### ANNA UNIVERSITY, CHENNAI

**AFFILIATED INSTITUTIONS**

**R 2008**

**B.E. ELECTRONICS AND COMMUNICATION ENGINEERING**

**II - VIII SEMESTERS CURRICULA AND SYLLABI**

#### SEMESTER II

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**TOTAL : 28 CREDITS**

| 10. | - | English Language Laboratory | 0 | 0 | 2 | - |
* Common to all B.E. / B.Tech. Programmes

+ Offering English Language Laboratory as an additional subject (with no marks) during 2\textsuperscript{nd} semester may be decided by the respective Colleges affiliated to Anna University Chennai.

A. **CIRCUIT BRANCHES**

I **Faculty of Electrical Engineering**

1. B.E. Electrical and Electronics Engineering
2. B.E. Electronics and Instrumentation Engineering
3. B.E. Instrumentation and Control Engineering

II **Faculty of Information and Communication Engineering**

1. B.E. Computer Science and Engineering
2. B.E. Electronics and Communication Engineering
3. B.E. Bio Medical Engineering
4. B.Tech. Information Technology

B. **NON – CIRCUIT BRANCHES**

I **Faculty of Civil Engineering**

1. B.E. Civil Engineering

II **Faculty of Mechanical Engineering**

1. B.E. Aeronautical Engineering
2. B.E. Automobile Engineering
3. B.E. Marine Engineering
4. B.E. Mechanical Engineering
5. B.E. Production Engineering

III **Faculty of Technology**

1. B.Tech. Chemical Engineering
2. B.Tech. Biotechnology
3. B.Tech. Polymer Technology
4. B.Tech. Textile Technology
5. B.Tech. Textile Technology (Fashion Technology)
7. B.Tech. Plastics Technology
### SEMESTER III
(Applicable to the students admitted from the Academic year 2008–2009 onwards)

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### SEMESTER VII - Elective IV

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### SEMESTER VIII - Elective V

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### SEMESTER VIII - Elective VI

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AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
1. Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits – Writing analytical paragraphs on different debatable issues.

UNIT III
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations.
Suggested activities:
1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. (Eg: object –verb / object – noun)
2. Speaking exercises involving the use of stress and intonation – Group discussions–analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.

UNIT IV
Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:
1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.

UNIT V
Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:
1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
EXTENSIVE READING:

NOTE:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161 MATHEMATICS – II

UNIT I ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS

UNIT III ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION

UNIT V LAPLACE TRANSFORM
Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOKS
REFERENCES:

PH2161 ENGINEERING PHYSICS – II

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

UNIT IV DIELECTRIC MATERIALS

UNIT V MODERN ENGINEERING MATERIALS
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA

TOTAL : 45 PERIODS
TEXT BOOKS:
2. Charles P. Poole and Frank J.Owen, ‘Introduction to Nanotechnology’, Wiley India(2007) (for Unit V)

REFERENCES:

CY2161 ENGINEERING CHEMISTRY – II

AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES:
• The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
• Principles of corrosion control
• Chemistry of Fuels and combustion
• Industrial importance of Phase rule and alloys
• Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe²⁺ vs dichromate and precipitation – Ag⁺ vs CI⁻ titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II CORROSION AND CORROSION CONTROL
UNIT III  FUELS AND COMBUSTION

UNIT IV  PHASE RULE AND ALLOYS

UNIT V  ANALYTICAL TECHNIQUES

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

ME2151  ENGINEERING MECHANICS

OBJECTIVE
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.
UNIT I  BASICS & STATICS OF PARTICLES

UNIT II  EQUILIBRIUM OF RIGID BODIES

UNIT III  PROPERTIES OF SURFACES AND SOLIDS

UNIT IV  DYNAMICS OF PARTICLES

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS

TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
UNIT I BASIC CIRCUITS ANALYSIS 12

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS: 12
Network reduction: voltage and current division, source transformation – star delta conversion.
Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS 12
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
UNIT I CIRCUIT ANALYSIS TECHNIQUES

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS

UNIT III SEMICONDUCTOR DIODES

UNIT IV TRANSISTORS
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES (QUALITATIVE TREATMENT ONLY)

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
UNIT I  ELECTRICAL CIRCUITS & MEASUREMENTS   12

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II  ELECTRICAL MECHANICS   12

UNIT III  SEMICONDUCTOR DEVICES AND APPLICATIONS   12


UNIT IV  DIGITAL ELECTRONICS   12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V  FUNDAMENTALS OF COMMUNICATION ENGINEERING   12

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES
GE2152 BASIC CIVIL & MECHANICAL ENGINEERING L T P C (Common to branches under Electrical and I & C Faculty) 4 0 0 4

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15


UNIT II BUILDING COMPONENTS AND STRUCTURES 15

Foundations: Types, Bearing capacity – Requirement of good foundations.


TOTAL : 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10


UNIT IV I C ENGINES 10

Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10


TOTAL: 30 PERIODS

REFERENCES

### LIST OF EXPERIMENTS

**1. UNIX COMMANDS**
- Study of Unix OS - Basic Shell Commands - Unix Editor

**2. SHELL PROGRAMMING**
- Simple Shell program - Conditional Statements - Testing and Loops

**3. C PROGRAMMING ON UNIX**
- Dynamic Storage Allocation-Pointers-Functions-File Handling

**TOTAL : 45 PERIODS**

### HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

**HARDWARE**
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

**SOFTWARE**
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

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### LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

• **A minimum of FIVE experiments shall be offered.**
• **Laboratory classes on alternate weeks for Physics and Chemistry.**
• **The lab examinations will be held only in the second semester.**
**LIST OF EXPERIMENTS**

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using $\text{BaCl}_2$ vs $\text{Na}_2\text{SO}_4$
4. Potentiometric Titration ($\text{Fe}^{2+}$ / $\text{KMnO}_4$ or $\text{K}_2\text{Cr}_2\text{O}_7$)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

**ME2155  COMPUTER AIDED DRAFTING AND MODELLING LABORATORY**

**List of Exercises using software capable of Drafting and Modeling**

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building ( Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

**List of Equipments for a batch of 30 students:**

1. Pentium IV computer or better hardware, with suitable graphics facility -30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.
LIST OF EXPERIMENTS

1. Verification of ohm’s laws and Kirchhoff’s laws.
2. Verification of Thevenin’s and Norton’s Theorem
3. Verification of superposition theorem
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
10. Frequency response of single tuned coupled circuits.

TOTAL: 45 PERIODS

EC2155 CIRCUITS AND DEVICES LABORATORY

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

TOTAL : 45 PERIODS

ENGLISH LANGUAGE LABORATORY (Optional)

1. LISTENING:
   Listening & answering questions – gap filling – Listening and Note taking- Listening to telephone conversations
2. SPEAKING:  
Pronouncing words & sentences correctly – word stress – Conversation practice.

CLASSROOM SESSION  
1. Speaking: Introducing oneself, Introducing others, Role play, Debate- Presentations:  
   Body language, gestures, postures. Group Discussions etc
2. Goal setting – interviews – stress time management – situational reasons

Evaluation  
(1) Lab Session – 40 marks  
   Listening – 10 marks  
   Speaking – 10 marks  
   Reading – 10 marks  
   Writing – 10 marks

(2) Classroom Session – 60 marks  
   Role play activities giving real life context – 30 marks  
   Presentation – 30 marks

Note on Evaluation  
1. Examples for role play situations:  
   a. Marketing engineer convincing a customer to buy his product.  
   b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.

2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES  

LAB REQUIREMENTS  
1. Teacher – Console and systems for students  
2. English Language Lab Software  
3. Tape Recorders.
OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I          FOURIER SERIES                      9 + 3

UNIT II          FOURIER TRANSFORMS                            9+3

UNIT III          PARTIAL DIFFERENTIAL EQUATIONS              9+3
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV          APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 3
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V          Z -TRANSFORMS AND DIFFERENCE EQUATIONS        9 +3

LECTURES: 45    TUTORIALS : 15 TOTAL : 60 PERIODS

TEXT BOOK:

REFERENCES
AIM
To expose the students to the concepts of various types of electrical machines and transmission and distribution of electrical power.

OBJECTIVES
- To impart knowledge on Constructional details, principle of operation, performance, starters and testing of D.C. machines.
- Constructional details, principle of operation and performance of transformers.
- Constructional details, principle of operation and performance of induction motors.
- Constructional details and principle of operation of alternators and special machines.
- Power System transmission and distribution.

UNIT I D.C. MACHINES

UNIT II TRANSFORMERS

UNIT III INDUCTION MOTORS

UNIT IV SYNCHRONOUS AND SPECIAL MACHINES

UNIT V TRANSMISSION AND DISTRIBUTION

TOTAL = 45 PERIODS

TEXT BOOKS

REFERENCES
AIM
To provide an in-depth knowledge in problem solving techniques and data structures.

OBJECTIVES
- To learn the systematic way of solving problems
- To understand the different methods of organizing large amounts of data
- To learn to program in C++
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems

UNIT I  PRINCIPLES OF OBJECT ORIENTED PROGRAMMING  9
Introduction- Tokens-Expressions-contour Structures –Functions in C++, classes and objects, constructors and destructors ,operators overloading and type conversions .

UNIT II  ADVANCED OBJECT ORIENTED PROGRAMMING  9
Inheritance, Extending classes, Pointers, Virtual functions and polymorphism, File Handling Templates ,Exception handling, Manipulating strings.

UNIT III  DATA STRUCTURES & ALGORITHMS  9
Algorithm, Analysis, Lists, Stacks and queues, Priority queues-Binary Heap-Application, Heaps–hashing-hash tables without linked lists

UNIT IV  NONLINEAR DATA STRUCTURES  9
Trees-Binary trees, search tree ADT, AVL trees, Graph Algorithms-Topological sort, shortest path algorithm network flow problems-minimum spanning tree - Introduction to NP - completeness.

UNIT V  SORTING AND SEARCHING  9
Sorting – Insertion sort, Shell sort, Heap sort, Quick sort, Indirect sorting, Bucket sort, Introduction to Algorithm Design Techniques –Greedy algorithm (Minimum Spanning Tree), Divide and Conquer (Merge Sort), Dynamic Programming (All pairs Shortest Path Problem).

TOTAL = 45 PERIODS

TEXT BOOKS

REFERENCES
7. Robert Lafore, Object oriented programming in C++, Galgotia Publication
AIM
To learn the basic methods for the design of digital circuits and provide the fundamental concepts used in the design of digital systems.

OBJECTIVES
- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits

UNIT I  MINIMIZATION TECHNIQUES AND LOGIC GATES  12
Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR-Implementations of Logic Functions using gates, NAND–NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates

UNIT II  COMBINATIONAL CIRCUITS  12

UNIT III  SEQUENTIAL CIRCUITS  12

UNIT IV  MEMORY DEVICES  12
UNIT V  SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS  12

Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits


TUTORIAL =15, TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

EC 2204  SIGNALS AND SYSTEMS  L T P C  3 1 0 4

AIM
To study and analyse characteristics of continuous, discrete signals and systems.

OBJECTIVES
- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.

UNIT I  CLASSIFICATION OF SIGNALS AND SYSTEMS  9
Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and periodic, random signals, CT systems and DT systems, Basic properties of systems - Linear Time invariant Systems and properties.

UNIT II  ANALYSIS OF CONTINUOUS TIME SIGNALS  9
Fourier series analysis, Spectrum of C.T. singals, Fourier Transform and Laplace Transform in Signal Analysis.
UNIT III  LINEAR TIME INVARIANT –CONTINUOUS TIME SYSTEMS  
Differential equation, Block diagram representation, Impulse response, Convolution integral, frequency response, Fourier and Laplace transforms in analysis, State variable equations and matrix representation of systems

UNIT IV  ANALYSIS OF DISCRETE TIME SIGNALS  
Sampling of CT signals and aliasing, DTFT and properties, Z-transform and properties of Z-transform.

UNIT V  LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS  
Difference equations, Block diagram representation, Impulse response, Convolution sum, LTI systems analysis using DTFT and Z-transforms, State variable equations and matrix representation of systems.

TOTAL : 45 + 15 = 60 PERIODS

TEXT BOOKS:

REFERENCES:

EC 2205  ELECTRONIC CIRCUITS I  
L T P C
3 1 0 4

AIM:
The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

OBJECTIVES:
• On completion of this course the student will understand
• The methods of biasing transistors
• Design of simple amplifier circuits
• Midband analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
• Method of calculating cutoff frequencies and to determine bandwidth
• Design of power amplifiers
• Analysis and design of power supplies.
UNIT I TRANSISTOR BIAS STABILITY

BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to $h_{FE}$ variation within manufacturers tolerance - Stability factors - Different types of biasing circuits - Method of stabilizing the Q point - Advantage of Self bias (voltage divider bias) over other types of biasing. Bias compensation – Diode, Thermister and Sensistor compensations, Biasing the FET and MOSFET.

UNIT II MIDBAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS


UNIT III FREQUENCY RESPONSE OF AMPLIFIERS

General shape of frequency response of amplifiers - Definition of cutoff frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cutoff frequency Hybrid – $\pi$ equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cutoff frequency – Gain Bandwidth Product - High frequency equivalent circuit of FETs - High frequency analysis of FET amplifiers - Gain-bandwidth product of FETs - General expression for frequency response of multistage amplifiers - Calculation of overall upper and lower cutoff frequencies of multistage amplifiers - Amplifier rise time and sag and their relation to cutoff frequencies.

UNIT IV LARGE SIGNAL AMPLIFIERS

Classification of amplifiers, Class A large signal amplifiers, second harmonic distortion, higher order harmonic distortion, transformer-coupled class A audio power amplifier – efficiency of Class A amplifiers. Class B amplifier – efficiency - push-pull amplifier - distortion in amplifiers - complementary-symmetry (Class B) push-pull amplifier, Class C, Class D amplifier – Class S amplifier – MOSFET power amplifier, Thermal stability and heat sink.

UNIT V RECTIFIERS AND POWER SUPPLIES

Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for $V_{dc}$ and ripple voltage with C, L, LC and CLC filters. Voltage multipliers, Voltage regulators - Zener diode regulator, principles of obtaining a regulated power supply, regulator with current limiting, Over voltage protection, Switched mode power supply (SMPS), Power control using SCR.

TUTORIAL = 15 TOTAL : 60 PERIODS

TEXT BOOKS:
REFERENCES:

EC 2207 DIGITAL ELECTRONICS LAB

1. Design and implementation of Adder and Subtractor using logic gates.
2. Design and implementation of code converters using logic gates
   (i) BCD to excess-3 code and vice versa
   (ii) Binary to gray 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 8 Bit Magnitude Comparator using IC 7485
5. Design and implementation of 16 bit odd/even parity checker generator using IC74180.
6. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154
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-10 / Mod-12 Ripple counters
9. Design and implementation of 3-bit synchronous up/down counter
10. Implementation of SISO, SIPO, PISO and PIPO shift registers using Flip- flops
11. Design of experiments 1, 6, 8 and 10 using Verilog Hardware Description Language
LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS
(2 PER BATCH)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
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<td>1</td>
<td>Digital IC Tester</td>
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<td>Multimeter</td>
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EC 2208 ELECTRONIC CIRCUITS LAB I
(Common to ECE & Bio Medical Engineering) 0 0 3 2

Expt No.1  Fixed Bias amplifier circuit using BJT
1. Waveforms at input and output without bias.
2. Determination of bias resistance to locate Q-point at center of load line.
4. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.2  Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor.
1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product
Expt No.3  Design and construct BJT Common Collector Amplifier using voltage divider bias (self-bias).

1. Measurement of gain.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.4  Darlington Amplifier using BJT.

1. Measurement of gain and input resistance. Comparison with calculated values.
2. Plot the frequency response & Determination of Gain Bandwidth Product

Expt No.5  Source follower with Bootstrapped gate resistance

1. Measurement of gain, input resistance and output resistance with and without Bootstrapping. Comparison with calculated values.

Expt No.6  Differential amplifier using BJT

1. Measurement of CMRR.

Expt No.7  Class A Power Amplifier

1. Observation of output waveform.
3. Determination of efficiency.
4. Comparison with calculated values.

Expt No.8  Class B Complementary symmetry power amplifier

1. Observation of the output waveform with crossover Distortion.
2. Modification of the circuit to avoid crossover distortion.
4. Determination of efficiency.
5. Comparison with calculated values.

Expt No.9  Power Supply circuit - Half wave rectifier with simple capacitor filter.

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.
2. Plot the Load regulation characteristics using Zener diode.

Expt No.10  Power Supply circuit - Full wave rectifier with simple capacitor filter

1. Measurement of DC voltage under load and ripple factor, Comparison with calculated values.

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS
(3 per Batch)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the equipments / Components</th>
<th>Quantity Required</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>Variable DC Power Supply</td>
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<td>(0-30V)</td>
</tr>
<tr>
<td>2</td>
<td>CRO</td>
<td>10</td>
<td>30MHz</td>
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<tr>
<td>4</td>
<td>Multimeter</td>
<td>6</td>
<td>Digital</td>
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<tr>
<td>6</td>
<td>Function Generator</td>
<td>8</td>
<td>1 MHz</td>
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<tr>
<td>7</td>
<td>DC Ammeter</td>
<td>10</td>
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</tbody>
</table>

31
EC 2209   DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING LAB   L T P C
0 0 3 2

1. Basic Programs for C++ Concepts
2. Array implementation of List Abstract Data Type (ADT)
3. Linked list implementation of List ADT
4. Cursor implementation of List ADT
5. Stack ADT - Array and linked list implementations
The next two exercises are to be done by implementing the following source files
(a) Program source files for Stack Application 1
(b) Array implementation of Stack ADT
(c) Linked list implementation of Stack ADT
(d) Program source files for Stack Application 2
An appropriate header file for the Stack ADT should be #included in (a) and (d)

5. Implement any Stack Application using array implementation of Stack ADT (by
implementing files (a) and (b) given above) and then using linked list implementation
of Stack ADT (by using files (a) and implementing file (c))

7. Queue ADT – Array and linked list implementations
8. Search Tree ADT - Binary Search Tree
9. Heap Sort
10. Quick Sort

LIST OF EQUIPMENTS AND COMPONENTS FOR A BATCH OF 30 STUDENTS
( 1 per Batch)

<table>
<thead>
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<th>S.No</th>
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<td>P IV Computer Variable DC Power Supply</td>
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<tr>
<td>2</td>
<td>C and C++ Compiler</td>
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AIM
This course aims at providing the necessary basic concepts in random processes. Knowledge of fundamentals and applications of random phenomena will greatly help in the understanding of topics such as signals & systems, pattern recognition, voice and image processing and filtering theory.

OBJECTIVES
- At the end of the course, the students would
- Have a fundamental knowledge of the basic probability concepts.
- Have a well-founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I  RANDOM VARIABLES  9 + 3

UNIT II  TWO DIMENSIONAL RANDOM VARIABLES  9 + 3
Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem (for iid random variables)

UNIT III  CLASSIFICATION OF RANDOM PROCESSES  9 + 3

UNIT IV  CORRELATION AND SPECTRAL DENSITIES  9 + 3
Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function

UNIT V  LINEAR SYSTEMS WITH RANDOM INPUTS  9 + 3
Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output – white noise.

LECTURES : 45   TUTORIAL : 15   TOTAL : 60 PERIODS

TEXT BOOKS
1. Oliver C. Ibe, “Fundamentals of Applied probability and Random processes”, Elsevier, First Indian Reprint ( 2007) (For units 1 and 2)
REFERENCES:

EC 2251 ELECTRONIC CIRCUITS II L T P C
3 1 0 4

AIM
The aim of this course is to familiarize the student with the analysis and design of feedback amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

OBJECTIVES:
- The advantages and method of analysis of feedback amplifiers
- Analysis and design of LC and RC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time base generators.

UNIT I FEEDBACK AMPLIFIERS
Block diagram, Loop gain, Gain with feedback, Effects of negative feedback – Sensitivity and desensitivity of gain, Cut-off frequencies, distortion, noise, input impedance and output impedance with feedback, Four types of negative feedback connections – voltage series feedback, voltage shunt feedback, current series feedback and current shunt feedback, Method of identifying feedback topology and feedback factor, Nyquist criterion for stability of feedback amplifiers.

UNIT II OSCILLATORS

UNIT III TUNED AMPLIFIERS
UNIT IV  WAVE SHAPING AND MULTIVIBRATOR CIRCUITS  9
RC & RL Integrator and Differentiator circuits – Storage, Delay and Calculation of
Transistor Switching Times – Speed-up Capacitor - Diode clippers, Diode comparator -
Clampers. Collector coupled andEmitter coupled Astable multivibrator - Monostable
multivibrator - Bistable multivibrators - Triggering methods for Bistable multivibrators -
Schmitt trigger circuit.

UNIT V  BLOCKING OSCILLATORS AND TIMEBASE GENERATORS  9
UJT sawtooth waveform generator, Pulse transformers – equivalent circuit – response -
applications, Blocking Oscillator – Free running blocking oscillator - Astable Blocking
Oscillators with base timing – Push-pull Astable blocking oscillator with emitter timing,
Frequency control using core saturation, Triggered blocking oscillator – Monostable
blocking oscillator with base timing – Monostable blocking oscillator with emitter timing,
Time base circuits - Voltage-Time base circuit, Current-Time base circuit - Linearization
through adjustment of driving waveform.

TUTORIAL= 15  TOTAL : 60 PERIODS

TEXT BOOKS:
2. S. Salivahanan, N. Suressh Kumar and A. Vallavaraj, Electronic Devices and Circuits,

REFERENCES:
3 Robert L. Boylestad and Louis Nasheresky, Electronic Devices and Circuit Theory, 9th

EC 2252  COMMUNICATION THEORY  L T P C
3 1 0 4

AIM
To study the various analog communication fundamentals viz., Amplitude modulation
and demodulation, angle modulation and demodulation. Noise performance of various
receivers and information theory with source coding theorem are also dealt.
OBJECTIVES:

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.

UNIT I  AMPLITUDE MODULATION SYSTEMS  10
Review of Spectral Characteristics of Periodic and Non-periodic signals; Generation and Demodulation of AM, DSBSC, SSB and VSB Signals; Comparison of Amplitude Modulation Systems; Frequency Translation; FDM; Non – Linear Distortion.

UNIT II  ANGLE MODULATION SYSTEMS  8
Phase and Frequency Modulation; Single tone, Narrow Band and Wideband FM; Transmission Bandwidth; Generation and Demodulation of FM Signal.

UNIT III  NOISE THEORY  8
Review of Probability, Random Variables and Random Process; Guassian Process; Noise – Shot noise, Thermal noise and white noise; Narrow band noise, Noise temperature; Noise Figure.

UNIT IV  PERFORMANCE OF CW MODULATION SYSTEMS  10
Superheterodyne Radio receiver and its characteristic; SNR; Noise in DSBSC systems using coherent detection; Noise in AM system using envelope detection and its FM system; FM threshold effect; Pre-emphasis and De-emphasis in FM; Comparison of performances.

UNIT V  INFORMATION THEORY  9
Discrete Messages and Information Content, Concept of Amount of Information, Average information, Entropy, Information rate, Source coding to increase average information per bit, Shannon-Fano coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon’s Theorem, Channel Capacity, Bandwidth- S/N trade-off, Mutual information and channel capacity, rate distortion theory, Lossy Source coding.

TUTORIAL 15  TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:
AIM
To familiarize the student to the concepts, calculations and pertaining to electric,
magnetic and electromagnetic fields so that an in depth understanding of antennas,
electronic devices, Waveguides is possible.

OBJECTIVES
- To analyze fields a potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT I  STATIC ELECTRIC FIELDS  9
Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-
ordinate System – Introduction to line, Surface and Volume Integrals – Definition of Curl,
Divergence and Gradient – Meaning of Stokes theorem and Divergence theorem
Coulomb’s Law in Vector Form – Definition of Electric Field Intensity – Principle of
Superposition – Electric Field due to discrete charges – Electric field due to continuous
charge distribution - Electric Field due to charges distributed uniformly on an infinite and
finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field
due to an infinite uniformly charged sheet.
Electric Scalar Potential – Relationship between potential and electric field - Potential
due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux

UNIT II  STATIC MAGNETIC FIELD  9
The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite
wire carrying a current I – Magnetic field intensity on the axis of a circular and
rectangular loop carrying a current I – Ampere’s circuital law and simple applications.
Magnetic flux density – The Lorentz force equation for a moving charge and applications
– Force on a wire carrying a current I placed in a magnetic field – Torque on a loop

UNIT III  ELECTRIC AND MAGNETIC FIELDS IN MATERIALS  9
Poisson’s and Laplace’s equation – Electric Polarization-Nature of dielectric materials-
Definition of Capacitance – Capacitance of various geometries using Laplace’s equation
– Electrostatic energy and energy density – Boundary conditions for electric fields –
Electric current – Current density – point form of ohm’s law – continuity equation for
current.Definition of Inductance – Inductance of loops and solenoids – Definition of
mutual inductance – simple examples. Energy density in magnetic fields – Nature of
magnetic materials – magnetization and permeability - magnetic boundary conditions.

UNIT IV  TIME VARYING ELECTRIC AND MAGNETIC FIELDS  9
Faraday’s law – Maxwell’s Second Equation in integral form from Faraday’s Law –
Equation expressed in point form.
Displacement current – Ampere’s circuital law in integral form – Modified form of
Ampere’s circuital law as Maxwell’s first equation in integral form – Equation expressed
in point form. Maxwell’s four equations in integral form and differential form.
Poynting Vector and the flow of power – Power flow in a co-axial cable – Instantaneous
Average and Complex Poynting Vector.
UNIT V  ELECTROMAGNETIC WAVES
Derivation of Wave Equation – Uniform Plane Waves – Maxwell’s equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material.
Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect.

TUTORIAL 15  TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:

EC 2254  LINEAR INTEGRATED CIRCUITS  L T P C  3 0 0 3

AIM
To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES
- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce the concepts of waveform generation and introduce some special function ICs.

UNIT I  IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR IC  9
UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS

Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Differentiator, Logarithmic amplifier, Antilogarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, clipper and clamper, Low-pass, high-pass and band-pass Butterworth filters.

UNIT III ANALOG MULTIPLIER AND PLL

Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell - Variable transconductance technique, analog multiplier ICs and their applications, Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS


UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs

Sine-wave generators, Multivibrators and Triangular wave generator, Saw-tooth wave generator, ICL8038 function generator, Timer IC 555, IC Voltage regulators - Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Monolithic switching regulator, Switched capacitor filter IC MF10, Frequency to Voltage and Voltage to Frequency converters, Audio Power amplifier, Video Amplifier, Isolation Amplifier, Opto-couplers and fibre optic IC.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
AIM
To familiarize the students with concepts related to the operation analysis and stabilization of control systems

OBJECTIVES
- To understand the open loop and closed loop (feedback) systems
- To understand time domain and frequency domain analysis of control systems required for stability analysis.
- To understand the compensation technique that can be used to stabilize control systems

UNIT I  CONTROL SYSTEM MODELING  
Basic Elements of Control System – Open loop and Closed loop systems - Differential equation - Transfer function, Modeling of Electric systems, Translational and rotational mechanical systems - Block diagram reduction Techniques - Signal flow graph

UNIT II  TIME RESPONSE ANALYSIS  
Time response analysis - First Order Systems - Impulse and Step Response analysis of second order systems - Steady state errors – P, PI, PD and PID Compensation, Analysis using MATLAB

UNIT III  FREQUENCY RESPONSE ANALYSIS  

UNIT IV  STABILITY ANALYSIS  

UNIT V  STATE VARIABLE ANALYSIS & DIGITAL CONTROL SYSTEMS  

TOTAL : 45 PERIODS

TEXTBOOKS:
REFERENCES:

EC 2257       ELECTRONICS CIRCUITS II AND SIMULATION LAB       L   T   P   C
                  0   0   3   2

DESIGN OF FOLLOWING CIRCUITS
1. Series and Shunt feedback amplifiers:
2. Frequency response, Input and output impedance calculation
3. RC Phase shift oscillator, Wien Bridge Oscillator
4. Hartley Oscillator, Colpitts Oscillator
5. Tuned Class C Amplifier
6. Integrators, Differentiators, Clippers and Clampers
7. Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE:
1. Differential amplifier
2. Active filters : Butterworth 2nd order LPF, HPF (Magnitude & Phase Response)
3. Astable, Monostable and Bistable multivibrator - Transistor bias
4. D/A and A/D converters (Successive approximation)
5. Analog multiplier
6. CMOS Inverter, NAND and NOR

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(3 per Batch)

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<thead>
<tr>
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<th>Quantity Required</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>1</td>
<td>Variable DC Power Supply</td>
<td>8</td>
<td>(0-30V)</td>
</tr>
<tr>
<td>2</td>
<td>Fixed Power Supply</td>
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<td>3</td>
<td>CRO</td>
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<td>30MHz</td>
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<tr>
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<td>Multimeter</td>
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<td>Digital</td>
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<td>Multimeter</td>
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<td>6</td>
<td>Function Generator</td>
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<td>7</td>
<td>Digital LCR Meter</td>
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<td>PC with SPICE Simulation Software</td>
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<td>BC107, BF195, 2N2222, BC147</td>
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<tr>
<td>10</td>
<td>Resistors 1/4 Watt Assorted</td>
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</table>

Consumables (Minimum of 25 Nos. each)
9. BC107, BF195, 2N2222, BC147
10. Resistors 1/4 Watt Assorted
Design and testing of
1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier
4. Active lowpass, Highpass and bandpass filters.
6. Phase shift and Wien bridge oscillators using op-amp.
7. Astable and monostable multivibrators using NE555 Timer.
8. PLL characteristics and its use as Frequency Multiplier.
9. DC power supply using LM317 and LM723.
10. Study of SMPS.
11. Simulation of Experiments 3, 4, 5, 6 and 7 using PSpice netlists.

Note: Op-Amps uA741, LM 301, LM311, LM 324 & AD 633 may be used

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<td>2</td>
<td>CRO</td>
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<td>30MHz</td>
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<tr>
<td>3</td>
<td>Digital Multimeter</td>
<td>10</td>
<td>Digital</td>
</tr>
<tr>
<td>4</td>
<td>Function Generator</td>
<td>8</td>
<td>1 MHz</td>
</tr>
<tr>
<td>5</td>
<td>IC Tester (Analog)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bread board</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Computer (PSPIECE installed)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Consumables (Minimum of 25 Nos. each)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of the equipments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IC 741</td>
</tr>
<tr>
<td>2</td>
<td>IC NE555</td>
</tr>
<tr>
<td>3</td>
<td>LED</td>
</tr>
<tr>
<td>4</td>
<td>LM317</td>
</tr>
</tbody>
</table>
EC 2259  ELECTRICAL ENGINEERING AND CONTROL SYSTEM LAB  L T P C  0 0 3 2

AIM
1. To expose the students to the basic operation of electrical machines and help them to develop experimental skills.
2. To study the concepts, performance characteristics, time and frequency response of linear systems.
3. To study the effects of controllers.
4. Open circuit and load characteristics of separately excited and self excited D.C. generator.
5. Load test on D.C. shunt motor.
7. Load test on single phase transformer and open circuit and short circuit test on single phase transformer.
8. Regulation of three phase alternator by EMF and MMF methods.
9. Load test on three phase induction motor.
10. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters).
12. Digital simulation of linear systems.
13. Stability Analysis of Linear system using Mat lab.
14. Study the effect of P, PI, PID controllers using Mat lab.
15. Design of Lead and Lag compensator.
16. Transfer Function of separately excited D.C.Engineer.
17. Transfer Function of armature and Field Controller D.C.Motor.

TOTAL: 45 PERIODS

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Generator set</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>200Ω, 5A, 175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V, 30V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>30A, 2A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Three point starter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

2. **Load test on D.C. shunt motor.**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC Motor</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Three point starter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

3. **Swinburne’s test and speed control of D.C. shunt motor**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC Motor</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>100Ω, 5A, 175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>5A, 2A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

4. **Load test on single-phase transformer and open circuit and short circuit test on single-phase transformer.**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single phase Transformer</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Wattmeter</td>
<td>300V, 5A, UPF, 300V, 5A, LPF</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter AC</td>
<td>300V</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter AC</td>
<td>5A, 30A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Single phase auto-transformer</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Resistive load</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
5. Regulation of three-phase alternator by EMF and MMF method.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Alternator set</td>
<td>200Ω, 5A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>200Ω, 5A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Voltmeter AC</td>
<td>600V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>2A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Ammeter AC</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TPST switch</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

6. Load test on three phase Induction motor.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three Phase Induction Motor</td>
<td>600V, 10A,UPF</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Wattmeter</td>
<td>600V, 10A,UPF</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600V, 5A,LPF</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter AC</td>
<td>600V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter AC</td>
<td>10A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Brake drum arrangement</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Star delta starter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

7. No load and blocked rotor test on three-phase induction motor
   (Determination of equivalent circuit parameters)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three Phase Induction Motor</td>
<td>600V, 10A,UPF</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600V, 5A,LPF</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Wattmeter</td>
<td>600V</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150V</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter AC</td>
<td>10A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Brake drum arrangement</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Three phase auto-transformer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Three point starter</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Four point starter</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Star-delta starter</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>DOL starter</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Three phase auto-transformer</td>
<td>1</td>
</tr>
</tbody>
</table>
Simulink software for minimum 3 users license

10. Stability analysis of linear system using Mat lab.
Matlab software for minimum 3 users license

Matlab software for minimum 3 users license

12. Design of lead and lag compensator.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resistor</td>
</tr>
<tr>
<td>2</td>
<td>Capacitor</td>
</tr>
<tr>
<td>3</td>
<td>Function generator</td>
</tr>
<tr>
<td>4</td>
<td>Bread Board</td>
</tr>
</tbody>
</table>

13. Transfer function of separately excited D.C. generator.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Motor Generator set</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>200Ω, 5A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2A</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Three point starter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Apparatus</th>
<th>Range</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC Motor</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rheostat</td>
<td>175Ω, 1.5A</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Voltmeter DC</td>
<td>300V</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ammeter DC</td>
<td>30A</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>DPST switch</td>
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<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Three point starter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Tachometer</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
AIM:
To introduce the basic concepts of Digital Communication in baseband and passband domains and to give an exposure to error control coding techniques.

OBJECTIVES:
- To study signal space representation of signals and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To understand baseband and bandpass signal transmission and reception techniques.
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

UNIT I DIGITAL COMMUNICATION SYSTEM

UNIT II BASEBAND FORMATTING TECHNIQUES
Sampling – Impulse sampling, Natural Sampling, Sampler Implementation; Quantisation – Uniform and Non-uniform; Encoding Techniques for Analog Sources; Temporal waveform encoding, Spectral waveform encoding, Model-based encoding, Comparison of speech encoding methods.

UNIT III BASEBAND CODING TECHNIQUES
Error Control Codes - Block Codes, Convolutional Codes, Concept of Error Free Communication; Classification of line codes, desirable characteristics and power spectra of line codes.

UNIT IV BASEBAND RECEPTION TECHNIQUES
Noise in Communication Systems; Receiving Filter – Correlator type, Matched Filter type; Equalising Filter - Signal and system design for ISI elimination, Implementation, Eye Pattern analysis; Synchronisation; Detector – Maximum Likelihood Detector, Error Probability, Figure-of-Merit for Digital Detection.

UNIT V BANDPASS SIGNAL TRANSMISSION AND RECEPTION
Memory less modulation methods - Representation and Spectral characteristics, ASK, PSK, QAM, QPSK, FSK; Bandpass receiving filter, Error performance – Coherent and Non-coherent detection systems.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
To study the signal processing methods and processors.

**OBJECTIVES:**
- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

**UNIT I DISCRETE FOURIER TRANSFORM**
DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

**UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS:**

**UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS**

**UNIT IV FINITE WORD LENGTH EFFECTS**
Fixed point and floating point number representations – Comparison – Truncation and Rounding errors - Quantization noise – derivation for quantization noise power – coefficient quantization error – Product quantization error - Overflow error – Roundoff noise power - limit cycle oscillations due to product roundoff and overflow errors - signal scaling

**UNIT V MULTIRATE SIGNAL PROCESSING**
Introduction to Multirate signal processing- Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

**TEXT BOOKS:**
REFERENCES:

EC2303 COMPUTER ARCHITECTURE AND ORGANIZATION

AIM
To discuss the basic structure of a digital computer and to study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.

OBJECTIVES:
- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study in detail the different types of control and the concept of pipelining.
- To study the hierarchical memory system including cache memories and virtual memory.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I INTRODUCTION

UNIT II DATA PATH DESIGN
Fixed Point Arithmetic, Addition, Subtraction, Multiplication and Division, Combinational and Sequential ALUs, Carry look ahead adder, Robertson algorithm, booth’s algorithm, non-restoring division algorithm, Floating Point Arithmetic, Coprocessor, Pipeline Processing, Pipeline Design, Modified booth’s Algorithm.

UNIT III CONTROL DESIGN
Hardwired Control, Microprogrammed Control, Multiplier Control Unit, CPU Control Unit, Pipeline Control, Instruction Pipelines, Pipeline Performance, Superscalar Processing, Nano Programming.

UNIT IV MEMORY ORGANIZATION
Random Access Memories, Serial - Access Memories, RAM Interfaces, Magnetic Surface Recording, Optical Memories, multilevel memories, Cache & Virtual Memory, Memory Allocation, Associative Memory.
UNIT V  SYSTEM ORGANIZATION  9
Communication methods, Buses, Bus Control, Bus Interfacing, Bus arbitration, IO and system control, IO interface circuits, Handshaking, DMA and interrupts, vectored interrupts, PCI interrupts, pipeline interrupts, IOP organization, operation systems, multiprocessors, fault tolerance, RISC and CISC processors, Superscalar and vector processor.

TOTAL= 45 PERIODS

TEXTBOOKS:

REFERENCES:

EC2305  TRANSMISSION LINES AND WAVEGUIDES  L T P C
3 1 0 4

AIM
To lay a strong foundation on the theory of transmission lines and wave guides by highlighting their applications.

OBJECTIVES

• To become familiar with propagation of signals through lines
• Understand signal propagation at Radio frequencies
• Understand radio propagation in guided systems
• To become familiar with resonators

UNIT I  FILTERS  9

UNIT II  TRANSMISSION LINE PARAMETERS  9
A line of cascaded T sections - Transmission lines - General Solution, Physical Significance of the equations, the infinite line, wavelength, velocity, propagation, Distortion line, the telephone cable, Reflection on a line not terminated in Zo, Reflection Coefficient, Open and short circuited lines, Insertion loss.
UNIT III  THE LINE AT RADIO FREQUENCY
Parameters of open wire line and Coaxial cable at RF – Line constants for dissipation - voltages and currents on the dissipation less line - standing waves – nodes - standing wave ratio - input impedance of open and short circuited lines - power and impedance measurement on lines – λ / 4 line, Impedance matching – single and double-stub matching circle diagram, smith chart and its applications – Problem solving using Smith chart.

UNIT IV  GUIDED WAVES BETWEEN PARALLEL PLANES
Application of the restrictions to Maxwell’s equations – transmission of TM waves between Parallel plans – Transmission of TE waves between Parallel planes. Transmission of TEM waves between Parallel planes – Manner of wave travel. Velocities of the waves – characteristic impedance - Attenuators

UNIT V  WAVEGUIDES
Application of Maxwell’s equations to the rectangular waveguide. TM waves in Rectangular guide. TE waves in Rectangular waveguide – Cylindrical waveguides. The TEM wave in coaxial lines. Excitation of wave guides. Guide termination and resonant cavities.

L: 45, T: 15, TOTAL= 60 PERIODS

TEXT BOOK

REFERENCES

GE 2021  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C
3 0 0 3

AIM
- The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional Endeavour that they participates.

OBJECTIVE
- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.
UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT
UNIT V     HUMAN POPULATION AND THE ENVIRONMENT


TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES BOOKS:

EC2304      MICROPROCESSOR AND MICROCONTROLLER

L T P C
3 1 0 4

AIM: To learn the architecture, programming, interfacing and rudiments of system design of microprocessors and microcontrollers.

OBJECTIVES
- To introduce microprocessors and basics of system design using microprocessors.
- To introduce h/w architecture, instruction set and programming of 8085 microprocessor.
- To introduce the h/w architecture, instruction set and programming of 8086 microprocessor.
- To introduce the peripheral interfacing of microprocessors.
- To introduce through case studies, the system design principles using 8085 and 8086.
- To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.

UNIT I     INTRODUCTION TO 8 BIT AND 16 BIT MICROPROCESSORS – H/W ARCHITECTURE

Introduction to microprocessor, computer and its organization, Programming system, Address bus, data bus and control bus, Tristate bus, clock generation, Connecting Microprocessor to I/O devices, Data transfer schemes, Architectural advancements of microprocessors. Introductory System design using microprocessors, 8086 – Hardware Architecture, External memory addressing, Bus cycles, some important Companion Chips, Maximum mode bus cycle, 8086 system configuration, Memory Interfacing, Minimum mode system configuration, Maximum mode system configuration, Interrupt processing, Direct memory access.
UNIT II  16 BIT MICROPROCESSOR INSTRUCTION SET AND ASSEMBLY
LANGUAGE PROGRAMMING
Programmer’s model of 8086, operand types, operand addressing, assembler directives,
instruction set - Data transfer group, Arithmetic group, logical group, control transfer
group, miscellaneous instruction groups, programming.

UNIT III  MICROPROCESSOR PERIPHERAL INTERFACING
Introduction, Generation of I/O Ports, Programmable Peripheral Interface (PPI)-Intel
8255, Sample-and-Hold Circuit and multiplexer, Keyboards and Display Interface,
Keyboard and Display Controller (8279), Programmable Interval timers (Intel 8253,
8254), D-to-A converter, A-to-D converter, CRT Terminal Interface, Printer Interface.

UNIT IV  8 BIT MICROCONTROLLER- H/W ARCHITECTURE, INSTRUCTION
SET AND PROGRAMMING
Introduction to 8051 Micro-controller, Architecture, Memory organization, Special
function registers, Port Operation, Memory Interfacing, I/O Interfacing, Programming
8051 resources, interrupts, Programmer’s model of 8051, Operand types, Operand
addressing, Data transfer instructions, Arithmetic instructions, Logic instructions, Control
transfer instructions, Programming

UNIT V  SYSTEM DESIGN USING MICRO PROCESSOR &
MICROCONTROLLER
Case studies – Traffic light control, washing machine control, RTC Interfacing using I2C
Standard- Motor Control- Relay, PWM, DC & Stepper Motor.

L: 45, T: 15, TOTAL: 60 PERIODS

TEXT BOOKS
1. Krishna Kant, “MICROPROCESSORS AND MICROCONTROLLERS Architecture,
   programming and system design using 8085, 8086, 8051 and 8096”. PHI 2007.
2. Douglas V Hall, “MICROPROCESSORS AND INTERFACING, PROGRAMMING
   AND HARDWARE” TMH, 2006.

REFERENCES
1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay The 8051

EC2306  DIGITAL SIGNAL PROCESSING LABORATORY
L T P C
0 0 3 2

AIM
To introduce the student to various digital Signal Processing techniques using TMS
320c5x family processors and MATLAB.

OBJECTIVES:
To implement the processing techniques using the instructions of
TMS320C5X/TMS320C 67XX/ADSP 218X/219X/BS531/532/561
- To implement the IIR and FIR filter using MATLAB.
USING TMS320C5X/TMS320C 67XX/ADSP 218X/219X/BS531/532/561
1. Study of various addressing modes of DSP using simple programming examples
2. Implementation of Linear and Circular Convolution
3. Sampling of input signal and display
4. Waveform generation
5. Implementation of FIR filter

USING MATLAB
1. Generation of Signals
2. Linear and circular convolution of two sequences
3. Sampling and effect of aliasing
4. Design of FIR filters
5. Design of IIR filters
6. Calculation of FFT of a signal
7. Decimation by polyphase decomposition.

TOTAL: 45 PERIODS

REQUIREMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PCs with Fixed / Floating point DSP Processors (Kit / Add-on Cards)</td>
<td>15 Units (2 students per system)</td>
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<td></td>
<td><strong>List of software required:</strong></td>
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<tr>
<td></td>
<td>MATLAB with Simulink and Signal Processing Tool Box</td>
<td>10 Users license</td>
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<tr>
<td></td>
<td>Function Generators (1MHz)</td>
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<tr>
<td></td>
<td>CRO (20MHz)</td>
<td>15</td>
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</table>

EC2307 COMMUNICATION SYSTEMS LABORATORY

1. Amplitude modulation and Demodulation.
2. Frequency Modulation and Demodulation
3. Pulse Modulation – PAM / PWM / PPM
4. Pulse Code Modulation
6. Digital Modulation & Demodulation – ASK, PSK, QPSK, FSK (Hardware & MATLAB)
8. PLL and Frequency Synthesizer
9. Line Coding
10. Error Control Coding using MATLAB.
11. Sampling & Time Division Multiplexing.
12. Frequency Division Multiplexing.

TOTAL: 45 PERIODS

REQUIREMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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<tbody>
<tr>
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<td>CRO – 20 MHz</td>
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<td>15</td>
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<tr>
<td></td>
<td>Function Generator (1 MHz)</td>
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<tr>
<td></td>
<td>Power Supply (0 - 30 Volts Variable) (IC Power supply)</td>
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<tr>
<td></td>
<td>Bread Board</td>
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<td></td>
<td>AM Transceiver Kit</td>
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<tr>
<td></td>
<td>FM Transceiver Kit</td>
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<td>PAM,PPM,PWM Trainer Kits</td>
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<td></td>
<td>PCM /DM/ ADM Trainer Kit</td>
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<td></td>
<td>Line Coding &amp; Decoding Kit</td>
<td>2</td>
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<tr>
<td></td>
<td>ASK,PSK,FSK,QPSK Trainer Kits</td>
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<tr>
<td></td>
<td>Sampling &amp; TDM trainer kit</td>
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<td>Mat lab (Communication tool box)</td>
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<td>OA79</td>
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<td>Resistors (Various ranges)</td>
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<td>Decade Inductance box</td>
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</table>

EC2308 MICROPROCESSOR AND MICROCONTROLLER LAB

1. Programs for 16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Interfacing ADC and DAC.
6. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
7. Interfacing and Programming 8279, 8259, and 8253.
8. Serial Communication between two MP Kits using 8251.
9. Interfacing and Programming of Stepper Motor and DC Motor Speed control.
11. Programming and verifying Timer, Interrupts and UART operations in 8051 microcontroller.
12. Communication between 8051 Microcontroller kit and PC.

TOTAL= 45 PERIODS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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<tbody>
<tr>
<td></td>
<td>8086 Trainer</td>
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<tr>
<td></td>
<td>8051 Trainer</td>
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<tr>
<td></td>
<td>8255 Interfacing Card</td>
<td>3 Nos.</td>
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<td></td>
<td>8279 Interfacing Card</td>
<td>3 Nos.</td>
<td></td>
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<tr>
<td></td>
<td>8259 Interfacing card</td>
<td>3 Nos.</td>
<td></td>
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<td></td>
<td>8251 Interfacing Card</td>
<td>3 Nos.</td>
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<tr>
<td></td>
<td>ADC Interfacing card</td>
<td>3 Nos.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>DAC Interfacing Card</td>
<td>3 Nos.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Stepper motor Interfacing card</td>
<td>3 Nos.</td>
<td></td>
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<tr>
<td></td>
<td>DC motor Interfacing card</td>
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REQUIREMENT FOR A BATCH OF 30 STUDENTS
Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session (Weightage 40%) 24 periods

1. English Language Lab (18 Periods)

1. Listening Comprehension: (6)
   Listening and typing – Listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. Reading Comprehension: (6)
   Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. Speaking: (6)

   Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. Discussion of audio-visual materials (Samples are available to learn and practice) 6 periods

1. Resume / Report Preparation / Letter Writing (1)
   Structuring the resume / report - Letter writing / Email Communication - Samples.

2. Presentation skills: (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples
3. **Soft Skills:**
   Time management – Articulateness – Assertiveness – Psychometrics –
   Innovation and Creativity - Stress Management & Poise - Video Samples

4. **Group Discussion:**
   Why is GD part of selection process? - Structure of GD – Moderator – led and
   other GDs - Strategies in GD – Team work - Body Language - Mock GD –Video
   samples

5. **Interview Skills:**
   Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-
   Video samples.

<table>
<thead>
<tr>
<th>II. Practice Session</th>
<th>(Weightage – 60%)</th>
<th>24 periods</th>
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</thead>
<tbody>
<tr>
<td>1. Resume / Report Preparation: Students prepare their own resume and report. (2)</td>
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<tr>
<td>2. <strong>Presentation Skills:</strong> Students make presentations on given topics. (8)</td>
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<tr>
<td>3. <strong>Group Discussion:</strong> Students participate in group discussions. (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. <strong>Interview Skills:</strong> Students participate in Mock Interviews (8)</td>
<td></td>
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</tbody>
</table>

**REFERENCES:**

**LAB REQUIREMENTS:**
1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

**GE2321 COMMUNICATION SKILLS LABORATORY**

1. A batch of 60 / 120 students is divided into two groups – one group for the PC-based session and the other group for the Class room session.
2. The English Lab (2 Periods) will be handled by a faculty member of the **English Department**. The Career Lab (2 Periods) may be handled by any competent teacher, **not necessarily from English Department**
3. **Record Notebook:** At the end of each session of English Lab, review exercises are given for the students to answer and the computer evaluated sheets are to be compiled as record notebook. Similar exercises for the career lab are to be compiled in the record notebook.
4. **Internal Assessment**: The 15 marks (the other 5 marks for attendance) allotted for the internal assessment will be based on the record notebook compiled by the candidate. 10 marks may be allotted for English Lab component and 5 marks for the Career Lab component.

5. **End semester Examination**: The end-semester examination carries 40% weightage for English Lab and 60% weightage for Career Lab.

6. Each candidate will have separate sets of questions assigned by the teacher using the teacher-console enabling PC–based evaluation for the 40% of marks allotted.

7. The Career Lab component will be evaluated for a maximum of 60% by a local examiner & an external examiner drafted from other Institutions, similar to any other lab examination conducted by Anna University.

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**MG2351 PRINCIPLES OF MANAGEMENT**

<table>
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</table>

**UNIT I OVERVIEW OF MANAGEMENT**

**UNIT II PLANNING**

**UNIT III ORGANIZING**

**UNIT IV DIRECTING**
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

**UNIT V CONTROLLING**
Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

**TOTAL = 45 PERIODS**

**TEXT BOOKS:**
REFERENCES:

EC2351 MEASUREMENTS AND INSTRUMENTATION L T P C
3 0 0 3

AIM:
To introduce the concept of measurement and the related instrumentation requirement as a vital ingredient of electronics and communication engineering.

OBJECTIVES:
To learn
- Basic measurement concepts
- Concepts of electronic measurements
- Importance of signal generators and signal analysers in measurements
- Relevance of digital instruments in measurements
- The need for data acquisition systems
- Measurement techniques in optical domains.

UNIT I BASIC MEASUREMENT CONCEPTS

UNIT II BASIC ELECTRONIC MEASUREMENTS

UNIT III SIGNAL GENERATORS AND ANALYZERS

UNIT IV DIGITAL INSTRUMENTS
UNIT V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENT


TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

EC2352 COMPUTER NETWORKS

AIM
To introduce the concept, terminologies, and technologies used in modern data communication and computer networking.

OBJECTIVES:
- To introduce the students the functions of different layers.
- To introduce IEEE standard employed in computer networking.
- To make students to get familiarized with different protocols and network components.

UNIT I PHYSICAL LAYER
Data Communications – Networks - Networks models – OSI model – Layers in OSI model – TCP / IP protocol suite – Addressing – Guided and Unguided Transmission media
Switching: Circuit switched networks – Data gram Networks – Virtual circuit networks Cable networks for Data transmission: Dialup modems – DSL – Cable TV – Cable TV for Data transfer.

UNIT II DATA LINK LAYER
Data link control: Framing – Flow and error control – Protocols for Noiseless and Noisy Channels – HDLC
Multiple access: Random access – Controlled access
UNIT III NETWORK LAYER
Logical addressing: IPv4, IPv6 addresses

UNIT IV TRANSPORT LAYER

UNIT V APPLICATION LAYER

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
1. Wayne Tomasi, “Introduction to Data Communication and Networking”, 1/e, Pearson Education.

EC2353 ANTENNAS AND WAVE PROPAGATION

AIM:
To enable the student to study the various types of antennas and wave propagation.

OBJECTIVES:
- To study radiation from a current element.
- To study antenna arrays
- To study aperture antennas
- To learn special antennas such as frequency independent and broad band antennas.
- To study radio wave propagation.
UNIT I ELECTROMAGNETIC RADIATION AND ANTENNA FUNDAMENTALS

UNIT II WIRE ANTENNAS AND ANTENNA ARRAYS
Wire antennas: Short dipole, Radiation resistance and Directivity, Half wave Dipole, Monopole, Small loop antennas. Antenna Arrays: Linear Array and Pattern Multiplication, Two-element Array, Uniform Array, Polynomial representation, Array with non-uniform Excitation-Binomial Array

UNIT III APERTURE ANTENNAS

UNIT IV SPECIAL ANTENNAS AND ANTENNA MEASUREMENTS

UNIT V RADIO WAVE PROPAGATION

TUTORIAL = 15 TOTAL =45 + 15 :60 PERIODS

TEXTBOOKS:

REFERENCES:
1. John D.Kraus, Ronald J Marhefka and Ahmad S Khan, “Antennas for all Applications”,
5. R.E.Collins, “Antenna and Radiowave propagation”,
AIM:
To introduce the technology, design concepts and testing of Very Large Scale Integrated Circuits.

OBJECTIVES:
- To learn the basic CMOS circuits.
- To learn the CMOS process technology.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing VLSI subsystems.
- To learn the concepts of modeling a digital system using Hardware Description Language.

UNIT I  CMOS TECHNOLOGY
A brief History-MOS transistor, Ideal I-V characteristics, C-V characteristics, Non ideal I-V effects, DC transfer characteristics - CMOS technologies, Layout design Rules, CMOS process enhancements, Technology related CAD issues, Manufacturing issues

UNIT II  CIRCUIT CHARACTERIZATION AND SIMULATION
Delay estimation, Logical effort and Transistor sizing, Power dissipation, Interconnect, Design margin, Reliability, Scaling- SPICE tutorial, Device models, Device characterization, Circuit characterization, Interconnect simulation

UNIT III  COMBINATIONAL AND SEQUENTIAL CIRCUIT DESIGN
Circuit families –Low power logic design – comparison of circuit families – Sequencing static circuits, circuit design of latches and flip flops, Static sequencing element methodology- sequencing dynamic circuits – synchronizers

UNIT IV  CMOS TESTING
Need for testing- Testers, Text fixtures and test programs- Logic verification- Silicon debug principles- Manufacturing test – Design for testability – Boundary scan

UNIT V  SPECIFICATION USING VERILOG HDL
Basic concepts- identifiers- gate primitives, gate delays, operators, timing controls, procedural assignments conditional statements, Data flow and RTL, structural gate level switch level modeling, Design hierarchies, Behavioral and RTL modeling, Test benches, Structural gate level description of decoder, equality detector, comparator, priority encoder, half adder, full adder, Ripple carry adder, D latch and D flip flop.

TOTAL  = 45 PERIODS

TEXT BOOKS:

REFERENCES:
4. J.Bhasker: Verilog HDL primer, BS publication,2001
EC2356  COMPUTER NETWORKS LABORATORY  L T P C  0 0 3 2

1. PC to PC Communication
2. Parallel Communication using 8 bit parallel cable
3. Serial communication using RS 232C
4. Ethernet LAN protocol
5. To create scenario and study the performance of CSMA/CD protocol through simulation
6. Token bus and token ring protocols
7. To create scenario and study the performance of token bus and token ring protocols through simulation
8. Wireless LAN protocols
9. To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
3. Implementation and study of stop and wait protocol
4. Implementation and study of Goback-N and selective repeat protocols
5. Implementation of distance vector routing algorithm
6. Implementation of Link state routing algorithm
10. Implementation of Data encryption and decryption
11. Transfer of files from PC to PC using Windows / Unix socket processing

EC2357  VLSI DESIGN LABORATORY  L T P C  0 0 3 2

1. Design Entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
2. Design Entry and simulation of sequential logic circuits (counters, PRBS generators, accumulators). Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.
3. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.
4. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt. 1. and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1. and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated at least on oscilloscopes (logic analyzer preferred).
5. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR.
6. Layout of a simple CMOS inverter, parasitic extraction and simulation.
7. Design of a 10 bit number controlled oscillator using standard cell approach, simulation followed by study of synthesis reports.
8. Automatic layout generation followed by post layout extraction and simulation of the circuit studied in Expt. No. 7

Note 1. For Expt. 1 To 4 can be carried out using Altera (Quartus) / Xilinx (Alliance) / ACTEL (Libero) tools.
Note 2. For expt. 5-8 introduce the student to basics of IC design. These have to be carried out using at least 0.5u CMOS technology libraries. The S/W tools needed Cadence / MAGMA / Tanner.
AIM
To introduce the concepts of wireless / mobile communication using cellular environment. To make the students to know about the various modulation techniques, propagation methods, coding and multi access techniques used in the mobile communication. Various wireless network systems and standards are to be introduced.

OBJECTIVES:

- It deals with the fundamental cellular radio concepts such as frequency reuse and handoff. This also demonstrates the principle of trunking efficiency and how trunking and interference issues between mobile and base stations combine to affect the overall capacity of cellular systems.
- It presents different ways to radio propagation models and predict the large – scale effects of radio propagation in many operating environment. This also covers small propagation effects such as fading, time delay spread and Doppler spread and describes how to measures and model the impact that signal bandwidth and motion have on the instantaneous received signal through the multi-path channel.
- It provides idea about analog and digital modulation techniques used in wireless communication.
- It also deals with the different types of equalization techniques and diversity concepts.. It provides an introduction to speech coding principles which have driven the development of adaptive pulse code modulation and linear predictive coding techniques.
- It deals with advanced transceiver schemes and second generation and third generation wireless networks.

UNIT I SERVICES AND TECHNICAL CHALLENGES 9
Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT II WIRELESS PROPAGATION CHANNELS 9
Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.

UNIT III WIRELESS TRANSCEIVERS 9
Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying, π/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT IV SIGNAL PROCESSING IN WIRELESS SYSTEMS 9
Principle of Diversity, Macrodiversity, Microdiversity, Signal Combining Techniques, Transmit diversity, Equalisers- Linear and Decision Feedback equalisers, Review of Channel coding and Speech coding techniques.

UNIT V ADVANCED TRANSCIEVER SCHEMES 9
Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation(GSM, IS–95) and Third Generation Wireless Networks and Standards

TOTAL : 45 PERIODS
TEXT BOOKS:

REFERENCES:

EC2402 OPTICAL COMMUNICATION AND NETWORKING
L T P C
3 0 0 3

AIM

- To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To study about various optical sources and optical detectors and their use in the optical communication system. Finally to discuss about digital transmission and its associated parameters on system performance.

OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

UNIT I INTRODUCTION


UNIT II TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS

UNIT III SOURCES AND DETECTORS  
Optical sources: Light Emitting Diodes - LED structures - surface and edge emitters, mono and hetero structures - internal - quantum efficiency, injection laser diode structures - comparison of LED and ILD.

Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise - Noise sources, Signal to Noise ratio, Detector response time.

UNIT IV FIBER OPTIC RECEIVER AND MEASUREMENTS  


UNIT V OPTICAL NETWORKS  

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

EC2403 RF AND MICROWAVE ENGINEERING

AIM:
To enable the student to become familiar with active & passive microwave devices & components used in Microwave communication systems.

OBJECTIVES:
- To study about multi- port RF networks and RF transistor amplifiers
- To study passive microwave components and their S- Parameters.
- To study Microwave semiconductor devices & applications.
- To study Microwave sources and amplifiers.
UNIT I   TWO PORT RF NETWORKS-CIRCUIT REPRESENTATION
Low frequency parameters-impedance ,admittance, hybrid and ABCD. High frequency parameters-Formulation of S parameters, properties of S parameters-Reciprocal and lossless networks, transmission matrix, Introduction to component basics, wire, resistor, capacitor and inductor, applications of RF

UNIT II   RFTRANSISTOR AMPLIFIER DESIGN AND MATCHING NETWORKS
Amplifier power relation, stability considerations, gain considerations noise figure, impedance matching networks, frequency response, T and Π matching networks, microstripline matching networks

UNIT III   MICROWAVE PASSIVE COMPONENTS
Microwave frequency range, significance of microwave frequency range - applications of microwaves. Scattering matrix -Concept of N port scattering matrix representation-Properties of S matrix- S matrix formulation of two-port junction. Microwave junctions - Tee junctions -Magic Tee - Rat race - Corners - bends and twists - Directional couplers - two hole directional couplers- Ferrites - important microwave properties and applications – Termination - Gyroscope- Isolator-Circulator - Attenuator - Phase changer – S Matrix for microwave components – Cylindrical cavity resonators.

UNIT IV   MICROWAVE SEMICONDUCTOR DEVICES
Microwave semiconductor devices- operation - characteristics and application of BJTs and FETs -Principles of tunnel diodes - Varactor and Step recovery diodes - Transferred Electron Devices -Gunn diode- Avalanche Transit time devices- IMPATT and TRAPATT devices. Parametric devices -Principles of operation - applications of parametric amplifier .Microwave monolithic integrated circuit (MMIC) - Materials and fabrication techniques

UNIT V   MICROWAVE TUBES AND MEASUREMENTS
Microwave tubes- High frequency limitations - Principle of operation of Multicavity Klystron, Reflex Klystron, Traveling Wave Tube, Magnetron. Microwave measurements: Measurement of power, wavelength, impedance, SWR, attenuation, Q and Phase shift.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
1. **Design of a 4-20 mA transmitter for a bridge type transducer.**
   Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.

2. **Design of AC/DC voltage regulator using SCR**
   Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.

3. **Design of process control timer**
   Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.

4. **Design of AM / FM modulator / demodulator**
   Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.

5. **Design of Wireless data modem.**
   Design a FSK modulator using 555/XR 2206 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565/XR 2212.

6. **PCB layout design using CAD**
   Drawing the schematic of simple electronic circuit and design of PCB layout using CAD

7. **Microcontroller based systems design**
   Design of microcontroller based system for simple applications like security systems combination lock.

8. **DSP based system design**
   Design a DSP based system for echo cancellation, using TMS/ADSP DSP kit.

9. **Psuedo-random Sequence Generator**

10. **Arithmetic Logic Unit Design**

**Note:** Kits should not be used. Instead each experiment may be given as mini project.
MICROWAVE EXPERIMENTS:
1. Reflex Klystron – Mode characteristics
2. Gunn Diode – Characteristics
3. VSWR, Frequency and Wave Length Measurement
4. Directional Coupler – Directivity and Coupling Coefficient – S – parameter measurement
5. Isolator and Circulator – S - parameter measurement
6. Attenuation and Power measurement
7. S - matrix Characterization of E-Plane T, H-Plane T and Magic T.
8. Radiation Pattern of Antennas.
9. Antenna Gain Measurement

OPTICAL EXPERIMENTS:
1. DC characteristics of LED and PIN Photo Diode.
2. Mode Characteristics of Fibers
4. Fiber Optic Analog and Digital Link
5. Numerical Aperture Determination for Fibers
6. Attenuation Measurement in Fibers

AIM
To make students to understand the applications of electronics in diagnostic and therapeutic area.

OBJECTIVES
- To study the methods of recording various biopotentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To understand the need and technique of electrical safety in Hospitals

UNIT I  ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING
The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.
UNIT II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9
PH, PO2, PCO2, PHCO3, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT III ASSIST DEVICES AND BIO-TELEMETRY 9
Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9
Ionosing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9
Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

TOTAL : 45 PERIODS

TEXT BOOK

REFERENCES

EC2022 OPERATING SYSTEMS L T P C
3 0 0 3

AIM
To have a thorough knowledge of the scheduling, memory management, I/O and File System in a Operating system. To have an introduction to distributed operating system.

OBJECTIVES
- To have an overview of components of an operating systems
- To have a thorough knowledge of Process management, Storage management, I/O and File Management.
- To have an understanding of a distributed operating systems.

UNIT I OPERATING SYSTEM OVERVIEW 9

UNIT II PROCESS MANAGEMENT 9
UNIT III MEMORY MANAGEMENT

UNIT IV DEVICE MANAGEMENT AND FILE SYSTEMS

UNIT V MODERN OPERATING SYSTEMS
Concepts of distributed operating systems – Real time operating system – Case studies: UNIX, LINUX and Windows 2000.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

EC2023 SOLID STATE ELECTRONIC DEVICES

AIM:
To have fundamental knowledge about structure and V-I characteristics of PN Junction diode, Zener diode, MOSFET, BJT, Opto electronic devices, high frequency devices and high power devices.

OBJECTIVES:
• To learn crystal structures of elements used for fabrication of semiconductor devices.
• To study energy band structure of semiconductor devices.
• To understand fermi levels, movement of charge carriers, Diffusion current and Drift current.
• To study behavior of semiconductor junction under different biasing conditions. Fabrication of different semiconductor devices, Varactor diode, Zener diode, Schottky diode, BJT, MOSFET, etc.
To study VI Characteristics of devices and ir limitations in factors like current, power frequency.
To learn photoelectric effect and fabrication of opto electronic devices.
To learn high frequency and high power devices.

UNIT I CRYSTAL PROPERTIES AND GROWTH OF SEMICONDUCTORS

UNIT II ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS AND JUNCTIONS

UNIT III METAL OXIDE SEMICONDUCTOR FET
GaAS MESFET - High Electron Mobility Transistor - Short channel Effects - Metal Insulator Semiconductor FET - Basic Operation and Fabrication - Effects of Real Surfaces - Threshold Voltage - MOS capacitance Measurements - current - Voltage Characteristics of MOS Gate Oxides - MOS Field Effect Transistor - Output characteristics - Transfer characteristics - Short channel MOSFET V-I characteristics - Control of Threshold Voltage - Substrate Bias Effects - Sub threshold characteristics - Equivalent Circuit for MOSFET - MOSFET Scaling and Hot Electron Effects - Drain - Induced Barrier Lowering - short channel and Narrow Width Effect - Gate Induced Drain Leakage.

UNIT IV OPTOELECTRONIC DEVICES

UNIT V HIGH FREQUENCY AND HIGH POWER DEVICES
Tunnel Diodes, IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode - transferred electron mechanism, formation and drift of space charge domains, p-n-p-n Diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.

TOTAL : 45 PERIODS

TEXT BOOK
REFERENCES

IT 2064 SPEECH PROCESSING L T P C 3 0 0 3

AIM
To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech analysis and speech compression

OBJECTIVES
- To introduce the models for speech production
- To develop time and frequency domain techniques for estimating speech parameters
- To introduce a predictive technique for speech compression
- To understand speech recognition, synthesis and speaker identification.

UNIT I MECHANICS OF SPEECH

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING

UNIT IV LINEAR PREDICTIVE ANALYSIS OF SPEECH
UNIT V  APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING


TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:

MA2264  NUMERICAL METHODS  L T P C
3 1 0 4

AIM:

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES:

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

I. The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.

II. When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

III. The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.

IV. Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.
UNIT I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  9

UNIT II  INTERPOLATION AND APPROXIMATION 9
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton’s forward and backward difference formulas.

UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION 9

UNIT IV  INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

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.

TEXT BOOKS

REFERENCES

L = 45   T = 15   TOTAL = 60 PERIODS
UNIT I  INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES  9

UNIT II  PARALLEL PROGRAMMING  9

UNIT III  OPENMP PROGRAMMING  9

UNIT IV  MPI PROGRAMMING  9
MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V  MULTITHREADED APPLICATION DEVELOPMENT  9
Algorithms, program development and performance tuning.

TOTAL : 45 PERIODS

TEXT BOOKS
2. Michael J Quinn, Parallel programming in C with MPI and OpenMP, Tata Mcgraw Hill, 2003.

REFERENCES
AIM
To learn the architecture and programming of advanced microprocessors.

OBJECTIVES
- To introduce the concepts of advanced microprocessors.
- To introduce the programming techniques using MASM, DOS and BIOS function calls.
- To introduce the basic architecture of Pentium family of processors.
- To introduce the architecture programming and interfacing of advanced microprocessors.
- To introduce the concepts and architecture of RISC processor.

UNIT I 80186, 80286, 80386 AND 80486 MICROPROCESSORS

UNIT II PENTIUM MICROPROCESSORS

UNIT III RISC PROCESSORS I

UNIT IV RISC PROCESSORS II(SUPERSCALAR PROCESSORS)

UNIT V PC HARDWARE OVERVIEW
Functional Units & Interconnection, New Generation Mother Boards 286 to Pentium 4 Bus Interface- ISA- EISA- VESA- PCI- PCIX. Peripheral Interfaces and Controller, Memory and I/O Port Addresses.

TOTAL : 45 PERIODS

TEXT BOOKS
REFERENCES:

EC2028 INTERNET AND JAVA

AIM
To learn the basics of Internetworking, Routing, World Wide Web, Java Programming with simple case studies.

OBJECTIVES:
- To learn Internetworking with TCP/IP.
- To learn routing for high speed multimedia traffic.
- To learn the fundamentals in WWW, HTML and XML.
- To learn Java for Networking application.
- To understand the basic concepts in E-com, Network operating system and Web design.

UNIT I INTERNETWORKING WITH TCP/IP
Review of network technologies, Internet addressing, Address resolution protocols (ARP / RARP), Routing IP datagrams, Reliable stream transport service (TCP) TCP / IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT II INTERNET ROUTING
Concepts of graph theory, Routing protocols, Distance vector protocols (RIP), Link state protocol (OSPP), Path vector protocols (BGP and IDRP), Routing for high speed multimedia traffic, Multicasting, Resource reservation (RSVP), IP switching.

UNIT III WORLD WIDE WEB
HTTP protocol, Web browsers netscape, Internet explorer, Web site and Web page design, HTML, Dynamic HTML, CGI, Java script.

UNIT IV INTRODUCTION TO JAVA
The java programming environment, Fundamental Programming structures, Objects and Classes, Inheritance, Event handling, Exceptions and Debugging, Multithreading, RMI.

UNIT V JAVA PROGRAMMING
Networking with Java, Swing: Applets and Applications, Menu’s & Tool Bars, Java and XML – Creating packages, Interfaces, JAR files & Annotations, Javabeans, JDBC.

TOTAL : 45 PERIODS
TEXT BOOKS:

REFERENCES:

EC2029 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

AIM
To introduce the student to various image processing techniques.

OBJECTIVES
• To study the image fundamentals and mathematical transforms necessary for image processing.
• To study the image enhancement techniques
• To study image restoration procedures.
• To study the image compression procedures.
• To study image segmentation and representation techniques.

UNIT I DIGITAL IMAGE FUNDAMENTALS
Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, Mach band effect, Color image fundamentals - RGB, HSI models, Image sampling, Quantization, dither, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT
Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION
UNIT IV  IMAGE SEGMENTATION  9

UNIT V  IMAGE COMPRESSION  9
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TOTAL : 45 PERIODS

TEXTBOOK

REFERENCES

EC2030    ADVANCED DIGITAL SIGNAL PROCESSING    L T P C
                      3 0 0 3

AIM
To introduce the student to advanced digital signal processing techniques.

OBJECTIVES
- To study the parametric methods for power spectrum estimation.
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- To introduce the student to wavelet transforms.

UNIT I  DISCRETE RANDOM PROCESS  9

UNIT II  SPECTRAL ESTIMATION  9
Bias and Consistency, Periodogram, Modified periodogram, Blackman-Tukey method, Welch method, Parametric methods of spectral estimation, Levinson-Durbin recursion.
UNIT III  LINEAR ESTIMATION AND PREDICTION  
Forward and Backward linear prediction, Filtering - FIR Wiener filter - Filtering and linear prediction, non-causal and causal IIR Wiener filters, Discrete Kalman filter.

UNIT IV  ADAPTIVE FILTERS  

UNIT V  ADVANCED TRANSFORM TECHNIQUES  
2-D Discrete Fourier transform and properties – Applications to image smoothing and sharpening – Continuous and Discrete wavelet transforms – Multiresolution Analysis – Application to signal compression.

TEXT BOOKS

REFERENCES

EC2031 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY  
L  T  P  C
3  0  0  3

AIM
To understand different electromagnetic interference problems occurring in Intersystem and in inter system and their possible mitigation techniques in Electronic design

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

UNIT I  BASIC CONCEPTS  
Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT II  EMI MEASUREMENTS  
Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection technique open area site, shielded anechoic chamber, TEM cell.
UNIT III  EMC STANDARD AND REGULATIONS  8

UNIT IV  EMI CONTROL METHODS AND FIXES  10
Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT V  EMC DESIGN AND INTERCONNECTION TECHNIQUES  9
Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

CS2060  HIGH SPEED NETWORKS

AIM
To highlight the features of different technologies involved in High Speed Networking and their performance.

OBJECTIVES
- Students will get an introduction about ATM and Frame relay.
- Students will be provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.
- Students will be provided with different levels of quality of service (Q.S) to different applications.

UNIT I  HIGH SPEED NETWORKS  9

UNIT II  CONGESTION AND TRAFFIC MANAGEMENT  8
UNIT III  TCP AND ATM CONGESTION CONTROL

UNIT IV  INTEGRATED AND DIFFERENTIATED SERVICES
Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V  PROTOCOLS FOR QOS SUPPORT

TOTAL : 45 PERIODS

TEXT BOOK

REFERENCES

EC2033  POWER ELECTRONICS  L T P C
3 0 0 3

AIM
Application of Electronic knowledge in industry for rectification of polyphase supply voltage and for control of motor speed and for thermal heating.

OBJECTIVES
- To study about power electronic circuits for voltage and current control and protection.
- To learn the switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- To learn controlled rectification AC supplies.
- To study of converters and inverters.
- To learn about motor control, charges, SMPS and UPS.

UNIT I  POWER ELECTRONICS DEVICES
UNIT II  TRIGGERING TECHNIQUES  9
Turn on circuits for SCR – triggering with single pulse and train of pulses – synchronizing with supply – triggering with microprocessor – forced commutation – different techniques – series and parallel operations of SCRs.

UNIT III  CONTROLLED RECTIFIERS  9

UNIT IV  INVERTERS  9
Voltage and current source inverters, resonant, Series inverter, PWM inverter. AC and DC choppers – DC to DC converters – Buck, boost and buck – boost.

UNIT V  INDUSTRIAL APPLICATIONS  9

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

EC2034  TELEVISION AND VIDEO ENGINEERING  L T P C
3 0 0 3

AIM
Television Technology has now become a vital tool to the information revolution that is sweeping across the countries of the world. The syllabus aims at a comprehensive coverage of Television Systems with all the new developments in Television Engineering

OBJECTIVES
- To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
- To study the principles of Monochrome Television Transmitter and Receiver systems.
- To study the various Color Television systems with a greater emphasis on PAL system.
- To study the advanced topics in Television systems and Video Engineering
UNIT I  FUNDAMENTALS OF TELEVISION

UNIT II  MONOCHROME TELEVISION TRANSMITTER AND RECEIVER

UNIT III  ESSENTIALS OF COLOUR TELEVISION

UNIT IV  COLOUR TELEVISION SYSTEMS

UNIT V  ADVANCED TELEVISION SYSTEMS

TOTAL = 45 PERIODS

TEXTBOOKS:

REFERENCES:
UNIT I INTRODUCTION TO NANOTECHNOLOGY

UNIT II FUNDAMENTALS OF NANOELECTRONICS

UNIT III SILICON MOSFETS & QUANTUM TRANSPORT DEVICES

UNIT IV CARBON NANOTUBES

UNIT V MOLECULAR ELECTRONICS

TOTAL: 45 PERIODS

TEXTBOOKS
1. Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons and Burkhard
UNIT I  FUZZY SET THEORY  

UNIT II  OPTIMIZATION  

UNIT III  ARTIFICIAL INTELLIGENCE  

UNIT IV  NEURO FUZZY MODELING  

UNIT V  APPLICATIONS OF COMPUTATIONAL INTELLIGENCE  

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
UNIT I  INTRODUCTION  9

UNIT II  TQM PRINCIPLES  9
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III  TQM TOOLS & TECHNIQUES I  9

UNIT IV  TQM TOOLS & TECHNIQUES II  9

UNIT V  QUALITY SYSTEMS  9

TOTAL : 45 PERIODS

TEXT BOOK

REFERENCES
AIM:
To understand the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

OBJECTIVES:
- To know the methods of conventional encryption.
- To understand the concepts of public key encryption and number theory
- To understand authentication and Hash functions.
- To know the network security tools and applications.
- To understand the system level security used.

UNIT I  INTRODUCTION

UNIT II  PUBLIC KEY CRYPTOGRAPHY

UNIT III  AUTHENTICATION AND HASH FUNCTION

UNIT IV  NETWORK SECURITY

UNIT V  SYSTEM LEVEL SECURITY

TOTAL : 45 PERIODS

TEXT BOOKS
REFERENCES:

EC2036 INFORMATION THEORY L T P C
3 0 0 3

AIM
To introduce the fundamental concepts of information theory.

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.

UNIT I QUANTITATIVE STUDY OF INFORMATION 8
Basic inequalities, Entropy, Kullback-Leibler distance, Mutual information, Bounds on entropy, Fisher information, Cramer Rao inequality, Second law of thermodynamics, Sufficient statistic, Entropy rates of a Stochastic process

UNIT II CAPACITY OF NOISELESS CHANNEL 8
Fundamental theorem for a noiseless channel, Data compression, Kraft inequality, Shannon-Fano codes, Huffman codes, Asymptotic equipartition, Rate distortion theory

UNIT III CHANNEL CAPACITY 9
Properties of channel capacity, Jointly typical sequences, Channel Coding Theorem, converse to channel coding theorem, Joint source channel coding theorem

UNIT IV DIFFERENTIAL ENTROPY AND GAUSSIAN CHANNEL 9
AEP for continuous random variables, relationship between continuous and discrete entropy, properties of differential entropy, Gaussian channel definitions, converse to coding theorem for Gaussian channel, channels with colored noise, Gaussian channels with feedback

UNIT V NETWORK INFORMATION THEORY 11
Gaussian multiple user channels, Multiple access channel, Encoding of correlated sources, Broadcast channel, Relay channel, Source coding and rate distortion with side information, General multi-terminal networks

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCE:
1. Information theory, inference & learning algorithms – David Mackay year?

EC2037 MULTIMEDIA COMPRESSION AND COMMUNICATION  L  T  P  C
3  0  0  3

AIM
To introduce the fundamental concepts of information theory.

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.

UNIT I MULTIMEDIA COMPONENTS
Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video, hardware.

UNIT II AUDIO AND VIDEO COMPRESSION

UNIT III TEXT AND IMAGE COMPRESSION
Compression principles-source encoders and destination encoders-lossless and lossy compression-entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding –Lempel ziv-welsh Compression-image compression

UNIT IV VOIP TECHNOLOGY
Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of Service- CODEC Methods-VOIP applicability

UNIT V MULTIMEDIA NETWORKING
Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia-beyond best effort service-secluding and policing Mechanisms-integrated services-differentiated Services-RSVP.

TEXT BOOKS:
REFERENCES:
1. Marcus goncalves “Voice over IP Networks”, Mcgaraw hill

EC2038 NANO ELECTRONICS

UNIT I INTRODUCTION TO NANOTECHNOLOGY

UNIT II FUNDAMENTALS OF NANO ELECTRONICS

UNIT III SILICON MOSFETS & QUANTUM TRANSPORT DEVICES
Quantum transport devices based on resonant tunneling:- Electron tunneling – resonant tunneling diodes – resonant tunneling devices; Single electron devices for logic applications:- Single electron devices – applications of single electron devices to logic circuits.

UNIT IV CARBON NANOTUBES
UNIT V  MOLECULAR ELECTRONICS


TOTAL: 45 PERIODS

TEXTBOOKS

EC2039 PARALLEL AND DISTRIBUTED PROCESSING  L T P C

3 0 0 3

AIM
To learn the concepts of parallel processing and distributed computing bringing out the differences among various architectures and systems.

OBJECTIVES
i. To introduce parallel processing and parallel architectures
II. To introduce the concepts of shared memory based and thread based implementations.
III. To learn the two modes of distributed computing using message passing and remote procedure calls.
IV To learn introductory techniques of parallel debugging, and be introduced to other parallel paradigms.
V. To introduce basic concepts of distributed data bases and distributed operating systems.

UNIT I  INTRODUCTION TO PARALLEL PROCESSING AND PARALLEL ARCHITECTURES

Need and definition of parallel processing, shared memory multiprocessing, Distributed memory, using parallelism, tools and languages, Parallelism in sequential machines, Multiprocessor architecture, Pipelining, Array processors.

UNIT II  SHARED MEMORY PROGRAMMING AND THREAD BASED IMPLEMENTATION

Shared Memory Programming and its general model, Process model under UNIX, Thread management, Example with threads, Attributes of Threads, Mutual Exclusion with threads and Thread implementation..
UNIT III  DISTRIBUTED COMPUTING – MESSAGE PASSING AND RPC MODEL
Message-passing model, General model, programming model, PVM, Remote procedure calls (RPC), Parameter passing, JAVA Remote Method Invocation, Distributed computing environment(DCE), Developing Applications in DCE.

UNIT IV  DEBUGGING PARALLEL PROGRAMS AND OTHER PARALLELISM PARADIGMS
Debugging Techniques, Debugging Message passing parallel programs and shared memory parallel programs, Dataflow computing, systolic architectures, functional and logic paradigms, distributed shared memory.

UNIT V  DISTRIBUTED DATABASES AND DISTRIBUTED OPERATING SYSTEMS
Reasons for and objectives of distributed databases, issues and systems, distribution options, concurrency control, DDBMS structure. Need for Distributed operating systems, network operating systems, distributed OS, Goals of DOS and Design issues.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

EC2041 AVIONICS

UNIT I  INTRODUCTION

UNIT II  RADIO NAVIGATION
Types of Radio Navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA. ILS, MLS

UNIT III  INERTIAL AND SATELLITE NAVIGATION SYSTEMS
Inertial sensors – Gyroscopes, Accelerometers, Inertial navigation systems – Block diagram, Platform and strap down INS. Satellite Navigation - GPS
UNIT IV  AIR DATA SYSTEMS AND AUTOPILOT  
Air data quantities – Altitude, Airspeed, Mach no., Vertical speed, Total Air temperature, Stall warning, Altitude warning. Autopilot – basic principles – longitudinal and lateral autopilot.

UNIT V  AIRCRAFT DISPLAYS  
Display technologies – LED, LCD, CRT, Flat Panel Display. Primary Flight parameter displays - Head Up Display, Helmet Mounted Display, Night vision goggles, Head Down Display, MFD, MFK, Virtual cockpit.

TEXT BOOKS  

REFERENCES  

GE2071  INTELLECTUAL PROPERTY RIGHTS (IPR)  

UNIT I  

UNIT II  

UNIT III  

UNIT IV  

UNIT V  
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL : 45 PERIODS
TEXT BOOK:

REFERENCES:

GE2025 PROFESSIONAL ETHICS IN ENGINEERING

UNIT I ENGINEERING ETHICS

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

EC2042 EMBEDDED AND REAL TIME SYSTEMS

AIM
To give sufficient background for undertaking embedded and real time systems design.

OBJECTIVES
- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To explain programming concepts and embedded programming in C and C++.
- To explain real time operating systems and inter-task communication.

UNIT I INTRODUCTION TO EMBEDDED COMPUTING
Complex systems and microprocessors – Design example: Model train controller – Embedded system design process – Formalism for system design – Instruction sets Preliminaries – ARM Processor – CPU: Programming input and output – Supervisor mode, exception and traps – Coprocessor – Memory system mechanism – CPU performance – CPU power consumption.

UNIT II COMPUTING PLATFORM AND DESIGN ANALYSIS
CPU buses – Memory devices – I/O devices – Component interfacing – Design with microprocessors – Development and Debugging – Program design – Model of programs – Assembly and Linking – Basic compilation techniques – Analysis and optimization of execution time, power, energy, program size – Program validation and testing.

UNIT III PROCESS AND OPERATING SYSTEMS

UNIT IV HARDWARE ACCELERATES & NETWORKS
Accelerators – Accelerated system design – Distributed Embedded Architecture – Networks for Embedded Systems – Network based design – Internet enabled systems.

UNIT V CASE STUDY
Hardware and software co-design - Data Compressor - Software Modem – Personal Digital Assistants – Set–Top–Box. – System-on-Silicon – FOSS Tools for embedded system development.

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCES:

EC2043 WIRELESS NETWORKS L T P C
3 0 0 3

AIM
To study some fundamental concepts in wireless networks.

OBJECTIVES
- To understand physical as wireless MAC layer alternatives techniques.
- To learn planning and operation of wireless networks.
- To study various wireless LAN and WAN concepts.
- To understand WPAN and geo-location systems.

UNIT I MULTIPLE RADIO ACCESS

UNIT II WIRELESS WANS

UNIT III WIRELESS LANS
Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, hysical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

UNIT IV ADHOC AND SENSOR NETWORKS
Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.
UNIT V WIRELESS MANS AND PANS

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

EC2044 TELECOMMUNICATION SWITCHING AND NETWORKS L T P C 3 0 0 3

AIMS
• To introduce fundamentals functions of a telecom switching office, namely, digital multiplexing, digital switching and digital subscriber access.
• To introduce a mathematical model for the analysis of telecommunication traffic.

OBJECTIVES
• To introduce the concepts of Frequency and Time division multiplexing.
• To introduce digital multiplexing and digital hierarchy namely SONET / SDH
• To introduce the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
• To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
• To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
• To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
• To characterize blocking probability holding service time distributions for in speech and data networks.

UNIT I MULTIPLEXING
UNIT II  DIGITAL SWITCHING  9
Switching Functions, Space Division Switching, Time Division Switching, two-
dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital
Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SS7
signaling.

UNIT III  NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT  9
Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements,
Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network
Synchronization, U.S. Network Synchronization, Network Control, Network
Management.

UNIT IV  DIGITAL SUBSCRIBER ACCESS  9
ISDN ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel
Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line,
VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated
Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop,
Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave

UNIT V  TRAFFIC ANALYSIS  9
Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems,
Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic,
Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TOTAL: 45 PERIODS

TEXTBOOKS

REFERENCES
Hall of India Ltd., 1994.
AIM
To enable the student to become familiar with satellites and satellite services.

OBJECTIVES
- Overview of satellite systems in relation to other terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components.
- Study of satellite access by various users.
- Study of DTH and compression standards.

UNIT I  SATELLITE ORBITS  8

UNIT II  SPACE SEGMENT AND SATELLITE LINK DESIGN  12
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  SATELLITE ACCESS:  10
Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission systems, Digital video Brocast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption

UNIT IV  EARTH SEGMENT  5
Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain.

UNIT V  SATELLITE APPLICATIONS  10
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

TEXT BOOKS:
EC2046 ADVANCED ELECTRONIC SYSTEM DESIGN  L T P C
3 0 0 3

AIM
To get knowledge about usage of electronic devices in Communication Engineering and Power supplies.

OBJECTIVES
• To study RF component such as resonator, filter, transmission lines, etc…
• To learn design of RF amplifiers using transistors.
• To study modern Power Supplies using SCR and SMPS technology
• To learn about signal shielding & grounding techniques and study of A/D and D/A Converters.
• To learn knowledge about fabrication of PCBs using CAD.

UNIT I INTRODUCTION TO RF DESIGN

UNIT II RF TRANSISTOR AMPLIFIER DESIGN
Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design \(S_{12} = 0\) – Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.
UNIT III  DESIGN OF POWER SUPPLIES  9
DC power supply design using transistors and SCRs, Design of crowbar and foldback protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT IV  DESIGN OF DATA ACQUISITION SYSTEMS  9
Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT V  DESIGN OF PRINTED CIRCUIT BOARDS  9
Introduction to technology of printed circuit boards (PCB), General lay out and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

EC2047  OPTO ELECTRONIC DEVICES  L T P C  3 0 0 3

AIM
To learn different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications.

OBJECTIVES
- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different methods of luminescence, display devices and laser types and their applications.
- To learn the principle of optical detection mechanism in different detection devices.
- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.
UNIT I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

UNIT II DISPLAY DEVICES AND LASERS 9

UNIT III OPTICAL DETECTION DEVICES 9
Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT IV OPTOELECTRONIC MODULATOR 9

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

TEXT BOOKS

REFERENCES

EC2048 TELECOMMUNICATION SYSTEM MODELING AND SIMULATION L T P C 3 0 0 3

AIM
To model the random variables and random process applied to telecommunication system and to learn the methods of system simulation and performance evaluation.

OBJECTIVES
- To learn simulation of random variables and random process
- To learn modeling of radio communication channels
- To understand various simulation techniques
- To understand simulation methodologies and performance evaluation
- To analyse some digital communication optical communication and satellite communication techniques as case studies through simulation.
UNIT I SIMULATION METHODOLOGY
Introduction, Aspects of methodology, Performance Estimation, Sampling frequency, Low pass equivalent models for bandpass signals, multicarrier signals, Non-linear and time varying systems, Post processing, Basic Graphical techniques and estimations

UNIT II SIMULATION OF RANDOM VARIABLES
RANDOM PROCESS
Generation of random numbers and sequence, Guassian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

UNIT III MODELING OF COMMUNICATION SYSTEMS
Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT IV ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION
Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT V SIMULATION AND MODELING METHODOLOGY
Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

TOTAL : 45 PERIODS

TEXTBOOK:

REFERENCES:

EC2049 RADAR AND NAVIGATIONAL AIDS L T P C
3 0 0 3

AIM
To make the student understand the principles of Radar and its use in military and civilian environment
Also to make the student familiar with navigational aids available for navigation of aircrafts and ships.
OBJECTIVES:
- To derive and discuss the Range equation and the nature of detection.
- 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
- To understand navigation of ships from shore to shore.

UNIT I  INTRODUCTION TO RADAR 9

THE RADAR EQUATION

UNIT II  MTI AND PULSE DOPPLER RADAR 9
Introduction to Doppler and MTI Radar- Delay –Line Cancelers- 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
Radar Receivers - The Radar Receiver - Receiver noise Figure - Superheterodyne Receiver - Duplexers and Receiver Protectors- Radar Displays.

UNIT IV 9
Radio Ranges - The LF/MF Four course Radio Range - VHF Omni Directional Range(VOR) - VOR Receiving Equipment - Range and Accuracy of VOR - Recent Developments.

UNIT V   DME AND TACAN
Distance Measuring Equipment - Operation of DME - TACAN - TACAN Equipment
Aids to Approach and Landing - Instrument Landing System - Ground Controlled Approach System - Microwave Landing System(MLS)
Satellite Navigation System - The Transit System - Navstar Global Positioning System (GPS)

TOTAL : 45 PERIODS

TEXTBOOKS

REFERENCES

EC2050   MOBILE ADHOC NETWORKS

UNIT I   INTRODUCTION
Introduction to adhoc networks – definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models: Indoor and out door models.

UNIT II   MEDIUM ACCESS PROTOCOLS
MAC Protocols: design issues, goals and classification. Contention based protocols- with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.

UNIT III   NETWORK PROTOCOLS

UNIT IV   END-END DELIVERY AND SECURITY
UNIT V CROSS LAYER DESIGN AND INTEGRATION OF ADHOC FOR 4G 9

Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective. Intergration of adhoc with Mobile IP networks.

TEXT BOOKS
1. C.Siva Ram Murthy and B.S.Manoj, Ad hoc Wireless Networks Architectures and protocols, 2nd edition, Pearson Education. 2007

REFERENCES
UNIT IV INFRASTRUCTURE ESTABLISHMENT

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V SENSOR NETWORK PLATFORMS AND TOOLS


TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

EC2052 REMOTE SENSING

UNIT I REMOTE SENSING

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING
UNIT IV  GEOGRAPHIC INFORMATION SYSTEM

UNIT V  MISCELLANEOUS TOPICS

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

EC2053  ENGINEERING ACOUSTICS  L T P C
3 0 0 3

AIM
This course aims at providing an overview of engineering acoustics.

OBJECTIVE
• To provide mathematical basis for acoustics waves
• To introduce the concept of radiation reception absorption and attenuation of acoustic waves.
• To present the characteristic behaviour of sound in pipes, resonators and filters.
• To introduce the properties of hearing and speech
• To describe the architecture and environmental inclusive of reverberation and noise.
• To give a detailed study on loud speakers and microphones.
UNIT I  ACOUSTICS WAVES


Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – method of images.

UNIT II  RADIATION AND RECEPTION OF ACOUSTIC WAVES

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source - radiation impedance - Fundamental properties of transducers.

Absorption and attenuation of sound
Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III  PIPES RESONATORS AND FILTERS

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmoltz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass.

Noise, Signal detection, Hearing and speech

UNIT IV  ARCHITECTURAL ACOUSTICS:

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design.

Environmental Acoustics:
Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V  TRANSDUCTION


TOTAL : 45 PERIODS

TEXT BOOK


REFERENCE

UNIT I  OPTICAL SYSTEM COMPONENTS  9
Light propagation in optical fibers – Loss & bandwidth, System limitations, Non-Linear
effects; Solitons; Optical Network Components – Couplers, Isolators & Circulators,
Multiplexers & Filters, Optical Amplifiers, Switches, Wavelength Converters.

UNIT II  OPTICAL NETWORK ARCHITECTURES  9
Introduction to Optical Networks; SONET / SDH, Metropolitan-Area Networks, Layered
Architecture ; Broadcast and Select Networks – Topologies for Broadcast Networks,
Media-Access Control Protocols, Testbeds for Broadcast & Select WDM; Wavelength
Routing Architecture.

UNIT III  WAVELENGTH ROUTING NETWORKS  9
The optical layer, Node Designs, Optical layer cost tradeoff, Routing and wavelength
assignment, Virtual topology design, Wavelength Routing Testbeds, Architectural
variations.

UNIT IV  PACKET SWITCHING AND ACCESS NETWORKS  9
Photonic Packet Switching – OTDM, Multiplexing and Demultiplexing, Synchronisation,
Broadcast OTDM networks, Switch-based networks; Access Networks – Network
Architecture overview, Future Access Networks, Optical Access Network Architectures;
and OTDM networks.

UNIT V  NETWORK DESIGN AND MANAGEMENT  9
Transmission System Engineering – System model, Power penalty - transmitter,
receiver, Optical amplifiers, crosstalk, dispersion; Wavelength stabilization ; Overall
design considerations; Control and Management – Network management functions,
Configuration management, Performance management, Fault management, Optical
safety, Service interface.

TOTAL : 45 PERIODS

TEXT BOOK
1. Rajiv Ramaswami and Kumar N. Sivarajan, “Optical Networks : A Practical

REFERENCES
1. Siva Ram Moorthy and Mohan Gurusamy, “WDM Optical Networks : Concept,