loop; ISDN local loop; DSL and ADSL; Wireless Local Loop; Fiber in the loop; Mobile and Satellite Phone local loop.

UNIT IV SWITCHING 9

Evolution; Space switching, Time switching and Combination Switching; Blocking and Delay characteristics; Message ,Packet and ATM switching; Advances in switching techniques – shared memory fast packet switches, shared medium fast packet switches and space division fast packet switches, Photonic switching- Optical TDM, WDM.

UNIT V TELETRAFFIC ENGINEERING 9

Telecom Network Modeling; Arrival Process; Network Blocking performance; Delay Networks Queuing system analysis and delay performance.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- examine the different types of signaling in digital telephony.
- analyze the various transmission schemes for telephony and broadband
- apply the methods of modeling and analysis techniques for data transmission
- compare the different switching techniques
- examine the telegraphic engineering in digital networks

TEXT BOOKS

J. Bellamy, “Digital Telephony”, John Wiley, 3rd Edition, 2003.

REFERENCES

1. J.E.Flood, “Telecommunication Switching, Traffic and Networks”, Pearson, 2007
2. ThiagarajanViswanathan, “Telecommunication Switching Systems and Networks”, Prentice Hall India, 1992, Twenty - Sixth Reprint, 2006.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	3	-	-	-	-		3	3	3	3
CO2	3	3	3	-	3	-	-	-	-		3	3	3	3
CO3	3	3	3	-	3	-	-	-	-		3	3	3	3
CO4	3	3	3	-	3	-	-	-	-		3	3	3	3
CO5	3	3	3	-	3	-	-	-	-		3	3	3	3



COURSE OBJECTIVES

To enable the students to

- study the concepts of architecture and assembly language programming of ARM Processor.
- understand the concepts of 32 bit processor
- know the concepts of pentium processor
- learn the concepts of RISC processor
- know the relevance of motorola processors

UNIT I OVERVIEW OF 16 BIT PROCESSOR 9

Need of advanced microprocessors: 80186 Microprocessor Architecture - Segmented Memory - Addressing Modes - Instruction Set - 80186 Assembly Language Programming - co processor 80187 Data Processor Architectural details - Data types - Floating point Operations – 80187 Instructions

UNIT II INTEL 32-BIT PROCESSOR 9

Architectural details of 80386 Microprocessor - Special registers - Memory management-Operation in protected mode and virtual 80386 mode - Memory paging mechanism - Special instructions of 80386 - Architectural details of 80486 - Special registers - Additional instructions - Comparison of 80386 and 80486 processors

UNIT III HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM 9

Introduction to Pentium Processor - Architectural features - Comparison with the workstations - Branch prediction logic - cache structure. - Special Pentium Registers. Memory management - virtual mode of operation - Comparison with the previous processors. Features of Pentium-II, Pentium-III and Pentium Pro-processors

UNIT IV RISC PROCESSOR 9

RISC Microprocessors – RISC Vs CISC – RISC Properties – DEC Alpha AXP Architecture - Power PC – Architecture - Programming Model – Data Types – Addressing Modes – Instruction Set. Sun SPARC – Architecture – Data Types – Instruction Sets - Features of MIPS, AMD Microprocessors

UNIT V MOTOROLA PROCESSORS 9

Motorola Microprocessors – 68000 Microprocessor – Architecture – Registers – Addressing Modes – Features of 68020 – 68030 – 68040 Microprocessors

TOTAL PERIODS 45

COURSE OUTCOMES

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

- apply the concepts of 16-bit processor
- analyse the concepts of 32-bit processor

- evaluate about PENTIUM processors and CPU cores.
- compare various RISC processors
- evaluate the relevance of motorola processors

TEXT BOOKS

1. Barry B Brey “Intel Microprocessors : 8086/88, 80186/188, 80286, 80386, 80486, Pentium, Pentium – II, Pentium – III and Pentium – IV, Architecture, Programming & Interfacing”, Pearson Education, 2003
2. Steve Furber, ARM System on Chip Architecture, Addison –Wesley Professional, 2000. “A Course in Electrical & Electronic Measurements and Instrumentation”, Dhanpat Rai and Co, 2004.

REFERENCES

1. Jason Andrews, o-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology), ewnes, BK and CD-ROM, Aug 2004.
2. L. James Antonakos, The Pentium Microprocessor, Pearson Education, 2000.
3. Daniel Tabak, Advanced Microprocessors, McGraw Hill, 2001.
4. A.K. Ray & K.M. Bhurchandi, “Advanced Microprocessors & Peripherals, Architecture, Programming & Interfacing”, Tata McGraw Hill.

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO2	3	3	2	2	-	-	-	-	2	-	3	3	3	3
CO3	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO4	3	3	3	1	-	-	-	-	2	-	3	3	3	3
CO5	3	3	3	1	-	3	-	-	2	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- study the concepts of architecture and assembly language programming of ARM Processor.
- understand the concepts of 32 bit processor
- know the concepts of pentium processor
- learn the concepts of RISC processor
- know the relevance of motorola processors

UNIT I OVERVIEW OF 16 BIT PROCESSOR 9

Need of advanced microprocessors: 80186 Microprocessor Architecture - Segmented Memory - Addressing Modes -Instruction Set - 80186 Assembly Language Programming - co processor 80187 Data Processor Architectural details - Data types - Floating point Operations – 80187 Instructions

UNIT II INTEL 32-BIT PROCESSOR 9

Architectural details of 80386 Microprocessor - Special registers - Memory management-Operation in protected mode and virtual 80386 mode - Memory paging mechanism -Special instructions of 80386 - Architectural details of 80486 - Special registers - Additional instructions - Comparison of 80386 and 80486 processors

UNIT III HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM 9

Introduction to Pentium Processor - Architectural features - Comparison with the workstations - Branch prediction logic - cache structure. - Special Pentium Registers. Memory management - virtual mode of operation - Comparison with the previous processors. Features of Pentium-II, Pentium-III and Pentium Pro-processors

UNIT IV RISC PROCESSOR 9

RISC Microprocessors – RISC Vs CISC – RISC Properties – DEC Alpha AXP Architecture - Power PC – Architecture - Programming Model – Data Types –Addressing Modes – Instruction Set. Sun SPARC – Architecture – Data Types –Instruction Sets - Features of MIPS, AMD Microprocessors

UNIT V MOTOROLA PROCESORS 9

Motorola Microprocessors – 68000 Microprocessor – Architecture – Registers –Addressing Modes – Features of 68020 – 68030 – 68040 Microprocessors

TOTAL PERIODS 45

COURSE OUTCOMES

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

- apply the concepts of 16-bit processor
- analyse the concepts of 32-bit processor

- evaluate about PENTIUM processors and CPU cores.
- compare various RISC processors
- evaluate the relevance of motorola processors

TEXT BOOKS

1. Barry B Brey “Intel Microprocessors : 8086/88, 80186/188, 80286, 80386, 80486, Pentium, Pentium – II, Pentium – III and Pentium – IV, Architecture, Programming & Interfacing”, Pearson Education, 2003
2. Steve Furber, ARM System on Chip Architecture, Addison –Wesley Professional, 2000. “A Course in Electrical & Electronic Measurements and Instrumentation”, Dhanpat Rai and Co, 2004.

REFERENCES

1. Jason Andrews, o-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology), ewnes, BK and CD-ROM, Aug 2004.
2. L. James Antonakos, The Pentium Microprocessor, Pearson Education, 2000.
3. Daniel Tabak, Advanced Microprocessors, McGraw Hill, 2001.
4. A.K. Ray & K.M. Bhurchandi, “Advanced Microprocessors & Peripherals, Architecture, Programming & Interfacing”, Tata McGraw Hill.

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO2	3	3	2	2	-	-	-	-	2	-	3	3	3	3
CO3	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO4	3	3	3	1	-	-	-	-	2	-	3	3	3	3
CO5	3	3	3	1	-	3	-	-	2	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- describe the basic concepts in quality management, customer orientation and retention.
- facilitate the understanding of quality management principles and process.
- discuss the techniques in six sigma, bench marking and FMEA.
- understand the basic concepts in quality function development and TPM.
- become familiar with quality system, quality auditing and HR practices.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II TQM PRINCIPLES 9

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I 9

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II 9

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service Return on Investment - Personnel management. Recruitment, selection and training - Technology in Agrisectors

TOTAL PERIODS 45

COURSE OUTCOMES

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

- discuss the basic concepts in quality management, customer orientation and retention



COURSE OBJECTIVES

To enable the students to

- gain knowledge about digital image fundamentals.
- exposed to simple image enhancement techniques.
- familiar with image restoration and segmentation techniques.
- know about wavelets and image compression techniques
- learn to represent image in form of features

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering. Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT III IMAGE RESTORATION AND SEGMENTATION 9

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering .Segmentation: Detection of Discontinuities–Edge Linking and Boundary detection – Region based segmentation Morphological processing erosion and dilation

UNIT IV WAVELETS AND IMAGE COMPRESSION 9

Wavelets – Sub band coding - Multiresolution expansions - Compression: Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the digital image fundamentals.

- apply image enhancement techniques.
- use image restoration and segmentation Techniques.
- analyse wavelets and image compression techniques
- represent features of images

TEXT BOOKS

Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
William K Pratt, “Digital Image Processing”, John Willey, 2002.
3. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
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CO1	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO2	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO4	3	3	3	-	3	-	-	-	-	-	3	3	3	3
CO5	3	3	3	-	3	-	-	-	-	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- make the students understand about performance of computer and various addressing modes
- acquire knowledge about the concept of arithmetic operation in computer design
- familiarize the student about various memory technologies and I/O system
- gain knowledge about the parallelism
- understand the concept of pipelining and control unit

UNIT I OVERVIEW AND INSTRUCTIONS 9

Computing and Computers- Evolution of computer- Eight Ideas – Components of a computer system – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – Format and its types – representing instructions – Logical operations – control operations – Addressing and addressing mode

UNIT II ARITHMETIC OPERATIONS 9

ALU – Fixed point Arithmetic - Addition and subtraction – Multiplication – Division – Floating Point Arithmetic – Subword parallelism.

UNIT III MEMORY AND I/O SYSTEMS 9

Memory hierarchy – Memory technologies – Cache basics – Measuring and improving cache performance – Virtual memory, TLBs – Input/output system, programmed I/O, DMA and interrupts, I/O processors.

UNIT IV PARALLELISM 9

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multiprocessor

UNIT V PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling of Data hazards and Control hazards – Exceptions.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- evaluate about performance of computer and various addressing modes
- analyse the concept of arithmetic operation in computer design
- the student about various memory technologies and I/O system
- acquire knowledge about the parallelism
- expose the student with concept of pipelining and control unit

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, “Computer Organization and Design”, Fifth edition, Morgan Kauffman / Elsevier, 2014.
2. John P.Hayes, ‘Computer architecture and Organisation’, Tata McGraw-Hill, Third edition, 1998.

REFERENCES

1. V.Carl Hamacher, Zvonko G. Varanasic and Safat G. Zaky, “Computer Organisation“, VI edition, McGraw-Hill Inc, 2012.
2. William Stallings “Computer Organization and Architecture”, Seventh Edition , Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, “Computer System Architecture”, Second Edition, Pearson Education, 2005.
4. Govindarajalu, “Computer Architecture and Organization, Design Principles and Applications”, first edition, Tata McGraw Hill, New Delhi, 2005 V

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO2	3	3	2	2	-	-	-	-	2	-	3	3	3	3
CO3	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO4	3	3	3	1	-	-	-	-	2	-	3	3	3	3
CO5	3	3	3	1	-	3	-	-	2	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- learn about the various compression techniques for audio signals- video signals and text data.
- gain knowledge about analog and digital video signals and systems
- learn about various video compression techniques
- study the image compression techniques
- acquire the basic concepts of designing audio compression

UNIT I INTRODUCTION OF MULTIMEDIA 9

Special features of Multimedia – Graphics and Image Data Representations –Fundamental Concepts in Text Images-Graphics-Video and Digital Audio – Storage requirements for multimedia applications - Need for Compression- Lossy& Lossless Compression techniques – Overview of source coding- Information theory & source models-vector quantization theory: LGB algorithm– Evaluation techniques – Error analysis and Methodologies

UNIT II TEXT COMPRESSION 9

Compaction techniques – Huffman coding – Adaptive Huffman Coding –Arithmetic coding – Shannon- Fanocoding – Dictionary techniques – LZW family algorithms

UNIT III AUDIO COMPRESSION 9

Audio compression techniques - μ - Law and A- Law companding.Frequency domain and filtering -. Predictive techniques – DM- PCM- DPCM: Optimal Predictors and Optimal Quantization- Formant and CELP Vocoders –Application to speech coding – G.722 – Application to audio coding – MPEG audio- progressive encoding for audio – Silence compression- speech compression techniques

UNIT IV IMAGE COMPRESSION 9

Contour based compression – Transform Coding – JPEG Standard – Sub-band coding algorithms: Design of Filter banks – Wavelet based compression: Implementation using filters – EZW- SPIHT coders – JPEG 2000 standards - JBIG- JBIG2 standards. Basic sub-band coding

UNIT V VIDEO COMPRESSION 9

Video compression techniques and standards – MPEG Video Coding I:MPEG – 1 and 2 – MPEG Video Coding II: MPEG – 4 and 7 – Motion estimation and compensation techniques – H.261 Standard – DVI technology – PLV performance – DVI real time compression – Packet Video

TOTAL PERIODS 45

COURSE OUTCOMES

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

- examine the concept of requirement for memory space reduction .
- develop efficient algorithms for compression.

- compare different multimedia data in digital formats
- comprehend about data compression techniques, image compression techniques like JPEG
- elaborate about video compression techniques like MPEG.

TEXT BOOKS

Khalid Sayood, “Introduction to Data Compression”, Morgan Kauffman
Harcourt India, 2nd Edition, 2000.

REFERENCES

1. Peter Symes, “Digital Video Compression”, McGraw Hill Pub., 2004.
2. Mark Nelson, “Data compression”, BPB Publishers, New Delhi, 1998.
3. Mark S.Drew, Ze-Nian Li, “Fundamentals of Multimedia” PHI, 1st Edition, 2003
4. Yun A Shi, Huifang Sun, “Image & Video compression for Multimedia Engineering, Fundamentals, Algorithms & Standards, CRC Press, 2003.

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO2	3	3	2	2	-	-	-	-	2	-	3	3	3	3
CO3	3	3	2	2	-	3	-	-	2	-	3	3	3	3
CO4	3	3	3	1	-	-	-	-	2	-	3	3	3	3
CO5	3	3	3	1	-	3	-	-	2	-	3	3	3	3



COURSE OBJECTIVES

To enable the students to

- make the student understand about Simulation methodology and modeling of communication networks
- apply the concept of layers in wireless network
- familiarize the student about the modeling of channels and mobility
- acquire knowledge about the network topology and modeling of higher level layers
- expose the student with application and performance of wireless system by simulation

UNIT I INTRODUCTION TO MODELING AND SIMULATION 9

Introduction, Discrete-event Simulation, Modeling for Computer Simulation, Tools and methods for Network Simulation, The Simulation Platform, Simulation Framework, Tools and Modeling Approaches for Simulating Hardware

UNIT II LOWER LAYER AND LINK LAYER WIRELESS MODELING 9

Physical Layer Modeling, Description of the Main Components of the PHY Layer, Physical Layer Modeling for Network Simulations, Link Layer Modeling, Medium Access Control (MAC) Protocols, Logical Link Control, Forward Error Detection and Correction, Backward Error Detection and Correction, Queuing and Processing Delay

UNIT III CHANNEL MODELING AND MOBILITY MODELING 9

Channel Modeling: The Physics of Radiation, Classification of Propagation Models, Deterministic Approaches by Classical Field Theory, Deterministic Geometric Optical Approaches, Empirical Path Loss Approaches. Mobility modeling: Mobility Models and category, Random Walk Model, Random Waypoint Model, Random Direction Model, Gauss Markov Model, Manhattan Model, Selection of Appropriate Mobility Models.

UNIT IV HIGHER LAYER MODELING AND NETWORK TOPOLOGY 9

Higher Layer Modeling: Modeling the Network Layer and Routing Protocols, Components of a Routing Protocol, Virtual Routing on Overlays, Modeling Transport Layer Protocols, Modeling Application Traffic. Modeling the Network Topology : Common Topology Models, Geometric Random Graphs–The Waxman Model, Hierarchical Topologies, Preferential Linking–The Barabási-Albert Model, Modeling the Internet.

UNIT V MONTE CARLO SIMULATION 9

Fundamental concepts, Application to communication systems, Monte Carlo integration, Semi analytic techniques, Case study: Performance estimation of a wireless system.

COURSE OUTCOMES

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

- understand about Simulation methodology and modeling of communication network
- apply the concept of layers in wireless network
- familiarize about the modeling of channels and mobility
- acquire knowledge about the network topology and modeling of higher level layers
- expose the application and performance of wireless system by simulation

TEXT BOOKS

M.C.Jeruchim, P.Balaban and K. Sam Shanmugam, “Simulation of Communication Systems: Modeling, Methodology and Techniques”, Plenum Press, New York, 2001.

REFERENCES

1. K.Wehrle. Gunes, J.Gross, “Modeling and Tools for Network simulation”, Springer, 2010.
2. Irene Karzela, “Modeling and Simulating Communications Networks”, Prentice Hall India,1998
3. William.H.Tranter, K. Sam Shanmugam, Theodore. S. Rappaport, Kurt L. Kosbar, “Principles of Communication Systems Simulation”, Pearson Education (Singapore)Pvt. Ltd, 2004.
4. Nejat;Bragg, Arnold, “Recent Advances in Modeling and Simulation Tools for Communication Networks and Services”, Springer, 2007

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)															
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 6	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	3	3	2	2	-	3	-	-	-	-	2	-	3	3	3	3
CO2	3	3	2	2	-	-	-	-	-	-	2	-	3	3	3	3
CO3	3	3	2	2	-	3	-	-	-	-	2	-	3	3	3	3
CO4	3	3	3	1	-	-	-	-	-	-	2	-	3	3	3	3
CO5	3	3	3	1	-	3	-	-	-	-	2	-	3	3	3	3



COURSE OBJECTIVES

- To understand the building blocks of embedded systems
- To learn the concept of memory map and memory interface
- To know the characteristics of real Time Systems
- To write programs to interface memory, I/O s with processor

LIST OF EXPERIMENTS

1. Interface Switches and LED's
2. Interface LCD and Display "Hello World"
3. Interface 4*4 Matrix Pad
4. Interfacing Seven segments
5. Flashing of LEDS
6. Interfacing LED and PWM.
7. Interfacing EPROM and interrupt.
8. Interfacing RTC
9. Images read and write in GLCD
10. Touch screen interface with ARM

COURSE OUTCOMES**TOTAL PERIODS 60**

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

- write programs in ARM for a specific application
- interface memory and write programs related to memory operations
- analyze the performance of interrupt
- write programmes for interfacing keyboard, display, motor.

Mapping of Course Outcomes with Programme Outcomes: (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak														
COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	3	3	-	3	-	-	-	-	-	3	3
CO2	-	3	-	3	3	-	3	-	-	-	-	-	3	3
CO3	-	3	-	3	3	-	3	-	-	-	-	-	3	3
CO4	-	3	-	3	3	-	3	-	-	-	-	-	3	3



COURSE OBJECTIVES

- To implement combinational and sequential circuits using FPGA
- To study and implement combinational circuits using schematic entry
- To implement Traffic light controller using FPGA
- To study and implement CMOS circuits using Microwind. **List of Experiments**

1. Design and Simulation of Combinational circuits
2. Design and Simulation of Sequential Circuits
3. Implementation of Combinational circuits using FPGA
4. Implementation of Sequential Circuits using FPGA
5. Design and Implementation of Combinational circuits using Schematic entry
6. To study pin assignment, placement and routing using FPGA
7. Implementation of Traffic light controller using FPGA
8. Design and Implementation of Inverter using Microwind
9. Design and Implementation of basic logic gates using Microwind
10. To study the characteristics of CMOS circuits using Microwind

TOTAL PERIODS**60****COURSE OUTCOMES**

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

- design the combinational and sequential circuits
- analyze pin assignment, placement and routing using FPGA
- implement traffic light controller using FPGA
- design the CMOS circuits and basic logic gates using microwind

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	3	3	-	-	-	-	-	-	-	3	3
CO2	-	-	3	3	3	-	-	-	-	-	-	-	3	3
CO3	-	-	3	3	3	-	-	-	-	-	-	-	3	3
CO4	-	-	3	3	3	-	-	-	-	-	-	-	3	3



OBJECTIVES:

- To inculcate understanding of the basics required for circuit representation of RF networks.
- To deal with the issues in the design of microwave amplifier.
- To instill knowledge on the properties of various microwave components.
- To deal with the microwave generation and microwave measurement techniques

UNIT I TWO PORT NETWORK THEORY**9**

Review of Low frequency parameters: Impedance, Admittance, Hybrid and ABCD parameters, Different types of interconnection of Two port networks, High Frequency parameters, Formulation of S parameters, Properties of S parameters, Reciprocal and lossless Network, Transmission matrix, RF behavior of Resistors, Capacitors and Inductors.

UNIT II RF AMPLIFIERS AND MATCHING NETWORKS**9**

Characteristics of Amplifiers, Amplifier power relations, Stability considerations, Stabilization Methods, Noise Figure, Constant VSWR, Broadband, High power and Multistage Amplifiers, Impedance matching using discrete components, Two component matching Networks, Frequency response and quality factor, T and Pi Matching Networks, Microstrip Line Matching Networks.

UNIT III PASSIVE AND ACTIVE MICROWAVE DEVICES**9**

Terminations, Attenuators, Phase shifters, Directional couplers, Hybrid Junctions, Power dividers, Circulator, Isolator, Impedance matching devices: Tuning screw, Stub and quarter wave transformers. Crystal and Schottky diode detector and mixers, PIN diode switch, Gunn diode oscillator, IMPATT diode oscillator and amplifier, Varactor diode, Introduction to MIC.

UNIT IV MICROWAVE GENERATION**9**

Review of conventional vacuum Triodes, Tetrodes and Pentodes, High frequency effects in vacuum Tubes, Theory and application of Two cavity Klystron Amplifier, Reflex Klystron oscillator, Traveling wave tube amplifier, Magnetron oscillator using Cylindrical, Linear, Coaxial Voltage tunable Magnetrons, Backward wave Crossed field amplifier and oscillator.

UNIT V MICROWAVE MEASUREMENTS**9**

Measuring Instruments : Principle of operation and application of VSWR meter, Power meter, Spectrum analyzer, Network analyzer, Measurement of Impedance, Frequency, Power, VSWR, Q-factor, Dielectric constant, Scattering coefficients, Attenuation, S-parameters.

TOTAL: 45 PERIODS**OUTCOMES:**

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

- Explain the active & passive microwave devices & components used in Microwave communication systems.
- Analyze the multi- port RF networks and RF transistor amplifiers.
- Generate Microwave signals and design microwave amplifiers.
- Measure and analyze Microwave signal and parameters.

TEXT BOOKS:

1. Reinhold Ludwig and Gene Bogdanov, "RF Circuit Design: Theory and Applications", Pearson Education Inc., 2011
2. Robert E Colin, "Foundations for Microwave Engineering", John Wiley & Sons Inc, 2005

REFERENCES:

1. David M. Pozar, "Microwave Engineering", Wiley India (P) Ltd, New Delhi, 2008.
2. Thomas H Lee, "Planar Microwave Engineering: A Practical Guide to Theory, Measurements and Circuits", Cambridge University Press, 2004.
3. Mathew M Radmanesh, "RF and Microwave Electronics", Prentice Hall, 2000.
4. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2005.

EC6702

OPTICAL COMMUNICATION AND NETWORKS

L T P C

3 0 0 3

OBJECTIVES:

- To Facilitate the knowledge about optical fiber sources and transmission techniques
- To Enrich the idea of optical fiber networks algorithm such as SONET/SDH and optical CDMA.
- To Explore the trends of optical fiber measurement systems.

UNIT I INTRODUCTION TO OPTICAL FIBERS

9

Evolution of fiber optic system- Element of an Optical Fiber Transmission link-- Total internal reflection-Acceptance angle –Numerical aperture – Skew rays Ray Optics-Optical Fiber Modes and Configurations -Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts-Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure.

UNIT II SIGNAL DEGRADATION OPTICAL FIBERS

9

Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination -Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling -Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT III FIBER OPTICAL SOURCES AND COUPLING

9

Direct and indirect Band gap materials-LED structures -Light source materials -Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition -Rate equations -External Quantum efficiency -Resonant frequencies -Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fiber -to- Fiber joints, Fiber splicing-Signal to Noise ratio , Detector response time.

UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS

9

Fundamental receiver operation, Pre amplifiers, Error sources – Receiver Configuration– Probability of Error – Quantum limit.Fiber Attenuation measurements- Dispersion measurements – Fiber Refractive index profile measurements – Fiber cut- off Wave length Measurements – Fiber Numerical Aperture Measurements – Fiber diameter measurements.

UNIT V OPTICAL NETWORKS AND SYSTEM TRANSMISSION

9

Basic Networks – SONET / SDH – Broadcast – and –select WDM Networks –Wavelength Routed Networks – Non linear effects on Network performance –Link Power budget -Rise time budget- Noise Effects on System Performance-Operational Principles of WDM Performance of WDM + EDFA system – Solutions – Optical CDMA – Ultra High Capacity Networks.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- Explain the various optical sources and optical detectors and their use in the optical communication system.
- Analyze the digital transmission and its associated parameters on system performance.

TEXT BOOKS:

1. Gerd Keiser, "Optical Fiber Communication" Mc Graw -Hill International, 4th Edition., 2010.
2. John M. Senior, "Optical Fiber Communication", Second Edition, Pearson Education, 2007.

REFERENCES:

1. Ramaswami, Sivarajan and Sasaki "Optical Networks", Morgan Kaufmann, 2009.
2. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 3rd Edition, 2008.
3. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

EC6703

EMBEDDED AND REAL TIME SYSTEMS

L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS

9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output-supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN

9

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS

9

Introduction – Multiple tasks and multiple processes – **Multirate systems**- Preemptive real-time operating systems- **Priority based scheduling**- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

UNIT V SYSTEM DESIGN TECHNIQUES AND NETWORKS

9

Design methodologies- **Design flows** - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- **Distributed embedded systems** – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY

9

Data compressor - **Alarm Clock** - Audio player - Software modem-**Digital still camera** - Telephone answering machine-Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time applications using embedded-system concepts

TEXT BOOK:

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCES:

1. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
2. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
3. Raymond J.A. Buhr, Donald L.Bailey, “An Introduction to Real-Time Systems- From Design to Networking with C/C++”, Prentice Hall, 1999.
4. C.M. Krishna, Kang G. Shin, “Real-Time Systems”, International Editions, Mc Graw Hill 1997
5. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.
6. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc Graw Hill, 2004.

OBJECTIVES:

- To understand the basics of satellite orbits.
- To understand the satellite segment and earth segment.
- To analyze the various methods of satellite access.
- To understand the applications of satellites.

UNIT I SATELLITE ORBITS**9**

Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion.

UNIT II SPACE SEGMENT AND SATELLITE LINK DESIGN**9**

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation- performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System reliability and design lifetime.

UNIT III EARTH SEGMENT**9**

Introduction – Receive – Only home TV systems – Outdoor unit – Indoor unit for analog (FM) TV – Master antenna TV system – Community antenna TV system – Transmit – Receive earth stations – Problems – Equivalent isotropic radiated power – Transmission losses – Free-space transmission – Feeder losses – Antenna misalignment losses – Fixed atmospheric and ionospheric losses – Link power budget equation – System noise – Antenna noise – Amplifier noise temperature – Amplifiers in cascade – Noise factor – Noise temperature of absorptive networks – Overall system noise temperature – Carrier-to- Noise ratio – Uplink – Saturation flux density – Input back off – The earth station - HPA – Downlink – Output back off – Satellite TWTA output – Effects of rain – Uplink rain– Fade margin – Downlink rain – Fade margin – Combined uplink and downlink C/N ratio – Inter modulation noise.

UNIT IV SATELLITE ACCESS**9**

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption.

UNIT V SATELLITE APPLICATIONS**9**

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

TOTAL: 45 PERIODS**OUTCOMES:****Upon Completion of the course, the students will be able to:**

- Analyze the satellite orbits.
- Analyze the earth segment and space segment.
- Design various satellite applications

TEXT BOOK:

1. Dennis Roddy, "Satellite Communication", 4th Edition, Mc Graw Hill International, 2006.

REFERENCES:

1. Wilbur L. Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007.
2. N. Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986.
3. Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Boston London, 1997.
4. Tri T. Ha, "Digital Satellite Communication", IInd edition, 1990.
5. Emanuel Fthenakis, "Manual of Satellite Communications", Mc Graw Hill Book Co., 1984.
6. Robert G. Winch, "Telecommunication Trans Mission Systems", Mc Graw-Hill Book Co., 1983.
7. Brian Ackroyd, "World Satellite Communication and earth station Design", BSP professional Books, 1990.
8. G.B. Bleazard, "Introducing Satellite communications", NCC Publication, 1985.
9. M. Richharia, "Satellite Communication Systems-Design Principles", Macmillan 2003.

EC6005

ELECTRONIC TESTING

L T P C
3 0 0 3

OBJECTIVES:

- To understand the basics of testing and the testing equipments
- To understand the different testing methods

UNIT I INTRODUCTION

9

Test process and automatic test equipment, **test economics and product quality**, fault modeling

UNIT II DIGITAL TESTING

9

Logic and fault simulation, **testability measures**, combinational and sequential circuit test generation.

UNIT III ANALOG TESTING

9

Memory Test, **DSP Based Analog and Mixed Signal Test**, Model based analog and mixed signal test, delay test, IIDQ test.

UNIT IV DESIGN FOR TESTABILITY

9

Built-in self-test, **Scan chain design**, Random Logic BIST, **Memory BIST**, Boundary scan test standard, Analog test bus, Functional Microprocessor Test, **Fault Dictionary**, Diagnostic Tree, Testable System Design, Core Based Design and Test Wrapper Design, Test design for SOCs

UNIT V LOADED BOARD TESTING

9

Unpowered short circuit tests, **unpowered analog tests**, Powered in-circuit analog, digital and mixed signal tests, **optical and X-ray inspection procedures**, functional block level design of in-circuit test equipment

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students

- Explain different testing equipments.
- Design the different testing schemes for a circuit.
- Discuss the need for test process

TEXT BOOK:

1. Michael L. Bushnell and Vishwani D. Agarwal, "Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits", Springer, 2006.

REFERENCE:

1. Dimitris Gizopoulos , “Advances in Electronic Testing” , Springer 2006.

EC6006**AVIONICS****L T P C
3 0 0 3****OBJECTIVES:**

- To understand the needs for avionics for both Civil and military aircraft.
- To introduce various digital electronic principles and working operations of digital circuit.
- To integrate the digital electronics with cockpit equipments
- To understand the various principles in flight disk and cockpit panels.
- To study the communication and navigation equipment
- To study certificate aspects of the Avionics system

UNIT I INTRODUCTION TO AVIONICS**9**

Basics of Avionics-**Basics of Cockpits**-Need for Avionics in civil and military aircraft and space systems – Integrated Avionics Architecture –**Military and Civil system** – Typical avionics System and Sub systems – Design and Technologies.

UNIT II DIGITAL AVIONICS BUS ARCHITECTURE**9**

Avionics Bus architecture–**Data buses MIL**–RS 232- RS422-RS 485-AFDX/ARINC-664-MIL STD 1553 B–ARINC 429–ARINC 629- **Aircraft system Interface**

UNIT III FLIGHT DECK AND COCKPITS**9**

Control and display technologies CRT, LED, LCD, EL and plasma panel - **Touch screen** - Direct voice input (DVI) – **ARINC 818**-Civil cockpit and military cockpit: MFDS, PFDS-HUD, HMD, HMI

UNIT IV AVIONICS SYSTEMS**9**

Communication Systems - **Navigation systems** - Flight control systems - **Radar electronic Warfare** - Utility systems Reliability and maintainability Fundamentals- Certification-Military and civil aircrafts.

UNIT V ON BOARD NAVIGATION SYSTEMS**9**

Over view of navigational aids, **Flight planning**, Area navigation, required time of arrival, RNAV architecture , performance aspects, approach and landing challenges, regulatory and safety aspects, **INS, GPS and GNSS characteristics.**

TOTAL: 45 PERIODS**OUTCOMES:****Upon completion of the course, students will:**

- Describe the hardware required for aircraft.
- Explain the communication and navigation techniques used in aircrafts.
- Discuss about the autopilot and cockpit display related concepts.

TEXT BOOK:

1. R.P.G. Collinson, “Introduction to Avionics”, Chapman & Hall Publications, 1996.

REFERENCES:

1. Cary R .Spitzer, "The Avionics Handbook", CRC Press, 2000.
2. Middleton, D.H. "Avionics Systems", Longman Scientific and Technical, Longman Group UK Ltd., England, 1989.
3. Spitzer, C.R. "Digital Avionics Systems", Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.
4. Brain Kendal, "Manual of Avionics", The English Book House, 3rd Edition, New Delhi, 1993
5. Jim Curren, "Trend in Advanced Avionics", IOWA State University, 1992.

CS6012

SOFT COMPUTING

L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the various soft computing frame works
- Be familiar with design of various neural networks
- Be exposed to fuzzy logic
- Learn genetic programming.
- Be exposed to hybrid systems.

UNIT I INTRODUCTION

9

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models - important technologies - applications.

Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.

UNIT II NEURAL NETWORKS

9

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative autoassociative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.

UNIT III FUZZY LOGIC

9

Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT IV GENETIC ALGORITHM

9

Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multilevel optimization – real life problem- advances in GA

OBJECTIVES:

- To introduce speech production and related parameters of speech.
- To show the computation and use of techniques such as short time Fourier transform, linear predictive coefficients and other coefficients in the analysis of speech.
- To understand different speech modeling procedures such as Markov and their implementation issues.

UNIT I BASIC CONCEPTS**10**

Speech Fundamentals: Articulatory Phonetics – Production and Classification of Speech Sounds; Acoustic Phonetics – Acoustics of speech production; Review of Digital Signal Processing concepts; Short-**Time Fourier Transform**, Filter-Bank and LPC Methods.

UNIT II SPEECH ANALYSIS**10**

Features, Feature Extraction and Pattern Comparison Techniques: **Speech distortion measures** – mathematical and perceptual – Log–Spectral Distance, Cepstral Distances, Weighted Cepstral Distances and Filtering, **Likelihood Distortions**, Spectral Distortion using a Warped Frequency Scale, LPC, PLP and MFCC Coefficients, Time Alignment and Normalization – Dynamic Time Warping, Multiple Time – **Alignment Paths**.

UNIT III SPEECH MODELING**8**

Hidden Markov Models: Markov Processes, **HMMs – Evaluation**, Optimal State Sequence – Viterbi Search, **Baum-Welch Parameter Re-estimation**, Implementation issues.

UNIT IV SPEECH RECOGNITION**8**

Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – **acoustics and language models** – n-grams, context dependent sub-word units; **Applications and present status**.

UNIT V SPEECH SYNTHESIS**9**

Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, **sub-word units for TTS**, intelligibility and naturalness – role of prosody, **Applications and present status**.

TOTAL: 45 PERIODS**OUTCOMES:**

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

- Model speech production system and describe the fundamentals of speech.
- Extract and compare different speech parameters.
- Choose an appropriate statistical speech model for a given application.
- Design a speech recognition system.
- Use different speech synthesis techniques.

TEXTBOOKS:

1. Lawrence Rabiner and Biing-Hwang Juang, “Fundamentals of Speech Recognition”, Pearson Education, 2003.
2. Daniel Jurafsky and James H Martin, “Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition”, Pearson Education, 2002.
3. Frederick Jelinek, “Statistical Methods of Speech Recognition”, MIT Press, 1997.

REFERENCES:

1. Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", California Technical Publishing, 1997.
2. Thomas F Quatieri, "Discrete-Time Speech Signal Processing – Principles and Practice", Pearson Education, 2004.
3. Claudio Becchetti and Lucio Prina Ricotti, "Speech Recognition", John Wiley and Sons, 1999.
4. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing, Processing and Perception of Speech and Music", Wiley- India Edition, 2006.

EC6008

WEB TECHNOLOGY

L T P C

3 0 0 3

OBJECTIVES:

- To design and create user interfaces using Java frames and applets.
- To have a basic idea about network programming using Java.
- To create simple Web pages and provide client side validation.
- To create dynamic web pages using server side scripting

UNIT I JAVA FUNDAMENTALS

9

Java Data types – Class – Object – I / O Streams – File Handling concepts – Threads – Applets – Swing Framework – Reflection

UNIT II JAVA NETWORKING FUNDAMENTALS

9

Overview of Java Networking - TCP - UDP - InetAddress and Ports - Socket Programming - Working with URLs - Internet Protocols simulation - HTTP - SMTP - POP - FTP - Remote Method Invocation - Multithreading Concepts

UNIT III CLIENT SIDE TECHNOLOGIES

9

XML - Document Type Definition - XML Schema - Document Object Model - Presenting XML - Using XML Parsers: DOM and SAX – JavaScript Fundamentals - Evolution of AJAX - AJAX Framework - Web applications with AJAX - AJAX with PHP - AJAX with Databases

UNIT IV SERVER SIDE TECHNOLOGIES

9

Servlet Overview - Life cycle of a Servlet - Handling HTTP request and response - Using Cookies - Session tracking - Java Server Pages - Anatomy of JSP - Implicit JSP Objects – JDBC - Java Beans - Advantages - Enterprise Java Beans - EJB Architecture - Types of Beans - EJB Transactions

UNIT V APPLICATION DEVELOPMENT ENVIRONMENT

9

Overview of MVC architecture - Java Server Faces: Features - Components - Tags - Struts: Working principle of Struts - Building model components - View components - Controller components - Forms with Struts - Presentation tags - Developing Web applications - Hibernate: Configuration Settings - Mapping persistent classes - Working with persistent objects - Concurrency - Transactions - Caching - Queries for retrieval of objects - Spring: Framework - Controllers - Developing simple applications.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Have knowledge about the fundamental Java networking technologies.
- Design their own web services using the client server concepts
- Describe the techniques involved to support real-time Software development.

TEXT BOOK:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.

REFERENCES:

1. Marty Hall and Larry Brown, "Core Servlets and Javasever Pages", Second Edition
2. Bryan Basham, Kathy Siegra, Bert Bates, "Head First Servlets and JSP", Second Edition
3. Uttam K Roy, "Web Technologies", Oxford University Press, 2011.

EC6009**ADVANCED COMPUTER ARCHITECTURE****L T P C
3 0 0 3****OBJECTIVES:****The student should be made to:**

- Understand the micro-architectural design of processors
- Learn about the various techniques used to obtain performance improvement and power savings in current processors

UNIT I FUNDAMENTALS OF COMPUTER DESIGN**9**

Review of Fundamentals of CPU, Memory and IO – Trends in technology, power, energy and cost, Dependability - Performance Evaluation

UNIT II INSTRUCTION LEVEL PARALLELISM**9**

ILP concepts – Pipelining overview - Compiler Techniques for Exposing ILP – Dynamic Branch Prediction – Dynamic Scheduling – Multiple instruction Issue – Hardware Based Speculation – Static scheduling - Multi-threading - Limitations of ILP – Case Studies.

UNIT III DATA-LEVEL PARALLELISM**9**

Vector architecture – SIMD extensions – Graphics Processing units – Loop level parallelism.

UNIT IV THREAD LEVEL PARALLELISM**9**

Symmetric and Distributed Shared Memory Architectures – Performance Issues –Synchronization – Models of Memory Consistency – Case studies: Intel i7 Processor, SMT & CMP Processors

UNIT V MEMORY AND I/O**9**

Cache Performance – Reducing Cache Miss Penalty and Miss Rate – Reducing Hit Time – Main Memory and Performance – Memory Technology. Types of Storage Devices – Buses – RAID – Reliability, Availability and Dependability – I/O Performance Measures.

TOTAL: 45 PERIODS**OUTCOMES:****At the end of the course, the student should be able to:**

- Evaluate performance of different architectures with respect to various parameters
- Analyze performance of different ILP techniques
- Identify cache and memory related issues in multi-processors

TEXT BOOK:

1. John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, Fifth Edition, 2012.

REFERENCES:

1. Kai Hwang and Faye Briggs, "Computer Architecture and Parallel Processing", Mc Graw-Hill International Edition, 2000.
2. Sima D, Fountain T and Kacsuk P, "Advanced Computer Architectures: A Design Space Approach", Addison Wesley, 2000.

EC6010

ELECTRONICS PACKAGING

L T P C
3 0 0 3

OBJECTIVES:

- To give a comprehensive introduction to the various packaging types used along with the associated same the thermal, speed, signal and integrity power issues.
- To introduce about CAD used in designing wiring boards

UNIT I OVERVIEW OF ELECTRONIC SYSTEMS PACKAGING

9

Definition of a system and history of semiconductors, **Products and levels of packaging**, Packaging aspects of handheld products, **Definition of PWB**, Basics of Semiconductor and Process flowchart, Wafer fabrication, inspection and testing, Wafer packaging; Packaging evolution; Chip connection choices, **Wire bonding**, TAB and flip chip.

UNIT II SEMICONDUCTOR PACKAGES

9

Single chip packages or modules (SCM), Commonly used packages and advanced packages; Materials in packages; **Thermal mismatch in packages**; Multichip modules (MCM)-types; System-in-package (SIP); Packaging roadmaps; Hybrid circuits; **Electrical Design considerations in systems packaging**, Resistive, Capacitive and Inductive Parasitics, Layout guidelines and the Reflection problem, **Interconnection**.

UNIT III CAD FOR PRINTED WIRING BOARDS

9

Benefits from CAD; **Introduction to DFM, DFR & DFT**, Components of a CAD package and its highlights, Beginning a circuit design with schematic work and component, layout, DFM check, list and design rules; **Design for Reliability**, Printed Wiring Board Technologies: Board-level packaging aspects, Review of CAD output files for PCB fabrication; Photo plotting and mask generation, Process flow-chart; Vias; PWB substrates; Surface preparation, Photoresist and application methods; UV exposure and developing; Printing technologies for PWBs, PWB etching; PWB etching; Resist stripping; **Screen-printing technology**, through-hole manufacture process steps; Panel and pattern plating methods, Solder mask for PWBs; Multilayer PWBs; Introduction to, microvias, Microvia technology and Sequential build-up technology process flow for high-density, interconnects

UNIT IV SURFACE MOUNT TECHNOLOGY AND THERMAL CONSIDERATIONS

9

SMD benefits; Design issues; Introduction to soldering, **Reflow and Wave Soldering methods to attach SMDs**, Solders; Wetting of solders; Flux and its properties; Defects in wave soldering, Vapour phase soldering, BGA soldering and Desoldering/Repair; SMT failures, SMT failure library and Tin Whisker, Tin-lead and lead-free solders; Phase diagrams; **Thermal profiles for reflow soldering**; Lead free Alloys, **Lead-free solder considerations**; Green electronics; RoHS compliance and e-waste recycling, Issues, Thermal Design considerations in systems packaging (L. Umanand, Thermal Design considerations in systems packaging

UNIT V EMBEDDED PASSIVES TECHNOLOGY**9**

Introduction to embedded passives; Need for embedded passives; Design Library; Embedded resistor processes, **Embedded capacitors**; Processes for embedding capacitors; Case study examples.

TOTAL: 45 PERIODS**OUTCOMES:**

Given an electronic system PCB or integrated circuit design specifications, the student should be in a position to recommend the appropriate packaging style to be used, and propose a design a design procedure and solution for the same.

TEXT BOOK:

1. Rao R. Tummala, "Fundamentals of Microsystems Packaging", McGraw Hill, NY, 2001

REFERENCE:

1. William D. Brown, "Advanced Electronic Packaging", IEEE Press, 1999.

EC6011 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY**L T P C
3 0 0 3****OBJECTIVES:**

- To tutor the basics of EMI, EMC
- To instill knowledge on the EMI coupling mechanism and its mitigation techniques
- To impart comprehensive insight about the current EMC standards and about various measurement techniques

UNIT I BASIC THEORY**8**

Introduction to EMI and EMC, **Intra and inter system EMI**, Elements of Interference, Sources and Victims of EMI, Conducted and Radiated EMI emission and susceptibility, Case Histories, Radiation hazards to humans, Various issues of EMC, **EMC Testing categories**, EMC Engineering Application.

UNIT II COUPLING MECHANISM**9**

Electromagnetic field sources and Coupling paths, Coupling via the supply network, Common mode coupling, Differential mode coupling, **Impedance coupling**, Inductive and Capacitive coupling, Radiative coupling, **Ground loop coupling**, Cable related emissions and coupling, Transient sources, Automotive transients.

UNIT III EMI MITIGATION TECHNIQUES**10**

Working principle of Shielding and Murphy's Law, LF Magnetic shielding, Apertures and shielding effectiveness, **Choice of Materials for H, E, and free space fields**, Gasketting and sealing, PCB Level shielding, Principle of Grounding, Isolated grounds, Grounding strategies for Large systems, Grounding for mixed signal systems, Filter types and operation, Surge protection devices, Transient protection.

UNIT IV STANDARDS AND REGULATION**9**

Need for Standards, Generic/General Standards for Residential and Industrial environment, Basic Standards, **Product Standards**, National and International EMI Standardizing Organizations; IEC, ANSI, FCC, AS/NZS, CISPR, BSI, CENELEC, ACEC. Electro Magnetic Emission and susceptibility standards and specifications, **MIL461E Standards**.

UNIT V EMI TEST METHODS AND INSTRUMENTATION

9

Fundamental considerations, EMI Shielding effectiveness tests, Open field test, TEM cell for immunity test, Shielded chamber, Shielded anechoic chamber, EMI test receivers, Spectrum analyzer, EMI test wave simulators, EMI coupling networks, Line impedance stabilization networks, Feed through capacitors, Antennas, Current probes, MIL -STD test methods, Civilian STD test methods.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Find solution to EMI Sources, EMI problems in PCB level / Subsystem and system level design.
- To measure emission immunity level from different systems to couple with the prescribed EMC standards

TEXT BOOK:

1. Clayton Paul, "Introduction to Electromagnetic Compatibility", Wiley Interscience, 2006

REFERENCES:

1. V Prasad Kodali, "Engineering Electromagnetic Compatibility", IEEE Press, Newyork, 2001.
2. Henry W. Ott, "Electromagnetic Compatibility Engineering", John Wiley & Sons Inc, Newyork, 2009
3. Daryl Gerke and William Kimmel, "EDN's Designer's Guide to Electromagnetic Compatibility", Elsevier Science & Technology Books, 2002
4. W Scott Bennett, "Control and Measurement of Unintentional Electromagnetic Radiation", John Wiley & Sons Inc., (Wiley Interscience Series) 1997.
5. Dr Kenneth L Kaiser, "The Electromagnetic Compatibility Handbook", CRC Press 2005,

EC6012

CMOS ANALOG IC DESIGN

L T P C
3 0 0 3

OBJECTIVES:

- To study designs with better precision in data conversion
- To study various ADC and DAC circuit architectures

UNIT I SAMPLE AND HOLD

9

Properties of MOS Switches, multiplexed input architectures, recycling architecture, open and closed loop sampling architectures, switched capacitor and current mode architectures.

UNIT II BUILDING BLOCK OF DATA CONVERSION CIRCUITS:

9

Amplifiers, open loop and closed loop amplifiers, gain boosting, common mode feedback, bipolar, CMOS and BiCMOS comparators.

UNIT III PRECISION TECHNIQUES

9

Comparator cancellation, input and output offset storage principles, comparators using offset cancelled latches, opamp offset cancellation, ADC and DAC calibration techniques.

UNIT IV ADC/DAC ARCHITECTURES

9

DAC Performance metrics, reference multiplication and division, switching and logical functions of DACs, Current steering architectures, DAC Performance metrics, Flash ADC architecture, Gray encoding, thermometer encoding and metastability.

UNIT V OVER SAMPLING CONVERTERS

9

Delta sigma modulators, alternative modulator architectures, quantization and noise shaping, decimation filtering, implementation of Delta sigma modulators, delta sigma DACs,

TOTAL: 45 PERIODS

OUTCOMES:

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

- Build Data Conversion circuits.
- Discuss calibration techniques
- Analyze ADC/DAC Architecture and Performance

TEXT BOOK:

1. B.Razavi "Data Conversion System Design" IEEE Press and John Wiley, 1995.

REFERENCE:

1. Phillip Allen and Douglas Holmberg "CMOS Analog Circuit Design" Second Edition, Oxford University Press, 2004.

EC6013

ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

L T P C

3 0 0 3

OBJECTIVES:

- To expose the students to the fundamentals of microprocessor architecture.
- To introduce the advanced features in microprocessors and microcontrollers.
- To enable the students to understand various microcontroller architectures.

UNIT I HIGH PERFORMANCE CISC ARCHITECTURE – PENTIUM

9

CPU Architecture- Bus Operations – Pipelining – Branch predication – floating point unit- Operating Modes –Paging – Multitasking – Exception and Interrupts – Instruction set – addressing modes – Programming the Pentium processor.

UNIT II HIGH PERFORMANCE RISC ARCHITECTURE – ARM

9

Arcon RISC Machine – Architectural Inheritance – Core & Architectures - Registers – Pipeline - Interrupts – ARM organization - ARM processor family – Co-processors - ARM instruction set- Thumb Instruction set - Instruction cycle timings - The ARM Programmer's model – ARM Development tools – ARM Assembly Language Programming - C programming – Optimizing ARM Assembly Code – Optimized Primitives.

UNIT III ARM APPLICATION DEVELOPMENT

9

Introduction to DSP on ARM –FIR filter – IIR filter – Discrete fourier transform – Exception handling – Interrupts – Interrupt handling schemes- Firmware and bootloader – Embedded Operating systems – Integrated Development Environment- STDIO Libraries – Peripheral Interface – Application of ARM Processor - Caches – Memory protection Units – Memory Management units – Future ARM Technologies.

UNIT IV MOTOROLA 68HC11 MICROCONTROLLERS

9

Instruction set addressing modes – operating modes- Interrupt system- RTC-Serial Communication Interface – A/D Converter PWM and UART.

UNIT V PIC MICROCONTROLLER**9**

CPU Architecture – Instruction set – interrupts- Timers- **I²C Interfacing** –UART- A/D Converter –PWM and introduction to C-Compilers.

TOTAL: 45 PERIODS**OUTCOMES:**

- The student will be able to work with suitable microprocessor / microcontroller for a specific real world application.

TEXT BOOK:

1. Andrew N.Sloss, Dominic Symes and Chris Wright “ ARM System Developer’s Guide : Designing and Optimizing System Software” , First edition, Morgan Kaufmann Publishers, 2004.

REFERENCES:

1. Steve Furber , “ARM System –On –Chip architecture”, Addison Wesley, 2000.
 2. Daniel Tabak , “Advanced Microprocessors”, Mc Graw Hill. Inc., 1995
 3. James L. Antonakos , “ The Pentium Microprocessor”, Pearson Education, 1997.
 4. Gene .H.Miller, “Micro Computer Engineering”, Pearson Education , 2003.
 5. John .B.Peatman , “Design with PIC Microcontroller”, Prentice Hall, 1997.
 6. James L.Antonakos, “An Introduction to the Intel family of Microprocessors”, Pearson Education, 1999.
 7. Barry.B.Brey, “The Intel Microprocessors Architecture, Programming and Interfacing”, PHI, 2002.
 8. Valvano, "Embedded Microcomputer Systems", Thomson Asia PVT LTD first reprint 2001.
- Readings: Web links www.ocw.nit.edu www.arm.com

EC6014**COGNITIVE RADIO****L T P C
3 0 0 3****OBJECTIVES:**

The student should be made to:

- Know the basics of the software defined radios.
- Learn the design of the wireless networks based on the cognitive radios
- Understand the concepts of wireless networks and next generation networks

UNIT I INTRODUCTION TO SOFTWARE DEFINED RADIO**9**

Definitions and potential benefits, **software radio architecture evolution**, technology tradeoffs and architecture implications.

UNIT II SDR ARCHITECTURE**9**

Essential functions of the software radio, basic SDR, hardware architecture, Computational processing resources, software architecture, **top level component interfaces**, interface topologies among plug and play modules,.

UNIT III INTRODUCTION TO COGNITIVE RADIOS**9**

Marking radio self-aware, cognitive techniques – position awareness, environment awareness in cognitive radios, **optimization of radio resources**, Artificial Intelligence Techniques.

UNIT IV COGNITIVE RADIO ARCHITECTURE

9

Cognitive Radio - functions, components and design rules, **Cognition cycle** - orient, plan, decide and act phases, **Inference Hierarchy**, Architecture maps, Building the Cognitive Radio Architecture on Software defined Radio Architecture.

UNIT V NEXT GENERATION WIRELESS NETWORKS

9

The XG Network architecture, **spectrum sensing**, spectrum management, spectrum mobility, spectrum sharing, upper layer issues, cross – layer design.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Describe the basics of the software defined radios.
- Design the wireless networks based on the cognitive radios
- Explain the concepts behind the wireless networks and next generation networks

TEXT BOOKS:

1. Joseph Mitola III, "Software Radio Architecture: Object-Oriented Approaches to Wireless System Engineering", John Wiley & Sons Ltd. 2000.
2. Thomas W. Rondeau, Charles W. Bostain, "Artificial Intelligence in Wireless communication", ARTECH HOUSE .2009.
3. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009.
4. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, "Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey" Elsevier Computer Networks, May 2006.

REFERENCES:

1. Simon Haykin, "Cognitive Radio: Brain –Empowered Wireless Communications", IEEE Journal on selected areas in communications, Feb 2005.
2. Hasari Celebi, Huseyin Arslan, "Enabling Location and Environment Awareness in Cognitive Radios", Elsevier Computer Communications , Jan 2008.
3. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "Software Defined Radio", John Wiley, 2003.
4. Huseyin Arslan, "Cognitive Radio, SDR and Adaptive System", Springer, 2007.
5. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, "Cognitive Radio Communication and Networks", Elsevier, 2010.

EC6015

RADAR AND NAVIGATIONAL AIDS

L T P C
3 0 0 3

OBJECTIVES:

- To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation

UNIT I	INTRODUCTION TO RADAR EQUATION	9
Introduction- Basic Radar –The simple form of the Radar Equation- Radar Block Diagram- Radar Frequencies – Applications of Radar – The Origins of Radar - Detection of Signals in Noise- Receiver Noise and the Signal-to-Noise Ratio-Probability Density Functions- Probabilities of Detection and False Alarm- Integration of Radar Pulses- Radar Cross Section of Targets - Radar cross Section Fluctuations- Transmitter Power-Pulse Repetition Frequency- Antenna Parameters- System losses – Other Radar Equation Considerations		
UNIT II	MTI AND PULSE DOPPLER RADAR	9
Introduction to Doppler and MTI Radar- Delay –Line Cancellers- Staggered Pulse Repetition Frequencies –Doppler Filter Banks - Digital MTI Processing - Moving Target Detector - Limitations to MTI Performance - MTI from a Moving Platform (AMIT) – Pulse Doppler Radar – Other Doppler Radar Topics- Tracking with Radar –Monopulse Tracking –Conical Scan and Sequential Lobing - Limitations to Tracking Accuracy - Low-Angle Tracking - Tracking in Range - Other Tracking Radar Topics - Comparison of Trackers - Automatic Tracking with Surveillance Radars (ADT).		
UNIT III	DETECTION OF SIGNALS IN NOISE	9
Matched –Filter Receiver –Detection Criteria – Detectors –Automatic Detector - Integrators - Constant-False-Alarm Rate Receivers - The Radar operator - Signal Management - Propagation Radar Waves - Atmospheric Refraction -Standard propagation - Nonstandard Propagation - The Radar Antenna - Reflector Antennas - Electronically Steered Phased Array Antennas – Phase Shifters - Frequency-Scan Arrays Radar Transmitters and Receivers - Introduction –Linear Beam Power Tubes - Solid State RF Power Sources - Magnetron - Crossed Field Amplifiers - Other RF Power Sources – Other aspects of Radar Transmitter.- The Radar Receiver - Receiver noise Figure – Super heterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.		
UNIT IV	RADIO DIRECTION AND RANGES	9
Introduction - Four methods of Navigation .- The Loop Antenna - Loop Input Circuits - An Aural Null Direction Finder - The Goniometer - Errors in Direction Finding - Adcock Direction Finders - Direction Finding at Very High Frequencies - Automatic Direction Finders – The Commutated Aerial Direction Finder - Range and Accuracy of Direction Finders - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR – Recent Developments. Hyperbolic Systems of Navigation (Loran and Decca) - Loran-A - Loran-A Equipment - Range and precision of Standard Loran - Loran-C - The Decca Navigation System -Decca Receivers - Range and Accuracy of Decca - The Omega System		
UNIT V	SATELLITE NAVIGATION SYSTEM	9
Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS) The Doppler Effect - Beam Configurations -Doppler Frequency Equations - Track Stabilization - Doppler Spectrum - Components of the Doppler Navigation System - Doppler range Equation - Accuracy of Doppler Navigation Systems. Inertial Navigation - Principles of Operation - Navigation Over the Earth – Components of an Inertial Navigation System - Earth Coordinate Mechanization - Strapped-Down Systems - Accuracy of Inertial Navigation Systems-The Transit System - Navstar Global Positioning System (GPS)		
TOTAL:45 PERIODS		

OUTCOMES:

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

- Explain principles of navigation, in addition to approach and landing aids as related to navigation
- Derive and discuss the Range equation and the nature of detection.
- Describe about the navigation systems using the satellite.

TEXTBOOKS:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 3rd Edition Tata Mc Graw-Hill 2003.
2. N.S.Nagaraja, "Elements of Electronic Navigation Systems", 2nd Edition, TMH, 2000.

REFERENCES:

1. Peyton Z. Peebles, "Radar Principles", John Wiley, 2004
2. J.C Toomay, "Principles of Radar", 2nd Edition –PHI, 2004

EC6016**OPTO ELECTRONIC DEVICES****L T P C
3 0 0 3****OBJECTIVES:**

- To understand the basics of solid state physics.
- To understand the basics of display devices.
- To understand the optical detection devices.
- To understand the design of optoelectronic integrated circuits.

UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS**9**

Wave nature of light, Polarization, Interference, Diffraction, **Light Source**, review of Quantum Mechanical concept, **Review of Solid State Physics**, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT II DISPLAY DEVICES AND LASERS**9**

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Display, **Liquid Crystal Displays**, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, **Classes of Lasers**, Mode Locking, laser applications.

UNIT III OPTICAL DETECTION DEVICES**9**

Photo detector, Thermal detector, Photo Devices, **Photo Conductors**, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR**9**

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, **Switching and Logic Devices**.

UNIT V OPTOELECTRONIC INTEGRATED CIRCUITS**9**

Introduction, **hybrid and Monolithic Integration**, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to

- To design display devices.
- To design optoelectronic detection devices and modulators.
- To design optoelectronic integrated circuits.

TEXTBOOKS:

1. Pallab Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", Mc Graw-Hill International Edition, 1998

REFERENCES:

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

EC6017

RF SYSTEM DESIGN

L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Be familiar with RF transceiver system design for wireless communications.
- Be exposed to design methods of receivers and transmitters used in communication systems

UNIT I CMOS PHYSICS, TRANSCEIVER SPECIFICATIONS AND ARCHITECTURES 9

Introduction to MOSFET Physics, Noise: Thermal, shot, flicker, popcorn noise, Two port Noise theory, Noise Figure, THD, IP2, IP3, Sensitivity, SFDR, Phase noise - Specification distribution over a communication link, **Homodyne Receiver**, Heterodyne Receiver, Image reject, Low IF Receiver Architectures Direct up conversion Transmitter, **Two step up conversion Transmitter**

UNIT II IMPEDANCE MATCHING AND AMPLIFIERS 9

S-parameters with Smith chart, Passive IC components, Impedance matching networks, Common Gate, Common Source Amplifiers, **OC Time constants in bandwidth estimation and enhancement**, High frequency amplifier design, Power match and Noise match, Single ended and Differential LNAs, Terminated with Resistors and Source Degeneration LNAs.

UNIT III FEEDBACK SYSTEMS AND POWER AMPLIFIERS 9

Stability of feedback systems: Gain and phase margin, Root-locus techniques, **Time and Frequency domain considerations**, Compensation, General model – Class A, AB, B, C, D, E and F amplifiers, Power amplifier Linearization Techniques, Efficiency boosting techniques, ACPR metric, Design considerations

UNIT IV PLL AND FREQUENCY SYNTHESIZERS 9

Linearised Model, Noise properties, Phase detectors, **Loop filters and Charge pumps**, Integer-N frequency synthesizers, Direct Digital Frequency synthesizers

OBJECTIVES:

The student should be made to:

- Learn the working of ARM processor
- Understand the Building Blocks of Embedded Systems
- Learn the concept of memory map and memory interface
- Know the characteristics of Real Time Systems
- Write programs to interface memory, I/Os with processor
- Study the interrupt performance

LIST OF EXPERIMENTS

1. Study of ARM evaluation system
2. Interfacing ADC and DAC.
3. Interfacing LED and PWM.
4. Interfacing real time clock and serial port.
5. Interfacing keyboard and LCD.
6. Interfacing EPROM and interrupt.
7. Mailbox.
8. Interrupt performance characteristics of ARM and FPGA.
9. Flashing of LEDs.
10. Interfacing stepper motor and temperature sensor.
11. Implementing zigbee protocol with ARM.

OUTCOMES:

At the end of the course, the student should be able to:

- Write programs in ARM for a specific Application
- Interface memory and Write programs related to memory operations
- Interface A/D and D/A convertors with ARM system
- Analyse the performance of interrupt
- Write programmes for interfacing keyboard, display, motor and sensor.
- Formulate a mini project using embedded system

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS (3 students per batch)

1. Embedded trainer kits with ARM board 10 No.s
2. Embedded trainer kits suitable for wireless communication 10 No.s
3. Adequate quantities of Hardware, software and consumables

OBJECTIVES:

The student should be made to:

1. Understand the working principle of optical sources, detector, fibers and microwave components
2. Develop understanding of simple optical communication link.
3. Learn about the characteristics and measurements in optical fiber
4. Know about the behavior of microwave components.

5. Practice microwave measurement procedures

LIST OF EXPERIMENTS

OPTICAL EXPERIMENTS

1. DC Characteristics of LED and PIN Photo diode
2. Mode Characteristics of Fibers
3. Measurement of connector and bending losses
4. Fiber optic Analog and Digital Link- frequency response(analog) and eye diagram (digital)
5. Numerical Aperture determination for Fibers
6. Attenuation Measurement in Fibers

MICROWAVE EXPERIMENTS

1. Reflex klystron or Gunn diode characteristics and basic microwave parameter measurement such as VSWR, frequency, wavelength.
2. Directional Coupler Characteristics.
3. Radiation Pattern of Horn Antenna.
4. S-parameter Measurement of the following microwave components (Isolator, Circulator, E plane Tee, H Plane Tee, Magic Tee)
5. Attenuation and Power Measurement

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS 3 STUDENTS PER EXPERIMENT:

1. Trainer kit for carrying out LED and PIN diode characteristics, Digital multi meter, optical power meter. – 2 Nos
2. Trainer kit for determining the mode characteristics, losses in optical fiber.- 2 Nos
3. Trainer kit for analyzing Analog and Digital link performance, 2 Mbps PRBS Data source, 10 MHz signal generator, 20 MHz Digital storage Oscilloscope. - 2 Nos
4. Kit for measuring Numerical aperture and Attenuation of fiber - 2 Nos
5. MM/SM Glass and plastic fiber patch chords with ST/SC/E2000 connectors - 2 set
6. LEDs with ST / SC / E2000 receptacles – 650 / 850 nm - 2 set
7. PIN PDs with ST / SC / E2000 receptacles – 650 / 850 nm - 2 set
8. Microwave test Bench at X band to determine Directional coupler characteristics. - 2 Nos
9. Microwave test Bench at X band and Antenna turn table to measure Radiation pattern of Horn antenna, 2 Horn antennas. - 2 Nos
10. Microwave test Bench at X band to determine VSWR for Isolator and Circulator, VSWR meter, Isolator, Circulator, E Plane Tee, H plane Tee. - 2 Nos
11. Microwave test Bench at X band, Variable attenuator, Detector and 20 MHz Digital / Analog Oscilloscope. - 2 Nos

Note: Microwave test bench comprises of Reflex klystron or Gunn diode with power supply, Gunn oscillator, PIN modulator, Isolator, Fixed and Variable Attenuator, frequency meter, Slotted section, Wave guides, detector with mount, Termination, Movable short, Slide screw tuner, Horn antenna, Directional coupler and 20 MHz Digital / Analog Oscilloscope.

OUTCOMES:

At the end of the course, the student should be able to:

- Analyze the performance of simple optical link.
- Test microwave and optical components.
- Analyse the mode characteristics of fiber
- Analyse the radiation of pattern of antenna.

OBJECTIVES:

The student should be made to:

- Know the characteristic of wireless channel
- Learn the various cellular architectures
- Understand the concepts behind various digital signaling schemes for fading channels
- Be familiar the various multipath mitigation techniques
- Understand the various multiple antenna systems

UNIT I WIRELESS CHANNELS**9**

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters- Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II CELLULAR ARCHITECTURE**9**

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking & grade of service – Coverage and capacity improvement.

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS**9**

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV MULTIPATH MITIGATION TECHNIQUES**9**

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,

UNIT V MULTIPLE ANTENNA TECHNIQUES**9**

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS**OUTCOMES:**

At the end of the course, the student should be able to:

- Characterize wireless channels
- Design and implement various signaling schemes for fading channels
- Design a cellular system
- Compare multipath mitigation techniques and analyze their performance
- Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance

TEXTBOOKS:

1. Rappaport,T.S., “Wireless communications”, Second Edition, Pearson Education, 2010.
2. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

REFERENCES:

1. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
2. Upena Dalal, "Wireless Communication", Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, "OFDM for wireless multimedia communications", Artech House, 2000.

EC6802

WIRELESS NETWORKS

L T P C
3 0 0 3

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT I WIRELESS LAN

9

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II MOBILE NETWORK LAYER

9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III MOBILE TRANSPORT LAYER

9

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT IV WIRELESS WIDE AREA NETWORK

9

Overview of UTM Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V 4G NETWORKS

9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- Design and implement wireless network environment for any application using latest wireless protocols and standards.

- Implement different type of applications for smart phones and mobile devices with latest network strategies.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)
2. Vijay Garg, "Wireless Communications and networking", First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013

EC6811

PROJECT WORK

L T P C
0 0 12 6

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 180 PERIODS

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

EC6001

MEDICAL ELECTRONICS

L T P C
3 0 0 3

OBJECTIVES:

- To gain knowledge about the various physiological parameters both electrical and non electrical and the methods of recording and also the method of transmitting these parameters.
- To study about the various assist devices used in the hospitals.
- To gain knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.

REFERENCES:

1. David Tse and Pramod Viswanath, "Fundamentals of Wireless Communication", Cambridge University Press, 2005.
2. Upena Dalal, "Wireless Communication", Oxford University Press, 2009.
3. Van Nee, R. and Ramji Prasad, "OFDM for wireless multimedia communications", Artech House, 2000.

EC6802

WIRELESS NETWORKS

L T P C
3 0 0 3

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT I WIRELESS LAN

9

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II MOBILE NETWORK LAYER

9

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III MOBILE TRANSPORT LAYER

9

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks.

UNIT IV WIRELESS WIDE AREA NETWORK

9

Overview of UTM Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

UNIT V 4G NETWORKS

9

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to

- Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- Design and implement wireless network environment for any application using latest wireless protocols and standards.

OUTCOMES:

Upon Completion of the course, the students will be able to

- To design display devices.
- To design optoelectronic detection devices and modulators.
- To design optoelectronic integrated circuits.

TEXTBOOKS:

1. Pallab Bhattacharya "Semiconductor Opto Electronic Devices", Prentice Hall of India Pvt., Ltd., New Delhi, 2006.
2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", Mc Graw-Hill International Edition, 1998

REFERENCES:

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

EC6017**RF SYSTEM DESIGN****L T P C****3 0 0 3****OBJECTIVES:**

The student should be made to:

- Be familiar with RF transceiver system design for wireless communications.
- Be exposed to design methods of receivers and transmitters used in communication systems

UNIT I CMOS PHYSICS, TRANSCEIVER SPECIFICATIONS AND ARCHITECTURES 9

Introduction to MOSFET Physics, Noise: Thermal, shot, flicker, popcorn noise, Two port Noise theory, Noise Figure, THD, IP2, IP3, Sensitivity, SFDR, Phase noise - Specification distribution over a communication link, Homodyne Receiver, Heterodyne Receiver, Image reject, Low IF Receiver Architectures Direct up conversion Transmitter, Two step up conversion Transmitter

UNIT II IMPEDANCE MATCHING AND AMPLIFIERS 9

S-parameters with Smith chart, Passive IC components, Impedance matching networks, Common Gate, Common Source Amplifiers, OC Time constants in bandwidth estimation and enhancement, High frequency amplifier design, Power match and Noise match, Single ended and Differential LNAs, Terminated with Resistors and Source Degeneration LNAs.

UNIT III FEEDBACK SYSTEMS AND POWER AMPLIFIERS 9

Stability of feedback systems: Gain and phase margin, Root-locus techniques, Time and Frequency domain considerations , Compensation, General model – Class A, AB, B, C, D, E and F amplifiers, Power amplifier Linearization Techniques, Efficiency boosting techniques, ACPR metric, Design considerations

UNIT IV PLL AND FREQUENCY SYNTHESIZERS 9

Linearised Model, Noise properties, Phase detectors, Loop filters and Charge pumps, Integer-N frequency synthesizers, Direct Digital Frequency synthesizers

**UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN
AD HOC WIRELESS NETWORKS**

9

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

**UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND
MAC PROTOCOLS**

9

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION & QOS

9

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

TEXT BOOK:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

REFERENCES:

1. Carlos De Moraes Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.
5. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

GE6082

INDIAN CONSTITUTION AND SOCIETY

**L T P C
3 0 0 3**

OBJECTIVES:

- To know about Indian constitution.
- To know about central and state government functionalities in India.
- To know about Indian society.

UNIT I	INTRODUCTION	9
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.		
UNIT II	STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT	9
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.		
UNIT III	STRUCTURE AND FUNCTION OF STATE GOVERNMENT	9
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.		
UNIT IV	CONSTITUTION FUNCTIONS	9
Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.		
UNIT V	INDIAN SOCIETY	9
Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.		

TOTAL: 45 PERIODS

OUTCOMES:

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

- Understand the functions of the Indian government
- Understand and abide the rules of the Indian constitution.
- Understand and appreciate different culture among the people.

TEXTBOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
3. Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

REFERENCES:

1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.

EC6018

MULTIMEDIA COMPRESSION AND COMMUNICATION

L T P C
3 0 0 3

OBJECTIVES:

- To have a complete understanding of error–control coding.
- To understand encoding and decoding of digital data streams.
- To introduce methods for the generation of these codes and their decoding techniques.
- To have a detailed knowledge of compression and decompression techniques.
- To introduce the concepts of multimedia communication.

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TOTAL : 45 PERIODS

- Describe various multimedia components
- Describe compression and decompression techniques.
- Apply the compression concepts in multimedia communication.

1. Fred Halshall "Multimedia communication - Applications, Networks, Protocols and Standards", Pearson Education, 2007.

1. Tay Vaughan, "Multimedia: Making it work", 7th Edition, TMH 2008 98
2. Kurose and W. Ross "Computer Networking "a Top Down Approach", Pearson Education 2005
3. Marcus Goncalves "Voice over IP Networks", Mc Graw hill 1999.
4. KR. Rao, Z S Bojkovic, D A Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Pearson Education 2007.
5. R. Steimnetz, K. Nahrstedt, "Multimedia Computing, Communications and Applications", Pearson Education Ranjan Parekh, "Principles of Multimedia", TMH 2007.

UNIT V **DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS**

9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management

TEXTBOOK:

1. Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy, 2009.

EC6019

DATA CONVERTERS

|| || L T P C
3 0 0 3

OBJECTIVES:

- To explain the basic operational and design principles of CMOS Analog to Digital and Digital to Analog converter architectures.
- To introduce the design calculations for developing the various blocks associated with a typical CMOS AD or DA converter.
- To make students decide the dimensions and bias conditions of all the MOS transistors involved in the design.

UNIT I SAMPLE AND HOLD CIRCUITS

9

Sampling switches, Conventional open loop and closed loop sample and hold architecture, **Open loop architecture with miller compensation, multiplexed input architectures, recycling** architecture switched capacitor architecture.

UNIT II SWITCH CAPACITOR CIRCUITS AND COMPARATORS 9
Switched-capacitor amplifiers, switched capacitor integrator, switched capacitor common mode feedback. Single stage amplifier as comparator, cascaded amplifier stages as comparator, latched comparators.

UNIT III DIGITAL TO ANALOG CONVERSION 9
Performance metrics, reference multiplication and division, switching and logic functions in AC, Resistor ladder DAC architecture, current steering DAC architecture.

UNIT IV ANALOG TO DIGITAL CONVERSION 9
Performance metric, Flash architecture, Pipelined Architecture, Successive approximation architecture, Time interleaved architecture.

UNIT V PRECISION TECHNIQUES 9
Comparator offset cancellation, Op Amp offset cancellation, Calibration techniques, range overlap and digital correction.

TOTAL:45 PERIODS

OUTCOMES:

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

- Explain sample and hold circuits
- Design ADC/DAC circuits
- Analyze ADC/DAC Architecture and Performance
- Discuss calibration techniques

TEXT BOOK:

1. Behzad Razavi, "Principles of data conversion System Design", IEEE press, 1995.

REFERENCES:

1. Franco Maloberti, "Data Converters", Springer, 2007.
2. Rudy Van de Plassche, "CMOS Integrated Analog-to-Digital and Digital-to-Analog Converters", Kluwer Academic Publishers, Boston, 2003.

CS6701 CRYPTOGRAPHY AND NETWORK SECURITY L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

UNIT I INTRODUCTION & NUMBER THEORY 10
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

UNIT V

9+3

Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email; Writing - Creative writing, Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar and Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents - Interpreting posters.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

Learners should be able to:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents.

TEXTBOOKS:

1. Department of English, Anna University. Mindscapes: English for Technologists and Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai. 2011

REFERENCES:

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice. Oxford University Press, New Delhi. 2011
2. Regional Institute of English. English for Engineers. Cambridge University Press, New Delhi. 2006
3. Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005
4. Rutherford, Andrea. J Basic Communication Skills for Technology. Pearson, New Delhi. 2001
5. Viswamohan, Aysha. English for Technical Communication. Tata McGraw-Hill, New Delhi. 2008

EXTENSIVE Reading (Not for Examination)

1. Kalam, Abdul. Wings of Fire. Universities Press, Hyderabad. 1999.

WEBSITES:

1. <http://www.usingenglish.com>
2. <http://www.uefap.com>

TEACHING METHODS:

- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.

OBJECTIVE:

- To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

UNIT I ENTREPRENEURSHIP**9**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur
Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION**9**

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS**9**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING**9**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS**9**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL : 45 PERIODS**OUTCOMES :**

- Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXTBOOKS :

1. S.S.Khanka, "Entrepreneurial Development" S.Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.
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